

RELATIONSHIPS THAT MATTER: MARRIAGE AND THE ROLE OF NON-MARITAL
NETWORK TIES IN PROVIDING HEALTH-BENEFITING SUPPORT AMONG THOSE IN
OLD AGE

By

Nicole Michele Lehpamer

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ABSTRACT

RELATIONSHIPS THAT MATTER: MARRIAGE AND THE ROLE OF NON-MARITAL NETWORK TIES IN PROVIDING HEALTH-BENEFITING SUPPORT AMONG THOSE IN OLD AGE

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Health scholars have extensively examined the role of social support on health, indicating that the association varies depending on which health outcomes are examined, which types of support are transmitted, and how support is transmitted across network ties. Scholars additionally highlight that marriage cultivates the best opportunities to receive health-benefiting support. Research examining gender differences in the consequences of social networks, social support, and health further indicate that the mechanisms for which social networks and social support impact health differ among men and women and throughout the life course. The associations between these constructs are of particular interest to scholars in gerontology who note that those in old age are at greatest risk for exhibiting social network turnover, health deterioration, and marital dissolution. In my three part dissertation, I use data from Waves 1 and 2 of the National Social Life, Health, and Aging Project (NSHAP) to examine how social support in the forms of emotional support and health information support, impact depression, physical health, and functional health, paying close attention to how marital and non-marital relationships help to transmit health-benefiting support, as well as whether these mechanisms differ among men and women. In paper 1, “Mechanisms Linking Network Ties, Social Support, and Changes in Health”, I examine how social network characteristics (SNCs) both directly and indirectly influence changes in health by means of social support and find that while functional health is primarily impacted by network ties, gender influences whether SNCs impact health by means of social support. In paper 2, “The Effects of Marital and Non-Marital Ties on the Transmission of

Health-Benefiting Support”, I examine social support as a form of social capital transmitted through SNCs and its impact on health among those of differing marital statuses. I find that those who are separated/divorced primarily benefit from social support transmitted across networks. In paper 3, “The Effects of Marital Quality and Non-Marital Ties on the Transmission of Health-Benefiting Support”, I examine whether marital quality moderates the association between the transmission of social support through social networks and health. My findings highlight that the consequences of marital quality on the transmission of non-marital support particularly benefit men. This study offers insight for the prevention of health deterioration during the aging process by elucidating how those in old age can capitalize on different forms of health-benefiting support transmitted throughout social networks.

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PREFACE

Health scholars have extensively examined the role of social support on health, indicating that the association varies depending on which health outcome is examined (Roe et al. 2001), which type of support is transmitted (Wong and Waite 2015), and how it is transmitted across networks (Cornwell 2009). Those with large (Schnittker 2007; Galliccio et al. 2006), diverse (Brummett et al. 2001), and dense (Fiori et al. 2006) networks characterized by frequent contact with network members (Terhell et al. 2007) have greatest odds of gaining access to social support resources (Schnittker 2007) and ultimately tend to have better physical (Berkman and Syme 1979) and mental health (York Cornwell and Waite 2009). However, research examining gender differences in the consequences of social networks, social support, and health indicate that the mechanisms for which social networks and social support impact health differ among men and women (Haines and Hurlbert 1992). As life expectancies increase, there has been a growing need to examine how social influences affect health among those who have greatest odds of exhibiting social network turnover and health declines (Cornwell 2014). Now more than ever, amid the Coronavirus-19 pandemic, those in old age are particularly vulnerable to changes in social contact and support impacting health, highlighting the importance and relevance of this research. This dissertation is broken into three sections, all which are guided by research on social networks among those in old age as well as research on gender socialization. All three sections further use data from Waves 1 and 2 of the National Social Life, Health, and Aging Project to examine how social support in the forms of emotional support and health information support impacts depression, physical health, and functional health.

Researchers have established that social support differently impacts health depending on which types of support are transmitted and which types of health outcomes are affected.

However, disagreement regarding the importance of social support in impacting health highlights the need to differentiate between the structural constraints of social networks from the functional support that they provide (Valtorta et al. 2016). As men and women further exhibit differences in social networks and the benefits of support that social networks may provide, past research indicates the need to differentiate how these mechanisms occur among men and women. In my paper, “Mechanisms Linking Network Ties, Social Support, and Changes in Health,” I thus attempt to answer a central question among those who have long been interested in understanding the association between social support and health, and more recently, those who are interested in understanding the structural network characteristics that can influence the association: how does social support function in ways impacting changes in health when embedded within the structural context of one’s social network? As such, the current research builds on former research by using longitudinal structural equation models of social network characteristics to examine both the direct effects of SNCs on health outcomes, as well as their indirect effects on health outcomes when mediated by social support. I further examine whether there are gender differences in these mechanisms.

Scholars in health and marriage agree that, relative to non-marital ties, marriage affords the strongest type of social bonds and the most opportunities to receive support benefiting health (Kalmijn 2017). For instance, some highlight that those who have experienced partner loss are less likely to exhibit emotional stressors and depression when they can alleviate gaps in support resulting from partner loss with support provided from extensive networks, including frequent exposure to relatives and friends (Hooyman and Kiyak 2015). Relative to women, men particularly benefit from support provided through marriage (Williams and Umberson 2004). Yet researchers further indicate that those who are not married, because of either separation/divorce

or widowhood, develop non-marital relationships that mitigate gaps in support access that are often afforded by marriage (Hooyman and Kiyak 2015). In my second paper, “The Effects of Marital and Non-Marital Ties on the Transmission of Health-Benefiting Support,” I examine the likelihood that the transmission of emotional support and health information support as forms of social capital, impact health differently among those of varying marital statuses and among separate populations of men and women.

Scholars in marriage and health also acknowledge that the health benefits of marriage further differ by whether individuals exhibit high levels of positive marital quality or negative marital quality (Waite 1995). Thus, while those exhibiting high levels of positive marital quality may exhibit health benefits from spousal support, those exhibiting high levels of negative marital quality have greater odds of exhibiting poor health caused by marital strain. Examining gender differences how the transmission of support impacts health is particularly a concern as women are more likely to exhibit poor mental health and poor marital quality than men (Waite 1995). In my third paper, “The Effects of Marital Quality and Non-Marital Ties on the Transmission of Health-Benefiting Support,” I examine whether those who exhibiting high levels of marital quality or low levels of marital quality experience changes in health from social support transmitted through their social networks, paying close attention to gender differences in these mechanisms.

The current research benefits those in old age by targeting interests of those concerned about those in old age within a platitude of fields. From a public health and social policy standpoint, this study offers insight for the prevention of health deterioration during the aging process by elucidating how those in old age can capitalize on different forms of health-benefiting support transmitted throughout social networks. From a practical perspective, it suggests how

caregivers can help those in old age cultivate their social networks that are most optimally beneficial for health.

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KEY TO ABBREVIATIONS

SNC	Social network characteristics
HIS	Health information support
ES	Emotional Support
LSEM	Longitudinal structural equation modeling
SEM	Structural equation modeling
NSHAP	National Social Life, Health, and Aging Project
NORC	National Opinion Research Center
ISR	Institute for Social Research
HRS	Health and Retirement Study
CES-D	The Center for Epidemiologic Studies Depression Scale
ADL	Katz Index of Independence in Activities of Daily Living
PMQ	Positive Marital Quality
NMQ	Negative Marital Quality
EFA	Exploratory Factor Analysis

PAPER 1: MECHANISMS LINKING NETWORK TIES, SOCIAL SUPPORT, AND CHANGES IN HEALTH

ABSTRACT

Social network characteristics are directly associated with health outcomes. Those with large, diverse, and dense networks characterized by frequent contact with network members, and networks composed of different types of ties have the greatest odds of gaining access to social support resources and ultimately tend to have better physical and mental health. However, the mechanisms linking these constructs are still unclear, likely in response to which types of social network characteristics, social support resources, and health outcomes have been examined. They also likely differ because of sex differences caused by gendered socialization processes, as well as limitations in opportunities to analyze the causality of these associations longitudinally over time. Using longitudinal data from the National Social Life, Health, and Aging Project (NSHAP), I examine social network constructs embedded within Structural Equation Models to investigate the mechanisms for which social network characteristics both directly and indirectly affect health outcomes—including depression, self-rated health, and functional health through various types of social net characteristics and opportunities to receive social support. Given gender differences in social network structures, preferences, and health outcomes, I further expose gender differences in these mechanisms. My findings indicate that the association between SNCs and health primarily occur indirectly. Emotional support mediates the association between SNCs and all health outcomes while HIS primarily mediates the association between SNCs and functional health. However, social support does not mediate the association between SNCs and health among women. Relative to men, women exhibit functional health benefits from direct exposure to network ties. The current research benefits those interested in understanding how to provide health benefiting support most optimally to men and women as they age.

INTRODUCTION

Sociologists have extensively examined the protective functions of social involvement (Durkheim 1897) and acknowledge that individuals' position within their social structure impacts their personal well-being (Pearlin 1989). Scholars of health and networks have already shown that those with large (Schnittker 2007; Galliccio et al. 2006), diverse (Brummett et al. 2001), and dense (Fiori et al. 2006) networks characterized by frequent contact with network members (Terhell et al. 2007) have greatest odds of gaining access to social support resources (Schnittker 2007) and ultimately tend to have better physical (Berkman and Syme 1979) and mental health (York Cornwell and Waite 2009).

A set of unresolved differences characterize the association between social support and health, depending on how each is characterized (Smith and Christakis 2008). While researchers have widely investigated the effects of social network characteristics on health outcomes longitudinally, there is little agreement on whether social network characteristics and the resources that they provide influence all health outcomes in the same way. Some have found that social support resources benefit both physical (Berkman et al. 2000) and mental health outcomes (Cornwell and Laumann 2015), while others have found that social support resources in the form of emotional support benefit only mental health and not physical health (Dupertuis et al. 2001). Research on the consequences of social support on functional health has been even more inconsistent. Some find that social support helps protect against functional impairment (Boult et al. 1994), some find that social support is directly associated with functional decline (Seeman et al. 1996), and others have failed to demonstrate any association at all (Liu et al. 1995). Thus, while SNCs (Social Network Characteristics) like size, diversity, density, and contact frequency

all impact health, further investigation is needed to understand the role that social support plays in examining the association between SNCs and various health outcomes.

Because of these differences, I examine how the structural constraints for which support is transmitted can impact multiple different health outcomes—including depression, physical health, and functional health—in attempts to target the mechanisms for which SNCs and social support can most optimally benefit each type of health outcome throughout the aging process. Exploring gender differences in these mechanisms can further elucidate potential structural and functional constraints for which social support can most optimally benefit these health outcomes among men and women. With these concerns in mind, I ask, “How do SNCs (including network size, density, composition, and contact frequency) both directly and indirectly impact changes in health outcomes when mediated by emotional and health information support?” Given potential gender differences, I further investigate how gender moderates this association.

Investigating the mechanisms linking social support and health outcomes among those in old age, including differences among men and women, allows us to engage pressing and unanswered questions regarding changes in the effects of SNCs on different health outcomes. Answering these questions not only benefits scholars interested in social networks and health but also those in social services who work with those in old age. Understanding the mechanisms linking SNCs, social support, and health outcomes can also guide policy in how to best socially engage and support those in old age in ways that most optimally benefit their health.

BACKGROUND

Structure and Function of Social Network Characteristics

Scholars have noted a growing need to examine “sociology of health, illness, and diseases” that “focuses on how social processes affect the severity or course of a disease and how, in turn, specific stages of disease affect social relationships, work, neighborhood, and family life” (Timmermans and Haas 2008:661). As such, they are concerned with how the structure and function of social relationships are associated with changes in health outcomes. Social network structure refers to the characteristics of the social network with which they are embedded and provide the context for which social engagement occurs. For example, those with large (Schnittker 2007), diverse (Brummett et al. 2001), and dense (Fiori et al. 2006) networks characterized by frequent contact with network members (Terhell et al. 2007), and networks composed of different types of ties (Antonucci and Akiyama 1987) have greatest access to social influences, attitudes, opportunities, and social support (Wellman 1983). Network function refers to the benefits and consequences of network ties on the well-being of those embedded within their social networks by means of social support and social strain (Berkman and Glass 2000). For instance, individuals exhibit healthier behaviors because access to social support resources helps to alleviate stressors that cause physiological dysregulation. (For review, see Wong and Waite 2015.) Thus, the structural characteristics of social networks provide opportunity for the exchange of any type of social support that benefits one’s well-being.

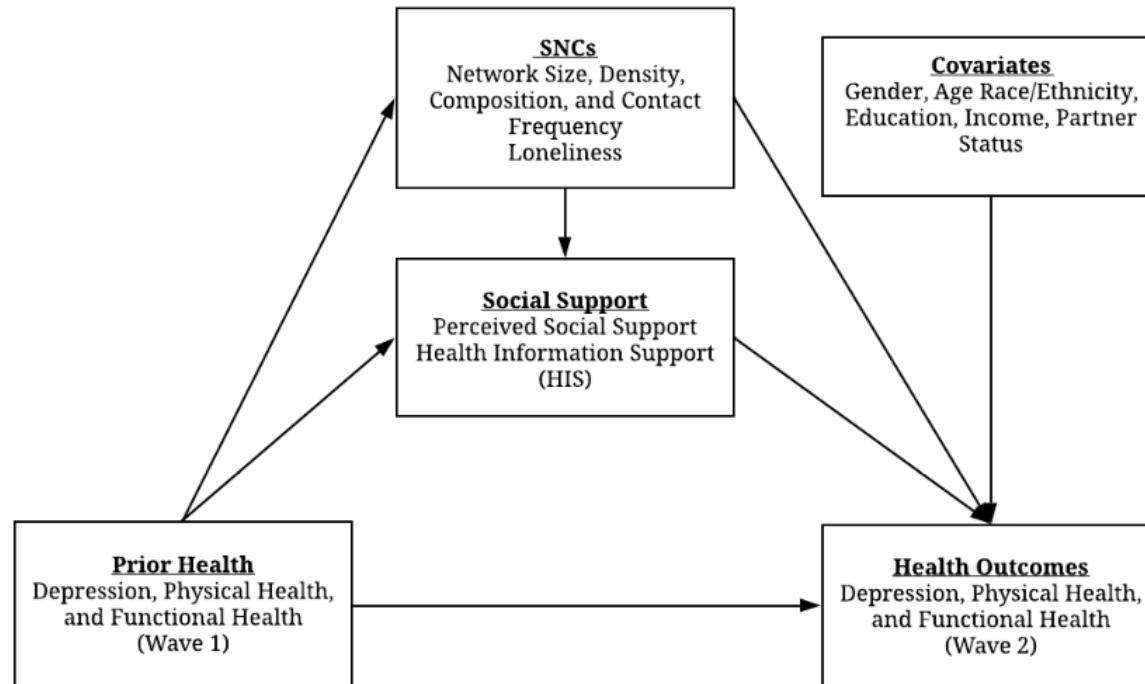
Although the structure and function of social networks have been conceptually differentiated, the empirical literature had been less clear in drawing this distinction between the benefits of both structure and functional social network characteristics. In a recent review of measurement instruments used to examine social relationships, Valtorta et al. (2016) note

research exhibit inconsistencies in how these constructs are measured and that clarity in measuring these constructs is needed to compare results across studies. As such, researchers have been unable to clarify whether structural SNCs are associated with health outcomes directly, or whether this association occurs indirectly by means of functional social support.

While researchers have extensively examined the association between SNCs and physical health and depression, it is possible that the direct and indirect effects of SNCs and support differently affect functional health. Those with poor functional health face complications maintaining social relationships different from those who exhibit other health concerns or who are healthy. For instance, those with poor functional health may require consistent daily physical support completing daily tasks like eating and dressing. Some types of support, such as helping someone go to the bathroom, are more private, suggesting that individuals may be more comfortable receiving support from specific network members (Roe et al. 2001).

I thus attempt to answer a central question among those who have long been interested in the association between social support and health, and more recently those who are interested in understanding the structural network characteristics that can influence the association: how are health outcomes and structural SNCs associated, both directly and indirectly, when mediated by the functional types of social support? As such, the current research builds on former research by using longitudinal structural equation models of SNCs to examine both the direct effects of SNCs on health outcomes and their indirect effects on health outcomes when mediated by social support. I hypothesize that the direct effects of structural SNCs and the indirect effects of structural SNCs, when mediated by support, differ by health outcome. My analysis is based on the theoretical framework depicted in Figure 1.1.

Figure 1.1. A conceptual model depicting the effects of network structure on changes in health outcomes.



Gender, Health, and Social Networks

A large body of literature has highlighted gender differences in SNCs, the support that they provide, and their effects on health. Relative to men, women tend to have social networks that are larger, more diverse, kin-centered, and offer greater opportunities for the transfer of support, while men tend to have social networks that are smaller and contain more coworkers and other distant ties, which are generally considered weaker and less likely to provide support (Cornwell 2009; Marsden 1987). However, even though men are less likely to have networks primarily comprised of kin, men with large kin-centered networks have greater odds of feeling supported (Gallicchio and Hoffman 2007) and experiencing better mental (Cable et al. 2013) and self-rated health (Booth et al. 2014), while women with kin-centered networks report higher levels of distress (Haines and Hurlbert 1992). Companionship further buffers the relationship between stress and distress among men but has no effect on women (Haines and Hurlbert 1992).

Many have theorized why these gender differences in SNCs, social support, and health outcomes occur. Those who examine socialization processes indicate that cultural context influences the likelihood that individuals seek social support resources. In attempts to maintain cultural norms, individuals who have been socialized to exhibit independence may try to resolve personal health problems on their own and avoid seeking support until the severity of their condition worsens and they can no longer exhibit independence (Taylor 2007). When applying socialization theories to social networks, Thoits (2011) argues that while social networks “equip them (or not) with resources that enhance (or inhibit) the exercise of agency,” she adds that within those networks, individuals, “are able to act (or not) in their own best interests only within social and cultural constraints that are themselves unequally distributed by social status.” For instance, in attempts to maintain cultural norms, individuals who have been socialized to exhibit

independence may try to resolve personal health problems on their own and avoid seeking support until the severity of their condition worsens and they can no longer exhibit independence (Taylor 2007).

In concordance with Thoits (2011), gender socialization may explain gender differences in the association between SNCs and health outcomes. Within the context of gender, men have particularly been socialized to value independence, highlighting how they are more likely to exhibit fatal health conditions (Case and Paxson 2005). On the other hand, women are often socialized to be submissive and act as caregivers, highlighting how women are more sensitive to familial strains than men. In support of gender socialization processes, Pullen et al. (2014) additionally suggests that women with high levels of kinship support may be less likely to seek out preventative care because they perceive their needs for health-maintaining advice are being met by kin (Salloway and Dillon 1973).

While gender socialization may help to explain gender differences in the direct and indirect associations between SNCs, social support, and health outcomes, discrepancies in the literature indicate the need to clarify their associations. First, past research was limited in its ability to identify causality in the association. This is important because gender differences in health outcomes change over time. For instance, gender differences in depression increase over time among those in old age (Mirowsky 1996). To capture these changes, I attempt to analyze the association between SNCs and health outcomes longitudinally.

Beyond methodological limitations, variations in the consequences of SNCs on different health outcomes indicate the need to examine the direct and indirect role of social support in this association. The association may differ by how health is measured. For instance, women are more likely to exhibit more chronic conditions (Case and Paxton 2005) and depression

(Mirowsky 1996) than men, in addition to experiencing less social support. As such, not only would failure to consider differences in gender and health outcomes overgeneralize the association, but it may also erroneously suggest that the associations between the constructs are insignificant. For this reason, I attempt to unmask these discrepancies by analyzing gender differences in the effects of SNCs on the health outcomes, depression, self-rated physical health, and functional health.

It is also possible that gender differences in the benefits of SNCs on health differ because of gender differences in which types of support are received from network members. Men specifically have greater odds of experiencing social support in the form of companionship and instrumental support resources (Fernandez and Sosa 2005). Because of gender differences in the effects of emotional support and instrumental support, I further analyze whether there are gender differences in the effects of emotional support and health information support (HIS) on health outcomes. Given previously established literature, I hypothesize that the transmission of social support across SNCs is more likely to benefit health among men than among women.

RESEARCH QUESTIONS

Given these concerns, the current paper addresses the following research questions:

1. Do SNCs (including network size, density, composition, and contact frequency) affect changes in health outcomes?
2. Is this relationship mediated by emotional and HIS support?
3. Are there gender differences in the relationship between SNC and health outcomes?

METHODS

To conduct this study, I use data from the National Social Life, Health, and Aging Project (NSHAP). NSHAP is a nationally representative, population-based study funded by the National Institutes of Health and conducted by the National Opinion Research Center (NORC). It was created to investigate the association between various aspects of health and social experiences. It includes extensive data regarding egocentric networks, partner history, mental and physical health, medication use, physical activity, health-related behaviors, and biomarkers across three waves of data. Given variations in data across waves, however, the current study examines only data from Waves 1 and 2. Wave 1 was collected between 2005 and 2006, and Wave 2 was collected between 2010 and 2011. Respondents were initially selected by the Institute for Social Research (ISR) for the Health and Retirement Study (HRS) using a probability design that oversampled respondents by race and ethnicity. Potential respondents for NSHAP were then selected from the surplus of respondents who did not participate in the HRS study. The NSHAP selection process further oversampled for age and gender (Cornwell et al. 2008). A total of 4,400 potential respondents between the ages of 57 and 85 were initially asked to participate in the NSHAP Study during Wave 1. Of those who were selected during Wave 1, 3,005 (75.5%) respondents completed the two-hour in-home interviews for the study. Given the length of the interviews, respondents were also asked to complete a paper questionnaire at their leisure and return it by mail. Of those who completed the two-hour in-home interview, 84% additionally completed and submitted the paper questionnaire (Cornwell et al. 2008). Of those who participated in Wave 1, 2,261 (75.2%) of respondents also participated in Wave 2. In addition to those who participated in Wave 1, Wave 2 also included some of the spouses of respondents from Wave 1 and other individuals who were asked to participate in Wave 1 but declined.

Although a total of 3,377 respondents participated in Wave 2 overall (Cornwell et al. 2014), the current study includes only those who have participated in both waves. Ultimately, the current study uses data from 1,419 respondents who participated in both waves. (For additional information regarding data collection methods, see Cornwell et al. 2009; O’Muircheartaigh et al. 2014.)

Social Network Characteristics

Data regarding individuals within each respondent’s social network were collected during each wave. Since NSHAP was interested in collecting data on the quality and types of relationships within one’s network, it asked respondents, *“Looking back over the last 12 months, who are the people with whom you most often discussed things that were important to you?”* Respondents could provide details about their relationships with five network members and could further list the number of any additional network members. Details regarding the first five network members included network characteristics and social support resources characteristics. The current study specifically addresses how changes in network density, size, composition, contact frequency between Waves 1 and Waves 2 either directly affect depression, self-rated health, and functional health.

Network size refers to the number of individuals within one’s network. In addition to the NSHAP question asking respondents to name the top five individuals within their network, respondents were asked how many additional individuals they had in their network beyond those for which respondents included network data for. Both questions were used to examine the number of individuals within one’s network. Because I’m examining changes in SNCs across waves, the current study identifies network size as the difference in the number of network

members within one's network between Waves 1 and 2. Positive values indicate network growth while negative values indicate network loss.

To examine network composition, I focus on the proportion of each type of network tie within one's network. NSHAP asked respondents to characterize the type of relationship that they have with everyone listed on the roster. NSHAP included 18 types of relationships: spouse, ex-spouse, child, stepchild, romantic/general partner, parent, parent-in-law, sibling, other relative, other in-law, neighbor, coworker or boss, minister/priest/other clergy, psychologist/psychiatrist/counselor/therapist, caseworker/social worker, housekeeper/home health care provider, or other. In the current study, network composition refers to those who belong to the following groups: kinship ties, friendship ties, and distant ties. Kin refers to those who reported network members as siblings, children, stepchildren, grandchildren, in-laws, other in-laws, parents, parent-in-laws, parents, and other types of relatives. Because this study includes an additional indicator for marital change, intimate relationship partners were not included in the variable identifying the composition of kin within one's network. Friends refer to those who reported network members as friends. Distant ties refer to ties made with network members characterized as case workers/social workers, coworkers, ex-spouses, housekeepers/home health care providers, ministers/priests/other clergy, neighbors, psychiatrists/psychologists/counselors, or any other types of network tie. The network composition group, distant ties, is identified as the comparative group at baseline.

Within NSHAP, contact frequency refers to the number of times respondents interacted with everyone listed on their roster. It is reported on an eight-point scale ranging from "every day" (8) to "less than once a year" (1).

Density refers to the likelihood that network members interact with each other. It is calculated as the proportion of all possible interactions between individuals within a respondent's network. NSHAP asked respondents to indicate the frequency for which individuals within their network interacted with other individuals within their network. Although density can be calculated as a weighted measurement accounting for contact frequency, density in the current study considers only whether network members interacted. The ties are considered directed because respondents were asked twice whether two individuals within their network interacted. For instance, respondents were asked whether network member X interacted with network member Y and whether network member Y interacted with network member X. Directed ties are calculated as the number of network ties (T) divided by the number of possible ordered pairs of interactions $N(N-1)$, as identified in Equation A. This equation also excludes interactions between respondents and each network member.

$$\text{Equation A: Directed ties} = T / (N(N - 1))$$

Social isolation can contribute to loneliness that could in turn have deleterious effects on health. For instance, the association between loneliness and depression has been found to occur bidirectionally over time (Santini et al. 2020). In both waves, NSHAP includes a series of questions targeting loneliness. On a scale ranging from 1 (hardly ever [or never]) to 3 (often), respondents were asked how often they felt that they lacked companionship, felt isolated, and felt left out. Responses to these questions were individually combined to create separate indicators for loneliness during both waves (Wave 1: Cronbach's $\alpha=.80$; Wave 2: Cronbach's $\alpha=.78$). Using these two indicators, a new indicator for loneliness was derived to capture changes in

loneliness across waves. While loneliness is not considered a structural SNC, it affects health in the same way. For instance, when SNCs are limited and respondents feel socially disconnected, both social disconnectedness and loneliness have been found to have the same effect on depression (Cornwell and Waite 2009). Given these similarities, the direct and indirect effects of loneliness on changes in health outcomes are examined using the same direct and indirect pathways as the other structural SNCs.

Social Support Resources: NSHAP provides two indicators to measure social support, one examining emotional social support, which I refer to as emotional support, and another examining health information support (HIS). To examine emotional support, respondents were asked how close they felt to close each individual within their network. Responses to the indicator for emotional support range from 1=“not very close” to 4=“very close.” To examine HIS, respondents were asked how likely they were to discuss their health concerns with everyone within their network. Responses to this indicator also ranged from 1=“not likely” to 3=“very likely.”

Health Indicators: Because health can impact how individuals engage with others within their social networks, data indicating depression, physical health, and functional health were collected during both waves and all three health outcomes examined during Wave 1 were used to predict each health outcome during Wave 2. Within both waves, respondents were asked to rate their overall self-rated physical health on a scale ranging from 1 (poor) to 5 (excellent). Responses to this question were reverse-coded such that higher values indicate poor self-rated physical health. They were also asked 11 questions derived from the Center for Epidemiologic Studies Depression Scale (CES-D) targeting the extent to which respondents exhibited 11 depressive characteristics. On a scale ranging from 1 (rarely or none of the time) to 4 (most of

the time), respondents were specifically asked how many times within the past week that they felt any of the following depressive characteristics: “sad,” “depressed,” “happy,” “disliked,” “like you enjoyed life,” “like everything was an effort,” “that you couldn’t get along,” “had a hard time getting to sleep or staying asleep,” “had trouble keeping your mind on what you were doing,” “did not feel like eating,” and “felt that others were unfriendly” (Ross and Mirowsky 1990).¹ Responses to questions addressing the extent to which respondents “were happy” and “enjoyed life” were reverse-coded such that higher responses indicate less happiness and life enjoyment, so that all questions were correlated. To address the association between SNCs and depression across time, 11 questions were averaged and combined to form indicators for depression during Wave 1 and Wave 2 (Wave 1: Cronbach’s $\alpha=.79$; Wave 2: Cronbach’s $\alpha=.85$).

The Katz Index of Independence in Activities of Daily Living (ADL) was used to examine functional health, because those with ADL limitations exhibit greater risk in impairment, hospitalization, and early mortality (Freedman and Spillman 2014). ADLs include questions addressing difficulty with personal care tasks, including bathing, such as difficulty washing or getting in or out of the shower or bathtub; eating, such as difficulty using utensils; and toileting, such as difficulty washing after voiding (Mahoney and Barthel 1965). Those with ADL limitations exhibit greater risk in impairment, hospitalization, and early mortality (Freedman and Spillman 2014). The ADL was given to respondents during both waves in the NSHAP study. Respondents were asked a set seven questions targeting mobility, including questions about their ability to get out of bed, use the bathroom, walk, bathe, and eat on their own. Responses were coded on a scale from 1 to 3, such that 1 indicated little difficulty

¹ The Center for Epidemiologic Studies Depression Scale also includes a question gauging respondent loneliness. However, loneliness is examined as a separate indicator within this study. To avoid multicollinearity among indicators, the CES-D indicator used to examine depression does not include the commonly used question addressing loneliness.

completing tasks and 3 indicated substantial difficulty completing tasks. In both waves, answers to these questions were combined to create indicators for functional health (Wave 1: Cronbach's $\alpha=.72$; Wave 2: Cronbach's $\alpha=.88$).

Covariates: Additionally, NSHAP further includes several other demographic and social engagement measures that potentially influence social network characteristics and health outcomes, including age, education attainment income, changes in partnership status, and gender. Gender, age, education attainment, race/ethnicity, income, and gender were collected from Wave 1. Gender is coded as a dichotomous variable with (1) indicating female. Age was coded as a continuous variable and centered at a mean of 68, indicating that on average, respondents were 68 years old when the study began.

Education attainment was considered as education may influence the likelihood that one is capable of understanding and complying with health care recommendations (Wellems et al. 2005). Those who are more educated are also more likely to maintain and ultimately be influenced by social networks composed of individuals who exhibit healthier behaviors (Christakis and Fowler 2007). In the current study, education attainment is categorized as whether respondents did not graduate from high school, graduated from high school, experienced some college, or graduated college, indicating that at baseline, respondents completed some college.

Race is also considered because, relative to Americans of European descent, African Americans have higher mortality rates for most of the top 15 leading causes of death, including hypertension, cancer, heart disease, and diabetes (Kung et al. 2008). Racially marginalized groups are unlikely to utilize preventative care services. Among minority women, for instance, racial discrimination and cultural mistrust shape the utilization of social support benefiting health

(Pullen et al. 2014). In the current study, race and ethnicity were categorized as Hispanic, non-Hispanic white, non-Hispanic black, and non-Hispanic indicating that at baseline, respondents are non-Hispanic white.

I controlled for socioeconomic status, as those with more socioeconomic resources have greater odds than those of low socioeconomic status to retain beneficial social ties (Schafer and Vargas 2016). However, because respondents often avoid answering survey questions pertaining to socioeconomic status, I specifically controlled for whether individuals believed that their income was less than, more than, or about equal to the average American. To account for those who refused to answer this question, I further controlled for those who did not report their emotional income bracket as “income missing.” Those who reported having an average income were coded as baseline. For further clarification, Table 1.1 indicates which variables were used from each wave of the NSHAP data.

Table 1.1. List of which variables were used from waves 1 and 2 of the NSHAP data.

Wave 1	Wave 2
Health Outcomes	
Depression, Physical Health, and Functional Health	Depression, Physical Health, and Functional Health
Support	
Emotional Support and HIS	
SNCs	
Contact Frequency, Kinship Ties, Friendship Ties, Distant Ties, Density, Network Size	
Covariates	
Gender, Education, Income, Race, Ethnicity, Age, and Loneliness	
Change in partnership status was derived using data from both waves.	

Analytical Design

I investigate the mechanisms linking social network characteristics, social support, and health longitudinally using Longitudinal Structural Equation Modeling (SEM). LSEM is used to concurrently estimate the associations between multiple latent constructs and outcomes at one time, ultimately increasing the validity and reliability of these associations.² In turn, LSEM allows for the direct identification of intra-individual (within person) change and their determinants, the direct identification of inter-individual differences in intra-individual change (between person change) and their determinants, and the analysis of interrelationships in change (Nesselroade and Baltes 1979). Within the context of this paper, LSEM allows me to concurrently investigate both the direct and indirect effects of each network characteristic and social support resource type on the three health outcomes. Regressions were used to investigate the effects of one's social support, SNCs and the various covariates on changes in depression, physical health, and functional health. Equation B. indicates a simplified version of the regression equation used to analyze how one's network characteristics influence an individual.

$$\text{Equation B: } y_{it} = \beta_1(SNC1_{it-1}) + \beta_2(SNC2_{it-1}) + \beta_3(Emotional\ Support_{it-1}) + \beta_4(HIS_{it-1}) \\ + \beta_5(Gender_i) + \beta_6(Prior\ Health_{it-1}) + \dots + \epsilon_{it}$$

In Equation B, Y_{it} represents the dependent health outcome being observed during Wave 2, β_x represents the coefficient associated with each independent variable examined during Wave

²When using SEM, researchers can consider models that include measurement error, allow measurement errors to correlate, and consider how the measurement errors influence the variables within the model (Paxton et al. 2011).

1 (t-1), and ε_{it} , represents potential error within each regression model. Each regression model controls for the effects of both types of social support, SNCs, and covariates on health.

I then analyze whether the association between social network characteristics and health outcomes varies by gender by running regressions accounting for whether gender interacts with SNCs and social support to influence each health outcome. Equation C. depicts a simplified version of a regression equation used to examine these gendered interaction effects.

$$\begin{aligned}
 \text{Equation C: } Y_{it} = & \beta_1(SNC1_{it-1}) + \beta_2(SNC2_{it-1}) + \beta_3(Emotional\ Support_{it-1}) \\
 & + \beta_4(HIS_{it-1}) + \beta_1(SNC1_{it-1}) \times \beta_5(Gender_i) \\
 & + \beta_2(SNC2_{it-1}) \times \beta_5(Gender_i) + \beta_3(Emotional\ Support_{it-1}) \times \beta_5(Gender_i) \\
 & + \beta_4(HIS_{it-1}) \times \beta_5(Gender_i) + \beta_5(Gender_i) + \beta_6(Prior\ Health_{it-1}) + \dots \\
 & + \varepsilon
 \end{aligned}$$

Equation B and C differ in that Equation C further accounts for gender related interaction effects. In Equation C, Y_{it} represents the dependent health outcome being observed during Wave 2, β_x represents the coefficient associated with each independent variable examined during Wave 1 (t-1), and ε_{it} , represents potential error within the models. However, gender is further multiplied by each β_x to indicate whether gender moderates the mechanisms for which the transmission of social support across networks impact health.

RESULTS

Descriptive Statistics

I used Longitudinal Structural Equation models to examine how social network characteristics affect changes in depression, physical health, and functional health over time, as well as how these associations may vary by gender. Each model was constructed to be fully saturated so that all variables and residuals within each model could be correlated. These models also controlled for the covariates, gender, age, race, education attainment, income, and partnership change.

Table 1.2 depicts the descriptive statistics for the various health outcomes during each wave, changes in SNCs across the two waves, and the covariates used in the models among separate populations of men and women. Respondents were primarily non-Hispanic white, believed that they earned an average income relative to their peers, and were consistently partnered across waves, though, more men remained consistently partnered than women. Most men attended college, while most women attended some college.

Changes in health outcomes also varied by gender. Both men and women exhibited low levels of depression and generally reported good physical health and functional health, which deteriorated across waves. Except for physical health during Wave 2, men were consistently less likely to be depressed and exhibit poor physical and functional health than women across waves. This is consistent with past research indicating that men generally exhibit fewer chronic conditions (Case and Paxton 2005) and less depression (Mirowsky 1996) than women.

While women were more likely to exhibit poor health than men, they exhibited stronger social network characteristics that benefit health. Although men generally had networks containing a larger proportion of kin, women exhibited larger, more dense networks with whom

they had more frequent contact. They were also more likely to feel supported and receive HHS. Despite these SNCs, women still reported feeling lonelier than men.

Table 1.2. Descriptive statistics for health outcomes during both Waves 1 and 2, changes in SNCs between Waves 1 and 2, and covariates.

	Men (0) N=681				Women (1) N=738			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Depression (W1)	1.386	0.380	1	3	1.481	0.458	1	3.455
Depression (W2)	1.384	0.412	1	3.273	1.459	0.424	1	3.273
Physical Health (W1)	2.517	1.030	1	5	2.606	1.052	1	5
Physical Health (W2)	2.722	1.066	1	5	2.696	1.042	1	5
Functional Health (W1)	1.088	0.213	1	2.857	1.132	0.257	1	2.714286
Functional Health (W2)	1.157	0.301	1	3	1.163	0.326	1	3
Emotional Support	3.062	0.569	1	4	3.148	0.503	1	4
Health Information Support (HIS)	2.510	0.517	1	3	2.632	0.429	1	3
Contact Frequency	22.762	7.744	3	49	24.064	7.327	5	46
Kinship Ties	0.632	0.340	0	1	0.548	0.337	0	1
Friendship Ties	0.226	0.306	0	1	0.297	0.314	0	1
Distant Ties	0.142	0.229	0	1	0.155	0.231	0	1
Density	0.943	0.554	0	3	0.840	0.441	0	3
Network Size	0.128	1.944	-6	8	0.093	1.707	-8	9
Loneliness	0.074	0.437	-1.333	1.667	0.046	0.468	-1.333	2
Age	-0.432	7.392	-11.011	16.989	0.096	7.365	-11.011	16.989
Non-Hispanic White (Baseline)	0.793	0.405	0	1	0.789	0.409	0	1
Non-Hispanic Black	0.095	0.294	0	1	0.119	0.324	0	1
Non-Hispanic Other	0.028	0.165	0	1	0.023	0.150	0	1
Hispanic	0.084	0.277	0	1	0.069	0.254	0	1
<High School	0.122	0.327	0	1	0.144	0.351	0	1
High School	0.239	0.427	0	1	0.272	0.445	0	1
Some College	0.288	0.453	0	1	0.364	0.482	0	1
College	0.351	0.478	0	1	0.220	0.414	0	1
<Average Income	0.242	0.429	0	1	0.317	0.466	0	1
Average Income (Baseline)	0.410	0.492	0	1	0.442	0.497	0	1
>Average Income	0.338	0.473	0	1	0.218	0.413	0	1
Income Missing	0.010	0.101	0	1	0.023	0.150	0	1
Partner Status	0.837	0.370	0	1	0.514	0.500	0	1

Correlations

Table 1.3 addresses how the various SNCs and health outcomes are correlated across waves and indicates the associations between all three health outcomes, and the various SNCs differ by health outcome and SNC type. While changes in physical health and depression remained significantly associated across waves, both health outcomes were only associated with functional health during Wave 1, likely indicating that both depression and physical health deterioration do not coincide with functional health deterioration. The SNCs also varied in whether they were directly or indirectly associated with the three health outcomes. Those who were depressed were significantly more likely to be lonely, and less likely to feel close to or have contact with network members. In Wave 2, those who exhibited poor physical health were also less likely to have contact with network members, while those who exhibited poor functional health had larger networks.

Both emotional support and HIS are associated with all types of SNCs except for networks that are primarily consist of friendship ties or distant ties. This may indicate that respondents felt more comfortable turning to their kin for support than their friends or other network ties. Loneliness was not associated with any of the SNCs.

Table 1.3. Pairwise correlations between health outcomes during both waves and changes in SNCs between waves.

	1	2	3	4	5	6	7
Depression (W1)	1						
Depression (W2)	0.567***	1					
Physical Health (W1)	0.38***	0.31***	1				
Physical Health (W2)	0.31***	0.35***	0.59***	1			
Functional Health (W1)	0.38	0.28	0.44	0.33	1		
Functional Health (W2)	0.02	0.01	0.02	0.03	0.04	1	
Emotional Support	-0.11***	-0.05*	-0.05	-0.01	-0.03	-0.02	1
Health Information Support (HIS)	-0.04	-0.03	0.01	0	0.03	-0.01	0.46***
Contact Frequency	-0.06*	-0.07**	-0.03	-0.07*	-0.02	0.05	0.09***
Kinship Ties	-0.08	-0.01	0	0.02	0	0.02	0.37***
Friendship Ties	0	0.01	-0.01	-0.03	0	-0.01	-0.27***
Distant Ties	0.07	0	0	0.01	0.01	-0.02	-0.19***
Density	-0.032	0.01	-0.02	-0.01	-0.01	0.03	0.14***
Network Size	-0.03	-0.02	0.03	-0.01	0.01	0.07*	0.09***

Table 1.3. (cont'd).

	8	9	10	11	12	13	14
Health Information Support (HIS)	1						
Contact Frequency	0.09***	1					
Kinship Ties	0.31***	0.06*	1				
Friendship Ties	-0.24***	-0.09***	-0.76***	1			
Distant Ties	-0.13***	0.03	-0.46***	-0.22***	1		
Density	0.12***	0.26***	0.28***	-0.22***	-0.11***	1	
Network Size	0.10***	0.32***	0.12***	-0.06*	-0.09***	0.58***	1

~*** p<0.001, ** p<0.005, * p<0.05

~Variables are not weighted or standardized

~W1=Wave 1; W2=Wave 2

The Direct and Indirect Effects of SNCs on Health Outcomes

I began by using SEM to analyze how SNCs affect changes in the association between depression, physical health, and functional health between Waves 1 and 2. Using Maximum likelihood estimation, the patterns highlighted in the path diagram in Figure 1.2 indicate the best model fit. (LR test of model vs. saturated: $X^2(97) = 590.87$, $\text{Prob} > X^2 = 0.0000$; RMSEA 0.060, CFI=.800). The effects of each prior health outcome during Wave 1 on the later health outcome during Wave 2 were significant, regardless of health outcome. Apart from functional health, which was affected only by prior depression ($b=.092^{***} (.022)$) and functional health ($b=.264^{***} (.041)$), all three health outcomes significantly impacted depression and physical health during Wave 2. Even when feeling emotionally supported, respondents exhibited increased odds of depression, as well as poor physical and functional health. Loneliness further increased the odds of depression and physical health deterioration.

When examining the direct effects of SNCs and social support on the three health outcomes, more SNCs significantly affected functional health than depression and physical health, as depicted in Figure 1.3. Respondents exhibited declines in functional health, regardless of support and SNCs. When controlling for HIS ($b=.083^{***} (.020)$) and emotional support from network members ($b=.115^{***} (.017)$), as well as exhibiting a higher proportion of kin ties ($b=.154^{***} (.041)$) and friendship ties ($b=.232^{***} (.010)$), respondents exhibited increased odds of functional health deterioration.

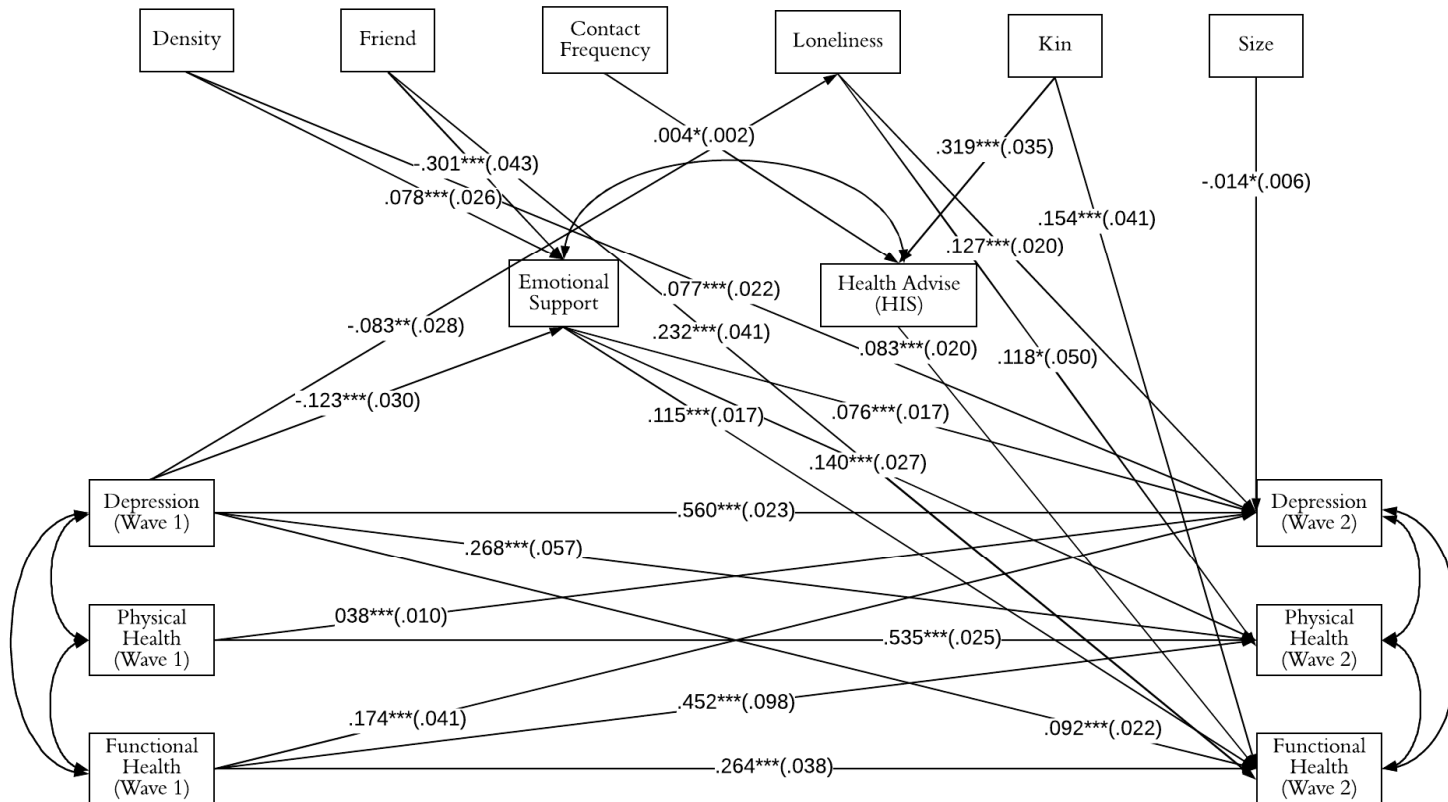
Depression was impacted by network density and size while physical health was impacted by loneliness and emotional support. The odds of exhibiting depression increased when networks were denser ($b=.077^{***} (.022)$) but decreased when networks were larger ($b=-.014^* (.006)$). While loneliness is associated with physical health deterioration ($b=.118^* (.050)$),

respondents were also more likely to exhibit health deterioration when they experienced emotional support ($b=.140^{***}$ (.027)). Thus, the consequences of loneliness on physical health may be greater than the potential benefits of emotional support.³

While most SNCs did not directly impact changes in the three health outcomes, they influenced access to both emotional support and HIS. Those who felt emotionally supported by network members were more likely to have dense networks ($b=.08^{***}$ (.026)) but felt less emotionally supported with networks primarily comprised of friends ($b=-.301^{***}$ (.043)). Respondents were more likely to report HIS if they exhibited frequent contact with network members ($b=.004^{*}$ (.002)) and networks primarily comprised of kin ($b=.319^{***}$ (.035)). The odds of receiving both types of support highlight the benefits of exhibiting close knit ties which are characteristically dense and primarily composed of kin.

³ In a model examining whether SNCs mediate changes in health outcomes, prior depression decreases the likelihood that individuals feel close to network members ($b=-.140^{***}$ (.034)) and become lonely ($b=-.084^{*}$ (.028)) (LR test of model vs. saturated: $X^2(103)=1993.31$, Prob > $X^2 = 0.0000$, RMSEA=.114); however, the fit of the model increased after no longer controlling for these moderating effects.

Figure 1.2. The direct and indirect effects of changes in SNCs on depression, physical health, and functional health between Wave 1 and Wave 2.



* Standard errors are in parenthesis

* $\chi^2(97) = 59.87$, Prob > $\chi^2 = 0.0000$

* RMSEA = .060

* CFI = .800

* Model also controls for gender, education, income, race, ethnicity, partnership change, and age.

Differences in the Association between SNCs and Health by Gender

I then used LSEM to analyze how gender moderates the direct and indirect associations between SNCs and health outcomes. Using Maximum likelihood estimation, the patterns highlighted in the path diagram in Figure 1.3 indicate the best model fit. (test of model vs. saturated: $X^2(62) = 419.21$, Prob > $X^2 = 0.0000$; RMSEA=.064; CFI=.739). While few SNCs both directly and indirectly impact health outcomes by means of social support, social support did not mediate the association between any SNCs and health outcomes when moderated by gender. Instead, the model suggests that when SNCs and support types are significantly associated with health outcomes, these associations occur directly. Additionally, while social support and loneliness mediated changes in depression within Figure 1.2, no SNCs or social support types mediated the association between changes in health outcomes when moderated by gender. Consistent with Figure 1.2, which does not control for gender moderation, prior health during Wave 1 predicts each health outcome in Wave 2. Prior depression further increases the likelihood that individuals exhibit poor physical health ($b=.341^{***}$ (.058)) and functional health ($b=.095^{***}$ (.022)), while poor functional health also predicts poor physical health ($b=.417^{**}$ (.097)).

Like the former model in Figure 1.2, functional health was more likely to be significantly affected by SNCs than depression and physical health. According to Figure 1.3, those who exhibited frequent contact with network members ($b=.007^{***}$ (.001)), experienced more direct emotional support ($b=.106^{***}$ (.015)), and had a higher proportion of kin ($b=.290^{***}$ (.050)) and friendship ties ($b=.326^{***}$ (.053)) within their network, had increased odds of exhibiting poor functional health. Relative to men, however, women exhibit functional health benefits from exhibiting networks primarily composed of kin and friends (Kinship Ties: $b= .290-.265=.025$;

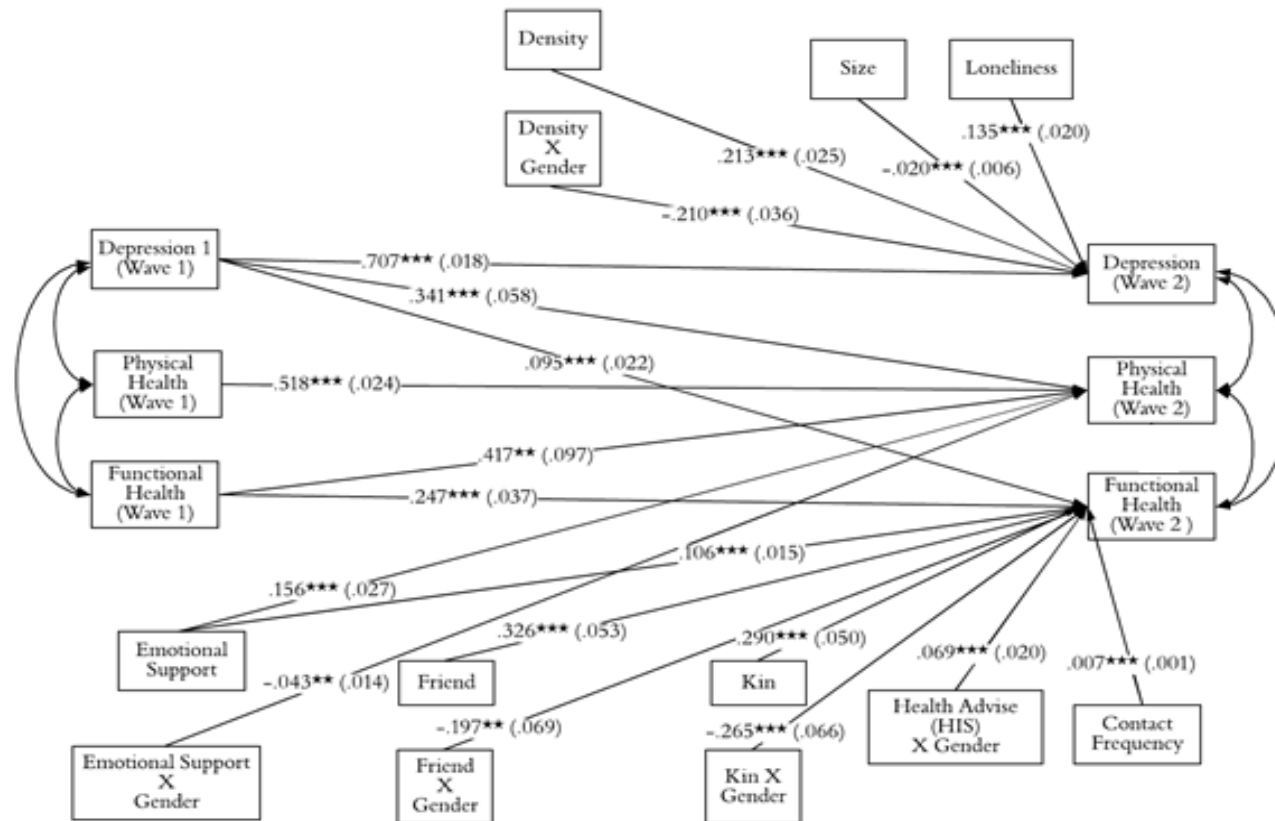
Friendship Ties: .326-.197=.129). Most notably, men were 15.72% less likely than women to exhibit functional health benefits for every 1 unit increase in having networks primarily made up of friends.⁴ These results support my second hypothesis, that SNCs differently affect changes in health outcomes among men and women, particularly among those who exhibit depression and functional health declines.

Like functional health, respondents had decreased odds of exhibiting physical health benefits from emotional support ($b=.156^{***}$ (.027)). men were specifically less likely to exhibit physical health benefits from emotional support ($b=.156-.043=.113$). For every 1 unit increase in emotional support, men were 11.96% less likely than women to exhibit physical health benefits from this support type. This is inconsistent with former research indicating that men are more likely to feel supported by network members (Fernandez and Sosa 2005) and to benefit from feeling supported (Gallicchio and Hoffman 2007). No other SNCs predicted changes in physical health.

The odds of exhibiting depression decreased if respondents had large networks ($b=-.020^{***}$ (.006)), but decreased if they exhibited dense networks ($b=.213^{***}$ (.025)) or if respondents were lonely ($b=.135^{***}$ (.020)). Unlike men, however, women were less likely to be depressed if they exhibited dense networks. ($b=.213-.210=.003$).

⁴ Percentages were calculated using Equation D: $((1-e^{\beta_1-\beta_1\beta_2}) \times 100)$ where β_1 = support type and $\beta_1\beta_2$ = the interaction between support type and gender.

Figure 1.3. The effects of changes in SNCs on depression, physical health, and functional health between Wave 1 and Wave 2 when moderated by gender.



* Standard errors are in parenthesis

* * $X^2(62) = 419.21$, Prob > $X^2 = 0.0000$

* RMSEA = .064

* CFI = .739

* Model also controls for gender, education, income, race, ethnicity, partnership change, and age.

DISCUSSION

While social support has long been argued to promote health (Pearlin 1989) the current study indicates the need to differentiate between the structural context for which social networks provide support and the function of different types of support provided. This study further highlights how the direct and indirect effects of SNCs on health differ by gender, support type, and health outcome. The current research benefits those in old age by targeting interests of those concerned about those in old age within a platitude of fields. From a public health and social policy standpoint, this study offers insight for the prevention of health deterioration in the transition to older adulthood. From a practical perspective, it suggests the need to allocate resources and expand opportunities for frequent contact with kinship and friendship ties to benefit those who are exhibiting functional health deterioration, primarily among women at greatest risk of exhibiting declines in functional health. For instance, it may be beneficial for nursing homes to promote kinship- and friendship-centered gatherings deemed socially common among women, such as those related to knitting. Perhaps this may be possible among nursing homes, which could offer more occupational therapy games that promote group involvement.

Both a social network analysis approach, as well as a gender socialization approach, emphasize the importance of context when considering the links between health and the social world. The methods used to transmit support within networks as well as the types of support transmitted are key factors that define the association between social interactions and health outcomes. Based on social network research, I hypothesized that the structural social network characteristics for which individuals interact with others within their network, differently impact health depending on which health outcomes are examined. This hypothesis is supported by my research which indicates the importance of structural SNCs on changes in all three health

outcomes. For instance, my findings elucidate the effects of structural characteristics, such as density and network size, on changes in depression. The research further indicates that relative to changes in depression and physical health, SNCs primarily impact changes in functional health.

Past research on social networks and health further highlight the need to consider how different types of support transmitted through social networks can impact health. Based on previous evidence, I hypothesized that the consequences of support on health differ by the type of support transmitted. This hypothesis was supported by my findings suggesting that while emotional support impacts all three health outcomes, functional health is further impacted by HIS. Unlike changes in depression and physical health which are primarily indirectly impacted by SNCs by means of emotional support, functional health is additionally impacted both directly by SNCs and indirectly by SNCs when mediated by HIS.

These findings highlight the need to differentiate between health outcomes and support type when examining how health is affected by social support (Valtorta et al. 2016). While scholars generally do not differentiate between physical health and functional health, the very nature of functional health as a health outcome defined by physical activity and mobility, suggests that functional health needs can differ substantially from general physical health needs. It further suggests that, in examining the effects of social support and network ties on health, scholars should differentiate between the structural characteristics of SNCs and the functional support characteristics that they can provide. Unlike physical health, for instance, merely being able to physically engage with network ties can benefit functional health, regardless of whether support is exchanged (Freedman and Spillman 2014).

Guided by research on gender differences in social networks as well as gender socialization, I hypothesized that the mechanisms for which social support and SNCs mediate

changes in health outcomes further differs by gender. While my research partially supports past research on gender differences in social networks as well as gender socialization, my findings raise more questions than they answer. While past research indicates that, relative to women, men have increased odds of exhibiting health benefits from support (Gallicchio and Hoffman 2007), my research does not suggest any gender differences in the indirect effects of SNCs on health by means of support. Instead, the data supports the importance of direct exposure to network ties on health among women. Given that women directly exhibit mental health benefits directly from exhibiting dense networks, my data reaffirms past literature highlighting the value of close network ties among women (Cornwell 2009).

Limitations

Several study limitations should be considered when interpreting my findings. Despite experiencing more emotional support across waves, it is unclear why respondents had increased odds of exhibiting declines in all three health outcomes. As with functional health, it is possible that the five-year time span between Waves 1 and 2 of the NSHAP study may have been too long or too short to fully capture whether SNCs mediate changes in their health outcomes. In support for this claim, scholars have noted that individuals experience surges in social support resources at the onset of health complications (Antonucci and Akiyama 1987).

Additionally, it is possible that the data collected from those who participated in both waves may have been biased and reflect changes in health outcomes and network characteristics among those who were healthy enough to participate in all waves. However, to mitigate any response bias in Waves 2 and 3 caused by mortality or incapacity, NSHAP attempted to

interview proxy respondents in place of those who were interviewed in the prior wave (O'Muircheartaigh et al. 2014).

CONCLUSION

A large body of literature indicates a strong link between social relationships and health (Waite, Iveniuk, and Laumann 2014). Much of this work focuses on the benefits of social support on health independent from the social network characteristics required for health-benefiting interactions to occur. Those that clarify how social support impacts health when transmitted across networks often fail to differentiate between the effects contact with network ties among networks of differing SNCs and the functional support that these contacts provide. This study builds on past literature examining the association between social support and health by differentiating between the consequences of the structural characteristics of network ties and the functional support that they provide in examining the effects of social relationships on health. It further addresses how direct and indirect effects of social networks on health differ by which health outcomes are examined and whether there are gender differences in these mechanisms. As such, it adds to previously established literature in the area of social networks and health by clarifying which social network characteristics most optimally promote the transfer of different types of social support resources impacting health a wider variety of health outcomes, as well as which types of SNCs impact health, regardless of whether support is transmitted.

PAPER 2: THE EFFECTS OF MARITAL AND NON-MARITAL TIES ON THE TRANSMISSION OF HEALTH-BENEFITING SUPPORT

ABSTRACT

Marriage, like other types of social network ties, provides access to support that acts as social capital by providing opportunities impacting health. While researchers have established that those who are married have greater access to resources benefiting health than their unmarried counterparts, they have also acknowledged that unmarried individuals develop relationships that mitigate gaps in support access that are often filled by marriage. As such, those of different marital statuses rely on a variety of network ties that can increase the odds that specific types of needed support are transferred. In attempts to explain how differences in access to social capital like support impacts health, this study uses data from Waves 1 and 2 of the National Social Life, Health, and Aging Project (NSHAP) to explore marital status differences in the mechanisms for which emotional support and Health Information Support (HIS) are transmitted through social networks and impact three health outcomes: depression, self-rated physical health, and functional health over time. Guided by research indicating gender differences in the health benefits of marriage and support transmitted through network ties (SNCs), this study further examines gender differences in these mechanisms. Findings indicate those who were formerly separated/divorced were primarily impacted by the transmission of support through SNCs, particularly when emotional support was transmitted. Data further indicates that men are more likely to exhibit health consequences resulting from the transmission of support than women, particularly when examining the transmission of support on depression. Of all SNCs examined to transmit support, living with network members most notably had little

benefit on health, regardless of health outcome. These findings support past research stressing the value of autonomy among those in old age.

INTRODUCTION

While researchers have long established the health benefits of social support, a set of unresolved differences characterize marital status differences in the consequences of support on health. Generally, marriage affords social support benefiting health. Those who are married have fewer physical health problems, are often less depressed, and tend to live longer (Carr and Springer 2010). Marriage benefits health because it provides a variety of different types of support. It increases economic resources allowing for healthier living and health care (Killewald 2013), offers its members a sense of belonging and purpose (Waite and Gallagher 2001), and helps to maintain social norms. For instance, those who are married are more likely to be held personally responsible for their health care behaviors and are less likely to engage in unhealthy behaviors like smoking and drug use (Fleming, White, and Catalano 2010). In addition to spousal support, married individuals have larger networks (Hurlbert and Acock 1990) that offer greater support than those who are not married, suggesting that the health benefits of marriage are more far-reaching than through direct spousal contact (Shapiro 2008).

Consequently, those who are separated/divorced or widowed do not benefit from support provided through marriage. During both divorce and partner loss through widowhood, unmarried individuals experience extensive life changes that cause stress, further negatively affecting both physical (e.g., Shor et al. 2012) and mental health (Sasson and Umberson 2014). Without access to direct support from partners, as well as indirect access to a spouse's network, those who are unpartnered are at a greater risk of being lonely (Warner and Adams 2012) and of engaging in

risky behaviors, in order to feel in control of their lives, ultimately catalyzing health deterioration (Hughes and Waite 2009).

Scholars known for their contributions in marriage and health literature have increasingly focused their research on those who are not married and are finding that those who are not married exhibit several mechanisms to compensate for any support that they may have experienced if married, such as developing alternative networks and relationships (Kalmijn 2017). For instance, some highlight that those who have experienced partner loss are less likely to exhibit emotional stressors and depression when they can alleviate gaps in support resulting from partner loss with support provided from extensive networks, including frequent exposure to relatives and friends (Hooyman and Kiyak 2015).

However, the mechanisms linking the transmission of support among those of varying marital statuses is more complex than what research has previously established, because the consequences of support on health differ by which types of health are affected and which types of support are provided (for more details, see paper 1). And while researchers have acknowledged that those who are not married develop different mechanisms to receive support than those who are married, those that examine marital status differences in the consequences of support on health continue to focus on depression. Research further examining the consequences of social support on other health outcomes exhibit less-consistent findings (Kalmijn 2017). Some have found that social support resources benefit both physical (Berkman and Glass 2000) and mental health outcomes (Cornwell and Laumann 2015), while others have found that social support resources in the form of emotional support benefit only mental health and not physical health (Dupertuis et al. 2001). As such, it's possible that in order to understand marital status differences in the mechanisms linking social support and health, it's necessary to uncover how

social support impacts health when social support is transferred within one's network as social capital using network analysis.

Lack of clarity in the current research examining marital status differences in the transmission of support on health is particularly concerning for scholars in gerontology, as well as health care workers, because those in old age have greater odds of experiencing life transitions accompanied by extensive network turnover and are more susceptible to declines in social capital impacting health. For instance, they have increased odds of exhibiting declines in social relationships due to death or relocation. Because of these changes, marital partners become increasingly important in maintaining a sense of social connectedness as individuals age (Hoogendoorn and Smit 2009). Thus, while the odds of exhibiting partner loss increase over the life course, so does the value and importance of marriage in maintaining social connectedness and ultimately health.

Gender differences in the consequences of marital ties and more distant social network ties on health can further play a role in how those of differing marital statuses receive health-impacting support, further indicating that gender may moderate the transmission of support through social networks on health (for review, see paper 1). Women are generally more likely to report poor marital quality, which increases the odds of exhibiting poor physical and mental health (Ross and Holmberg 1990), suggesting that married women may be more susceptible to health deterioration unless they compensate from lacking marital support by receiving support from nonmarital sources. Relative to men, however, women are more likely to engage in kinship ties even though these ties increase their odds of experiencing distress (Booth et al. 2014). As such, it is unclear how women of differing marital statuses can exhibit health benefits from receiving social capital from network members.

In response to these discrepancies, the current study uses waves 1 and 2 of the National Social Life, Health, and Aging Project (NSHAP) to examine how social capital in the form of emotional support and health information support (HIS) impacts different health outcomes over time, including depression, physical health, and functional health, further addressing whether the transmission of social capital impacting health differ by marital status. Since gender differences in the consequences of social networks on health can further play a role in how individuals receive social capital from networks, gender differences are further explored.

Understanding the mechanisms for which both emotional support and HIS are transferred and impacted by various types of health outcomes among those in old age can allow those interested in preventative health care to provide opportunities and services for those who are at greatest risk for specific types of health deterioration. By examining the consequences of the transmission of support on health outcomes among those of different marital status and gender, health care providers can better assess the social support needs of their patients and learn to tailor opportunities to meet patient needs to gain access to this type of social capital.

BACKGROUND

Support as Social Capital

Understanding the processes for which social support impacts health may best be explained when examining social support as a form of social capital. In characterizing social support, some scholars identify social capital as one type of support that can benefit health over time (Lochner et al. 1999; Portes 1998; McOrmond and Babb 2005). Social capital is the ability to receive resources from others through membership in networks and other social structures. Pierre Bourdieu, who first conceptualized the idea of social capital, specifically identified social

capital as individuals within one's network who can be used as resources to accumulate other forms of capital, such as cultural and economic capital (Bourdieu 1979, 1980; Wacquant 2000). Individuals within networks have access to social capital through social participation, which increases the odds that they have access to support like information and services. In turn, they benefit from these different types of social capital and often exhibit better health (Mohnen et al. 2011; Giordano et al. 2011; Hyypä 2010; Kawachi et al. 2008).

Yet it seems that the opportunities to receive social capital and its consequences depend on whether network members can *provide* or *facilitate* the exchange of social support resources across network ties, the characteristics that both the support provider and receiver possess, and their willingness to either provide or receive the support (Wellman and Frank 2001). First, engaging in social activities that provide opportunities for the exchange of support can depend on whether individuals are physically capable and psychologically willing to engage in these opportunities. Second, individuals may also engage in social networks that do not offer the type of support in need. For instance, although kinship ties tend to be stronger and offer more extensive social support resources, those in old age more strongly value friendship ties, because they provide social activity and emotional support while further allowing individuals to maintain their independence (Cornwell and Laumann 2011). Third, individuals may also trust different individuals within their network to provide different types of capital. Despite this, many do not have social networks with characteristics that optimally benefit health. For instance, relative to men, women are more likely to engage in kinship ties even though these ties increase their odds of experiencing distress (Booth et al. 2014). Thus, opportunities to receive social capital depend on their ability and willingness of individuals to participate in networks (Grootaert et al. 2004).

Scholars examining social capital note that while it generally benefits health, it may not impact health, depending on its availability, and can even negatively impact health under certain conditions. Receiving social capital can involve excessive demands from those who initially provide support, and access to support can restrict freedom and individual control. Receiving support within groups can also recalibrate standards of group members' achievements by redefining norms and creating boundaries for within group membership (Portes 1998). Through these interactions, the consequences of support can further negatively impact others within groups by association. For instance, while women have extensive kin ties, these ties increase the odds that women exhibit stress because gender socialization dictates that, as caregivers, women should be providing support rather than receiving it (Gove 1979). Thus, contact with network members may not promote the exchange of social capital in relationships if social bonds are unfavorable or social interactions are unappreciated.

Because individuals may not engage in relationships that most optimally provide access to social capital benefiting health, I explore whether the consequences of emotional support and HIS differently impact depression, physical health, and functional health, depending on the characteristics of the social networks providing the support. The social network constructs used to examine the transmission of support further include prior health characteristics to control whether physical or psychological barriers impact how support is transmitted.

Marital Status, Gender, and Health

The benefits of marriage align with the benefits of receiving social capital through other network contacts. Marriage helps to establish norms and attitudes that influence health behaviors, provides psychological support enhancing self-esteem, and can increase access to health care

(Kawachi and Berkman 2000). For instance, those with high levels of social capital, especially through social participation and networks, engage in healthier behaviors and feel healthier both physiologically and psychologically (Nieminen et al. 2013). Beyond opportunities to receive support from unmarried individuals, frequent contact common among married couples affords the most intimate bonds, cultivates the strongest relationship ties, and offers the most social support resources. (For review, see Smith and Christakis 2008.) The spouse plays an even more central role in the disabled older adult's social network because he or she is likely the primary caregiver (Spitze and Ward 2000). As such, I hypothesize that those who are not married are more likely to exhibit the health consequences of social support transmitted across their social networks.

Yet, it seems that, in seeking to understand the process of understanding marital status differences in the transmission of support, it is necessary to understand how gender differences in support can moderate the association between marital status and health. Gender differences in the consequences of marriage on health indicate that while married men and women appear to have better mental health than their unmarried counterparts (Mirowsky and Ross 2003), marriage enhances the health of men more than women (Williams and Umberson 2004). Additionally, while marriage increases the odds that beneficial social support resources are exchanged, husbands experience greater health benefits from the exchange of these resources (Waite and Lillard 1995). In support for these gender differences in the consequences of marriage on health, past research indicates that the adverse effects of marital dissolution on health are greater for men (Williams and Umberson 2004).

While scholars in health and marriage have shown that those who are not married develop mechanisms to gain access to support normally provided through marriage, men and

women exhibit differences in social network characteristics, which may impact the odds that they exhibit health benefits from support received through these alternative network ties. Women tend to have social networks that are larger, more diverse, and offer greater intimacy and disclosure, while men tend to have networks that emphasize sociality and instrumental support (Antonucci and Akiyama 1987). Women also tend to have networks that contain more kin, while men tend to have networks that contain more coworkers and other types of social ties that tend to be weaker (Marsden 1987).

Many have theorized why these gender differences in health outcomes occur. One argument highlights how cultural context influences the likelihood that individuals seek social support resources. In attempts to maintain cultural norms, individuals who have been socialized to exhibit independence may try to resolve personal health problems on their own and avoid seeking support until the severity of their condition worsens and they can no longer exhibit independence (Taylor 2007). Within the context of gender, men have particularly been socialized to value independence, highlighting how they are more likely to exhibit more fatal health conditions (Case and Paxson 2005). On the other hand, women are often socialized to be submissive and act as caregivers, highlighting how women are more sensitive to familial strains than men (Gove 1979) and why men are more likely to benefit from being cared for by their wives (Umberson 1992). Given gender differences in the benefits of social support and marriage, I hypothesize that non-married men are more likely to capitalize on the transmission of support within their social networks, ultimately impacting their health.

Examining how gender differences and how marital status moderate the association between the transmission of social support and health may shed light on how men and women gain access to support if marriage ends. Understanding the role that marital status plays in the

transmission of social capital can guide the development of programs aiding those who are experiencing marital status transitions.

RESEARCH QUESTIONS

Given these concerns, the current paper addresses the following research questions:

1. Does the transmission of support through SNCs impacting health differ by health type?
2. Are the effects of support transmitted through SNCs moderated by former marital status?
3. Are there gender differences in these mechanisms?

METHODS

I use data from the National Social Life, Health, and Aging Project (NSHAP). NSHAP is a nationally representative, population-based study funded by the National Institutes of Health and conducted by the National Opinion Research Center (NORC). It was created to investigate the association between various aspects of health and social experiences. It includes extensive data regarding egocentric networks, partner history, mental and physical health, medication use, physical activity, health-related behaviors, and biomarkers across three waves of data. The current study uses data from the first two waves. Wave 1 was collected between 2005 and 2006, and Wave 2 was collected between 2010 and 2011. A total of 4,400 potential respondents between the ages of 57 and 85 were initially asked to participate in the NSHAP Study during Wave 1. Of those who were selected during Wave 1, 3,005 (75.5%) respondents completed the two-hour in-home interviews for the study. Given the length of the interviews, respondents were also asked to complete a paper questionnaire at their leisure and return it by mail. Of those who completed the two-hour in-home interview, 84% additionally completed and submitted the paper

questionnaire (Cornwell et al. 2008). Of those who participated in Wave 1, 2,261 (75.2%) of respondents also participated in Wave 2. In addition to those who participated in Wave 1, Wave 2 also included some of the spouses of respondents from Wave 1 and other individuals who were asked to participate in Wave 1 but declined. A total of 3,377 respondents participated in Wave 2 overall (Cornwell et al. 2014). Although more respondents were added during Wave 2, the current study includes only those who have participated in both waves. After deleting missing cases and outliers that promoted heteroskedasticity, the current study uses data from 1,796 respondents who participated in both waves. (For additional information regarding data collection methods, see Cornwell et al. 2009; O’Muircheartaigh et al. 2014.)

Health Indicators: Because health can impact how individuals engage with others within their social networks, data indicating depression, physical health, and functional health were collected during both waves and all three health outcomes examined during Wave 1 were used to predict each health outcome during Wave 2. Within both waves, respondents were asked questions about their self-rated physical health, depressive symptoms, and functional health. Indicators for all three health outcomes from Waves 1 and 2 were used to predict health outcomes during Wave 2. Respondents were asked to rate their overall self-rated physical health on a scale ranging from 1 (poor) to 5 (excellent). Responses to this question were reverse-coded such that higher values indicate poor self-rated physical health. They were also asked 11 questions derived from the Center for Epidemiologic Studies Depression Scale (CES-D) targeting the extent to which respondents exhibited 11 depressive characteristics. On a scale ranging from 1 (rarely or none of the time) to 4 (most of the time) respondents were specifically asked how many times within the past week that they felt any of the following depressive characteristics: “sad,” “depressed,” “happy,” “disliked,” “like you enjoyed life,” “like everything

was an effort,” “that you couldn’t get along,” “had a hard time getting to sleep or staying asleep,” “had trouble keeping your mind on what you were doing,” “did not feel like eating,” and “felt that others were unfriendly” (Ross et al. 1990).⁵ Responses to questions addressing the extent to which respondents “were happy” and “enjoyed life” were reverse-coded such that higher responses indicate less happiness and life enjoyment, so that all questions were correlated. To address the association between SNCs and depression across time, 11 questions were averaged and combined to form indicators for depression during Wave 1 and Wave 2 (Wave 1: Cronbach’s $\alpha=.79$; Wave 2: Cronbach’s $\alpha=.85$).

The Katz Index of Independence in Activities of Daily Living (ADL) was used to examine functional health, because those with ADL limitations exhibit greater risk in impairment, hospitalization, and early mortality (Freedman and Spillman 2014). ADLs include questions addressing difficulty with personal care tasks, including bathing, such as difficulty washing or getting in or out of the shower or bathtub; eating, such as difficulty using utensils; and toileting, such as difficulty washing after voiding (Mahoney and Barthel 1965). Those with ADL limitations exhibit greater risk in impairment, hospitalization, and early mortality (Freedman and Spillman 2014). The ADL was given to respondents during both waves in the NSHAP study. Respondents were asked a set of seven questions targeting mobility, including questions about their ability to get out of bed, use the bathroom, walk, bathe, and eat on their own. Responses were coded on a scale from 1 to 3, such that 1 indicated little difficulty completing tasks, and 3 indicated substantial difficulty completing tasks. In both waves, answers

⁵ The Center for Epidemiologic Studies Depression Scale also includes a question gauging respondent loneliness. However, loneliness is examined as a separate indicator within this study. To avoid multicollinearity among indicators, the CES-D indicator used to examine depression does not include the commonly used question addressing loneliness.

to these questions were combined to create indicators for functional health (Wave 1: Cronbach's $\alpha=.72$; Wave 2: Cronbach's $\alpha=.88$).

Social Support Resources: In Waves 1 and 2, NSHAP provides two indicators to measure social support, one examining emotional social support, otherwise referred to as emotional support, and another examining health information support (HIS). To examine emotional support, respondents were asked how close they felt to each individual within their network. Responses to the indicator for emotional support range from 1="not very close" to 4="very close." To examine HIS, respondents were asked how likely they were to discuss their health concerns with everyone within their network. Responses to this indicator also ranged from 1="not likely" to 3="very likely." Data about types of support were collected during Wave 2.

Network Characteristics: Data regarding individuals within each respondent's social network were collected during each wave. Since NSHAP was interested in collecting data on the quality and types of relationships within one's network, it asked respondents, "*Looking back over the last 12 months, who are the people with whom you most often discussed things that were important to you?*" Respondents could provide details about their relationships with five network members and could further list the number of any additional network members. Details regarding the first five network members included network characteristics and social support resources characteristics. The current study specifically addresses how prior support transferred through current network composition, contact frequency, density, size, female contacts, and living with network members, impacts depression, self-rated health, and functional health during Wave 2.

Large networks increase the odds that network members may be able to offer support. Although respondents were asked whether they had any network members beyond those for which they provided network data, most individuals have core networks that include from three

to five individuals (Perry et al. 2018) As such, the current study defines network size as the number of individuals for which respondents provided network data.

In the current study, I focus on the proportion of each type of network tie within one's network. NSHAP asked respondents to characterize the type of relationship that they have with everyone listed on the roster. NSHAP included 18 types of relationships: spouse, ex-spouse, child, stepchild, romantic/general partner, parent, parent-in-law, sibling, other relative, other in-law, neighbor, coworker or boss, minister/priest/other clergy, psychologist/psychiatrist/counselor/therapist, caseworker/social worker, housekeeper/home health care provider, or other. In the current study, network composition refers to those who belong to the following groups: kinship ties, friendship ties, and distant ties. Kin refers to those who reported network members as spouses or intimate partners, siblings, children, stepchildren, grandchildren, parents, parent-in-laws, other in-laws, and other types of relatives. Friends refer to those who reported network members as friends. Distant ties refer to ties made with network members characterized as case workers/social workers, coworkers, ex-spouses, housekeepers/home health care providers, ministers/priests/other clergy, neighbors, psychiatrists/psychologists/counselors, or any other types of network tie.⁶

Individuals with frequent contact with network members have greater access to acquire support from network members (Munch, McPherson, and Smith-Lovin 1997). Within NSHAP, contact frequency is reported on an eight-point scale ranging from “every day” to “less than once a year.” In the current study, contact frequency is referred to as the approximate number of days that an individual spends with an alter each year. For example, if an individual spends every day with a network member, the network member's response score is coded as 365. I then calculated

⁶ Individuals can generally provide accurate data about their spouses, children, siblings, and friends but generally provide less accurate data about weaker ties, including other types of kin and neighbors (Reysen et al. 2014).

the sum of these scores across network members to obtain a measure of overall contact frequency with network members.

Density refers to the likelihood that network members interact with each other. Dense networks offer individuals the opportunity to receive support either directly or indirectly through network members that may have access to information from others within your network (Kazak and Marvin 1984). Networks with high density are characterized by close-knit ties to homogenous network members, which help to foster social norms and cooperation (Lakon et al. 2008). However, networks with low density have been found to provide diverse types of support, like coping strategies, which help to foster resilience in the face of adversity (Wilcox 1981). Density is calculated as the proportion of all possible interactions between individuals within a respondent's network. NSHAP asked respondents to indicate the frequency for which individuals within their network interacted with other individuals within their network. Although density can be calculated as a weighted measurement accounting for contact frequency, density in the current study considers only whether network members interacted. The ties are considered directed because respondents were asked twice whether two individuals within their network interacted (Perry et al. 2018). For instance, respondents were asked whether network member X interacted with network member Y and whether network member Y interacted with network member X. Directed ties are calculated as the number of network ties (T) divided by the number of possible ordered pairs of interactions $N(N-1)$, as identified in Equation A. This equation also excludes interactions between respondents and each network member.

$$\text{Equation A: Directed ties} = \frac{T}{N(N-1)}$$

Living with network members allows for greater contact frequency and greater opportunity to receive support. For instance, those who have poor functional health may benefit from living with network members for help with day-to-day tasks. Within the NSHAP data, respondents were asked whether they lived with any of the individuals for whom they provided network data. In the current study, I focus on the proportion of one's network that contains contacts with whom respondents live and is identified as the variable *lives with contacts*.

Individuals with networks containing many female contacts may have greater odds of receiving support, because women have been socialized to provide support (Antonucci and Akiyama 1987.). Like the variable, *lives with contacts*, respondents were asked which respondents within their network were female. This data was used to create the variable "female contacts," which indicates the proportion of females within one's network.

Covariates: Additionally, NSHAP further includes several other demographic and social engagement measures that potentially influence social network characteristics and health outcomes, including gender, age, education attainment, race/ethnicity, income, and prior loneliness. All these variables were collected from Wave 1. Gender is coded as a dichotomous variable with (1) indicating female. Age was coded as a continuous variable and centered at a mean of 68, indicating that on average, respondents were 68 years old when the study began. Education attainment was considered, as education may influence the likelihood that one is capable of understanding and complying with health care recommendations (Wellems et al. 2005). Those who are more educated are also more likely to maintain and ultimately be influenced by social networks composed of individuals who exhibit healthier behaviors (Christakis and Fowler 2007). In the current study, education attainment is categorized as whether respondents did not graduate from high school, graduated from high school, experienced

some college, or graduated college, indicating that at baseline, respondents completed some college.

Race is also considered because, relative to Americans of European descent, African Americans have higher mortality rates for most of the top 15 leading causes of death, including hypertension, cancer, heart disease, and diabetes (Kung et al. 2008). Racially marginalized groups are unlikely to utilize preventative care services. Among minority women, for instance, racial discrimination and cultural mistrust shape the utilization of social support benefiting health (Pullen et al. 2014). In the current study, race and ethnicity were categorized as Hispanic, non-Hispanic white, non-Hispanic black, and non-Hispanic, indicating that at baseline, respondents are non-Hispanic white.

I controlled for socioeconomic status, as those with more socioeconomic resources have greater odds than those of low socioeconomic status to retain beneficial social ties (Schafer and Vargas 2016). However, because respondents often avoid answering survey questions pertaining to socioeconomic status, I controlled for whether individuals believed that their income was less than, more than, or about equal to the average American. To account for those who refused to answer this question, I further controlled for those who did not report their emotional income bracket as “income missing.” Those who reported having an average income were coded as baseline.

Last, I control for loneliness, which has been found to have deleterious effects on health. For instance, the association between loneliness and depression has been found to occur bidirectionally over time (Santini et al. 2020). Three questions from Wave 1 were used to create an indicator for loneliness. On a scale ranging from 1 (hardly ever [or never]) to 3 (often), respondents were asked how often they felt that they lacked companionship, felt isolated, and felt

left out. Responses to these questions were combined to create a single indicator for prior loneliness (Wave 1: Cronbach's $\alpha=.78$).

Because the current study examines whether prior marital status moderates the transmission of social support on health, data for marital status was collected during Waves 1 and 2. During Wave 1, marital status is categorized as married, separated/divorced, and widowed. I then compared these marital status categorical variables to the same variables during Wave 2 and calculated whether respondents exhibited any changes in marital status across waves. Marital status change is coded as a dummy variable, where 1 indicates that marital status change occurred between waves. For further clarification, Table 2.1 indicates which variables were used from each wave of the NSHAP data.

Table 2.1. List of which variables were used from waves 1 and 2 of the NSHAP data.

Wave 1	Wave 2
Health Outcomes	
Depression, Physical Health, and Functional Health	Depression, Physical Health, and Functional Health
Support	
Emotional Support and HIS	
SNCs	
Contact Frequency, Kinship Ties, Friendship Ties, Distant Ties, Density, Network Size, Lives with Contacts, Female Contacts	
Covariates	
Gender, Education, Income, Race, Ethnicity, Age, and Marital Status, and Loneliness	
Change in marital status was derived using data from both waves.	

Analytical Design

The benefits of social capital, such as social support, depend on its availability. For instance, social support can be diffused only if network members i' are able to provide support, and if an individual's network exhibits characteristics that allow for its exchange (Frank et al. 2004). Thus, access to support can be examined using network influence equations, such as Equation E.

Equation E: *Access to Support*

$$= \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (Support_{i't-1}) + \beta_1(Prior\ Health_{it-1}) + \dots + \varepsilon_{it}$$

Using Equation E., I indicate the extent to which an individual i reports at Time 2 ($t-1$) that they received support from i' , each individual within individual i 's network. For instance, if James has a network of three members, including Tina, Mike, and Mary, then the amount of emotional support transmitted to James can be calculated as the sum amount of exposure he has had to each contact member. Exposure is calculated by multiplying the amount of contact that James has had with each network member by the amount of support he has received by each. After calculating how much exposure James has had to each network member, all exposure terms are added to calculate how much support has been transmitted. For instance, if James reported that he felt extremely supported by Tina (4= very close) with whom he saw 365 days a year, didn't feel very supported by Mike (1=not very close) with whom he saw once a week (52 days a year), and didn't feel very supported by Mary (1=not very close) with whom he saw once a month (12 days a year), then then the amount of emotional support transmitted to James would

value 1,524 ((365*4) + (52*1) + (12*1)=1, 524.) , 52. +1+1)=2,574). Because prior health can impact access to support, Equation E. further controls for prior health (β_1).

The variables created to indicate the transmission of support using Equation F. were then embedded within lagged regression models containing all other independent variables to examine how network characteristics transmit emotional support and HIS in ways which impact depression, physical health, and functional health across both waves of data (Marsden and Friedkin 1994). Each regression model specifically addresses how the transmission of a single type of support, such as emotional support, is transmitted across networks to influence a specific health outcome. Equation F. is a simplified version of the regression equation used for analysis.

Equation F: *Health Outcome*

$$= \rho \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (Support_{i't-1}) + \beta_1 (Prior\ Health_{t-1}) \\ + \beta_2 (Marital\ Status_{it-1}) + \dots + \varepsilon_{it}$$

In Equation F, Y_{it} represents the dependent health outcome being observed during Wave 2, β_x represents the coefficient associated with each independent variable examined during Wave 1 (t-1), and ε_{it} , represents potential error within each regression model. Each regression model controls for the effects of either emotional support or HIS through the various types of SNCs for which support is transmitted, and the various covariates.

I further examine whether the transmission of each type of support through SNCs, interacts with marital status to impact depression, physical health, and functional health. Equation G. depicts a simplified version of a regression equation used to examine these marital status interaction effects.

Equation G: *Health Outcome*

$$\begin{aligned}
&= \rho \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (Support_{i't-1}) + \beta_1(Prior\ Health_{t-1}) \\
&+ \beta_2(Marital\ Status_{it-1}) \\
&+ \beta_3(Marital\ Status_{it-1}) \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (Support_{i't-1}) \\
&+ \beta_3 X(Prior\ Health_{it-1}) + \dots + \varepsilon_{it}
\end{aligned}$$

Equation E and F differ in that E further accounts for the interaction effects of marital status. Within Equation F, Y_{it} represents the dependent health outcome being observed during Wave 2, β_x represents the coefficient associated with each independent variable examined during Wave 1 (t-1), and ε_{it} , represents potential error within the models. However, marital status is further multiplied by each variable indicating the transmission of support through SNC to indicate whether marital status moderates the mechanisms for which the transmission of social support across networks impact health.

Last, I examined whether there were gender differences in how the transmission of social support through SNCs impact each health outcome by examining data from each gender separately and comparing results across groups. I considered whether group differences in results were statistically significant using Konfoundit! to perform X^2 analysis and the Wald test (Frank 2014).⁷

⁷ The Konfound it! Program cites Cohen and Cohen (1983) in programming calculations to compare independent beta coefficients across groups.

RESULTS

Descriptive Statistics

I first examined the descriptive statistics for each variable used. Table 2.2 compares marital differences in health outcomes, SNCs, and covariates. Of the 1,796 respondents, most respondents during both waves were married (Married: N=1, 212 (W1); N=1,103 (W2)) and fewer respondents were separated/divorced than widowed during both waves (Separated/divorced: N=205 (W1), N=197 (W2); Widowed: N=323 (W1), N=440 (W2)). Regardless of marital status, respondents reported worse physical health than functional health and depression. Most respondents were non-Hispanic white; however, average descriptive statistics for all over covariables differed by marital status. Among those who were married, respondents on average reported to be non-Hispanic white, with some college or a college degree, an average or above average income, and married during Wave 2. Respondents who were widowed were more likely to be non-Hispanic black or another race, and to have completed high school. Respondents who were widowed had the greatest odds of being Hispanic, to have received less than a high school education, and to have a below average income.

On average, those who were widowed were most likely to exhibit depression and poor physical and functional health, followed by those who were separated/divorced and married. These trends were consistent regardless of wave. Changes in average health outcomes were similar among those who were married or widowed. Relative to those who were separated/divorced who on average exhibited more depression, poorer functional health, and better physical health, those who were married or widowed became less depressed but exhibited declines in both physical and functional health.

Married respondents were most likely to receive support, followed by those who were widowed. Relative to those who were separated/divorced, those who were married or widowed were also more likely to receive both emotional support and HIS through the same SNCs. Those who were married were more likely to feel emotionally supported, receive emotional support through kinship ties, contact with network members, large and dense networks, and living with contacts. Like emotional support, those who were married were also most likely to receive HIS both directly and indirectly through kinship ties, frequent contact with network members, large and dense networks, and living with contacts and were additionally more likely to receive HIS through friendship ties. Those who were widowed were the second most likely to receive support using these SNCs and were additionally most likely to receive both types of support through distant ties, and to receive HIS through female contacts. Except for having the greatest odds of receiving emotional support through friendship ties and female contacts, those who were separated/divorced were less likely than both those who are married or widowed to receive all other types of support.

Table 2.2. Descriptive statistics for the variables used to examine the transmission of support impacting health. Variables indicate which wave of NSHAP was used to collect the data. Results are grouped by marital status.

	Married (N=1,212)				Separated/Divorced (N=205)				Widowed (N=323)			
	Mean	S.D	Min	Max	Mean	S.D	Min	Max	Mean	S.D	Min	Max
Depression (W1)	1.40	0.41	1.00	3.64	1.56	0.53	1.00	3.46	1.57	0.48	1.00	3.36
Depression (W2)	1.40	0.39	1.00	3.27	1.58	0.54	1.00	3.27	1.55	0.47	1.00	3.46
Physical Health (W1)	2.53	1.02	1.00	5.00	2.72	1.24	1.00	5.00	2.72	1.09	1.00	5.00
Physical Health (W2)	2.66	1.08	1.00	5.00	2.71	1.18	1.00	5.00	2.89	1.01	1.00	5.00
Functional Health (W1)	1.11	0.25	1.00	2.71	1.14	0.30	1.00	2.86	1.14	0.27	1.00	2.71
Functional Health (W2)	1.14	0.29	1.00	3.00	1.16	0.31	1.00	2.71	1.20	0.35	1.00	3.00
Emotional Support	2.95	0.61	0.00	4.00	2.83	0.60	0.43	4.00	2.86	0.61	0.00	4.00
Health Information Support (HIS)	2.53	0.42	1.00	3.00	2.41	0.50	1.00	3.00	2.47	0.46	0.83	3.00
Emotional Support through...												
Kinship Ties	15.51	5.31	3.14	52.00	12.65	5.62	3.00	41.27	14.09	6.12	3.09	41.64
Friendship Ties	8.45	4.32	3.00	41.36	10.55	4.96	3.00	41.27	9.46	4.99	3.00	41.66
Distant Ties	7.03	3.42	3.00	27.18	7.79	3.52	3.00	20.18	7.82	3.25	3.00	22.29
Contact Frequency	3061.19	1627.56	4.61	18827.00	2296.54	1385.09	78.00	12541.27	2737.76	1775.85	3.09	12541.64
Female Contacts	14.04	5.06	3.00	51.00	16.00	5.59	3.36	41.27	15.84	5.52	3.09	41.64
Living with Contacts	9.02	3.39	3.00	31.14	6.36	2.79	3.00	18.47	6.63	2.93	3.00	23.51
Network Density	53.35	70.19	3.00	696.84	63.09	62.66	3.00	696.84	62.46	60.10	3.00	696.04
Network Size	20.65	5.24	4.37	36.73	21.33	5.41	4.86	37.63	21.25	5.39	4.37	37.31
HIS through...												
Kinship Ties	13.84	4.49	3.14	39.00	11.56	4.72	3.00	30.60	12.84	4.97	3.09	31.20
Friendship Ties	13.83	4.53	3.14	39.00	11.52	4.74	3.00	32.27	12.99	5.15	3.09	32.64

Table 2.2. (cont'd).

Distant Ties	6.75	3.03	3.00	22.82	7.54	3.22	3.00	19.00	7.57	3.08	3.00	22.29
Contact Frequency	2499.08	1270.59	5.00	13978.00	1887.35	1098.93	33.00	9407.27	2216.86	1385.40	3.09	9407.64
Female Contacts	12.73	4.41	3.00	41.36	14.26	4.64	3.36	41.27	14.43	5.26	3.09	41.64
Living with	8.71	3.41	3.00	33.36	6.64	3.27	3.00	25.60	6.92	3.22	3.00	22.20
Network Density	46.17	65.27	3.00	696.84	53.61	55.25	3.00	696.84	52.91	52.15	3.00	696.56
Network Size	18.18	4.24	5.67	30.35	18.62	4.24	5.00	29.66	18.56	4.20	5.00	30.35
Covariates												
Loneliness (W1)	1.24	0.39	1.00	3.00	1.54	0.55	1.00	3.00	1.49	0.51	1.00	3.00
Age	-2.08	6.98	-11.30	16.70	-2.60	6.56	-11.30	16.70	4.16	7.55	-11.30	16.70
Non-Hispanic	0.86	0.35	0.00	1.00	0.76	0.43	0.00	1.00	0.11	0.31	0.00	1.00
Non-Hispanic	0.06	0.24	0.00	1.00	0.13	0.34	0.00	1.00	0.79	0.41	0.00	1.00
Non-Hispanic	0.02	0.15	0.00	1.00	0.04	0.19	0.00	1.00	0.05	0.21	0.00	1.00
Hispanic	0.06	0.23	0.00	1.00	0.07	0.25	0.00	1.00	0.06	0.23	0.00	1.00
<High School	0.12	0.32	0.00	1.00	0.31	0.47	0.00	1.00	0.23	0.42	0.00	1.00
High School	0.23	0.42	0.00	1.00	0.14	0.35	0.00	1.00	0.32	0.47	0.00	1.00
Some College	0.34	0.48	0.00	1.00	0.31	0.46	0.00	1.00	0.29	0.46	0.00	1.00
College	0.32	0.47	0.00	1.00	0.24	0.43	0.00	1.00	0.16	0.37	0.00	1.00
<Average Income	0.20	0.40	0.00	1.00	0.54	0.50	0.00	1.00	0.48	0.50	0.00	1.00
Average Income	0.42	0.49	0.00	1.00	0.30	0.46	0.00	1.00	0.37	0.48	0.00	1.00
>Average Income	0.36	0.48	0.00	1.00	0.16	0.36	0.00	1.00	0.13	0.34	0.00	1.00
Income Missing	0.02	0.15	0.00	1.00	0.01	0.09	0.00	1.00	0.02	0.14	0.00	1.00
Married (W2)	0.85	0.35	0.00	1.00	0.09	0.28	0.00	1.00	0.04	0.19	0.00	1.00
Separated/Divorced	0.03	0.17	0.00	1.00	0.80	0.40	0.00	1.00	0.02	0.13	0.00	1.00
Widowed (W2)	0.12	0.32	0.00	1.00	0.10	0.31	0.00	1.00	0.95	0.23	0.00	1.00
Marital Status Change	0.11	0.32	0.00	1.00	0.13	0.33	0.00	1.00	0.15	0.36	0.00	1.00

~All values are standardized for nonresponse.

~W1=Variable was taken from Wave 1 of data; W2=Variable was taken from Wave 2 of data.

~Note: All social network indicators account for the sum support received across all network members; therefore, mean values indicate the mean of additive support.

Correlations

I further examined whether the transfer of emotional support through SNCs is associated with each health outcome (depression, physical health, and functional health) as well as each marital status (married, separated/divorced, and widowed). These correlations are depicted in Table 2.3. Physical health is directly associated with the transmission of emotional support through kinship ties, friendship ties, distant ties, female contacts, and living with network members. In both waves, declines in physical health are additionally associated with the transfer of social support through dense networks. In Wave 2, declines in physical health are further associated with the transfer of emotional support through large networks and frequent contact with network members.

With a few exceptions, the association between depression and the transfer of SNCs through emotional support mirror their association with physical health. For instance, while dense networks are associated with poor physical health, they are not associated with depression. While contact frequency is associated with poor physical health during Wave 2, it is indirectly associated with depression during Wave 1, indicating that those who receive emotional support through frequent contact with network members are less likely to be depressed in the earlier stages of aging.

Fewer SNCs are associated with functional health in Wave 2 than in Wave 1. During Wave 1, poor functional health is associated with receiving emotional support directly, as well as through kinship ties, friendship ties, distant ties, female network members, living with network members, and large networks. During Wave 2 the poor functional health is further associated directly with transmission of emotional support through kinship ties and indirectly associated

with receiving emotional support from distant ties, indicating that emotional support from distant ties becomes more important as individuals age.

Prior marriage is indirectly associated with depression and physical health within both waves, as well as functional health during Wave 1. On average, those who are married are significantly likely to receive emotional support from kin, through frequent contact with network members, and through living with network members but are significantly unlikely to receive emotional support directly or through friendship ties, distant ties, and female network members. The same health outcomes that are associated with being married are inversely associated with prior widowhood. Those who are widowed are more likely to receive emotional support directly through female contacts, and by living with network members, but are less likely to receive it from kin, friends, or distant ties.

Unlike those who are married or widowed who share significant associations with all three health outcomes, only one health outcome is associated with prior status as separated/divorced: depression. No patterns emerged to explain the association between prior status as separated/divorced and the transfer of emotional support through SNCs. On average, those who are separated/divorced are more likely to receive emotional support from friends, distant ties, and female contacts and are less likely to receive emotional support from kin, frequent contact with network members, dense networks, and living with network members.

Table 2.3. Pairwise correlations between health outcomes and emotional support.

	1	2	3	4	5	6	7	8
Physical Health (W1)	1							
Physical Health (W2)	0.60***	1						
Depression (W1)	0.35***	0.32***	1					
Depression (W2)	0.31***	0.40***	0.56***	1				
Functional Health (W1)	0.34***	0.44***	0.26***	0.39***	1			
Functional Health (W2)	0.03	0.02	0.01	0.01	0.01	1.00		
Emotional Support (ES)	0.54***	0.85***	0.40***	0.60***	0.57***	0.02	1	
Emotional Support through...								
ES through Kin	0.15***	0.23***	0.07**	0.12***	0.10***	0.05*	0.37***	1
ES through friends	0.12***	0.24***	0.10***	0.15***	0.18***	-0.03	0.25***	-0.21***
ES through Distant Ties	0.21***	0.38***	0.20***	0.30***	0.27***	-0.03**	0.39***	-0.11***
ES through Contact Frequency	0.03	0.06*	-0.05*	-0.04	0.02	0.02	0.21***	0.56***
ES through Female Contacts	0.13***	0.25***	0.11***	0.17***	0.16***	0.02	0.37***	0.36***
ES through Living with Contacts	0.28***	0.39***	0.12***	0.24***	0.26***	0.00	0.42***	0.40***
ES through Network Density	0.05*	0.05*	0.00	-0.02	0.02	-0.01	0.18***	0.54*
ES through Network Size	0.05	0.18***	0.03	0.08***	0.12***	0.00	0.31***	0.35***

Table 2.3. (cont'd).

	8	9	10	11	12	13	14	15
ES through Kin	1							
ES through friends	-0.21***	1						
ES through Distant Ties	-0.11***	0.02	1					
ES through Contact Frequency	0.56***	0.12***	0.03	1				
ES through Female Contacts	0.36***	0.38***	0.21***	0.41***	1			
ES through Living with Contacts	0.40***	-0.05*	0.10***	0.36***	0.08***	1		
ES through Network Density	0.54*	0.11***	0.07**	0.60***	0.34***	0.18***	1	
ES through Network Size	0.35***	0.32***	0.26***	0.35***	0.46***	0.08***	0.07**	1

~*** p<0.001, ** p<0.005, * p<0.05

~Variables are not weighted or standardized

~W1=Wave 1; W2=Wave 2; ES=Emotional Support

Because I examine the transfer of emotional support and HIS separately, I also examined whether the transmission of HIS through SNCs is associated with each health outcome (depression, physical health, and functional health) as well as each marital status (married, separated/divorced, and widowed). These correlations are depicted in Table 2.4. With a few exceptions, associations between the transfer of HIS through SNCs, health outcomes, and marital statuses mirror the associations between the transfer of emotional support through SNCs, health outcomes, and marital statuses. During Wave 1, poor physical health and depression are additionally associated with the transfer of HIS through large networks. During Wave 2, poor functional health is additionally associated with the transfer of HIS through friends and female contacts.

More differences emerged when examining marital status differences in the transfer of HIS through SNCs than when examining the association between support type and health outcomes. Among those who were formerly married, while the transfer of emotional support is more likely to occur through kin and less likely to occur through friends, the transfer of HIS is not significantly likely to occur within these types of networks. Among the formerly widowed, while the transfer of emotional support through kin and friends is significantly less likely, they are not significant when transferring HIS. Among those who are widowed, the transfer of HIS through frequent contact with network members is significantly unlikely but has no significant effect on the transfer of emotional support.

Table 2.4. Pairwise correlations between health outcomes and Health Information Support (HIS).

	1	2	3	4	5	6	7
Physical Health (W1)	1						
Physical Health (W2)	0.60***	1					
Depression (W1)	0.35***	0.32***	1.00				
Depression (W2)	0.31***	0.40***	0.56***	1			
Functional Health (W1)	0.34***	0.44***	0.26***	0.39***	1		
Functional Health (W2)	0.03	0.02	0.01	0.01	0.01	1	
HIS	0.57***	0.90***	0.43***	0.64***	0.60***	0.03	1
HIS through...							
HIS through Kin	0.21***	0.32***	0.13***	0.19***	0.17***	0.06*	0.40***
HIS through Friends	0.21***	0.32***	0.13***	0.18***	0.16***	0.05*	0.39***
HIS through Distant Ties	0.23***	0.42***	0.22***	0.34***	0.30***	-0.02	0.46***
HIS through Contact Frequency	0.04	0.06*	-0.03	-0.03	0.03	0.03	0.16***
HIS through Female Contacts	0.18***	0.32***	0.16***	0.23***	0.20***	0.02***	0.40***
HIS through Living with Contacts	0.29***	0.44***	0.16***	0.27***	0.28***	0.01	0.45***
HIS through Network Density	0.06*	0.05*	0.02	-0.01	0.02	0.00	0.11***
HIS through Network Size	0.12***	0.28***	0.09***	0.15***	0.18***	0.02	0.37***

Table 2.4. (cont'd).

	8	9	10	11	12	13	14	15
HIS through Kin	1							
HIS through Friends	0.97***	1						
HIS through Distant Ties	-0.07*	-0.06*	1					
HIS through Contact Frequency	0.45***	0.49***	0.04	1				
HIS through Female Contacts	0.33***	0.38***	0.27***	0.37***	1			
HIS through Living with Contacts	0.52***	0.51***	0.19***	0.28***	0.21***	1		
HIS through Network Density	0.33***	0.45***	0.07**	0.57***	0.33***	0.07**	1	
HIS through Network Size	0.41***	0.40***	0.32***	0.32***	0.49***	0.27***	0.01	1

~*** p<0.001, ** p<0.005, * p<0.05

~Variables are not weighted or standardized

~W1=Wave 1; W2=Wave 2; HIS=Health Information Support

The marital status differences in the transfer of support impacting depression

I first examined how the transfer of emotional support and HIS through SNCs impacts depression, and whether marital status moderates this association. Unlike those who are married, depression among those who are either separated/divorced or widowed is influenced by transmission of support through SNCs, as seen in Table 2.5 which highlights how prior marital status moderates the association between the transmission of both emotional support and HIS and depression. In Table 2.5, Model 1 indicates regression results for the entire sample, while Models 2 and 3 indicate regression results for separate samples of men and women, respectively. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on depression while columns labeled with even numbers identify models controlling for whether marital status moderates the association. The transmission of both types of support affect depression among those who are separated/divorced, while the transmission of HIS specifically impacts those who are widowed. Among those who are either separated/divorced or widowed, the transmission of HIS through dense networks has decreased odds of benefiting mental health (Separated/Divorced: $b=0+.003=.00$; Widowed: $b=0+.002=.002$). These odds also decrease among those who are separated/divorced, who receive emotional support through dense networks ($b=0+.002=.002$). Those who are widowed further have increased odds of exhibiting mental health benefits from the transmission of HIS, particularly when transmitted through female contacts ($b=-.003-.012=-.015$).

Men who are married have decreased odds of exhibiting mental health benefits from direct emotional support, both before and after accounting for whether emotional support interacts with marital status to impact depression. (Model 5: $b=.047^* (.019)$; Model 6: $b=.044 (.021)$). However, the transmission of support through SNCs indirectly impacts depression when

moderated by marital status. Men who are separated/divorced exhibit decreased odds of exhibiting mental health benefits from HIS transmitted through distant ties ($b = -.002 + .036 = .038$), as well as from emotional support transmitted through female contacts ($b = .003 + .024 = .027$) and living with contacts ($b = .001 + .047 = .048$). The mental health consequences of the transmission of emotional support through female contacts and living with contacts significantly differs by gender (Female Contacts X S/D: $X^2 = 7.306$, $*p > .007$, Wald: 2.703; Living with contacts X S/D: $X^2 = 8.432$, $**p > .004$, Wald: 2.904). Men who are widowed exhibit decreased odds of exhibiting mental health benefits when either type of support is transmitted through living with contact members (ES: $b = .001 + .051 = .052$; HIS: $b = 0 + .055 = .055$). These odds also specifically differ by gender (ES: $X^2 = 4.201$, $*p > .040$, Wald: 2.050; HIS: $X^2 = 4.061$, $*p > .044$, Wald: 2.015).

Mental health among women is affected by the transmission of emotional support through SNCs, primarily among those who are separated/divorced. The odds that separated/divorced women exhibit physical health benefits from emotional support decrease when transmitted through dense networks and friends (Network Density: $b = 0 + .002 = .002$; Friends: $b = .003 + .026 = .029$), but they increase when transmitted through large networks (Network Size: $b = .005 - .027 = .022$). The mental health consequences of emotional support transmitted through friends significantly differ by gender ($X^2 = 8.565$, $**p > .003$, Wald: 2.927).

Table 2.5. Marital status differences in the transfer of emotional support and HIS impacting depression. Model 1 indicates entire sample, Model 2 examines women, and Model 3 examines men. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on depression while columns labeled with even numbers identify models controlling for whether marital status moderates the transmission of support impacting depression.

	Model 1. All (N=1,789)				Model 2. Men (N=859)				Model 3. Women (N=930)			
	Emotional Support		HIS		Emotional Support		HIS		Emotional Support		HIS	
	1	2	3	4	5	6	7	8	9	10	11	12
Prior Separated/Divorced	0.02 (0.03)	-0.12 (0.17)	0.03 (0.03)	0.04 (0.18)	0.08 (0.05)	0.01 (0.28)	0.10* (0.05)	-0.38 (0.27)	-0.02 (0.04)	-0.12 (0.26)	-0.01 (0.04)	0.40 (0.28)
Prior Widowed	-0.02 (0.03)	0.21 (0.17)	-0.02 (0.03)	0.16 (0.17)	0.02 (0.05)	0.25 (0.35)	0.01 (0.05)	0.06 (0.37)	-0.04 (0.03)	0.29 (0.21)	-0.05 (0.03)	0.28 (0.22)
Direct Support	0.02 (0.01)	0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	0.05* (0.02)	0.04* (0.02)	0.00 (0.03)	0.00 (0.03)	-0.01 (0.02)	-0.01 (0.03)	-0.03 (0.03)	-0.03 (0.04)
Direct Support x S/D		0.02 (0.04)		-0.05 (0.05)		-0.08 (0.07)		-0.06 (0.08)		0.09 (0.07)		-0.02 (0.09)
Direct Support x Widowed		-0.04 (0.04)		0.03 (0.05)		0.07 (0.08)		0.10 (0.11)		-0.02 (0.05)		0.02 (0.07)
Support Through...												
Kin	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.00)	-0.00 (0.00)	0.01 (0.01)	-0.00 (0.02)	0.01 (0.00)	0.01 (0.01)	-0.01 (0.02)	0.00 (0.02)
Kin x S/D		0.00 (0.01)		0.02 (0.04)		-0.01 (0.01)		0.09 (0.06)		0.02* (0.01)		-0.00 (0.06)
Kin x Widowed		-0.00 (0.01)		0.01 (0.03)		-0.01 (0.02)		0.02 (0.04)		-0.01 (0.01)		-0.04 (0.04)
Friends	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.01)	0.01 (0.01)	-0.01 (0.00)	-0.01 (0.00)	-0.00 (0.01)	0.01 (0.02)	0.00 (0.00)	0.00 (0.01)	0.02 (0.02)	0.00 (0.02)
Friends x S/D		0.00 (0.01)		-0.02 (0.04)		-0.02 (0.01)		-0.08 (0.06)		0.03* (0.01)		0.01 (0.06)
Friends x Widowed		0.00 (0.01)		-0.01 (0.03)		-0.00 (0.02)		-0.02 (0.04)		-0.00 (0.01)		0.04 (0.04)

Table 2.5. (cont'd).

Distant Ties	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.01)	-0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	-0.00 (0.01)
Distant Ties x S/D		0.01 (0.01)		0.01 (0.01)		0.01 (0.02)		0.04* (0.02)		0.02 (0.01)		-0.00 (0.01)
Distant Ties x Widowed		-0.00 (0.01)		-0.00 (0.01)		-0.03 (0.02)		-0.03 (0.03)		-0.01 (0.01)		-0.00 (0.01)
Contact Frequency	-0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)
Contact Frequency x S/D		-0.00 (0.00)		-0.00 (0.00)		-0.00 (0.00)		-0.00 (0.00)		0.00 (0.00)		-0.00 (0.00)
Contact Frequency x Widowed		-0.00 (0.00)		-0.00 (0.00)		0.00 (0.00)		0.00 (0.00)		-0.00 (0.00)		-0.00 (0.00)
Female Contacts	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Female Contacts x S/D		0.00 (0.01)		-0.00 (0.01)		0.02* (0.01)		0.01 (0.01)		-0.02 (0.01)		-0.01 (0.01)
Female Contacts x Widowed		-0.01 (0.01)		-0.01* (0.01)		-0.02 (0.01)		-0.02 (0.02)		-0.01 (0.01)		-0.01 (0.01)
Living with Contacts	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.01)	-0.01 (0.00)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Living with Contacts x S/D		0.01 (0.01)		0.01 (0.01)		0.05* (0.02)		0.02 (0.02)		-0.03 (0.02)		0.01 (0.01)
Living with Contacts x Widowed		0.01 (0.01)		0.01 (0.01)		0.05* (0.02)		0.05* (0.02)		0.01 (0.01)		0.01 (0.01)
Network Density	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00* (0.00)	0.00 (0.00)	0.00* (0.00)	0.00 (0.00)
Network Density x S/D		0.00** (0.00)		0.00** (0.00)		0.00 (0.00)		0.00 (0.00)		0.00* (0.00)		0.00 (0.00)
Network Density x Widowed		0.00 (0.00)		0.00* (0.00)		0.00 (0.00)		0.00 (0.00)		0.00 (0.00)		0.00 (0.00)

Table 2.5. (cont'd).

Network Size	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.01)
Network Size x S/D		-0.01 (0.01)		-0.00 (0.01)		-0.00 (0.01)		0.00 (0.01)		-0.03* (0.01)		-0.02 (0.01)
Network Size x Widowed		-0.00 (0.01)		-0.01 (0.01)		-0.02 (0.01)		-0.01 (0.01)		-0.00 (0.01)		-0.02 (0.01)
Constant	0.50*** (0.07)	0.50** (0.08)	0.52** (0.07)	0.51** (0.08)	0.48*** (0.10)	0.56** (0.11)	0.48** (0.10)	0.58** (0.11)	0.56*** (0.11)	0.49** (0.14)	0.61** (0.11)	0.47* (0.15)
R-squared	0.38	0.38	0.37	0.39	0.37	0.39	0.36	0.39	0.40	0.41	0.40	0.42

~Standard errors are in

~ *** p<0.001, ** p<0.005, * p<0.05

~ Data is standardized and weighted for non-response.

~ Models also control for gender (female), race (Non-Hispanic White), age, education (high school), income (average income), prior depression, prior physical, and prior functional health, and change in widowhood status, change in separated/divorced status.

~ ES=Emotional Support, HIS=Health Information Support, S/D: Separated/Divorced.

~ Bold coefficients and standard errors indicate statistically significant gender differences in association.

The marital status differences in the transfer of support impacting physical health

I then examined how the transfer of emotional support and HIS through SNCs impacts physical health, and whether marital status moderates this association. This data is depicted in Table 2.6. In Table 2.6, Model 1 indicates regression results for the entire sample, while Models 2 and 3 indicate regression results for separate samples of men and women, respectively. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on physical health while columns labeled with even numbers identify models controlling for whether marital status moderates the association. Columns 1 and 3 indicate that receiving both emotional support through living with contacts, as well as receiving HIS through living with contacts and through large networks, increases the odds of exhibiting poor physical health. These mechanisms remain significant once further accounting for potential moderating effects of marital status.

Unlike HIS, the transmission of emotional support impacts physical health. This association is further moderated by prior marriage or widowhood. Relative to those who are married, the odds of exhibiting poor physical health increase among those who were formerly separated/divorced, regardless of whether models controlled for the transmission of emotional support or HIS (ES: $b=.922^*$ (.418); HIS: $b=1.404^{**}$ (.441)). These consequences are particularly a concern among prior separated/divorced men (ES: $b=2.380^{***}$ (.700); HIS: $b=2.672^{***}$ (.676)). The odds that those who are married exhibit physical health benefits from the transmission of support decrease, regardless of when HIS is transmitted through large networks ($b=.018^*$ (.008)) or living with contacts ($b=.029^{**}$ (.009)), as well as when emotional support is transmitted through living with contacts ($b=.025^{**}$ (.009)). Otherwise, the odds of exhibiting physical health benefits decrease among those who were formerly widowed when

emotional support is transferred through dense networks ($b=0+.003=.003$) but increase among those who were formerly separated/divorced, who receive HIS directly ($b=.027-.289=-.262$). Relative to those who were formerly married, every 1 unit increase in the direct transmission of HIS increases the odds that those who were formerly separated/divorced exhibit physical health benefits by 23.049%.⁸

Before controlling for potential moderating effects of marital status, columns 5 and 7 indicate that men exhibit health benefits from emotional support transmitted through friends ($b=.024 (.003)$) but do not exhibit physical health benefits from emotional support transmitted through living with contacts ($b=.024 (.012)$) or through HIS transmitted through Kin ($b=.074 * (.034)$) and living with contacts ($b=.0344 (.012)$). Except for HIS transmitted through kin, all mechanisms remain significant in columns 6 and 8 when further controlling for whether marital status moderates these mechanisms.

Married men have decreased odds of exhibiting physical health benefits from direct emotional support ($b=.126*(.051)$), when HIS is transmitted through large networks ($b=.025* (.011)$) and when either type of support is transmitted through living with contacts (ES: $b=.025*(.012)$; HIS: $b=.037** (.013)$) but they benefit from receiving emotional support through friends ($b=-.021* (.010)$). However, gender differences in the direct impact of emotional support on physical health are significant ($X^2=8.923$, $*p>.002$, Wald: 2.987). Among men who are separated/divorced, their odds of exhibiting physical health benefits from emotional support decrease when transmitted through living with contacts ($b=.025+.098=.123$), but they increase when emotional support is transmitted through large networks ($b=.01-.067=-.068$) and networks primarily comprised of distant ties ($b=-.005-.119=-.119$). Gender differences in the benefits of

⁸ Percentages were calculated using Equation D: $((1-e^{\beta_1-\beta_1\beta_2}) \times 100)$ where β_1 = support type and $\beta_1\beta_2$ = the interaction between support type and marital status.

large networks and distant ties on physical health are significant (Large Networks: $X^2=6.202$, $*p>.013$, Wald: 2.490; Distant ties: $X^2=7.365$, $*p>.007$, Wald: 2.714). Men who are separated/divorced also benefit from the direct transmission of HIS ($b=.047-.617=-.57$) and the transmission of HIS through distant ties ($b=-.001-.094=-.095$), the latter of which is also significant by gender ($X^2=5.861$, $*p>.015$, Wald=2.421). Like men who are separated/divorced, men who are widowed also exhibit physical health benefits from the transmission of emotional support through distant ties ($b=-.005-.139=-.144$). Among men who are widowed, every 1 unit increase in emotional support through distant ties decreases the odds of exhibiting physical health benefits by 14.339%. Similarly, those who are widowed exhibit gender differences in the transmission of emotional support through distant ties ($X^2=6.413$, $*p>.011$, Wald=2.532).

Before controlling for potential moderating effects of marital status, Column 11 indicates that women exhibit health benefits from HIS transmitted through distant ties ($b=-.024$ (.010)). The benefits of HIS transmitted through distant ties increase in column 12 when further controlling for the moderating effects of marital status, indicating that women who are married primarily benefit from distant ties. ($b=-.038^{**}$ (.013)). Those who are widowed exhibit decreased odds of benefiting from direct emotional support ($b=-.140+.220=.08$). Gender differences in both associations are significant (Distant Ties: $X^2=4.050$, $*p>.044$, Wald=2.013; Direct ES X Widowed: $X^2=5.571$, $*p>.018$, Wald=2).

Table 2.6. Marital status differences in the transfer of emotional support and HIS impacting physical health. Model 1 indicates entire sample, Model 2 examines women, and Model 3 examines men. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on physical health while columns labeled with even numbers identify models controlling for whether marital status moderates the transmission of support impacting physical health.

	Model 1. All (N=1,789)				Model 2. Men (N=859)				Model 3. Women (N=930)			
	Emotional Support		HIS		Emotional Support		HIS		Emotional Support		HIS	
	1	2	3	4	5	6	7	8	9	10	11	12
Prior Separated/Divorced	-0.04 (0.07)	1.00* (0.42)	-0.06 (0.07)	1.45** (0.44)	-0.06 (0.12)	2.38*** (0.70)	-0.04 (0.12)	2.67*** (0.68)	-0.08 (0.09)	0.29 (0.60)	-0.10 (0.09)	0.39 (0.66)
Prior Widowed	0.09 (0.06)	0.24 (0.40)	0.07 (0.06)	0.63 (0.40)	0.03 (0.14)	1.24 (0.87)	0.02 (0.13)	-1.17 (0.91)	0.07 (0.08)	-0.48 (0.49)	0.04 (0.08)	0.89 (0.51)
Direct Support	0.01 (0.03)	0.03 (0.04)	-0.02 (0.05)	0.04 (0.06)	0.09 (0.05)	0.13* (0.05)	-0.01 (0.07)	0.05 (0.07)	-0.08 (0.05)	-0.14 (0.07)	-0.02 (0.07)	0.04 (0.10)
Direct Support x S/D		-0.17 (0.10)		-0.29* (0.13)		-0.07 (0.16)		-0.62* (0.20)		-0.15 (0.15)		-0.10 (0.20)
Direct Support x Widowed		0.01 (0.09)		-0.08 (0.13)		-0.32 (0.20)		0.07 (0.26)		0.22* (0.11)		-0.12 (0.17)
Support Through...												
Kin	0.00 (0.01)	0.00 (0.01)	0.03 (0.03)	0.04 (0.03)	0.00 (0.01)	0.00 (0.01)	0.07* (0.03)	0.06 (0.04)	0.01 (0.01)	0.01 (0.01)	-0.03 (0.04)	0.02 (0.05)
Kin x S/D		-0.02 (0.02)		-0.13 (0.09)		-0.05 (0.03)		0.07 (0.14)		-0.01 (0.03)		-0.26 (0.14)
Kin x Widowed		-0.01 (0.02)		0.01 (0.07)		-0.03 (0.04)		0.07 (0.09)		-0.00 (0.02)		-0.07 (0.10)
Friends	-0.01 (0.01)	-0.00 (0.01)	-0.02 (0.03)	-0.03 (0.03)	-0.02* (0.01)	-0.02* (0.01)	-0.06 (0.03)	-0.05 (0.04)	0.01 (0.01)	0.01 (0.01)	0.03 (0.04)	-0.02 (0.05)
Friends x S/D		-0.01 (0.02)		0.10 (0.09)		-0.06 (0.03)		-0.10 (0.15)		-0.02 (0.03)		0.24 (0.14)
Friends x Widowed		-0.02 (0.02)		-0.00 (0.07)		-0.05 (0.04)		-0.04 (0.10)		-0.01 (0.02)		0.07 (0.10)

Table 2.6. (cont'd).

Distant Ties	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02* (0.01)	-0.02 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.02 (0.01)	-0.02* (0.01)	-0.04* (0.01)
Distant Ties x S/D		-0.03 (0.02)		-0.01 (0.02)		-0.12** (0.04)		-0.09* (0.04)		0.01 (0.03)		0.03 (0.03)
Distant Ties x Widowed		-0.01 (0.02)		0.02 (0.02)		-0.14* (0.06)		-0.02 (0.07)		0.02 (0.02)		0.03 (0.02)
Contact Frequency	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Contact Frequency x S/D		0.00 (0.00)		0.00 (0.00)		0.00 (0.00)		0.00* (0.00)		-0.00 (0.00)		-0.00 (0.00)
Contact Frequency x Widowed		-0.00 (0.00)		-0.00 (0.00)		0.00 (0.00)		0.00 (0.00)		-0.00 (0.00)		-0.00 (0.00)
Female Contacts	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	0.00 (0.01)
Female Contacts x S/D		-0.01 (0.02)		-0.02 (0.02)		0.01 (0.03)		-0.01 (0.03)		-0.03 (0.03)		-0.03 (0.02)
Female Contacts x Widowed		0.02 (0.01)		-0.01 (0.01)		0.05 (0.04)		0.03 (0.04)		0.01 (0.02)		-0.02 (0.02)
Living with Contacts	0.02** (0.01)	0.02* (0.01)	0.02* (0.01)	0.03** (0.01)	0.02* (0.01)	0.03* (0.01)	0.03** (0.01)	0.04** (0.01)	0.02 (0.01)	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)
Living with Contacts x S/D		0.03 (0.03)		0.02 (0.03)		0.10* (0.05)		0.06 (0.04)		0.05 (0.04)		0.02 (0.03)
Living with Contacts x Widowed		-0.00 (0.02)		-0.04 (0.02)		-0.01 (0.05)		-0.03 (0.05)		0.02 (0.03)		-0.02 (0.03)
Network Density	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Network Density x S/D		-0.00 (0.00)		-0.00 (0.00)		0.00 (0.00)		0.01 (0.00)		-0.00 (0.00)		-0.00 (0.00)
Network Density x Widowed		0.00* (0.00)		0.00 (0.00)		0.01 (0.00)		0.00 (0.01)		0.00 (0.00)		0.00 (0.00)

Table 2.6. (cont'd).

Network Size	0.00 (0.01)	0.00 (0.01)	0.01* (0.01)	0.02* (0.01)	-0.00 (0.01)	0.00 (0.01)	0.02* (0.01)	0.03* (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)
Network Size x S/D		-0.01 (0.02)		-0.03 (0.02)		-0.07* (0.03)		-0.07 (0.04)		0.03 (0.03)		0.01 (0.03)
Network Size x Widowed		-0.00 (0.01)		-0.02 (0.02)		0.01 (0.03)		0.00 (0.04)		-0.01 (0.02)		-0.01 (0.02)
Constant	0.80*** (0.17)	0.64*** (0.19)	0.75* (0.17)	0.44* (0.20)	0.49* (0.25)	0.09 (0.26)	0.34 (0.25)	0.02 (0.27)	1.20*** (0.25)	1.36*** (0.32)	1.16*** (0.26)	0.79* (0.34)
R-squared	0.42	0.43	0.42	0.43	0.44	0.47	0.44	0.47	0.43	0.44	0.43	0.44

~Standard errors are in parenthesis.

~ *** p<0.001, ** p<0.005, * p<0.05

~ Data is standardized and weighted for non-response.

~ Models also control for gender (female), race (Non-Hispanic White), age, education (high school), income (average income), prior depression, prior physical, and prior functional health, and change in widowhood status, change in separated/divorced status.

~ ES=Emotional Support, HIS=Health Information Support, S/D: Separated/Divorced.

~ Bold coefficients and standard errors indicate statistically significant gender differences in association.

The marital status differences in the transfer of support impacting functional health

The transmission of support through SNCs primarily impacts those who were formerly separated/divorced, as seen in Table 2.7 which highlights how prior marital status moderates the association between the transmission of both emotional support and HIS and functional health. In Table 2.7, Model 1 indicates regression results for the entire sample, while Models 2 and 3 indicate regression results for separate samples of men and women, respectively. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on functional health while columns labeled with even numbers identify models controlling for whether marital status moderates the transmission of support impacting functional health. Those who were formerly separated/divorced have increased odds of benefiting from emotional support transmitted through friends ($b=.003-.022=-.019$), distant ties ($b=.003-.019=-.016$) as HIS transmitted directly ($b=-.018-.114=-.132$) but are less likely to benefit when emotional support is transmitted through female contacts ($b=-.002+.013=.011$) and through living with contacts ($b=.002+.036=.038$).

Prior marriage or widowhood primarily impacted by the transmission of HIS through large networks, both with and without controlling for the potential moderating effects of marital status (Column 3 ($b=.006* (.003)$); Column 4: $b=.006* (.003)$). The odds that HIS transmitted through large networks will benefit functional health decrease among those who are married ($b=.006* (.003)$) but increase among those who are widowed ($b=.006-.016=-.010$).

Among separate populations of men and women, the consequences in how support is transmitted on functional health are still particularly of interest among those who are separated/divorced. Unlike for separated/divorced women, however, these mechanisms specifically impact men. Men who are separated/divorced have increased odds of exhibiting

health benefits from the direct transmission of HIS ($b = -.045$ -.220=.265) but have decreased odds of exhibiting health benefits from the transmission of emotional support through living with contacts ($b = 0$ +.004=.004) and from the transmission of HIS through large networks ($b = .006$ +.029=.035). Additional analysis across men and women further indicates that the transmission of HIS through large networks further differs between men and women ($X^2 = 7.866$; $**p > .005$, Wald=2.804).

Men and women who are widowed exhibit the functional health benefits of the transmission of HIS. The odds of exhibiting functional health benefits from HIS increase among widowed men when transmitted through distant ties ($b = .007$ -.051=-.044) and among widowed women when transmitted through large networks ($b = .005$ -.019=-.014). The health benefits of the transmission of HIS through distant ties significantly differs further by gender ($X^2 = 5.225$; $*p > .022$, Wald=2.286).

Table 2.7. Marital status differences in the transfer of emotional support and HIS impacting functional health. Model 1 indicates entire sample, Model 2 examines women, and Model 3 examines men. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on functional health while columns labeled with even numbers identify models controlling for whether marital status moderates the transmission of support impacting functional health.

	Model 1. All (N=1,789)				Model 2. Men (N=859)				Model 3. Women (N=930)			
	Emotional		HIS		Emotional		HIS		Emotional		HIS	
	1	2	3	4	5	6	7	8	9	10	11	12
Prior Separated/Divorced	0.01 (0.03)	0.29 (0.15)	0.01 (0.03)	0.39* (0.16)	-0.00 (0.04)	-0.23 (0.26)	-0.03 (0.04)	-0.03 (0.25)	0.02 (0.03)	0.54* (0.21)	0.01 (0.03)	0.57* (0.23)
Prior Widowed	0.07** (0.02)	0.09 (0.14)	0.06* (0.02)	0.29* (0.14)	0.08 (0.05)	-0.12 (0.32)	0.07 (0.05)	0.44 (0.33)	0.06* (0.03)	0.10 (0.17)	0.06* (0.03)	0.32 (0.18)
Direct Support	-0.00 (0.01)	0.00 (0.01)	-0.03 (0.02)	-0.01 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.08* (0.02)	-0.04 (0.03)	0.02 (0.02)	0.04 (0.03)	0.01 (0.03)	0.05 (0.04)
Direct Support x S/D		-0.03 (0.04)		-0.12* (0.05)		-0.01 (0.06)		-0.22* (0.08)		-0.07 (0.05)		-0.06 (0.07)
Direct Support x Widowed		-0.01 (0.03)		-0.02 (0.05)		-0.07 (0.08)		-0.11 (0.10)		-0.02 (0.04)		-0.06 (0.06)
Support Through...												
Kin	0.00 (0.00)	0.00 (0.00)	0.01 (0.01)	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.01)	-0.01 (0.01)	0.00 (0.00)	0.00 (0.00)	0.03 (0.02)	0.03 (0.02)
Kin x S/D		-0.02* (0.01)		0.05 (0.03)		0.01 (0.01)		0.07 (0.05)		-0.02 (0.01)		-0.03 (0.05)
Kin x Widowed		0.01 (0.01)		0.00 (0.02)		0.02 (0.01)		-0.00 (0.03)		0.01 (0.01)		0.00 (0.04)
Friends	0.00 (0.00)	0.00 (0.00)	-0.01 (0.01)	-0.00 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)	0.01 (0.01)	-0.00 (0.00)	0.00 (0.00)	-0.03 (0.02)	-0.02 (0.02)
Friends x S/D		-0.02** (0.01)		-0.06 (0.03)		-0.02 (0.01)		-0.06 (0.05)		-0.01 (0.01)		0.02 (0.05)
Friends x Widowed		-0.00 (0.01)		0.00 (0.02)		0.01 (0.01)		0.03 (0.04)		-0.00 (0.01)		0.00 (0.04)
Distant Ties	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.01 (0.00)	-0.01 (0.00)	-0.01 (0.00)	-0.01 (0.00)

Table 2.7. (cont'd).

Distant Ties x S/D		-0.02*		-0.01		-0.01		0.01		-0.02		-0.02
		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)
Distant Ties x Widowed		-0.00		-0.00		-0.01		-0.05*		0.01		0.01
		(0.01)		(0.01)		(0.02)		(0.03)		(0.01)		(0.01)
Contact Frequency	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Contact Frequency x S/D		-0.00		0.00		-0.00*		-0.00		0.00		0.00*
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Contact Frequency x Widowed		0.00		0.00		-0.00		-0.00		0.00		0.00
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Female Contacts	0.00	-0.00	0.00	-0.00	-0.01	-0.00	-0.01	-0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Female Contacts x S/D		0.01*		-0.00		0.01		-0.01		0.01		-0.00
		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)
Female Contacts x Widowed		0.01		0.01		-0.02		-0.02		0.01		0.01
		(0.01)		(0.00)		(0.01)		(0.01)		(0.01)		(0.01)
Living with Contacts	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Living with Contacts x S/D		0.04**		0.01		0.04*		0.01		0.02		0.02
		(0.01)		(0.01)		(0.02)		(0.02)		(0.01)		(0.01)
Living with Contacts x Widowed		-0.01		-0.01		0.03		0.04*		-0.02		-0.02
		(0.01)		(0.01)		(0.02)		(0.02)		(0.01)		(0.01)
Network Density	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Network Density x S/D		-0.00		-0.00		-0.00		-0.00		-0.00		-0.00
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Network Density x Widowed		-0.00		-0.00		0.00		0.00		-0.00		-0.00
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)

Table 2.7. (cont'd).

Network Size	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01* (0.00)	0.00 (0.00)	0.00 (0.00)	0.01* (0.00)	0.01 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Network Size x S/D		0.00 (0.01)		-0.00 (0.01)		0.02 (0.01)		0.03* (0.01)		-0.01 (0.01)		-0.02 (0.01)
Network Size x Widowed		-0.01 (0.01)		-0.02* (0.01)		0.01 (0.01)		-0.00 (0.01)		-0.01 (0.01)		- (0.01)
Constant	1.12*** (0.06)	1.08** (0.07)	1.19** (0.06)	1.10** (0.07)	1.02*** (0.09)	1.06** (0.10)	1.11** (0.09)	1.09** (0.10)	1.10*** (0.09)	0.97** (0.11)	1.14* (0.09)	0.97* (0.12)
R-squared	0.03	0.04	0.03	0.04	0.06	0.10	0.08	0.12	0.04	0.07	0.04	0.07

~Standard errors are in

~ *** p<0.001, ** p<0.005, * p<0.05

~ Data is standardized and weighted for non-response.

~ Models also control for gender (female), race (Non-Hispanic White), age, education (high school), income (average income), prior depression, prior physical, and prior functional health, and change in widowhood status, change in separated/divorced status.

~ ES=Emotional Support, HIS=Health Information Support, S/D: Separated/Divorced.

~ Bold coefficients and standard errors indicate statistically significant gender differences in association.

It is further noteworthy that the models examining physical health and depression consistently result in high R-Squared values ranging from .39 and .48, and that R-Squared values for the models examining functional health are much lower. This suggests that while the variables in the models explain slightly less than half of the variation in the models examining their effects on depression and physical health, the variables explain far less of the variation in the models examining their effects on functional health. As such, it is possible that the transmission of support impacting functional health may occur through mechanisms different from those addressing depression and physical health.

DISCUSSION

While marriage has been argued to promote health, those who are not married are able to turn to others within their social networks to capitalize on the health consequences of support most commonly provided through marriage (Kalmijn 2017). This study highlights the importance of examining the transmission of different types of support on health across social networks among those of differing marital statuses. This study helps to clarify how the transmission of both emotional support and HIS impact depression, physical health, and functional health over time. It moves beyond past research which identifies the effects of social networks on health by examining the transmission of support within social networks as a form of social capital transmitted among social networks of those with differing marital statuses. It also clarifies our understanding of the role that gender plays in moderating this association.

This study contributes to literature on marriage, social networks, and health by elucidating the mechanisms for which both emotional support and HIS are transferred through social networks, and how these forms of social support impact various types of health outcomes among

those in old age. The findings are strengthened by longitudinal analysis which helps to clarify the causal mechanisms linking their association and provides further direction for those interested in implementing programs targeting how marital and non-marital sources of social support impact health throughout the aging process. By examining the consequences of the transmission of support on health outcomes among those of different marital status and gender, health care providers can better assess the social support needs of their patients and learn to tailor opportunities to meet patient needs to gain access to this type of social capital.

A social capital approach emphasizes the importance of examining how support is transmitted through social networks (Mohnen et al. 2011). Based on previous research, I explored how the transmission of support through SNCs differently impact health depending on which health outcomes are examined, including depression, physical health, and functional health. I further explored how emotional support and HIS act as forms of social capital impacting three health outcomes.

Using the social capital approach, I first examined whether the transmission of emotional support and HIS through SNCs differently impact depression, physical health, and functional health. Results suggest that, unlike depression and functional health, physical health is primarily impacted by the transmission of support. Specifically, the transmission of both emotional support and HIS through living with contacts similarly do not benefit physical health. The transmission of HIS through large networks also does not benefit physical health. These three associations are particularly significant among women. Women further benefit from the transmission of emotional support through friends and do not benefit from the transmission of HIS through kin while men benefit from the transmission of HIS through distant ties.

Guided by research emphasizing the effects of marital status on health, I explored how the transmission of emotional support and HIS differently impact health when moderated by marital status. I hypothesized that those who are not married are more likely to exhibit the health consequences of social support transmitted across their social networks. This hypothesis was partially supported. Relative to depression and physical health, functional health is most likely to be impacted by the transmission of support. Both depression and physical health are more likely to be impacted by the transmission of HIS while functional health is more likely to be impacted by emotional support. Results suggest that while the transmission of both types of support had varying impact on each health outcome, respondents were primarily unlikely to exhibit health benefits from their transmission. For instance, respondents generally exhibited increased odds of being depressed when support was transmitted through dense networks and living with contact members. Unlike those who were formerly married or widowed, those who were separated/divorced were most likely to exhibit health consequences from the transmission of support within their social networks. Among those who were formerly separated/divorced, the transmission of both types of support through dense networks increased the odds of depression while the transmission of emotional support increased the odds of exhibiting functional health benefits when transmitted through kin, friends, and distant ties. Marriage decreased the odds that respondents exhibited physical health benefits from the transmission of both emotional support and HIS through living with contacts. Marriage also decreased the odds that respondents would exhibit both physical health and functional health benefits from the transmission of HIS through large networks. The transmission of HIS benefited those who were formerly widowed who exhibited mental health benefits when HIS was transmitted through female contacts and functional health benefits when HIS was transmitted through large networks.

Prior research examining gender differences the role of both social networks and marital status on health emphasize the need to examine gender differences in the transmission of support impacting health when moderated by marital status. Given this research, I hypothesized that non-married men are more likely to capitalize on the transmission of support within their social networks, ultimately impacting their health. This hypothesis was supported. Men were primarily impacted by the transmission of support, regardless of health outcome and marital status. While both men and women were primarily impacted by the transmission of emotional support, men were more likely to be impacted by the transmission of both types of support than women, regardless of whether gender differences in these mechanisms were significant.

Women primarily exhibited health benefits from large networks. Among women with large networks, those who were widowed exhibited functional health benefits from the transmission through HIS while those who were separated/divorced exhibited mental health benefits through the transmission of emotional support. However, women who were separated/divorced did not exhibit mental health benefits from the transmission of emotional support through kin, friends, and dense networks. s.

Relative to women, men were more likely to be impacted by the transmission of both types of support, regardless of marital status. Like women, however, most mechanisms used to transmit support had no health benefits. Separated/divorced men were most likely to benefit from the transmission of support. Most noteworthy, separated/divorced men exhibited physical and functional health benefits from the direct transmission of HIS and physical health benefits from the transmission of HIS through distant ties. Men who were formerly widowed were also more likely to exhibit functional health benefits from the transmission of HIS through distant ties.

Between group analysis, examining gender differences in these mechanisms indicates that significant gender differences are most common when examining the transmission of emotional support, as well as the consequences of support on depression. Relative to women, men are more likely to be impacted by the mechanisms linking social support and health, specifically when emotional support is transmitted and when depression is affected. Among all methods for which support is transmitted, gender differences in the transmission of support through distant ties are also most common.

Of all findings, the most elusive involve the transmission of support through distant ties. Among men, distant ties benefit physical health when used to transmit emotional support among those who were formerly separated/divorced or widowed, but negatively impact physical health among the separated/divorced when used to transmit HIS. Though, I did not further explore the specific characteristics of distant ties, it is possible that respondents were more likely to receive HIS through distant ties because of increased contact with healthcare workers whose jobs are to provide HIS to those in old age-a group likely to exhibit health deterioration (Charles 2010). These findings are further supported by research indicating that those in old age increasingly value distant ties to maintain their autonomy and increasingly exhibit networks characterized by network turnover which can result in the formation of more distant bonds (Cornwell 2014). Future research is needed to further understand the role of different types of distant ties on the transmission of support impacting health.

Limitations

It is important to note that while longitudinal analysis has helped to strengthen my findings by establishing the causal mechanisms linking the transmission of support and health, it is still

possible that these associations may be spurious. Since those in old age are at greater risk of exhibiting network turnover, the five-year time frame between waves may not be of appropriate length to fully capture the consequences of network changes on health (Cornwell 2014). Researchers have also indicated that the benefits of marriage increase over time (Lillard and Waite 1995). I was unable to address this concern because including indicators for marital status length would have drastically decreased my research population and would have inevitably decreased the accuracy of my findings. Past research further indicates that the health consequences of separation/divorce are temporary, as stress surrounding the loss of a relationship declines over time. These short-term consequences more strongly impact mental health than self-rated health (Meadows et al. 2008).

Additionally, past research has highlighted the difficulties in isolating the consequences of marriage on health, because those who are married tend to overestimate their health status compared to those who are unmarried. Research further highlights that the consequences of marriage on health depend more on marital quality than marital status itself (Williams and Umberson 2004). As such, Paper 3 specifically explores how the transmission of social support through SNCs impacts health when moderated by marital quality.

CONCLUSION

The consequences of social capital on health differ by which types of social support are provided, how it is transmitted, and which health outcomes are affected. Marital status and gender further moderate the mechanisms for which social capital in the form of support impacts the various health outcomes. In this article, I examined how the transmission of both emotional support and HIS through SNCs impacts physical health, depression, and functional health when

moderated by marital status. I consider whether these mechanisms differ among separate populations of men and women and whether gender differences in these mechanisms are significant. I ultimately help to clarify where those in old age turn to for support with and without support most provided through marriage. I also help lay a foundation for future research examining how those in old age may be able to rely on their social networks to adapt after experiencing partner loss or when those in old age are no longer able to rely on their partners for support. The study highlights that those who are separated/divorced are most impacted by the transmission of support across networks and that men are more likely to capitalize on the support that social networks provide.

PAPER 3: THE EFFECTS OF MARITAL QUALITY AND NON-MARITAL TIES ON THE TRANSMISSION OF HEALTH-BENEFITING SUPPORT

ABSTRACT

The odds that those who are married experience health benefits afforded by marital status differ by marital quality. Those with high levels of positive marital quality (PMQ) are more likely to be exposed to spousal support benefiting health than those who exhibit high levels of negative marital quality (NMQ). Scholars in health and marriage have acknowledged that those who are not married develop mechanisms to gain support that mitigate potential gaps in support most frequently provided by marriages characterized by high levels of PMQ. Guided by the stress buffering theory and gender socialization, as well as data from waves 1 and 2 of the National Social Life, Health, and Aging Project (NSHAP) this study explores marital quality differences in the mechanisms for which emotional support and Health Information Support (HIS) are transmitted through social networks and impact three health outcomes: depression, self-rated physical health, and functional health over time. This study further examines gender differences in these mechanisms. The transmission of SNCs, including kin ties, friend ties, and ties with female contacts, most frequently impacts health. The transmission of both types of support also more frequently impacts the health of men than women. Among men, social network characteristics (SNCs) primarily impact both the transmission of emotional support and health information support (HIS) on depression, and both PMQ and NMQ frequently moderate these mechanisms. Among women, physical health and functional health are primarily impacted by the transmission of HIS through SNCs. These mechanisms are more frequently moderated by PMQ than NMQ.

INTRODUCTION

Researchers have found that while those who are married generally exhibit better health than their unmarried counterparts, the effects of marriage on health are moderated by marital quality. Married individuals who exhibit high levels of marital quality have greater odds of experiencing better self-rated physical health, better mental health (Waite 1995), and lower rates of depression (Proulx et al. 2007). However, researchers have also noted that the health consequences of marital quality differ by how it is defined. For instance, Hui and Waite (2014) find that when differentiating between positive and negative marital quality, exhibiting high levels of positive marital quality (PMQ) benefits health, while exhibiting high levels of negative marital quality (NMQ) increases the odds of health deterioration. Proulx et al. (2007) further found that the association between marital quality and personal well-being is stronger when considering negative characteristics of marital quality, like conflict, rather than positive characteristics marital quality, like satisfaction. Thus, the health of married individuals is more likely to be affected if their marriages provide higher levels of NMQ than PMQ.

Scholars known for their contributions in marriage and health literature are also increasingly focusing their research on those who are not married and are finding that those who are not married exhibit several mechanisms to compensate for any support that they may have experienced if married, such as developing alternative networks and relationships (Kalmijn 2017). For instance, some highlight that those who have experienced partner loss are less likely to exhibit emotional stressors and depression when they can alleviate gaps in support resulting from partner loss with support provided from extensive networks, including frequent exposure to relatives and friends (Hooyman and Kiyak 2015).

Given that high levels of NMQ among those who are married are associated with poor health, and that those who are unmarried have developed social mechanisms to experience support more commonly found in marriage, it seems plausible that those experiencing high levels of NMQ may seek support elsewhere by relying on others within their social networks when they feel that they can't rely on support from their partners. As such, an analysis of how marital quality moderates the association between how social support impacts health when transmitted through social networks of varying characteristics (SNCs) can help to understand how individuals can develop relationships with others outside of marriage when they no longer feel supported within it.

Similarly, while those who exhibit high levels of PMQ are more likely to exhibit better health, the process of cultivating support with marriage affords less time and opportunity to nurture other types of relationships that could further benefit health and are limited by the amount and type of support that spouses can provide. Those with large (Schnittker 2007; Galliccio et al. 2007), diverse (Brummett et al. 2001), and dense (Fiori et al. 2006) social networks characterized by frequent contact with network members (Terhell et al. 2007) have the greatest odds of gaining access to social support resources (Schnittker 2007) and ultimately tend to have better physical (Berkman and Syme 1979) and mental health (York Cornwell and Waite 2009). Thus, even when exhibiting high levels of PMQ, individuals can still benefit from more extensive social networks.

The consequences of marital quality on health are a particular concern for those in old age. While those in old age generally report high levels of PMQ, highly stressful events like retirement, bereavement, and residential change increase the odds that they experience health declines (Walsemann et al. 2008) and network change (Cornwell and Laumann 2015). Given

these health and social network changes, those in old age consequently become more reliant on spouses for support (Hoogendoorn and Smit 2009). Since those in old age further have greater odds of exhibiting partner loss, spousal dependency can impede opportunities to gain support elsewhere once marital support is no longer available.

Gender differences in marital quality, SNCs, and health outcomes further indicate the need to examine gender differences in the mechanisms linking these constructs among those in old age. Relative to men, women are more likely to report high levels of NMQ and poor health but are more likely to have extensive social networks. However, while women are more likely to have networks primarily comprised of kin, men with large kin-centered networks have greater odds of experiencing better mental (Cable et al. 2013) and self-rated health (Booth et al. 2014), and women with kin-centered networks report higher levels of distress (Haines and Hurlbert 1992). As such, analysis of gender differences in how marital quality moderates the association between the transmission of support and health can further elucidate how those in old age can access support benefiting health given their specific needs and tendencies.

Using data from waves 1 and 2 of the National Social Life, Health, and Aging Project (NSHAP) to examine the causal mechanisms for which marital quality and support from non-marital ties affect health over time, this study overarchingly attempts to address the following question: “Among those who are married, how does the transmission of social support across network members impact health when moderated by marital quality?” Given gender differences in SNCs, marital quality, and health outcomes, I further attempt to examine gender differences in these mechanisms.

Understanding the mechanisms for which both emotional support and HIS are transferred and impacted by various types of health outcomes among those in old age can allow those

interested in preventative health care to provide opportunities and services for those who are at greatest risk for specific types of health deterioration. By examining gender differences in the consequences of the transmission of support on health outcomes among those exhibiting different levels of marital support, health care providers can better assess the social support needs of their patients and learn to tailor opportunities to meet them.

BACKGROUND

Network Ties, Marital Quality, and Health

Social support is a form of social capital transmitted among social networks that benefits health. This includes actual and emotional provisions of social support, social control (social control, norms), social engagement, person-to-person contacts, and access to resources (jobs, money, and information) (Smith and Christakis 2008). It can also help individuals cope by enhancing self-esteem, as well as by promoting optimism and self-efficacy (Cohen 1992).

Marriages characterized by high levels of marital quality also provide support benefiting health. Happy marriages act as havens that reduce exposure to stress and help buffer stressful life events, enhancing emotional well-being. In contrast, marriages characterized by high levels of low marital quality increase the odds of health deterioration. For instance, involvement in a distressed marriage exposes an individual to stressful interactions that may lead to depression. Depression, in turn, affects health either indirectly, by promoting unhealthy behaviors such as smoking and drinking, or directly, by stimulating the production of stress hormones, evoking physiological responses, and triggering chronic arousal (Robles and Kiecolt-Glaser 2003). Distressed marriages can also directly decrease physical health. For instance, those exhibiting poor marital quality have increased levels of TNF— α , a proinflammatory cytokines tumor

necrosis factor (Wilson et al. 2019). Thus, the odds of experiencing poor health increase when exposed to NMQ and decrease when exposed to PMQ.

Understanding the processes for which social support, such as marital support, impacts health can be explained by the stress-buffering hypothesis. The stress buffering hypothesis postulates that access to supportive relationships, such as high-quality marriages, can mitigate the consequences of stressors on physical and mental health. Sources of stressors may include structural sources, such as institutionalized inequality, as well as individual factors, such as marital status, unemployment, parenthood. Stress outcomes in turn can be manifested through emotions, cognitions, health-related behaviors, coping behaviors, and physiological responses (Kiecolt-Glaser and Newton 2001).

Research supporting the stress-buffering hypothesis argue that the health consequences of marital support is a particular concern among those in old age. Throughout the aging process, those in old age are more susceptible to health deterioration caused by stressors (Charles 2010), ultimately increasing their need for social support. Despite this increased need, however, they are at greater risk of exhibiting network turnover, inhibiting their ability to rely on more distant ties (Cornwell 2014) and increasing the importance of support provided through marriage. Even in the absence of network turnover, marital support becomes more valuable to those in old age as more time is spent interacting with those linked by more intimate bonds (Carstensen 1991), and marital support accumulates over time (Waite 2005).

Regardless of whether social capital in the form of social support is provided by spouses or from other individuals within one's network, opportunities to receive social capital and its consequences depend on whether network members can *provide* or *facilitate* the exchange of social support resources across network ties, the characteristics that both the support provider

and receiver possess, and their willingness to either provide or receive the support (Wellman and Frank 2001). As such, when PMQ benefiting health may not be available, it seems plausible that those within a marriage can seek support from others within their networks for which social support is more readily available. Thus, I hypothesize that those with high levels of NMQ are more likely to seek support from network members benefiting health because they may feel that they cannot receive the same support from their spouses. They may adapt withdrawing as much as possible from the stressful, problematic marriage and pouring themselves into other relationships that are more satisfying/absorbing (Gecas and Seff 1990). Consequently, I further hypothesize that those with high levels of PMQ are less likely to exhibit changes in health resulting from the transmission of support through network members because their spouses can fulfill their support needs.

Gender, Support, and Health

Men and women exhibit gender differences in the benefits of social support transmitted within networks on health. (See Paper 1.) Gender differences in these mechanisms further differ by marital status. (See Paper 2.) Yet it seems that, in seeking to understand gender differences in the process for which marital quality moderates the transmission of support, it is important to understand how gender differences in marital quality affect health. While marital quality is positively associated with subjective well-being, this association is typically stronger among women (Jackson et al. 2014). The physical benefits of marital support are also greater for women than for men (Waite 1995).

Many have theorized why gender impacts the association between marital quality and health. According to Gender Relations Theory, gender is a widely recognized series of socially

constructed and meaningful practices that define perceptions of masculinity and femininity in relation to forms of power. According to this theory, gender relations within the family can be used to analyze relationships, such as the constraints of gendered expectations and behaviors across various divisions and organizations of labor within families and the workplace (Martin 2004). However, it suggests that marriage is the primary familial institution that governs intimate relationships and defines normative gender differences that reflect hegemonic masculinity (Meier et al. 2009). Individuals within society generally share an understanding of normative marital practices. For instance, gendered practices in the allocation of housework are shaped by the cultural expectations of appropriate masculine and feminine behavior (Brines 1994). When individuals violate any of these practices, marriages may experience turbulence and risk dissolution.

In accordance with this theory, marriage and intimate relationships are more central to a woman's identity and consequently have a greater impact on the overall well-being of women. Relative to men, women typically "specialize" in nurturing roles and emotional work while their husbands typically specialize in paid employment outside the home (Loscocco and Walzer 2013). To succeed at maintaining their emotional roles, women may take responsibility for marital problems (Beach et al. 2003). Given that women traditionally hold less power within marriage, some researchers further argue that women have a greater investment in maintaining healthy relationships (Bulanda 2011).

However, most of the research using Gender Relations Theory to examine the association gender differences in the association between marital quality and health focus on those in mid-life and may be less applicable to those in old age who researchers theorize exhibit "role crossover". While Gender Relations Theory indicates that men value power and agency when

embodying the breadwinner role, “role crossover” suggests that men tend to prioritize family and affiliations that promote emotional connectedness over power and agency as men age-especially after retirement. Likewise, while Gender Relations Theory indicates that women should engage in emotional work in order to fulfill their caregiving role, “role crossover” suggests that as women age, they increasingly embody values highlighting their own agency and self-fulfillment rather than values closely tied to their relationships with others (Loscocco and Walzer 2003). Given how men and women exhibit “role crossover” during the aging process, I hypothesize that, relative to women, men are more likely to exhibit health benefits from the transmission of social support from non-spousal network members, regardless of whether they exhibit high levels of NMQ or PMQ.

RESEARCH QUESTIONS

Given the concerns, this study examines the following research questions:

1. Are the effects of the transmission of social support through SNCs on physical health, depression, and functional health moderated by positive and negative marital quality?
2. Do these associations differ among men and women?

METHODOLOGY

I use data from the National Social Life, Health, and Aging Project (NSHAP). NSHAP is a nationally representative, population-based study funded by the National Institutes of Health and conducted by the National Opinion Research Center (NORC). It was created to investigate the association between various aspects of health and social experiences. It includes extensive data regarding egocentric networks, partner history, mental and physical health, medication use,

physical activity, health-related behaviors, and biomarkers across three waves of data. The current study uses data from the first two waves. Wave 1 was collected between 2005-2006, and Wave 2 was collected between 2010-2011. A total of 4,400 potential respondents between the ages of 57 and 85 were initially asked to participate in the NSHAP Study during Wave 1. Of those who were selected during Wave 1, 3,005 (75.5%) respondents completed the 2-hour in-home interviews for the study. Given the length of the interviews, respondents were also asked to complete a paper questionnaire at their leisure and return it by mail. Of those who completed the 2-hour in-home interview, 84% additionally completed and submitted the paper questionnaire (Cornwell et al. 2008). Of those who participated in Wave 1, 2,261 (75.2 %) of respondents also participated in Wave 2. In addition to those who participated in Wave 1, Wave 2 also included some of the spouses of respondents from Wave 1 and other individuals who were asked to participate in Wave 1 but declined. A total of 3,377 respondents participated in Wave 2 overall (Cornwell et al. 2014). Although more respondents were added during Wave 2, the current study only includes those who reported being married during both waves and did not report any change in marital status. After deleting missing cases and outliers that promoted heteroskedasticity, the current study uses data from 817 respondents who participated in both waves (For additional information regarding data collection methods, see Cornwell et al. 2009; O’Muircheartaigh et al. 2014).

Health indicators: Because health can impact how individuals engage with others within their social networks, data indicating depression, physical health, and functional health were collected during both waves and all three health outcomes examined during Wave 1 were used to predict each health outcome during Wave 2. Within both waves, respondents were asked questions about their self-rated physical health, depressive symptoms, and functional health.

Data was collected for all three health indicators during both waves and health indicators from Wave 1 were used to predict the health indicators during Wave 2. Respondents were asked to rate their overall self-rated physical health on a scale ranging from 1 (poor) to 5 (excellent). Responses to this question were reverse coded such that higher values indicate poor self-rated physical health. They were also asked 11 questions derived from the Center for Epidemiologic Studies Depression Scale (CES-D) targeting the extent to which respondents exhibited 11 depressive characteristics. On a scale ranging from 1 (rarely or none of the time) to 4 (most of the time) respondents were specifically asked how many times within the past week that they felt any of the following depressive characteristics: “sad”, “depressed”, “happy”, “disliked”, “like you enjoyed life”, “like everything was an effort”, “that you couldn’t get along”, “had a hard time getting to sleep or staying asleep,” “ had trouble keeping your mind on what you were doing,” “did not feel like eating,” and “felt that others were unfriendly” (Ross et al. 1990).⁹ Responses to questions addressing the extent to which respondents “were happy” and “enjoyed life” were reverse coded such that higher responses indicate less happiness and life enjoyment, so that all questions were correlated. To address the association between SNCs and depression across time, 11 questions were averaged and combined to form indicators for depression during Wave 1 and Wave 2 (Wave 1: Cronbach’s $\alpha=.77$; Wave 2: Cronbach’s $\alpha=.76$).

An indicator for functional health was created using the Katz Index of Independence in Activities of Daily Living (ADL) was used to examine functional health because those with ADL limitations exhibit greater risk in impairment, hospitalization, and early mortality (Freedman and Spillman 2014).ADLs includes questions addressing difficulty with personal care tasks,

⁹ The Center for Epidemiologic Studies Depression Scale also includes a question gauging respondent loneliness. However, loneliness is examined as a separate indicator within this study. To avoid multicollinearity among indicators, the CES-D indicator used to examine depression does not include the commonly used question addressing loneliness.

including: bathing such as difficulty washing or getting in or out of the shower or bathtub; eating such as difficulty using utensils; and toileting such as difficulty washing after voiding (Mahoney and Barthel 1965). Those with ADL limitations exhibit greater risk in impairment, hospitalization, and early mortality (Freedman and Spillman 2014). The ADL was given to respondents during both waves in the NSHAP study. Respondents were asked a set seven questions targeting mobility, including questions about their ability to get out of bed, use the bathroom, walk, bathe, and eat on their own. Responses were coded on a scale from 1 to 3 such that 1 indicated little difficulty completing tasks and 3 indicated substantial difficulty completing tasks. In both waves, answers to these questions were combined to create indicators for functional health (Wave 1: Cronbach's $\alpha = .78$; Wave 2: Cronbach's $\alpha = .84$).

Marital Quality

Marriages can exhibit high levels of both PMQ and NMQ concurrently (Umberson et al. 2006). For this reason, I created different factors for both constructs. Guided by Liu and Waite's (2014) approach to examine both PMQ and NMQ using NSHAP data, I use exploratory factor analysis (EFA) using all eight items that target marital quality within Wave 1 and Wave 2 of the NSHAP data.

As an indicator for item 1, respondents were asked how close they felt their relationship with their spouse was.¹⁰ Responses ranged from 1 (not very close to somewhat close) to 3 (extremely close). As an indicator for item 2, respondents were asked how happy they were in their spousal relationship. These responses ranged from 1 (very unhappy) to 7 (very happy). Because this indicator was highly skewed, it was collapsed so that 1=unhappy (1,2,3,4), 2=happy

¹⁰ Indicator 1 was created using network data. Respondents were specifically asked how close they were to each individual within their network. Responses pertaining to partners and spouses were then used to create this indicator.

(5,6), and 3=very happy (7). As an indicator for item 3, respondents were asked how happy they were in their spousal relationship. Responses ranged from 0 (not at all) to 4 (extremely). Because this indicator was also highly skewed, I collapsed the values to 1="not satisfied" (0,1,2), 2="satisfied" (3) and 3="very satisfied" (4). As an indicator for item 4, respondents were asked the extent to which they preferred to spend their free time doing things with their spouse. Responses ranged from 1 (mostly together) to 3 (mostly apart). This item was reverse-coded such that more time spent together indicated better marital quality. Respondents were also asked how often they could open up to their spouse about their worries (Item 5) and how often they could rely on the spouse for help if they had a problem (Item 6). Responses to both questions ranged from 1 (hardly ever or never) to 3 (often). Finally, respondents were asked, "How often does spouse get on your nerves?" (Item 7) and "How often does your spouse make too many demands of you?" (Item 8). Responses to both questions included 1="never, hardly ever, or rarely," 2="some of the time," and 3="often."

EFA was specifically conducted using oblique rotation with maximum likelihood estimation. This means that the factors are not independent and are correlated (Osborne 2015). Results from the EFA indicate that all eight items from two different items, one for PMQ and one for NMQ. While all eight items were used in constructing indicators for PMQ and NMQ, the first six items carried more weight when addressing PMQ, while the second two items carried more weight when addressing NMQ. The factor loadings used to create indicators for PMQ and NMQ are depicted in Table 2.1.

Table 3.1. Factor loadings for marital quality.

	Positive Marital Quality (Factor 1)	Negative Marital Quality (Factor 2)
How close do you feel is your relationship with your spouse?	.028	.269
How often can you open up to your spouse?	.343	.417
How often can you rely on your spouse?	.358	.432
How emotionally satisfying do you find your relationship with your spouse?	.340	.573
How would you describe your marriage in terms of happiness?	.268	.552
Do you and spouse spend free time together or apart?	.180	.300
How often does your spouse criticize you?	-.512	.617
How often does your spouse make too many demands of you?	-.274	.502

Factors were created using The Maximum Likelihood Rotation Method.

Oblimin with Kaiser Normalization

Factor Scores Method: regression.

X^2 : 58.169***; df=13

Because the study attempts to clarify the causal association between the transmission of support and health, Wave 2 indicators for PMQ and NMQ were used to create variables targeting whether responses exhibited any change in either PMQ or NMQ across waves. These variables are identified as “PMQ change” and “NMQ change,” respectively.¹¹

Social Support Resources: In Waves 1 and 2, NSHAP provides two indicators to measure social support, one examining emotional social support, otherwise referred to as emotional support, and another examining health information support (HIS). To examine emotional support, respondents were asked how close they felt to each individual within their network. Responses to the indicator for emotional support range from 1=“not very close” to 4=“very close.” To examine HIS, respondents were asked how likely they were to discuss their health concerns with everyone within their network. Responses to this indicator also ranged from 1=“not likely” to 3=“very likely.” Data about types of support were collected during Wave 2.

Network Characteristics: Data regarding individuals within each respondent’s social network were collected during each wave. Since NSHAP was interested in collecting data on the quality and types of relationships within one’s network, it asked respondents, “*Looking back over the last 12 months, who are the people with whom you most often discussed things that were important to you?*” Respondents could provide details about their relationships with five network members and could further list the number of any additional network members. Details regarding the first five network members included network characteristics and social support resources characteristics. The current study specifically addresses how prior support transferred through

¹¹ Though factors for PMQ and NMQ during Wave 2 were also created to calculate change in marital quality, goodness-of-fit tests indicate that these factors poorly represent the data ($X^2=14.928$, DF: 13; sig. .312).

current network composition, contact frequency, density, size, female contacts, and living with network members, impacts depression, self-rated health, and functional health during Wave 2.

Large networks increase the odds that network members may be able to offer support. Although respondents were asked whether they had any network members beyond those for which they provided network data, most individuals have core networks that include from three to five individuals (Perry et al. 2018). As such, the current study defines network size as the number of individuals for which respondents provided network data.

In the current study, I focus on the sum of support received from network ties of different relations. In NSHAP, respondents were asked to identify their relationship to each of their network ties using any of the following 19 types of relationships: spouse, ex-spouse, child, stepchild, romantic/general partner, parent, parent-in-law, sibling, other relative, other in-law, neighbor, coworker or boss, minister/priest/other clergy, psychologist/psychiatrist/counselor/therapist, caseworker/social worker, housekeeper/home health care provider, or other. In the current study, network composition refers to those who belong to the following groups: kinship ties, friendship ties, and distant ties. "Kin" refers to those who reported network members as spouses or intimate partners, siblings, children, stepchildren, grandchildren, parents, parent-in-laws, other in-laws, and other types of relatives. "Friends" refer to those who reported network members as friends. "Distant Ties" refer to ties made with network members characterized as case workers/social workers, coworkers, ex-spouses, housekeepers/home health care providers, ministers/priests/other clergy, neighbors, psychiatrists/psychologists/counselors, or any other types of network tie.¹²

¹² Individuals can generally provide accurate data about their spouses, children, siblings, and friends but generally provide less accurate data about weaker ties, including other types of kin and neighbors (Reysen et al. 2014).

Individuals with frequent contact with network members have greater access to acquire support from network members (Munch, McPherson, and Smith-Lovin 1997). Within NSHAP, contact frequency is reported on an eight-point scale ranging from “every day” to “less than once a year.” In the current study, contact frequency is standardized and is referred to as the approximate number of days that an individual spends with each individual within his or her network each year. For example, if an individual spends every day with a network member, the network member’s response score is coded as 365. I then calculated the sum of these scores across network members to obtain a measure of overall contact frequency with network members.

Density refers to the likelihood that network members interact with each other. Dense networks offer individuals the opportunity to receive support either directly or indirectly through network members that may have access to information from others within your network (Kazak and Marvin 1984). Networks with high density are characterized by close-knit ties to homogenous network members, which help to foster social norms and cooperation (Lakon et al. 2008). However, networks with low density have been found to provide diverse types of support, like coping strategies, which help to foster resilience in the face of adversity (Wilcox 1981). Density is calculated as the proportion of all possible interactions between individuals within a respondent’s network. NSHAP asked respondents to indicate the frequency for which each individual within their network interacted with other individuals within their network. Although density can be calculated as a weighted measurement accounting for contact frequency, density in the current study considers only whether network members interacted. The ties are considered directed because respondents were asked twice whether two individuals within their network interacted (Perry et al. 2018). For instance, respondents were asked whether network member X

interacted with network member Y and whether network member Y interacted with network member X. Directed ties are calculated as the number of network ties (T) divided by the number of possible ordered pairs of interactions $N(N-1)$, as identified in Equation A.. This equation also excludes interactions between respondents and each network member.

$$\text{Equation A: Directed ties} = \frac{T}{N(N-1)}$$

Living with network members allows for greater contact frequency and greater opportunity to receive support. For instance, those who have poor functional health may benefit from living with network members for help with day-to-day tasks. Within the NSHAP data, respondents were asked whether they lived with any of the individuals for which they provided network data. In the current study, I focus on the proportion of one's network that contains contacts with whom respondents live and is identified as the variable *lives with contacts*.

Individuals with networks containing many female contacts may have greater odds of receiving support because women have been socialized to provide support (Antonucci and Akiyama 1987). Like the variable, "lives with contacts," respondents were asked which respondents within their network were female. This data was used to create the variable "female contacts," which indicates the proportion of females within one's network.

Marital quality is influenced by the length of an individual's marriage (Proulx 2007), and long-term relationships with network members influence the type of support available within one's network. I thus control for the length of time respondents have known each individual within their network and refer to this variable as network duration. Responses are coded on a four-point

scale, including 1=“less than a year,” 2=“one to three years,” 3=“three to six years,” and 4=“more than six years.”

Covariates: Additionally, NSHAP further includes several other demographic and social engagement measures that potentially influence social network characteristics and health outcomes, including gender, age, education attainment, race/ethnicity, income, and prior loneliness. All these variables were collected from Wave 1. Gender is coded as a dichotomous variable, with (1) indicating female. Age was coded as a continuous variable and centered at a mean of 72, indicating that on average, respondents were 72 years old when the study began. Education attainment was considered, as education may influence the likelihood that one is capable of understanding and complying with health care recommendations (Wellems et al. 2005). Those who are more educated are also more likely to maintain and ultimately be influenced by social networks composed of individuals who exhibit healthier behaviors (Christakis and Fowler 2007). In the current study, education attainment is categorized as whether respondents did not graduate from high school, graduated from high school, experienced some college, or graduated college, indicating that at baseline, respondents completed some college.

Race is also considered, because, relative to Americans of European descent, African Americans have higher mortality rates for most of the top 15 leading causes of death, including hypertension, cancer, heart disease, and diabetes (Kung et al. 2008). Racially marginalized groups are unlikely to utilize preventative care services. Among minority women, for instance, racial discrimination and cultural mistrust shape the utilization of social support benefiting health (Pullen et al. 2014). In the current study, race and ethnicity were categorized as Hispanic, non-

Hispanic white, non-Hispanic black, and non-Hispanic, indicating that at baseline, respondents are non-Hispanic white.

I controlled for socioeconomic status, as those with more socioeconomic resources have greater odds than those of low socioeconomic status to retain beneficial social ties (Schafer and Vargas 2016). However, because respondents often avoid answering survey questions pertaining to socioeconomic status, I controlled for whether individuals believed that their income was less than, more than, or about equal to the average American. To account for those who refused to answer this question, I further controlled for those who did not report their emotional income bracket as “income missing.” Those who reported having an average income were coded as baseline.

Last, I control for loneliness, which has been found to have deleterious effects on health and relationship length which benefits health. For instance, the association between loneliness and depression has been found to occur bidirectionally over time (Santini et al. 2020). Three questions from Wave 1 were used to create an indicator for loneliness. On a scale ranging from 1 (hardly ever [or never]) to 3 (often), respondents were asked how often they felt that they lacked companionship, felt isolated, and felt left out. Responses to these questions were combined to create a single indicator for prior loneliness (Wave 1: Cronbach’s $\alpha=.78$). Relationship length is a network construct created using network analysis but was included in this study as a covariate. In order to gauge relationship length, respondents were asked how long they’ve known each individual within their network. Responses ranged from 1 (less than a year), 2 (1-3 years), 3 (3-years) and 4 (more than 6 years). For further clarification, Table 3.2 indicates which variables were used from each wave of the NSHAP data.

Table 3.2. List of which variables were used from waves 1 and 2 of the NSHAP data.

	Wave 1	Wave 2
Health Outcomes		
	Depression, Physical Health, and Functional Health	Depression, Physical Health, and Functional Health
Support		
	Emotional Support and HIS	
SNCs		
	Contact Frequency, Kinship Ties, Friendship Ties, Distant Ties, Density, Network Size, Lives With Contacts, Female Contacts	
Covariates		
	Gender, Education, Income, Race, Ethnicity, Age, Relationship Length, and Loneliness	
	PMQ and NMQ	
	Change in PMQ and NMQ is derived from data from both waves	

Analytical Design

The benefits of social capital, such as social support, depend on its availability. For instance, social support can be diffused only if network members i' are able to provide support, and if an individual's network exhibits characteristics that allow for its exchange (Frank et al. 2004). Thus, access to support can be examined using network influence equations, such as Equation E.

$$\text{Equation E: } \textit{Access to Support} = \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (\textit{Support}_{i't-1}) + \beta_1(\textit{Prior Health}_{it-1}) + \dots + \varepsilon_{it}$$

Using Equation E., I indicate the extent to which an individual i reports at Time 2 ($t-1$) that they received support from i' , each individual within individual i 's network. For instance, if Melissa has a network of three members, including Addie, Britley, and Josh, then the amount of emotional support transmitted to Melissa can be calculated as the sum amount of exposure she has had to each contact member. Exposure is calculated by multiplying the amount of contact that Melissa has had with each network member by the amount of support she has received by each. After calculating how much exposure Melissa has had to each network member, all exposure terms are added in order to calculate how much support has been transmitted. For instance, if Melissa reported that she felt extremely supported by Josh (4= very close) with whom she saw 365 days a year, didn't feel very supported by Addie (1=not very close) with whom she saw once a week (52 days a year), and didn't feel very supported by Britley (1=not very close) with whom she saw once a month (12 days a year), then then the amount of emotional support transmitted to Melissa would value 1,524 $((365*4) + (52*1) + (12*1)) = 1,524$.

524.)”. Because prior health can impact access to support, Equation E. further controls for prior health (β_1).

The variables created to indicate the transmission of support using Equation E. were then embedded within lagged regression models containing all other independent variables to examine how network characteristics transmit emotional support and HIS in ways which impact depression, physical health, and functional health across both waves of data (Marsden and Friedkin 1994). Each regression model specifically addresses how the transmission of a single type of support, such as emotional support, is transmitted across networks to influence a specific health outcome. Equation H. is a simplified version of the regression equation used in my analysis.

Equation H: *Health Outcome*

$$= \rho \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (Support_{i't-1}) + \beta_1 (Health\ Outcome_{t-1}) \\ + \beta_2 (Marital\ Quality_{it-1}) + \dots + \varepsilon_{it}$$

In Equation H, Y_{it} represents the dependent health outcome being observed during Wave 2, β_x represents the coefficient associated with each independent variable examined during Wave 1 ($t-1$), and ε_{it} , represents potential error within each regression model. Each regression model controls for the effects of both types of social support, SNCs, and covariates on health.

I further examine whether the transmission of each type of support across SNCs, interacts with marital quality to impact depression, physical health, and functional health. Equation I.

depicts a simplified version of a regression equation used to examine these marital status interaction effects.

Equation I: *Health Outcome*

$$\begin{aligned}
&= \rho \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (Support_{i't-1}) + \beta_1(Health\ Outcome_{t-1}) \\
&+ \beta_2(Marital\ Quality_{it-1}) \\
&+ \beta_3(Marital\ Quality_{it-1}) \sum_{i' \neq i}^{n-1} (SNC_{i't-1}) \times (Support_{i't-1}) \\
&+ \beta_3 X(Health\ Outcome_{it-1}) + \dots + \varepsilon_{it}
\end{aligned}$$

Equation E and F differ in that E further accounts for the interaction effects of marital quality, including NMQ and PMQ. Within Equation F, Y_{it} represents the dependent health outcome being observed during Wave 2, β_x represents the coefficient associated with each independent variable examined during Wave 1 (t-1), and ε_{it} , represents potential error within the models. However, marital quality is further multiplied by each β_x associated with each variable indicating the transmission of support through SNC to indicate whether marital quality moderates the mechanisms for which the transmission of social support across networks impact health.

Last, I examined whether there were gender differences in how the transmission of social support through SNCs impact each health outcome by examining data from each gender separately and comparing results across groups. I considered whether group differences in results

were statistically significant using Konfoundit! to perform X^2 analysis and the Wald test (Frank 2014).¹³

FINDINGS

Descriptive Statistics

Table 3.3 compares gender differences in descriptive statistics for the variables considered in my analysis, including the health outcomes, the variables used to indicate the transmission of both emotional support and HIS through SNCs, and covariates. Of the 817 married respondents who participated in both waves, 317 were women and 500 were men. Of all respondents, most were non-Hispanic white, and had a college degree. On average, women reported earning an average income while men reported earning an income that was higher than average.

Men exhibited poorer physical health while women were more likely to report being depressed. Women were more likely to exhibit poor functional health during Wave 1 while men were more likely to exhibit poor functional health during Wave 2. Regardless of gender, respondents on average reported worse physical health and functional health during Wave 2 than during Wave 1 and were less likely to report depression as the waves progressed. Women were more likely to report higher levels of both NMQ and PMQ than men. Gender differences in the transmission of support through SNCs were consistent across support types. Relative to men, women were more likely to report receiving both emotional support and HIS directly, through kin, friends, distant ties, frequent contact with network members, large networks, dense networks, and through female contacts. However, men were more likely to receive both types of

¹³ The Konfoundit! Program cites Cohen and Cohen (1983) in programming calculations to compare independent beta coefficients across groups.

support through living with network members and through network members with whom they knew longer.

Table 3.3. Descriptive statistics for the variables used to examine the transmission of support impacting health. Variables indicate which wave of NSHAP was used to collect the data. Results are grouped by gender.

	Women (N=317)				Men (N=500)			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Physical Health (W1)	2.42	1.03	1.00	5.00	2.49	1.04	1.00	5.00
Physical Health (W2)	2.51	1.05	1.00	5.00	2.65	1.04	1.00	5.00
Depression (W1)	1.40	0.40	1.00	3.64	1.37	0.39	1.00	3.00
Depression (W2)	1.38	0.37	1.00	3.27	1.36	0.39	1.00	3.27
Functional Health (W1)	0.39	0.24	0.29	2.00	0.36	0.18	0.29	1.57
Functional Health (W2)	1.12	0.28	1.00	3.00	1.13	0.28	1.00	3.00
Emotional Support through...								
Direct Emotional Support	7.36	1.44	4.84	11.65	7.06	1.39	3.63	11.84
Kin	15.73	5.18	6.29	51.29	14.21	5.10	3.92	38.17
Friends	8.29	4.34	2.29	24.19	6.97	3.86	2.29	25.29
Distant Ties	6.22	3.30	2.29	22.10	6.15	3.22	2.29	26.47
Contact Frequency	3517.62	1781.80	1029.65	18826.29	2803.76	1341.69	3.92	8031.43
Network Size	22.07	4.72	7.05	34.56	19.84	5.31	5.00	35.81
Network Density	71.20	65.59	5.10	684.24	54.17	47.58	2.29	411.78
Female Contacts	14.67	4.92	4.56	50.29	11.84	4.31	3.92	29.17
Living with Contacts	8.68	2.96	3.16	23.68	8.75	3.12	2.56	26.56
Relationship Length	8.10	3.35	2.29	20.47	8.36	3.42	2.29	20.62
HIS through....								
Direct HIS	6.83	1.43	4.07	11.49	6.62	1.38	3.72	11.59
Friends	13.71	4.29	5.16	38.29	12.72	4.43	3.56	29.57
Distant Ties	13.69	4.33	5.16	38.29	12.80	4.40	3.56	29.56
Contact Frequency	5.91	3.03	2.29	22.10	5.89	2.93	2.29	21.47
Network Size	2876.81	1376.55	1149.47	13977.29	2299.75	1089.56	242.58	6576.26
Network Density	19.04	3.67	9.69	27.56	17.21	4.13	6.80	28.81
Female Contacts	60.12	53.12	4.42	378.56	45.02	39.14	2.29	314.35
Living with Contacts	13.18	4.51	4.29	38.29	10.63	3.62	3.56	27.17
Relationship Length	8.03	2.85	3.16	25.19	8.43	3.42	2.56	27.29
Friends	7.47	2.95	2.29	16.47	7.59	3.03	2.29	16.61

Table 3.3. (cont'd).

Covariates									
Age	-1.47	6.24	-10.05	16.95	-0.87	7.20	-10.05	17.95	
Non-Hispanic White	0.89	0.31	0.00	1.00	0.85	0.36	0.00	1.00	
Non-Hispanic Black	0.04	0.21	0.00	1.00	0.05	0.22	0.00	1.00	
Non-Hispanic Other	0.02	0.14	0.00	1.00	0.02	0.15	0.00	1.00	
Hispanic	0.05	0.21	0.00	1.00	0.08	0.27	0.00	1.00	
>High School	0.09	0.29	0.00	1.00	0.13	0.34	0.00	1.00	
High School	0.26	0.44	0.00	1.00	0.20	0.40	0.00	1.00	
Some College	0.37	0.48	0.00	1.00	0.30	0.46	0.00	1.00	
College	0.28	0.45	0.00	1.00	0.37	0.48	0.00	1.00	
<Average Income	0.17	0.38	0.00	1.00	0.18	0.39	0.00	1.00	
Average Income	0.42	0.50	0.00	1.00	0.39	0.49	0.00	1.00	
>Average Income	0.39	0.49	0.00	1.00	0.41	0.49	0.00	1.00	
Income Missing	0.02	0.14	0.00	1.00	0.02	0.12	0.00	1.00	
Change in NMQ	0.31	1.07	-2.86	4.21	-0.15	1.09	-3.02	3.65	
Change in PMQ	0.15	1.39	-5.28	1.73	0.00	1.24	-6.01	1.77	
Marital Quality									
NMQ	0.07	0.96	-0.75	4.75	-0.09	0.76	-0.75	4.57	
PMQ	0.15	0.77	-2.47	0.91	-0.06	0.86	-2.50	0.91	

~All values are standardized for nonresponse.

~W1=Variable was taken from Wave 1 of data; W2=Variable was taken from Wave 2 of data.

~Note: Except for relationship duration, all social network indicators account for the sum support received across all network members; therefore, mean values indicate the mean of additive support. Relationship length accounts for mean support received across one's relationships with network members.

Correlations

Table 3.4 indicates how the various health outcomes and marital quality are correlated with each type of SNC used to transmit emotional support. Except for functional health during wave 2, all health outcomes were directly associated with each other and PMQ but indirectly associated with NMQ. Unlike functional health during either wave, both physical health and depression were also directly associated with negative marital quality.

Declines in physical and functional health during both waves, and declines in functional health during Wave 2, are also significantly associated with receiving emotional support directly, as well as when it is transmitted through kin, friends, distant ties, large networks, female contacts, living with contacts, and contacts with whom respondents had longer relationships. These health outcomes were not correlated with contact frequency or network density. Although functional health during Wave 2 was not associated with the transmission of emotional support through most network types, networks primarily composed of kin are associated with poor functional health.

Table 3.4. Pairwise correlations between health outcomes, emotional support transmission methods, and marital quality.

	1	2	3	4	5	6	7	8	9
Physical Health (W1)	1								
Physical Health (W2)	0.64***	1							
Depression (W1)	0.40***	0.33***	1						
Depression (W2)	0.28***	0.31***	0.50***	1					
Functional Health (W1)	0.45***	0.39***	0.37***	0.23***	1				
Functional Health (W2)	-0.02	0.06	-0.03	0.03	0.02	1			
Emotional Support through...									
Direct Emotional Support	0.86***	0.58***	0.58***	0.35***	0.57***	0	1		
Kin	0.25***	0.16***	0.12***	0.10***	0.14***	0.04***	0.39***	1	
Friends	0.25***	0.13***	0.20***	0.12***	0.19***	-0.04	0.26***	-0.29***	1
Distant Ties	0.38***	0.24***	0.31***	0.17***	0.26***	-0.01	0.39***	-0.10*	0
Contact Frequency	0.03	0	-0.03	-0.02	0	0.04	0.19***	0.51***	0.01
Network Size	0.18***	0.11***	0.09*	0.05	0.16***	0.05	0.54***	0.40***	0
Network Density	0	-0.03	0.01	0.01	0.02	-0.04	0.08*	0.3***	0.14***
Female Contacts	0.26***	0.17***	0.18***	0.13***	0.15***	0	0.36***	0.42***	0.21***
Living with Contacts	0.50***	0.35***	0.34***	0.20***	0.32***	-0.03	0.54***	0.36***	0.01
Length of Relationships	0.41***	0.26***	0.32***	0.20***	0.22***	-0.03	0.46***	0.12***	0.26***
Marital Quality									
NMQ	0.11***	0.12***	0.25***	0.19***	0.07*	-0.02	0.11***	-0.01	0.11***
PMQ	-0.07*	-0.1*	-0.17***	-0.13*	-0.04	0.03	-0.05	0.06	-0.05

Table 3.4. (cont'd).

	10	11	12	13	14	15	16	17	18
Distant Ties	1								
Contact Frequency	0.07*	1							
Network Size	0.05	0.57***	1						
Network Density	0.27***	0.21***	0.01	1					
Female Contacts	0.21***	0.40***	0.26***	0.32***	1				
Living with Contacts	0.17***	0.33***	0.28***	-0.03	0.19***	1			
Length of Relationships	0.35***	0.09*	0.17***	0.20***	0.18***	0.14***	1		
Marital Quality									
NMQ	0.05	-0.02	-0.03	-0.06	0.05	-0.03	0.08*	1	
PMQ	-0.06	0.08***	0.08*	0.05	0.03	-0.04	-0.03	-0.47***	1

~*** p<0.001, ** p<0.005, * p<0.05

~Variables are not weighted or standardized

~W1=Wave 1; W2=Wave 2; ES=Emotional Support; NMQ=Negative Marital Quality; PMQ=Positive Marital Quality

As with the transmission of emotional support through SNCs, the various health outcomes and marital quality types are also similarly associated with the transmission of HIS through each of the SNCs, as seen in Table 3.5. Receiving HIS through large networks is additionally associated with poor functional health during Wave 2.

Table 3.5. Pairwise correlations between health outcomes, methods to transmit Health Information Support, and marital quality.

	1	2	3	4	5	6	7	8	9
Physical Health (W1)	1								
Physical Health (W2)	0.64***	1							
Depression (W1)	0.40***	0.33***	1						
Depression (W2)	0.28***	0.31***	0.50***	1					
Functional Health (W1)	0.45***	0.39***	0.37***	0.23***	1				
Functional Health (W2)	-0.02	0.06	-0.03	0.03	0.02	1			
HIS through...									
HIS	0.91***	0.62***	0.61***	0.38***	0.59***	0.01	1		
Kin	0.33***	0.24***	0.17***	0.15***	0.19***	0.05	0.41***	1	
Friends	0.34***	0.24***	0.18***	0.15***	0.20***	0.05	0.41***	0.99***	1
Distant Ties	0.42***	0.28***	0.37***	0.19***	0.29***	0.01	0.46***	-0.03	-0.03
Contact Frequency	0.05	0.03	0.01	0.01	0.04	0.06	0.16***	0.47***	0.46***
Network Size	0.31***	0.22***	0.18***	0.13***	0.25***	0.08*	0.52***	0.29***	0.28***
Network Density	0.03	0.01	0.04	0.02	0.04	-0.03	0.08*	0.26***	0.25***
Female Contacts	0.33***	0.23***	0.24***	0.19***	0.17***	0.01	0.41***	0.40***	0.40***
Living with Contacts	0.48***	0.35***	0.32***	0.20***	0.26***	-0.01	0.49***	0.52***	0.51***
Length of Relationships	0.47***	0.31***	0.34***	0.21***	0.28***	0	0.52***	0.13***	0.13***
Marital Quality									
NMQ	0.11***	0.12***	0.25***	0.19***	0.07*	-0.02	0.16***	0.05	0.05
PMQ	-0.07*	-0.1*	-0.17*	-0.13*	-0.04	0.03	-0.10*	-0.02	-0.01

Table 3.5. (cont'd).

	10	11	12	13	14	15	16	17	18
Distant Ties	1								
Contact Frequency	0.10***	1							
Network Size	0.10***	0.57***	1						
Network Density	0.26***	0.18***	-0.02	1					
Female Contacts	0.29***	0.34***	0.24***	0.34***	1				
Living with Contacts	0.22***	0.26***	0.07	-0.08*	0.29***	1			
Length of Relationships	0.39***	0.11***	0.26***	0.24***	0.23***	0.08*	1		
Marital Quality									
NMQ	0.08*	0.04	0.06	-0.03	0.10*	0.07*	0.11***	1	
PMQ	-0.08*	0.02	0	0.03	-0.03	-0.1*	-0.05	-0.47*	1

~*** p<0.001, ** p<0.005, * p<0.05

~Variables are not weighted or standardized

~W1=Wave 1; W2=Wave 2; ES=Emotional Support; NMQ=Negative Marital Quality; PMQ=Positive Marital Quality

Gender differences in the transfer of support impacting depression when moderated by marital quality

I examined how the transfer of both emotional support and HIS through SNCs impacts depression, and whether marital quality moderates this association. This data is depicted in Table 3.6. In Table 3.6, Model 1 indicates regression results for the entire sample, while Models 2 and 3 indicate regression results for separate samples of women and men, respectively. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on depression while columns labeled with even numbers identify models controlling for whether marital quality moderates the transmission of support impacting depression. Column 1 indicates that before controlling for whether marital quality interacts with the transmission of support to impact health, receiving emotional support directly increases the odds of depression ($b=.132^*$ (.065) while receiving emotional support through female contacts decreases the odds of depression ($b=-.017^*$ (.008)).

According to columns 2 and 4, the odds that individuals exhibit mental health benefits from the transmission of emotional support decrease when transmitted directly ($b=.180^*$ (.070)) but increase when transmitted through distant ties ($b=-.028^*$ (.010)). Except for those with high levels of NMQ who have increased odds of being depressed when emotional support is transmitted through female contacts (Female Contacts: $b=.046+.013=.059$), marital quality does not moderate the association between the transmission of emotional support transmitted through SNCs and depression. Instead, the consequences of transmitting HIS impacts depression. No other SNCs affect the transmission of emotional support.

Depression is influenced by the transmission of HIS through distant ties among those with high levels of PMQ, as well as when directly transmitted through female contacts among

those with high levels of NMQ. Among those with high levels of PMQ, the odds that the transmission of HIS will benefit mental health increase when transmitted among distant ties ($b = -.025 + .015 = -.010$). Among those with high levels of NMQ, the odds that the transmission of HIS benefits mental health increase when transmitted directly ($b = -.009 - .047 = -.056$) but decrease when transmitted through female contacts ($b = -.009 + .011 = .002$). While the transmission of either type of support has no effect on depression among women, the transmission of both types of support impacts depression among men. Men receive mental health benefits when HIS is transmitted through large networks ($b = -.021^* (.013)$) but not when transmitted directly ($b = .211^* (.087)$).

Among men, the mental health benefits of emotional support differ by whether men exhibit high levels of PMQ or NMQ, specifically when emotional support is transmitted through female contacts. The odds that the men with high levels of PMQ benefit from emotional support decrease when transmitted through female contacts ($b = .105 + .015 = .12$). For every 1 unit increase in emotional support, the odds that it will benefit mental health decrease by 12.75% when transmitted through female contacts. However, the transmission of emotional support through female contacts has the opposite effect among men who exhibit high levels of NMQ and who benefit from emotional support transmitted through female contacts ($b = -.138 + .018 = -.12$). This may suggest that men may turn to other women for support when they are not feeling supported by their wives. These men also benefit from emotional support transmitted through kin ($b = -.138 - .021 = -.159$).

Among men exhibiting high levels of PMQ, the odds that the transmission of HIS benefits mental health increase when transmitted through large networks, dense networks, or through living with contacts (Network Size: $b = -.031 - .019 = -.05$; Density: $b = -.031 - .002 = -.033$;

Living with Contacts: $b = -.031$ -.021=-.052) but decrease when transmitted directly ($b = -.031$ +.174=.143). Additional between-group comparative analysis suggests that gender differences in consequences of receiving HIS directly or through large networks are further significant (Direct Support: $X^2 = 6.420$, $p > *$, Wald=2.53; Network Size x PMQ: $X^2 = .718$, $p > **$, Wald=2.778).

Men with high levels of NMQ are more likely to exhibit the mental health benefits of HIS is transmitted through kin, friends, and female contacts (Kin-.152-.116=-.268; Friends: $b = -.152$ +.105=-.047; Female Contacts: $b = -.152$ +.025=-.117) For every 1 unit increase in HIS, the odds of being depressed decrease by 23.51% but only by 4.59% when transmitted through friends. Analysis examining gender differences in these associations suggests that unlike women, men with high levels of NMQ who receive HIS from friends are more likely to exhibit the health benefits of receiving this type of support ($X^2 = 4.778$, $p > *$, Wald=2.186). The odds that men benefit from HIS transmitted from female contacts further increase 11.93% for every 1 unit increase in the transmission of HIS.

Table 3.6. Marital quality differences in the transfer of emotional support and HIS impacting depression. Model 1 indicates entire sample, Model 2 examines women, and Model 3 examines men. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on depression while columns labeled with even numbers identify models controlling for whether marital quality moderates the transmission of support impacting depression.

	Model 1. All (N=817)				Model 2. Women (N=315)				Model 3. Men (N=500)			
	Emotional Support		HIS		Emotional Support		HIS		Emotional Support		HIS	
	1	2	3	4	5	6	7	8	9	10	11	12
Transmission of support through....												
Direct Support	0.13*	0.18*	0.09	0.09	0.01	0.02	0.00	0.11	0.14	0.21*	0.12	0.10
	(0.06)	(0.07)	(0.06)	(0.06)	(0.12)	(0.13)	(0.12)	(0.13)	(0.08)	(0.09)	(0.08)	(0.08)
Kin	-0.00	-0.00	0.00	0.01	0.00	0.00	0.04	0.05	0.00	-0.00	-0.00	-0.01
	(0.00)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)
Friends	-0.01	-0.01	0.00	-0.00	0.00	0.01	-0.03	-0.04	-0.00	-0.00	0.01	0.01
	(0.00)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)
Distant Ties	-0.00	-0.01	-0.00	-0.00	0.00	0.01	0.01	0.01	-0.00	-0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Contact Frequency	0.00	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Density	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Network Size	-0.02*	-0.03*	-0.01	-0.01	-0.01	-0.00	-0.00	-0.02	-0.02	-0.03*	-0.01	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Female Contacts	0.00	0.00	0.01	0.00	-0.00	-0.01	0.00	-0.00	0.00	0.00	0.01	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Living with Contacts	0.00	0.00	-0.00	0.00	0.00	0.00	-0.00	0.01	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PMQ	0.00	0.05	0.00	-0.01	-0.01	0.21	-0.01	0.01	-0.01	-0.14	0.00	-0.15
	(0.02)	(0.10)	(0.02)	(0.10)	(0.04)	(0.16)	(0.04)	(0.17)	(0.03)	(0.14)	(0.03)	(0.14)
Direct Support X PMQ		0.03		0.05		0.08		-0.16		-0.03		0.17*
		-0.03		(0.06)		(0.05)		(0.12)		(0.04)		(0.07)

Table 2.6. (cont'd).

Kin X PMQ	-0.01	-0.01			-0.02	-0.02			0.00	-0.02		
	-0.01	(0.02)			(0.02)	(0.05)			(0.01)	(0.03)		
Friends X PMQ	-0.01	0.02			-0.03	0.04			0.00	0.03		
	-0.01	(0.02)			(0.02)	(0.05)			(0.01)	(0.03)		
Distant Ties X PMQ	0	0.01*			-0.03	-0.00			0.01	0.01		
	-0.01	(0.01)			(0.02)	(0.01)			(0.01)	(0.01)		
Contact Frequency X PMQ	0	-0.00			0.00	-0.00			-0.00	-0.00		
	0	(0.00)			(0.00)	(0.00)			(0.00)	(0.00)		
Density X PMQ	0	0.00			0.02	0.01			0.02*	0.01		
	0	(0.00)			(0.01)	(0.01)			(0.01)	(0.01)		
Network Size X PMQ	-0.01	-0.01			-0.02	-0.03			-0.01	-0.02*		
	-0.01	(0.01)			(0.01)	(0.02)			(0.01)	(0.01)		
Female Contacts X PMQ	0.01	-0.00			0.00	0.00			-0.00	-0.00*		
	-0.01	(0.00)			(0.00)	(0.00)			(0.00)	(0.00)		
Living with Contacts X PMQ	-0.01	-0.01			-0.01	0.03			0.00	-0.02*		
	-0.01	(0.01)			(0.01)	(0.02)			(0.01)	(0.01)		
NMQ	0.08***	0.06	0.08***	-0.03	0.01	-0.01	0.00	-0.09	0.11***	0.10	0.11***	-0.03
	(0.02)	(0.09)	(0.02)	(0.11)	(0.04)	(0.20)	(0.04)	(0.22)	(0.03)	(0.12)	(0.03)	(0.13)
Direct Support X NMQ	0.03	-0.05*			0.01	-0.01			0.03	-0.05		
	(0.03)	(0.02)			(0.03)	(0.03)			(0.03)	(0.04)		
Kin X NMQ	-0.01	-0.04			-0.02	0.02			-0.02*	-0.12**		
	(0.01)	(0.03)			(0.01)	(0.04)			(0.01)	(0.04)		
Friends X NMQ	-0.01	0.05			-0.02	-0.02			-0.01	0.10**		
	(0.01)	(0.03)			(0.01)	(0.04)			(0.01)	(0.04)		
Distant Ties X NMQ	0.00	0.01			-0.02	-0.00			-0.01	0.00		
	(0.01)	(0.01)			(0.02)	(0.01)			(0.01)	(0.01)		
Contact Frequency X NMQ	0.00	-0.00			-0.00	-0.00			0.00	-0.00		
	(0.00)	(0.00)			(0.00)	(0.00)			(0.00)	(0.00)		
Density X NMQ	0.01	0.01*			0.02	0.01			0.02*	0.03*		
	(0.00)	(0.00)			(0.01)	(0.01)			(0.01)	(0.01)		

Table 3.6. (cont'd).

Table 1: OLS regression results for the effect of network size and social contacts on the probability of being infected by COVID-19													
Model 1: Network Size X NMQ					Model 2: Network Size X NMQ + Female Contacts X NMQ				Model 3: Network Size X NMQ + Living with Contacts X NMQ				
Network Size X NMQ	-0.01			-0.00				-0.01				-0.01	0.01
	(0.01)			(0.01)				(0.01)				(0.02)	(0.01)
Female Contacts X NMQ		-0.00		-0.00		-0.00			-0.00			0.00	0.00
		(0.00)		(0.00)		(0.00)			(0.00)			(0.00)	(0.00)
Living with Contacts X NMQ			-0.01	0.01		-0.00		0.02		0.01		0.02	
			(0.00)	(0.01)		(0.01)		(0.02)		(0.01)		(0.01)	
Constant	0.60***	0.51***	0.56***	0.56***	0.62***	0.65**	0.61***	0.57**	0.67***	0.50***	0.58***	0.60***	
	(0.09)	(0.11)	(0.09)	(0.09)	(0.18)	(0.21)	(0.17)	(0.18)	(0.12)	(0.14)	(0.12)	(0.12)	
Observations	817	817	817	817	317	317	317	317	500	500	500	500	
R-squared	0.33	0.35	0.33	0.35	0.38	0.42	0.38	0.42	0.34	0.38	0.34	0.39	

~ Standard errors in parentheses

~ *** p<0.001, ** p<0.005, * p<0.05

~ Data is standardized and weighted for non-response

~ Models also control for gender (female), race (Non-Hispanic White), age, education (high school), income (average income), prior physical, and prior functional health, and change in both PMQ and NMQ across waves.

~ ES=Emotional Support, HIS=Health Information Support, PMQ: Positive Marital Quality, NMQ= Negative Marital Quality.

~ Bold coefficients and standard errors indicate statistically significant gender differences in association.

Gender differences in the transfer of support impacting physical health when moderated by marital quality

I then examined how the transfer of both emotional support and HIS through SNCs impacts physical health, and whether marital quality moderates this association. This data is depicted in Table 3.7 which includes models that align with those depicted in Table 3.6. In Table 3.7, Model 1 indicates regression results for the entire sample, while Models 2 and 3 indicate regression results for separate samples of women and men, respectively. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on physical health while columns labeled with even numbers identify models controlling for whether marital quality moderates the transmission of support impacting physical health. Except for column 5 indicating that women have decreased odds of exhibiting physical health benefits when emotional support is transmitted through dense networks, all other odd numbered columns highlight that the transmission of support through SNCs have no impact on physical health unless further controlling for the potential moderating effects of marital quality.

Respondents exhibiting high levels of PMQ have decreased odds of exhibiting physical health benefits from distant ties (ES: $b=.020+.053=.073$; HIS: $b=.023+.047=.070$), particularly among men (ES: $b=.042+.072=.114$; HIS: $b=-.013+.060=.047$). For every 1 unit increase in emotional support from distant ties, the odds that men with high levels of PMQ exhibit physical health benefits from this support decrease by 12.075%. Women with high levels of PMQ are more likely to receive health benefits of HIS from female contacts but are less likely to benefit from living with contacts (Female Contacts: $b=-.292+.048=-.034$; Living with Contacts: $b=-.292-.079=-.371$). As such, for every 1 unit increase in the transmission of HIS from living with

contacts, women exhibiting high levels of PMQ are 31.00% less likely to experience its physical health benefits. However, this association does not significantly differ by gender.

Among those with high levels of NMQ, the transmission of support impacting physical health specifically occurs among men. These men exhibit physical health benefits from both emotional support and HIS transmitted through female contacts (ES: $b=.299-.052=-.247$; HIS: $b=.410-.076=-.334$). In fact, with every 1 unit increase in support, the odds of men exhibiting declines in physical health decrease when women transmit emotional support and HIS by 28.02%, and 39.65%, respectively.¹⁴ The physical health benefits of receiving both types of support from female contacts further significantly differs by gender ($X^2=6.420$, $p>*$, Wald=2.53).

Men exhibiting high levels of NMQ exhibit stark differences in the health consequences of HIS transmitted through kin and friends. Whereas men with high levels of NMQ exhibit mental health benefits of HIS transmitted through kin and friends, these men have increased odds of exhibiting physical health declines when HIS is transmitted through the same avenues. Men exhibiting high levels of NMQ have increased odds of exhibiting poor physical health when HIS is transmitted through kin and friends (Kin: $b=.410+.204=.614$; Friends: $b=.410-.199=.211$). As such, with every 1 unit increase in HIS, its odds of benefiting physical health decrease by 84.78% when transmitted through family and by 23.49% when transmitted through friends. However, gender differences in physical health consequences of HIS transmitted through kin and friends are not significant.

¹⁴ Percentages were calculated using Equation D: $((1-e^{\beta_1-\beta_1\beta_2}) \times 100)$ where β_1 = support type and $\beta_1\beta_2$ = the interaction between support type and marital status.

Table 3.7. Marital quality differences in the transfer of emotional support and HIS impacting physical health. Model 1 indicates entire sample, Model 2 examines women, and Model 3 examines men. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on physical health while columns labeled with even numbers identify models controlling for whether marital quality moderates the transmission of support impacting physical health.

	Model 1. All (N=817)				Model 2. Women (N=315)				Model 3. Men (N=500)			
	Emotional		HIS		Emotional		HIS		Emotional		HIS	
	1	2	3	4	5	6	7	8	9	10	11	12
Transmission of support through....												
Direct Support	0.05 (0.16)	0.06 (0.17)	-0.08 (0.15)	-0.07 (0.15)	-0.05 (0.29)	-0.01 (0.32)	0.05 (0.31)	0.06 (0.33)	0.14 (0.20)	0.23 (0.20)	-0.12 (0.19)	-0.07 (0.18)
Kin	-0.00 (0.01)	-0.01 (0.01)	0.02 (0.04)	0.02 (0.04)	-0.01 (0.03)	-0.01 (0.03)	0.05 (0.07)	0.07 (0.07)	-0.00 (0.01)	-0.00 (0.02)	0.02 (0.05)	0.03 (0.05)
Friends	-0.02 (0.01)	-0.02 (0.01)	-0.01 (0.04)	-0.01 (0.04)	-0.03 (0.03)	-0.03 (0.03)	-0.02 (0.07)	-0.06 (0.07)	-0.03 (0.01)	-0.03* (0.01)	0.01 (0.05)	0.00 (0.05)
Distant Ties	-0.02 (0.01)	-0.02 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.04 (0.03)	-0.06 (0.03)	-0.01 (0.02)	-0.02 (0.02)	-0.01 (0.02)	-0.00 (0.02)	0.01 (0.02)	0.01 (0.02)
Contact Frequency	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Density	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Network Size	-0.01 (0.02)	-0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	-0.02 (0.04)	-0.03 (0.05)	-0.01 (0.04)	-0.02 (0.04)	-0.01 (0.02)	-0.03 (0.03)	0.03 (0.02)	0.02 (0.02)
Female Contacts	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	0.03* (0.02)	0.02 (0.02)	0.02 (0.01)	0.01 (0.02)	0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.03 (0.01)
Living with Contacts	0.02 (0.01)	0.03 (0.01)	0.02 (0.01)	0.02 (0.01)	0.04 (0.02)	0.04 (0.02)	0.01 (0.02)	0.02 (0.03)	0.01 (0.02)	0.00 (0.02)	0.02 (0.02)	0.01 (0.02)
PMQ	0.07 (0.06)	0.17 (0.24)	0.06 (0.06)	0.26 (0.24)	0.14 (0.10)	-0.23 (0.40)	0.15 (0.10)	-0.44 (0.45)	0.04 (0.08)	0.30 (0.34)	0.03 (0.08)	0.41 (0.33)
Direct Support X NMQ		-0.04 (0.15)		0.05 (0.12)		0.14 (0.31)		-0.18 (0.31)		-0.12 (0.08)		0.07 (0.17)
Kin X NMQ		0.02 (0.05)		0.06 (0.05)		-0.00 (0.04)		0.04 (0.12)		0.02 (0.02)		0.07 (0.06)

Table 3.7. (cont'd).

Friends X NMQ	0.02	-0.04	-0.02	0.01	0.01	-0.06						
	-0.02	(0.05)	(0.04)	(0.12)	(0.02)	(0.06)						
Distant Ties X NMQ	0.05*	0.05**	0.02	0.05	0.07**	0.06**						
	-0.02	(0.02)	(0.05)	(0.04)	(0.02)	(0.02)						
Contact Frequency X NMQ	-0.00*	-0.00*	0.00	-0.00	-0.00*	-0.00*						
	0	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
Density X NMQ	0	0.01	0.05	0.05*	-0.01	-0.03						
	0	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)						
Network Size X NMQ	0	-0.02	-0.04	-0.08*	0.00	0.00						
	-0.01	(0.02)	(0.04)	(0.04)	(0.02)	(0.02)						
Female Contacts X NMQ	0.01	-0.00	-0.00	-0.00	-0.00	0.00						
	-0.01	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
Living with Contacts X NMQ	-0.02	-0.02	-0.04	0.02	0.02	-0.01						
	-0.02	(0.02)	(0.02)	(0.04)	(0.01)	(0.02)						
NMQ	0.01	0.02	0.01	0.02	-0.04	-0.20	-0.04	-0.29	0.02	0.04	0.03	-0.01
	(0.06)	(0.23)	(0.06)	(0.26)	(0.11)	(0.50)	(0.11)	(0.58)	(0.07)	(0.27)	(0.07)	(0.31)
Direct Support X PMQ	-0.04	0.03	-0.07	-0.01	-0.02	0.11						
	(0.06)	(0.05)	(0.08)	(0.09)	(0.07)	(0.08)						
Kin X PMQ	0.02	0.08	0.02	0.04	0.01	0.20*						
	(0.02)	(0.06)	(0.03)	(0.11)	(0.02)	(0.09)						
Friends X PMQ	0.02	-0.08	0.00	-0.02	0.00	-0.20*						
	(0.02)	(0.06)	(0.04)	(0.11)	(0.02)	(0.09)						
Distant Ties X PMQ	0.05*	0.00	0.07	0.06	-0.00	-0.03						
	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)						
Contact Frequency X PMQ	-0.00*	0.00	-0.00	-0.00	0.00	0.00						
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
Density X PMQ	0.01	-0.01	0.02	0.02	-0.05*	-						
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)						
Network Size X PMQ	-0.02	0.01	0.04	-0.04	0.00	-0.01						
	(0.02)	(0.02)	(0.04)	(0.04)	(0.04)	(0.03)						

Table 3.7. (cont'd).

Female Contacts X PMQ	-0.00	0.00	-0.00	0.00	0.00	0.00	-0.00					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)					
Living with Contacts X PMQ	-0.00	-0.02	0.02	0.02	0.01	-0.03						
	(0.01)	(0.02)	(0.03)	(0.04)	(0.02)	(0.03)						
Constant	1.03***	1.02***	0.89**	0.89**	1.67***	1.57**	1.25*	1.32*	0.71*	0.58	0.61*	0.61*
	(0.23)	(0.26)	(0.23)	(0.23)	(0.45)	(0.53)	(0.43)	(0.46)	(0.29)	(0.32)	(0.29)	(0.29)
Observations	817	817	817	817	317	317	317	317	500	500	500	500
R-squared	0.47	0.49	0.46	0.49	0.50	0.54	0.50	0.52	0.47	0.53	0.47	0.54

~ Standard errors in

~ *** p<0.001, ** p<0.005, * p<0.05

~ Data is standardized and weighted for non-response

~ Models also control for gender (female), race (Non-Hispanic White), age, education (high school), income (average income), prior physical, and prior functional health, and change in both PMQ and NMQ across waves.

~ ES=Emotional Support, HIS=Health Information Support, PMQ: Positive Marital Quality, NMQ= Negative Marital Quality.

~ Bold coefficients and standard errors indicate statistically significant gender differences in association.

Gender differences in the transfer of support impacting functional health when moderated by marital quality

Last, I examined how the transfer of both emotional support and HIS through SNCs impacts functional health, and whether marital quality moderates this association. This data is depicted in Table 3.8 and includes models that align with those depicted in Tables 3.5 and 3.6. In Table 3.8, Model 1 indicates regression results for the entire sample, while Models 2 and 3 indicate regression results for separate samples of women and men, respectively. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on functional health while columns labeled with even numbers identify models controlling for whether marital quality moderates the transmission of support impacting functional health. Except for column 7 indicating that women have decreased odds of exhibiting functional health benefits when HIS is transmitted through friends, all other odd numbered columns highlight that the transmission of support through SNCs have no impact on functional health unless further controlling for the potential moderating effects of marital quality.

Model 1 indicates that, among the entire sample comprising both men and women, functional health is impacted by the transmission of emotional support but not HIS. Those with high levels of PMQ have increased odds of exhibiting functional health benefits from receiving emotional support directly ($b=.116-.045=.071$), while those with high levels of NMQ have decreased odds of exhibiting poor functional health if they exhibit large networks ($b=-.017+.011=-.006$).

Among women, functional health is impacted by the transmission of HIS but not emotional support, regardless of marital quality. Among women with high levels of PMQ, their odds of exhibiting poor functional health increase when HIS is transmitted through kin but

decrease when transmitted through friends (Kin: $b=.105+.122=.227$; Friends: $b=.105-.110=-.005$). For every 1 unit increase in HIS, the odds of women exhibiting health benefits from HIS transmitted through kin decrease by 25.48%. Among women with high levels of NMQ, HIS transmitted through large networks increases the odds of exhibiting better functional health ($b=-.025-.027=-.052$). Analysis examining gender differences in the functional health impacts of these three mechanisms of transmission indicates that gender differences in these mechanisms are significant (Friends: $X^2=4.363$, $p>*$, Wald=2.089; Kin x PMQ: $X^2=7.63$, $p>*$, Wald=2.763; Friends x PMQ: $X^2=4.170$, $p>*$, Wald: 2.042).

Men exhibiting high levels of PMQ exhibit functional health benefits resulting from the direct transmission of emotional support, as well as the transmission of emotional support through large networks and living with network members (Direct Support: $b=.197-.092=.116$; Network Size: $b=.197+.012=.209$; Living with Contacts: $b=.197+.015=.211$). The odds that men with high levels of NMQ receive emotional support that benefits functional health increase when transmitted through kin but decrease when transmitted through large networks (Kin: $b=.047-.015=-.067$; Large Networks: $b=.047+.013=.060$). These men also have decreased odds of exhibiting functional health benefits from HIS when it transmitted through female contacts, regardless of marital quality (PMQ: $b=.103+.013=.116$; NMQ: $b=-.010+.020=.010$).

Table 3.8. Marital quality differences in the transfer of emotional support and HIS impacting functional health. Model 1 indicates entire sample, Model 2 examines women, and Model 3 examines men. Columns labeled with odd numbers indicate the direct effects of each type of support transmission on functional health while columns labeled with even numbers identify models controlling for whether marital quality moderates the transmission of support impacting functional health.

	Model 1. All (N=817)				Model 2. Women (N=315)				Model 3. Men (N=500)			
	Emotional Support		HIS		Emotional Support		HIS		Emotional Support		HIS	
	1	2	3	4	5	6	7	8	9	10	11	12
Transmission of support through....												
Direct Support	-0.02 (0.06)	0.02 (0.06)	0.09 (0.05)	0.08 (0.05)	0.11 (0.10)	0.21 (0.11)	0.06 (0.11)	0.06 (0.11)	-0.06 (0.07)	-0.01 (0.07)	0.10 (0.06)	0.08 (0.07)
Kin	0.01 (0.00)	0.00 (0.00)	-0.01 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	-0.05 (0.02)	-0.04 (0.03)	0.00 (0.01)	0.00 (0.01)	0.01 (0.02)	0.00 (0.02)
Friends	0.01 (0.00)	0.01 (0.00)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	-0.00 (0.01)	0.06* (0.02)	0.05* (0.02)	0.01 (0.01)	0.01 (0.01)	-0.01 (0.02)	-0.01 (0.02)
Distant Ties	0.00 (0.00)	0.00 (0.01)	-0.00 (0.00)	-0.00 (0.00)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)
Contact Frequency	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Density	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Network Size	0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)	-0.02 (0.02)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)
Female Contacts	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)	0.00 (0.01)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Living with Contacts	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.02 (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
PMQ	-0.03 (0.02)	-0.02 (0.08)	-0.03 (0.02)	-0.02 (0.08)	-0.03 (0.04)	-0.22 (0.14)	-0.03 (0.04)	-0.03 (0.15)	-0.03 (0.03)	0.05 (0.12)	-0.02 (0.03)	-0.01 (0.12)
Direct Support X NMQ		-0.045* (0.02)		-0.03 (0.05)		-0.01 (0.04)		-0.17 (0.11)		-0.09** (0.03)		0.04 (0.06)
Kin X NMQ		0 (0.01)		0.02 (0.02)		0.00 (0.01)		0.12** (0.04)		-0.00 (0.01)		-0.01 (0.02)

Table 3.8. (cont'd).

Friends X NMQ	0	-0.03			-0.00	-0.11*		0.01	-0.01			
	-0.01	(0.02)			(0.01)	(0.04)		(0.01)	(0.02)			
Distant Ties X NMQ	0	-0.01			0.01	0.00		0.00	-0.01			
	-0.01	(0.01)			(0.02)	(0.01)		(0.01)	(0.01)			
Contact Frequency X NMQ	0	0.00			0.00	0.00		-0.00	0.00			
	0	(0.00)			(0.00)	(0.00)		(0.00)	(0.00)			
Density X NMQ	0	0.00			0.01	0.01		0.01	0.01*			
	0	(0.00)			(0.01)	(0.01)		(0.01)	(0.01)			
Network Size X NMQ	0.01	0.00			0.01	0.00		0.02*	0.00			
	0	(0.01)			(0.01)	(0.01)		(0.01)	(0.01)			
Female Contacts X NMQ	0	-0.00			-0.00	-0.00		-0.00	0.00			
	0	(0.00)			(0.00)	(0.00)		(0.00)	(0.00)			
Living with Contacts X NMQ	0.01	0.00			0.00	0.00		0.01*	-0.00			
	-0.01	(0.01)			(0.01)	(0.01)		(0.01)	(0.01)			
NMQ	0.05*	0.12	0.06*	0.14	0.02	-0.17	0.01	0.11	0.07**	0.20*	0.08***	0.10
	(0.02)	(0.08)	(0.02)	(0.09)	(0.04)	(0.18)	(0.04)	(0.20)	(0.03)	(0.10)	(0.03)	(0.11)
Direct Support X PMQ		-0.04*		0.00		-0.01		0.05		-0.00		-0.04
		(0.02)		(0.02)		(0.03)		(0.03)		(0.03)		(0.03)
Kin X PMQ		-0.00		0.02		0.01		0.07		-0.02*		-0.02
		(0.01)		(0.02)		(0.01)		(0.04)		(0.01)		(0.03)
Friends X PMQ		0.00		-0.02		0.00		-0.05		-0.01		0.00
		(0.01)		(0.02)		(0.01)		(0.04)		(0.01)		(0.03)
Distant Ties X PMQ		-0.00		0.00		0.02		0.01		-0.00		-0.00
		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)
Contact Frequency X PMQ		0.00		0.00		-0.00		0.00		0.00		-0.00
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
Density X PMQ		0.00		0.01		0.01		0.01		0.01		0.02*
		(0.00)		(0.00)		(0.01)		(0.01)		(0.01)		(0.01)
Network Size X PMQ		0.01		-0.00		-0.00		-0.03		-0.00		0.01
		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)		(0.01)

Table 3.8. (cont'd).

Female Contacts X PMQ	-0.00	-0.00			-0.00	-0.00			0.00	0.00		
	(0.00)	(0.00)			(0.00)	(0.00)			(0.00)	(0.00)		
Living with Contacts X PMQ	0.01	-0.00			0.01	-0.03*			0.01*	0.01		
	(0.00)	(0.01)			(0.01)	(0.01)			(0.01)	(0.01)		
Constant	1.12***	1.00***	0.99***	1.00***	0.84***	0.72***	1.00***	1.07***	1.13***	1.00***	0.94***	0.93***
	(0.08)	(0.09)	(0.08)	(0.08)	(0.16)	(0.19)	(0.15)	(0.16)	(0.10)	(0.12)	(0.10)	(0.10)
Observations	817	817	817	817	317	317	317	317	500	500	500	500
R-squared	0.06	0.09	0.07	0.09	0.10	0.16	0.11	0.19	0.09	0.15	0.10	0.15

~ Standard errors in parentheses

~ *** p<0.001, ** p<0.005, * p<0.05

~ Data is standardized and weighted for non-response

~ Models also control for gender (female), race (Non-Hispanic White), age, education (high school), income (average income), prior physical, and prior functional health, and change in both PMQ and NMQ across waves.

~ ES=Emotional Support, HIS=Health Information Support, PMQ: Positive Marital Quality, NMQ= Negative Marital Quality.

~ Bold coefficients and standard errors indicate statistically significant gender differences in association.

DISCUSSION

While positive marital quality has been argued to promote health and negative marital quality has been argued to increase health deterioration, those who are married can engage with others within their social networks that can also offer support (Kalmijn 2017). This study highlights the importance of having network contacts beyond spouses that can be drawn on for support impacting health. This study helps to clarify how the transmission of both emotional support and HIS impact depression, physical health, and functional health among those with differing levels of PMQ and NMQ and is strengthened by the usage of longitudinal analysis to clarify the causal mechanisms for which the transmission of social support across networks and marital quality impact health. It moves beyond past research which has examined the consequences of marital quality on health independently from the consequences of social networks on health by synthesizing a more complex understanding of how health-benefiting social support can be drawn on from network members in the absence of beneficial spousal support. It also contributes to our understanding of the role that gender plays in moderating this association.

I used a social capital approach to explore how social support acts as a form of social capital that, when transmitted through SNCs, impacts physical health, depression, and functional health moderated by positive and negative marital quality. Based on previous research on marital quality and the stress buffering hypothesis, I hypothesized that those with high levels of NMQ are more likely to seek support from network members benefiting health because they may feel that they cannot receive the same support from their spouses. Consequently, I further hypothesized that those with high levels of PMQ are less likely to exhibit changes in health resulting from the transmission of support through network members because their spouses can fulfill their support needs. My findings did not support my hypothesis and no patterns emerged to

explain my findings. Among respondents with high levels of PMQ, the transmission of emotional support decreased the odds of exhibiting physical health benefits when transmitted through distant ties but increased the odds of exhibiting functional health benefits when transmitted directly. The transmission of HIS through distant ties decreased the odds of exhibiting depression but also decreased the odds of exhibiting physical health benefits. Among those with high levels of NMQ, emotional support transmitted through large networks benefited functional health. Those with high levels of NMQ also exhibited mental health benefits when HIS was transmitted directly but had increased odds of being depressed if HIS was transmitted among female contacts.

Given research on gender differences in social networks as well as on gender differences in the health consequences of marital quality, I questioned whether gender impacts the association between the transmission of social support through SNCs on health when moderated by marital quality. I explored whether Social Relations Theory and “Role Crossover” can be applied to explain gender differences in this association. Given how men and women exhibit “role crossover” during the aging process, I hypothesize that, relative to women, men are more likely to exhibit health benefits from the transmission of social support from non-spousal network members, regardless of whether they exhibit high levels of NMQ or PMQ. This hypothesis was supported.

Gender differences in most of my findings can primarily be explained using the theory of “Role Crossover”. While men are more likely to be supported by both emotional support and HIS, women primarily show significant gender differences in the effects of HIS on health outcomes, indicating that women in old age are less dependent on emotional support for health purposes. In most cases, while the health outcomes of both men and women are impacted by the

transmission of HIS through the same SNCs, the mechanisms differ by health outcome. The transmission of HIS primarily impacts functional health among women but not men and primarily impacts depression among men but not women, further indicating that men become more comfortable with engaging in emotional work as they age.

While the transmission of HIS primarily affects functional health among women and depression among men, the transmission of HIS through SNCs differ by whether respondents are exhibiting high levels of NMQ or PMQ. Whereas the transmission of HIS through friends benefits functional health among women with high levels of PMQ, it decreases the odds of being depressed among men with high levels of NMQ. Likewise, while the transmission of HIS through large networks benefits functional health among women with high levels of PMQ, it decreases the odds of depression among men with high levels of NMQ.

My findings further indicate that despite failing to reject my first hypothesis that stress buffering can be used to explain the mechanisms linking the transmission of social support on health when moderated by marital quality, my hypothesis is validated when considering gender differences in these mechanisms, specifically when applied to men. For instance, while individuals exhibiting high levels of NMQ have decreased odds of experiencing mental health benefits from receiving emotional support and HIS from female contacts, men benefit from both. These men also have greater odds of exhibiting physical health benefits from both types of support transmitted through female contacts.

Among men, the transmission of both emotional support and HIS impacts all health outcomes, regardless of whether they exhibit high levels of NMQ or PMQ. Mechanisms linking the transmission of support primarily differ by health outcome. For instance, men with high levels of NMQ also exhibit a stark contrast in how the transmission of HIS through kin and

friends impacts physical health and depression. Among men with high levels of NMQ the transmission of HIS through kin and friends decreases the odds of exhibiting depression but increases the odds of exhibiting declines in physical health.

Among men, the mechanisms linking the transmission of support on health also differ by whether men exhibited high levels of NMQ or PMQ. For instance, the transmission of both emotional support and HIS through female contacts benefited mental and physical health of men with high levels of NMQ but the transmission of emotional support did not benefit mental health among men with high levels of PMQ. However, men did not exhibit functional health benefits from the transmission of HIS through female contacts, regardless of whether men exhibited high levels of PMQ or NMQ.

Unlike among men, whose health is impacted by the transmission of both types of support, health outcomes among women are impacted only by the transmission of HIS and not emotional support. The transmission of support among women also has the greatest odds of impacting physical health and functional health but not depression. While women with high levels of NMQ exhibit functional health benefits from the transmission of HIS through large networks, the transmission of HIS primarily impacts those with high levels of PMQ. Women exhibiting high levels of PMQ have decreased odds of exhibiting functional health benefits from HIS transmitted through kin but have increased odds of benefiting when transmitted through friends. The functional health benefits of receiving HIS from friends and the consequences of receiving HIS from family significantly differ by gender. Women exhibiting high levels of PMQ further exhibit physical health consequences associated with the transmission of HIS through female contacts and through living with network members. Their odds of experiencing physical

health benefits from HIS increase when transmitted through female contacts but decrease when transmitted through living with contacts.

Limitations

Though suggestive, my findings are limited. Of greatest concern, the current study does not address emotional contagion, a concept that has been increasingly examined among marriage scholars to explain the consequences of spousal exposure on health. Emotional Contagion is the idea that perceptions of marital quality influence husbands' and wives' own well-being, which further influences their partners' well-being. Within this framework, spouses' own emotional experiences may serve as a pathway for their partners' well-being. Though the consequences of contagion effects on health have been well established, the role in which social networks play in buffering the consequences of potential contagion have not. Further analysis using dyads may help to isolate the effects of potential emotional contagion.

Additionally, it is important to note that older adults are believed to have cognitive bias such that they underestimate negative experiences, recollections and sentiments while exaggerating the positive (Charles et al. 2003). Given these biases, respondents likely exhibited higher levels of NMQ and lower levels of PMQ than reported. As such, the consequences of NMQ on the association between the transmission of social support and health are likely greater than my research suggests.

CONCLUSION

In this article, I examined how the transmission of both emotional support and HIS through SNCs impacts physical health, depression, and functional health when moderated by

both PMQ and NMQ. I consider whether these mechanisms differ among separate populations of men and women and whether gender differences in these mechanisms are significant. I ultimately help to clarify where those in old age turn to for support with and without the support of their spouse. I also help lay a foundation for future research examining how those in old age may be able to rely on their social networks to adapt after experiencing partner loss or when those in old age are no longer able to rely on their partners for support.

DISSERTATION CONCLUSION

In this dissertation, I clarify the mechanisms linking the transmission of support through social networks on health. In all three papers, I use Waves 1 and 2 of NSHAP to examine the consequences of SNCs on the health outcomes, depression, physical health, and functional health when they offer support in the form of emotional support and HIS.

In my first paper, “Mechanisms Linking Network Ties, Social Support, and Changes in Health,” I examine if and how emotional support and HIS mediate the association between SNCs and changes in depression, physical health, and functional health, as well as gender differences in these mechanisms. Data indicates that health continues to decline, regardless of whether social support is provided. Additionally, while few SNCs directly impacted changes in depression and physical health, many impacted changes in functional health. Functional health benefits from emotional support transmitted through friends but benefits from HIS when transmitted through family. Examination of gender differences in these mechanisms indicate that when moderated by gender, the consequences of SNCs on health are more likely to occur directly, rather than indirectly by means of social support and are still more likely to impact functional health than depression or physical health. These findings indicate the need to examine functional health as a health outcome independently from physical health (Freedman and Spillman 2014). They also indicate the need to differentiate between the direct and indirect effects of network ties within the structure of one’s network from the functional support that network ties frequently offer and highlight that these mechanisms differ by health outcome and gender (Valtorta et al. 2016).

In my second paper, “The Effects of Marital and Non-Marital Ties on the Transmission of Health-Benefiting Support”, I explore how social support acts as a form of social capital that is transmitted across social networks, paying close attention to how the transmission of

emotional support and HIS differently impact depression, physical health, and functional health when moderated by marital status. I contribute to formerly established literature highlighting the health benefits of marriage (Carr and Springer 2010) and expand on recent research suggesting how non-married individuals can exhibit health benefits from the transmission of social support in the absence of marital ties (Kalmijn 2017). I find that relative to physical health and functional health, depression is most likely to be impacted by the transmission of support. Additionally, both depression and physical health are more likely to be impacted by the transmission of emotional support while functional health is more likely to be impacted by the transmission of HIS. All three health outcomes are primarily impacted through receiving support directly through distant ties, and through living with contacts.

Guided by research on social capital and marriage, I uncover how those who are married, separate/divorced, and widowed exhibit health benefits from the transmission of support. I find that the mechanisms linking social support and health are primarily a concern among those who were formerly separate/divorced, regardless of health outcome. While those who were formerly married or widowed were more likely to benefit from the transmission of HIS, those who were separated/divorced were more likely to exhibit health benefits from the transmission of emotional support. Those who were separated/divorced particularly benefited from support transmitted directly and through distant ties but were also more likely than those who were married or widowed to be impacted by the transmission of support through large or dense networks primarily composed of either kin or friends.

Guided by research on gender socialization, I further examined gender differences in the consequences of marital status on the transmission of support impacting health. I found that men were primarily impacted by the transmission of support, regardless of health outcome and marital

status. While both men and women were primarily impacted by the transmission of emotional support, men were more likely to be impacted by the transmission of both types of support than women, especially when emotional support is transmitted and when depression is affected. Among all methods for which support is transmitted, gender differences in the transmission of support through distant ties are also most common. However, men further experienced increased odds of exhibiting health consequences from the transmission of support directly, as well as through female contacts, distant ties, living with contacts, and large networks.

I used the same social capital and socialization framework to guide my research in paper 3, “The Effects of Marital Quality and Non-Marital Ties on the Transmission of Health Benefiting Support”. Though also applicable to paper 2, paper 3 builds upon research on social capital and socialization and applies both stress buffering theory and gender role theory to examine how both negative marital quality and positive marital quality impact the likelihood that individuals will benefit from the transmission of both emotional support and HIS through network members and whether there are gender differences in these mechanisms. I found that respondents were more likely to exhibit health benefits from the transmission of HIS than emotional support, primarily when transmitted through distant contacts and friends. I also found that respondents primarily exhibited decreased odds of benefiting from support from female contacts. However, while I hypothesized that the transmission of support through non-marital ties would buffer potentially negative consequences of NMQ and mediate the potential benefits of PMQ on health, this theory was not supported until further considering gender differences in these mechanisms.

As a foundation for my research examining gender differences in the moderating effects of marital support on the association between the transmission of support and health, I relied on

gender role theory, paying close attention to research on gender roles among those in old age which indicates that men and women increasingly exhibit “role crossover” throughout the aging process. I find that stress buffering theory and “role crossover” can be used concurrently to explain my findings, particularly among men. First, while PMQ and NMQ equally impacted the mechanisms among men, only PMQ impacted mechanisms among women. This suggests that men are more susceptible to marital strains in old age. Second, men were more likely to be impacted by both types of support while women were only impacted by the transmission of HIS and there were far more significant gender differences in the transmission of HIS than emotional support. Last, while the transmission of support impacted all three health outcomes among men and only physical health and functional health among women, men were more likely to exhibit mental health benefits from the transmission of support. Consequently, men more frequently had decreased odds of exhibiting physical and functional health benefits from the transmission of support. The latter two points are further supported by role crossover as men increasingly value family and emotional connectedness and women increasingly value agency as they age (Loscocco and Walzer 2003). Together, these findings support that because those in old age engage in what scholars define as “role crossover”, stress buffering theory is primarily applicable when understanding the role of marital quality on the transmission of health benefiting support among men.

This dissertation targets the concerns of scholars, healthcare providers, and network ties interested in helping those in old age stay healthy. From a public health and social policy standpoint, this study offers insight regarding the prevention of health deterioration during the aging process by elucidating how those in old age can capitalize on different forms of health-benefiting support transmitted throughout social networks. Regardless of gender, it highlights the

need to further consider the effects of network ties and social support on functional health independently from physical health and depression and emphasizes the need to help provide alternative network ties benefiting health among those who have been separated/divorced. Among women, this research highlights the health benefits of direct contact with network members, regardless of whether network members can provide health benefiting support. It reaffirms gender theory on “role crossover”, highlighting that women primarily benefit from network relations that promote personal agency rather than emotional support. The research also reaffirms gender theory on “role crossover” when examining the effects of marital quality in moderating the association between the transmission of social support and health among men by highlighting the importance of maintaining non-marital relationships as sources of support that can buffer the health consequences of stressors associated with NMQ.

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