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**The Effects of Physical Constraint and Community Social Capital on Mental
Distress in Older Adults: A Latent Interaction Model**

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DEDICATION

This dissertation is dedicated to my wife, YunHee Seo. I am truly blessed to have
you in my life

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**The Effects of Physical Constraint and Community Social Capital on Mental
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by

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The University of Texas at Austin, 2015

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Physical constraints such as functional disability and chronic disease are prevalent in older adults. These conditions are known to decrease one's quality of life and may lead to mental health problems for the older population. Research shows that individual social resources such as social networks and support from family and friends improve individual health and buffer the negative impact of chronic stress. Yet, few studies have examined the protective role of community social capital in improving older adults' mental health. This study highlights community social capital as a critical coping resource for older adults with physical constraints. Building upon the previous literature on the link between physical and mental health in later life, the present study explored the buffering effects of community social capital (indicated by social cohesion, social ties, and safety) in the relationship between physical constraints (indicated by chronic disease and functional disability) and mental distress (indicated by depression and anxiety).

Using data from 2,362 community-dwelling older adults aged 65 and older in the National Social Life, Health, and Aging Project (NSHAP) Wave 2, a latent moderated structural equation modeling was tested. The fit of the model including both direct effects of physical burden and social capital and their latent interaction was excellent. Both physical constraints ($\beta = .382$, $p < .001$) and community social capital ($\beta = -.059$, $p < .01$) had a direct effect on mental distress, and their interaction was also found to be significant ($\beta = -.306$, $p < .001$). The group with high social capital presented a relatively stable slope in the prediction of physical burden on mental distress, suggesting their resilience. On the other hand, the group with a low social capital demonstrated a steep slope, indicating heightened vulnerability to mental distress when faced with stress caused by physical constraints. Given its buffering role, further attention need to be paid to enhance the ways community social capital can promote the health and well being of older adults.

Table of Contents

List of Tables.....	x
List of Figures	xi
CHAPTER 1: INTRODUCTION	1
Purpose of the Study.....	4
Significance for Gerontology Social Work	6
CHAPTER 2: LITERATURE REVIEW	8
Physical Constraint and Mental Distress among Older Adults	8
Effects of Social Resources in Older Adults	11
Direct effects of social support and social network.....	12
Moderating effects of social support and social network	18
Effects of Community Social Capital	23
CHAPTER 3: THEORETICAL FRAMEWORK AND PROPOSED HYPOTHESES ...	32
Social Capital Theory	34
Main Effects Model and Stress-Buffering Model	41
A Framework and Proposed Hypotheses	46
CHAPTER 4: METHODOLOGY	53
Data and Population	55
Measures.....	56
Physical constraints	56
Community social capital	57
Mental distress.....	60
Control variables	63
Analytic Plan	65
Descriptive analysis.....	67
Structural Equation Modeling	67
CHAPTER 5: RESULTS	71

Sample Characteristics	71
Confirmatory Factor Analysis	73
Structural Equation Modeling	80
Main effects model for H1 and H2.....	80
Stress-buffering model for H3.....	82
CHAPTER 6: CONCLUSION AND DISCUSSION	91
Implications	98
Social work practitioners.....	99
Social work education	104
Policy makers	107
Limitations and Suggestions.....	109
REFERENCES	115
VITA.....	134

List of Tables

Table 1. Definitions of social capital	38
Table 2. Factor loading for 9 items of community social capital scale	59
Table 3. Factor loading for 11 items of CESD scale	61
Table 4. Factor loading for 7 items of HADS-A scale	63
Table 5. Characteristics of the study sample (n = 2,362).....	72
Table 6. Model comparison between basic model and latent interaction model	86
Table 7. Mental distress depending on the effects of physical constraint and social capital	88

List of Figures

Figure 1. Main effect model of social networks and mental health.....	43
Figure 2. Stress-buffering mold of social capital and mental health	45
Figure 3. The role of community social capital	50
Figure 4. Conceptual framework of the study	54
Figure 5. 1 st order confirmatory factor analysis model of physical constraint	74
Figure 6. 2 nd order factor analysis of community social capital	75
Figure 7. 3 rd order confirmatory factor analysis of mental distress	77
Figure 8. Results of the confirmatory factor analysis	78
Figure 9. Measurement model and structural model for mental distress	79
Figure 10. Main effects model for mental distress without interaction.	81
Figure 11. Latent interaction model for mental distress results.....	83
Figure 12. Interaction of social capital and physical stress predicting mental distress ...	90

CHAPTER 1: INTRODUCTION

For the older population, functional disability and chronic disease are common physical constraints. Such physical constraints are a major stressor that can lead to mental distress. Forty percent of older adults who live in the community have trouble completing daily activities, while more than 1.5 million older adults require help with two or more difficulties performing activities of daily living (ADL) (i.e., taking care of personal hygiene, feeding themselves, getting dressed, and toileting) (*Federal Interagency Forum on Aging-Related Statistics*, 2012; Kaye, Harrington, & LaPlante, 2010; Lyon, 2000). More than eighty percent of older adults aged 65 and over have one or more chronic diseases (CDC, 2011) that are expected to last twelve or more months and require ongoing medical care (Bean, Vora, & Frontera, 2004; Huang, Dong, Lu, Yue, & Liu, 2010; Hwang, Weller, Ireys, & Anderson, 2001).

Older adults with functional disabilities and chronic diseases are more likely to use physician services, hospitals, and to be hospitalized (Mor, Wilcox, Rakowski, & Hiris, 1994; Stump, Johnson, & Wolinsky, 1995; Verbrugge & Patrick, 1995). Furthermore, physical constraints for older adults have close associations with poor health-related quality of life (Thompson, Zack, Krahn, Andresen, & Barile, 2012) and higher rates of mortality (Keller & Potter, 1994; Reuben, Rubenstein, Hirsch, & Hays, 1992). These physical constraints act as chronic stressors and are regarded as risk factors for mental health problems in older adults (Bean, Vora, & Frontera, 2004; Bisschop, Kriegsman, Deeg, Beekman, & van Tilburg, 2004; Cole & Dendukuri, 2003; Huang,

Dong, Lu, Yue, & Liu, 2010; Ormel et al., 1997; Vink, Aartsen, & Schoevers, 2008).

Therefore, in order to help older adults stay in the community, identifying protective factors that improve the health and mental health of older adults is a crucial aspect of health studies.

Social resources are regarded as protective factors for individual's health and mental well-being (De Silva, McKenzie, Harpham, & Huttly, 2005). Older adults who have support from their social networks tend to be healthier, and report a higher quality of life (Hays, Saunders, Flint, Kaplan, & Blazer, 1997; Newsom & Schulz 1996). In the 21st century, researchers in the health field have identified social capital as social resources available to individuals; a rapidly growing number of studies on social capital and health have been published (Kawachi, Subramanian, & Kim, 2008). Social capital is defined as a property of a group or network (Kawachi & Berkman, 2000; Putnam 1993), resources which are embedded in networks and communities where individuals live (Bourdieu, 1986; Portes, 1998).

The beneficial effects of social resources on individuals' health and well-being have been widely explored. These effects include reduced mortality, improved quality of life, and reduced mental distress (i.e. unpleasant mental status such as depression and anxiety) (Kahn, Hessling, & Russell, 2003; Sherman et al, 2006; Weaver & Rivello, 2006). Social resources are particularly critical for reducing mental distress in older adults who are more likely to have physical constraint caused by deteriorating health. According to the person-environment fit theory, stress arises from incongruences

between a person and his or her environment (Edwards, Caplan, & Van Harrison, 1998). The underlying logic of a poor fit between person and environment implies that stress may increase when older adults with physical constraints who need assistance do not perceive enough support from their environment. In contrast, older adults who receive assistance from their social networks may feel supported and experience less mental distress. In sum, social resources act as a protective factor for older adults' mental health (De Silva, McKenzie, Harpham, & Huttly, 2005; Ziersch, Baum, MacDougall, & Putland, 2005).

Although previous literature has demonstrated the positive role of social resources for older adults' mental health, their work has several limitations. In particular, much of the current research focuses on social networks and supports at the individual level, which are regarded as the main social resources available to older adults with physical constraints (DeLongis & Holtzman, 2005; Taylor & Stanton, 2007). In addition to the role that individual social resources play in older adults' mental health, it is important to recognize that the concept of social resources has broad and diverse aspects, including social capital that arises from transactions within the context of community.

Community social environment is considered a critical factor influencing individuals' health and mental health, especially among older adults with physical constraints who are more likely to rely on supports from their close neighbors and community that provide important social resources when assistance is needed. Despite the importance of social environments, community social capital has not been considered

to be a significant factor in health study (Stuck et al., 1999), and consequently little research has explored the potential roles of community social capital in the relationships between physical constraints and mental distress for older adults. Furthermore, without knowledge of how community social capital impacts older adults' mental distress, practitioners and policy makers cannot estimate the effects of social resources on mental distress in later life. Therefore, this study pays attention to community social capital embedded in communities or neighborhoods such as social cohesion, social ties, and neighborhood safety.

This study is also intended to provide an in-depth understanding of community social capital and its positive role on older adults' mental distress using nationally representative data. In particular, it is hoped that a more in depth understanding will be developed regarding community social resources available to older adults with functional disability and chronic disease, which may help practitioners and policy makers develop appropriate policy and programs to improve older adults' well-being. An expanded understanding of the relationships between community social capital and mental distress in later life also may suggest directions for community based programs to improve older adults' mental health.

Purpose of the Study

This study explores the effects of physical constraints and community social capital on mental distress. In particular, this study focuses on the impact of community social capital on the relationship between physical constraint and mental distress among

older adults. This study was guided by the overall research question: “How do physical constraint and community social capital impact mental distress for the older population?” This study was also guided by the social capital theory and the stress-buffering model, which indicates that social capital impacts mental health directly and moderates the effects of stressful events on mental health in later life (Cohen & Wills, 1985), to identify the direct and interaction effects of community social capital on mental distress in later life. Also, the role of community social capital on the relationship between physical constraint and mental distress was explored in depth.

Considering the gaps in research, this study explored the moderating role of community social capital against the adverse effects of physical constraints among older adults. The purpose of the study is to identify the effects of community social capital on mental distress and any protective role community social capital may play in the relationship between physical constraint and mental distress.

To investigate the direct effects of community social capital, the following research questions were addressed in this study:

- (1) Do physical constraints increase older adults’ mental distress?
- (2) Does community social capital decrease older adults’ mental distress?

To investigate the moderating effect of community social capital, the following research question was proposed:

- (3) Does community social capital modify the effects of physical constraint on mental distress for older adults?

Significance for Gerontology Social Work

This study attempts to fill a gap in current research on community social capital. Further, this study extends previous research primarily focused on the effects of social support and network by analyzing data from the National Social Life and Aging Project (NSHAP) in order to investigate the role of community social capital in the relationship between physical constraint and mental distress. In particular, this study examines the direct and interaction effects of community social capital on mental health by exploring mechanisms community social capital can decrease older adults' mental distress and how community social capital interacts with physical constraint. Thus, this study makes several contributions to the profession of social work and policies related to the older population residing in the community.

First, this study improves on previous research by using a nationally representative sample rather than a regional sample. While a few studies have examined the effects of community social capital on mental health for older adults (Glass, De Leon, Bassuk, & Berkman, 2006; Mair, Diez Roux, & Morenoff, 2010), such studies used regional samples from Chicago, New Haven, and Connecticut rather than a nationally representative sample. Examining the role of community social capital using a nationally representative sample will give social workers and other helping professionals an

opportunity to learn more about how social resources influence the mental health of the older American.

Second, this study can increase knowledge of ways in which community social capital influence older adults' mental health. Social workers and health professionals must consider the significance of social resources available to older adults in order to decrease their mental distress. Once the effects of community social capital are identified, prevention programs can be developed to reduce mental distress for older adults. Policies also can be developed to improve community environments and create community programs to increase the level of community social capital, if it is found to be an important factor.

The third contribution of this study is its exploration of the buffering role of community social capital may have against the adverse effects of physical constraints on mental distress. Since only a few studies have attempted to investigate the interaction effect of community social capital and physical constraints, this study can provide critical information on the effect of community social capital for older adults, especially among who experience deterioration in physical health and help them stay in their community. Thus, this study contributes to increase awareness of the importance of community social capital and draw attention to community-based services and programs available to older adults with functional disability and chronic disease.

CHAPTER 2: LITERATURE REVIEW

Two major concepts are critical to this study: physical constraints and social resources. Physical constraints, including functional impairment and chronic disease increase older adults' mental distress (DeLongis & Holtzman, 2005; Lazarus & DeLongis, 1983; Lyon, 2000). Social resources, a broad concept, include social support, social networks, and community social capital. In general, social resources are protective factors in influencing older adults' health and well-being (Kawachi, Subramanian, & Kim, 2008).

To clarify the association among related factors, this chapter examines the link between physical constraint and mental distress and the effects of social resources on older adult's health and well-being. To illustrate the effects of social resources, direct effects of social support and social resources on health and well-being were reviewed. In order to explore the moderating effects of social resources, relationships between physical constraint, social support and network, and health and well-being are reviewed. Lastly, to distinguish the role of community social capital from social support and social network, the effects of community social capital on older adults' health and well-being are reviewed.

Physical Constraint and Mental Distress among Older Adults

Physical constraints older adults tend to experience with age have close associations with mental distress. *Functional disability* and *chronic disease* are two major physical constraints for older adults, which may create stress and increase mental distress.

Also, chronic diseases in later life may limit patients' social activities, cause hospitalization, increase health care costs, and require long-term care (Bean, Vora, & Frontera, 2004; Nihtilä et al., 2008; Verbrugge & Patrick, 1995). Chronic diseases of older adults such as heart disease, stroke, cancer, chronic respiratory diseases, and diabetes increase psychological distress and may even lead to death (Penninx et al., 1996; Verbrugge & Patrick, 1995; WHO, 2011). A systematic review showed that chronic diseases were associated with a high likelihood of depression in old age (Huang, Dong, Lu, Yue, & Liu, 2010). Similarly, a longitudinal study of older adults also confirmed that chronic diseases were positively associated with increased depressive symptoms (Bisschop, Kriegsman, Deeg, Beekman, & van Tilburg, 2004).

As a prevalent chronic stressor, *functional disability* significantly increases older adults' mental distress (Cole & Dendukuri, 2003; de Beurs et al., 1999; Fried, Ferrucci, Darer, Williamson, & Anderson, 2004; Kennedy, Kelman, & Thomas, 1990; Manton, Gu, & Lamb, 2006; Prince, Harwood, Thomas, & Mann, 1998; Vink, Aartsen, & Schoevers, 2008). For instance, Gazmararian and colleagues (2000) used data from new Medicare enrollees aged 65 and older in large cities and identified a close association between depression measured with the Geriatric Depression Scale and functional limitations on performing ADLs and IADLs among older adults. Those with ADL limitations were 2.3 times more likely to be depressed compared to those who had no ADL limitations. Those who had IADL limitations were three times more likely to be depressed than those who had none. Similar findings were observed from other

longitudinal studies, which also showed a long-term positive effect of functional disability on depression (Biderman, Cwikel, Fried, & Galinsky, 2002 ; Ormel et al, 2002; Zeiss, Lewinsohn, Rohde, & Seeley, 1996). Also, recent systematic reviews of literature on mental health showed a close association between functional disability and mental distress (Büchtemann, Lupp, Bramesfeld, & Riedel-Heller, 2012; Vink, Aartsen, & Schoevers, 2008). Along with the relationships between physical constraints and depression, previous studies reported that physical constraint increased the risk of depression and anxiety (Beekman et al, 2000; Mancini & Bonanno, 2006) and comorbidity of anxiety and depression (Schoevers, Beekman, Deeg, Jonker, & Tilburg, 2003).

Among older adults, depression and anxiety are common mental health problems (Seitz, Purandare, & Conn, 2010; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010) and are representative indicators of mental distress. The elderly population may be at greater risk for depression and anxiety disorders than other age groups due to their declining health and social role changes (Teachman, 2006). In later life, depression and anxiety not only cause emotional suffering, but are found to reduce quality of life (Blazer, 2003; Seignourel, Kunik, Snow, Wilson, & Stanley, 2008) and increase the likelihood of hospitalization and longer hospital stays (Huang et al., 2000; Prina et al., 2013). Furthermore, depression is a known risk factor for suicide (Conwell, Duberstein, & Caine, 2002; Mitty & Flores, 2008). Anxiety also causes mental and physical sufferings for older adults and may be a risk factor for dementia and cognitive decline (Sinoff &

Werner, 2003; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010; Potvin, Forget, Grenier, Prévile, & Hudon, 2011), and type 2 diabetes (Demakakos, Pierce, & Hardy, 2010). Depression is known to be highly comorbid with anxiety disorders in late life (Hasin, Goodwin, Stinson, & Grant, 2005; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010).

Older adults with *physical constraints* are more likely to experience limited social activities and increased isolation from their networks, which escalate mental distress. As social resources are viewed as a protective factor for mental health in older adults (De Silva, McKenzie, Harpham, & Huttly, 2005), the next section reviews the effects of social resources.

Effects of Social Resources in Older Adults

Social resources broadly include personal social resources such as social network and support from family and friends as well as community resources such as community perception and services (Danso, 2014). The effects of social network and supports have been widely investigated in health studies. Along with the positive effects of social network and supports, the importance of community social capital increases with age (Cagney & Wen, 2008). In particular, since stress in later life is dependent on the quality of interactions with persons and environments in which social resources are embedded (Friedman & Allen, 2010), it is important to understand the relationships between social resources and health in older adults. Thus, the effects of social network and social support

on health and mental distress and the effects of community social capital on health and well-being were reviewed in depth.

Direct effects of social support and social network

Social support and social networks are well-known factors influencing individual's health and mental well-being. As forms of social resources, social supports and social networks are closely associated with mental well-being in later life (Newsom & Schulz, 1996; Hays, Steffens, Flint, Bosworth, & George, 2001; Paukert et al., 2010; Shiovitz-Ezra & Leitsch, 2010; Wallsten, Tweed, Blazer, & George, 1999). Social support can be defined as individuals' perception or experience of being cared for and loved by family and friends (Taylor & Stanton, 2007). Social networks are objective measures for interpersonal social relationships, observed by the size of networks and frequency of contacts with close family and friends (Pinquart & Sörensen, 2000; Sabatini, 2009). The perception of availability of social support and perceived social support may reduce mental health problems, as well as facilitate the use of adaptive coping strategies, resulting in positive outcomes for health and well-being (DeLongis & Holtzman, 2005; Taylor & Stanton, 2007). In contrast, when social resources are limited, older adults are likely to experience mental health problems (Blazer, 2003). As older adults experience decrease in networks and contacts with network members with advanced age, they are more likely to become isolated, thus increasing their risk of suffering from mental health problems compared to younger populations (Forsman, Herberts, Nyqvist, Wahlbeck, & Schierenbeck, 2013; Forte, 2009).

Previous studies have tried to investigate how social supports and networks influence individual health status, and found both direct and buffering effects of social capital on health and well-being in later life (Jang, Haley, Small, & Mortimer, 2002; Paukert et al., 2010; Penninx et al., 1997; Wallsten, Tweed, Blazer, & George, 1999; Zhang & Li, 2011). Specifically, previous studies have found that strong social support is negatively associated with depression, thus alleviates depressive symptoms (Bozo, Toksabay, & Kürüm, 2009; Glass, De Leon, Bassuk, & Berkman, 2006; Koenig et al., 1997), and smaller network size is closely associated with mental health problems such as depressive symptoms and loneliness (Newsom & Schulz, 1996; Shiovitz-Ezra & Leitsch, 2010).

While social networks are a structural and a relatively objective measure of social resources, social support is a cognitive and subjective measure of support from network members. Many studies have investigated the positive role of social support and social networks without distinguishing both concepts. For instance, Newsom and Schulz (1996) conducted a regression analysis to examine the importance of objective and subjective support, controlling for age, gender, and income and used structural equation modeling to examine whether perceived social support mediated the relationship between functional status and quality of life among older adults enrolled in Medicare. They measured objective supports with family networks, friendship networks, and other networks and measured perceived support with tangible support, appraisal support, and belonging. Social support, family network, and friend network ($\beta = -.09, p < .001$; $\beta = -.06, p <$

.001; $\beta = -.13$, $p < .001$, respectively) were negatively associated with impairment; family network and friend network were positively associated with life satisfaction ($\beta = .059$, $p < .001$; $\beta = .038$, $p < .01$, respectively); and friend networks were negatively associated with depressive symptoms ($\beta = -.029$, $p < .05$). Using structural equation modeling, they found that impairment was a significant predictor of social support ($p < .005$) and lower social support negatively influenced life satisfaction ($p < .001$) and increased depressive symptoms as predicted ($p < .001$).

Hays and colleagues (1997) also investigated the effects of social supports and instrumental supports on health decline controlling for age, gender, race, and education among community-dwelling older adults aged 65 and older. They measured health status with ADL, physical activity, and functional health. Social supports were measured with network size, frequency of social interaction, instrumental support such as providing transportation and helping daily activities, satisfaction with social interaction, and availability of a confidant. Subjective social support, availability of confidants, and instrumental support were negatively associated with one year health decline ($p < 0.01$).

Hays and colleagues (2001) also tested whether social support protects against functional decline among adults aged 60 or older with depression. Functional performance was measured with self-reported ability to perform ADLs. Social support was measured by size of social network, amount of social interaction, availability of instrumental aid, and subjective social support using the Duke Social Support Index. They found that social support was negatively associated with functional decline among

older adults with depression. Subjective social support measured by respondent's perception on relationships was negatively associated with functional impairment ($p=0.09$) and instrumental social support measured by the availability of physical assistance was also negatively associated with functional decline ($p=0.01$) at 1 year follow-up (Hays, Steffens, Flint, Bosworth, & George, 2001).

In addition to the effects of social support and social network on physical health, studies have investigated the relationship between support and social network and mental health. A study using path analysis found that social support was not related to health status but was negatively related to mental distress. Koenig and colleagues (1997) used path analysis to examine models of the relationships between religious activities, social support, and depressive symptoms controlling for sex, age, and race among community-dwelling adults aged 65 and over who participated in Wave 1 of the Established Populations for Epidemiologic Studies of the Elderly project. Using three of four Duke Social Support Index scales, they found that social support was negatively related to depressive symptoms as predicted, but social support was not related to good health status.

Kahn and colleagues (2003) also examined whether the effect of social support on self-reported well-being and physical health among older adults attending senior centers was spurious after controlling for negative affectivity that is related to negative emotion and poor self-concept. They used the Social Provision Scale to measure perceptions of social support and measured mental well-being with depression, loneliness, and life

satisfaction. Self-rated health status was used to represent physical health status. As predicted, older adults with higher social support were more likely to report better health and greater well-being. Using path analysis, they found that social support was negatively associated with mental health scales for loneliness, depression, and satisfaction after controlling for negative affectivity, which implies that social support is a strong predictor of mental distress in later life (Kahn, Hessling, & Russell, 2003).

In addition to cross-sectional studies, longitudinal studies have confirmed the relationship between social support and social network, and mental distress and health (Hashimoto, Kurita, Haratani, Fujii, & Ishibashi, 1999; Shye, Mullooly, Freeborn, & Pope, 1995; Zunzunegui, Alvarado, Del Ser, & Otero, 2003). For instance, Sherman and colleagues (2006) tested the impact of social support and social integration on baseline and follow-up measures of health-related quality of life after an 18-month exercise intervention among adults aged 60 and older with osteoarthritis. Health related quality of life was measured with physical functioning, perceived health, depressive symptoms, life satisfaction, and social functioning. Social support was measured by assessing how often different kinds of support were available and social integration was measured by marital status, family contact, and level of community and religious involvement. As predicted, after controlling for age, gender, and number of comorbid conditions, they found that social support was closely and negatively associated with psychological ($\beta = -.13, p < .01$) and physical disability ($\beta = -.11, p < .05$) at baseline and that social support was negatively associated with depressive symptoms at follow-up after additionally

controlling for intervention and baseline outcomes ($\beta = -.39, p < .001$). Contrary to predictions, social integration was not associated with any quality of life indicators at baseline; but as expected, it was significant in predicting social functioning at follow-up. Though the effects of social support at baseline and follow-up on physical health were not consistent, social support was closely associated with individuals' changes in psychological functioning.

By using data from the National Social Life, Health, and Aging Project, Shiovitz-Ezra and Leitsch (2010) also explored the relationship between older adults' social relationships and loneliness while controlling for sociodemographic characteristics and self-reported health status among community dwelling adults aged 57 to 85. They measured social relationships with objective measures of network size and frequency of social contacts and subjective measures consisting of perceived support from friends and family. Using hierarchical regression, they found that those who had a larger social network and more frequent contacts with network members were less likely to experience loneliness ($\beta = -.08, p < .05$; $\beta = -.09, p < .001$, respectively). They also found that perceived family support was negatively associated with loneliness ($\beta = -.09, p < .01$), but contrary to the authors' expectations, perceived friend support was not associated with feelings of loneliness.

Overall, direct effects of social support and social network on older adults' health and well-being have been widely studied. As a result, social resources have been identified and accepted as a protective factor for older adults' health and well-being.

Moderating effects of social support and social network

Along with the direct impacts of social support and social networks on health and well-being, the moderating effects of social resources that the stress-buffering model (Cohen & Wills, 1985) proposed have been identified. The stress-buffering model assumes that social resources moderate the impact of stressful events on individuals' mental well-being. For example, Hashimoto and colleagues (1999) examined the effects of life stressors and social supports on depressive symptoms among adults aged 60 and older receiving social services at home in Japan. Life stressors were measured with 17 stressful life events for the elderly including personal injury, separation from children, and decrease in income. Social support measures included instrumental and emotional supports from family, neighbors, and others. Older adults with low social support had higher levels of depressive symptoms ($p < .05$). Buffering effects were found in older adults with low support who were more likely to experience more depressive symptoms after life stressors, while older adults in the middle and high support range did not report differences in their mental health status after experiencing life stressors. Even after controlling for health status, social capital had a significant influence on older adults' mental well-being, which means that social capital can potentially protect older adults against deteriorating mental health (Hashimoto, Kurita, Haratani, Fujii, & Ishibashi, 1999).

In addition to the direct effects of social support and life stressors, social support and social networks buffer the effects of demographic factors on mental health in later

life. Zhang and Li (2011) examined the roles of social support in the relationship between gender and depressive symptoms as well as marital status and depressive symptoms among Chinese adults aged 55 and older. They measured social supports with family support and friend support. They expected that gender and marital status would be significantly associated with depressive symptoms and that social supports would modify the effect of gender and marital status on depressive symptoms. Using regression analysis, they found that marital status was closely associated with depressive symptoms ($\beta = -.11, p < .01$) but that gender was not a significant predictor of depressive symptoms. They also found that family support and friend support had a direct negative association with depressive symptoms ($\beta = -.39, p < .001$; $\beta = -.28, p < .05$, respectively). Family support also mediated the relationship between marital status and depressive symptoms to such an extent that insufficient family support partially explained the higher level of depressive symptoms among widowed older adults. They found that friend support modified the relationship between marital status and depressive symptoms ($\beta = -.09, p < .01$) such that married older adults with a high level of friend support were less likely to experience depressive symptoms compared to those who were widowed and had a low level of friend support.

Previous studies also investigated the effects of social and personal resources buffering the adverse effects of physical constraint as chronic stress. For example, Penninx and colleagues (1997) examined direct and buffering effects of social support and personal resources on depression controlling for age and sex among adults aged 55 to

85 with arthritis in the Netherlands. They measured social support with social networks consisting of close relations and diffuse social relations, instrumental support, and emotional support. Personal resources were measured with mastery, self-efficacy, and self-esteem. Using regression and linear structural analysis, they identified the direct and buffering effects of personal resources and social support on depression. Regardless of severity of arthritis, feelings of mastery, high self-esteem, self-efficacy, and large network sizes were closely associated with less depressive symptoms. In addition to the direct effects of personal and social resources, mastery and social networks showed buffering effects against arthritis. Among those with high stress levels caused by arthritis, those who had a larger social network and received more emotional support reported less depressive symptoms ($\beta = -.12, p < .01$).

Similarly, Paukert and colleagues (2010) examined the role of social support and self-efficacy in the relation between physical health and depressive and anxiety symptoms controlling for sociodemographic factors in community-dwelling adults age 60 and older. They measured physical health with a 12-item self-report measure and comorbidity index. They also measured social support with the Multidimensional Scale of Perceived Social Support, and used overall perceived social support and social support from friends. Depression was measured with the Beck Depression Inventory-II (BDI-II) and the Depression, Anxiety, and Stress Scales (DASS-D). As expected, subjective health status was closely associated with somatic anxiety but not associated with depressive symptoms. As predicted in this study, the researchers not only found that perceived social

support and social support from friends were closely associated with depressive symptoms (BDI-II and DASS-D) ($\beta = -.30, p < .001$; $\beta = -.16, p < .05$, respectively), but they also found that overall perceived social support and social support from friends modified the effects of impaired physical health on worry ($\beta = -.16, p < .05$; $\beta = -.18, p < .01$, respectively) and depressive symptoms ($\beta = -.17, p < .05$; $\beta = -.20, p < .01$, respectively). Healthier older adults who had higher social support were more likely to experience less depressive moods, whereas those with lower social support were likely to experience increased depressive moods.

In addition to the interaction effects of social support and physical health status, the interaction effects of social capital and functional disability on mental distress have been explored. Wallsten and colleagues (1999) studied the buffering effects of social supports on the associations of disability and depression controlling for age, gender, race, and income among adults aged 65 and over using data from the Piedmont Health Survey of the Elderly. They measured social supports with instrumental support and subjective appraisal of their social network. Findings suggested not only direct effects of instrumental social support and subjective appraisal on depression ($p < .001$; $p < .001$, respectively), but also interaction effects of disability and subjective appraisal on depressive symptoms ($p < .001$), i.e., social support modified the effect of disability on depression when older adults perceived high social support. Instrumental support did not show a significant buffering effect on depressive symptoms, although the interaction between disability and instrumental support was nearly significant ($p = .58$).

Jang and colleagues (2002) also investigated the impacts of mastery and social resources on depression among community-dwelling older adults controlling for demographic factors and chronic conditions. Using data from the Charlotte County Healthy Aging Study, they measured social resources with social network, social support, and satisfaction with support and found direct and buffering effects of mastery and social support on mental distress. They found the direct effects of social network and satisfaction with support on depressive symptoms ($\beta = -.09, p < .05$; $\beta = -.14, p < .01$, respectively) and also found that satisfaction with support buffered or mitigated the harmful effects of disability on depressive symptoms ($\beta = -.12, p < .01$). However, contrary to their expectations, social networks and social support, which included instrumental support, informational support, and emotional support, did not modify the effects of disability on depression; while satisfaction with social support showed protective effects against the impact of disability on depressive symptoms (Jang, Haley, Small, & Mortimer, 2002).

In similar studies Bozo and colleagues (2009) examined the effect of ADL and perceived social support on the level of depression among Turkish adults aged 60 and over. They measured perceived social support with level of social support from a significant other, family, or friends. The researchers expected direct effects of ADL and social support on depression and buffering effects of social support against ADL difficulties. Their examinations confirmed that ADL and depression were negatively associated, and that older adults who perceived high social support showed lower levels

of depressive symptoms. However, the interaction between ADL and social support was not significant.

In addition to the direct and positive effects of social support and network on health and well-being, moderating effects of individual social resources have been widely studied. As noted, social support and networks are closely associated with older adults' health and mental health; social support and networks are protective factors improving physical and mental health status for the older population.

Effects of Community Social Capital

Along with the positive role of social support and social network on older adults' health outcomes, community social capital can be considered to be a protective factor upon which older adults can rely on. Community social capital is community-based resources available to individuals in the neighborhood in which they reside (Lochner, Kawachi, & Kennedy, 1999; Putnam, 1993). Community social capital has been conceptualized as consisting of structural social capital and cognitive social capital. Structural community social capital refers to community participation, memberships, and physical environments such as the number of non-profit organizations and social organizations (De Silva, McKenzie, Harpham, & Huttly, 2005; Ferlander, 2007; Weaver & Rivello, 2006). Cognitive community social capital as features of organizations and communities is measured with indicators of trust, norms, and cohesion, and safety based on the concept of social capital suggested by Putnam (Kawachi, 2006; Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Kawachi, Subramanian, & Kim, 2008). Both

structural and cognitive community social capital are closely associated with individuals' health and well-being.

Structural community social capital is closely associated with community environments, and since individuals are affected by their environment (Edwards, Caplan, & Van Harrison, 1998), community characteristics influence community members' health, health behaviors, and social activities (Beard et al, 2009; Weden, Carpiano, & Robert, 2008; Wen, Hawkey, & Cacioppo, 2006). Community environments such as the amount of traffic, noise level, and accessibility to public transportation are examples of community characteristics that are regarded as structural community social capital (Glass & Balfour, 2003) related to social activities and individuals' health. For example, noise and heavy traffic are associated with lower social interaction and decreased social participation (Glass & Balfour, 2003). Residential instability and negative street characteristics such as filthy sidewalks and streets are also positively associated with physical disability in older adults (Beard et al, 2009). Since social environment is closely associated with feelings of safety, those who live in unsafe environments feel less safe, which leads to decreased contact with community members and social activities, therefore negatively influencing health (Everard, Lach, Fisher, & Baum, 2000; Wethington & Kavey, 2000). Those who have physical constraints are more vulnerable to social environments because they are more likely to experience difficulties reaching social resources, which results in decreased benefits from networks within the community (Glass & Balfour, 2003; LeClere, 2009; Scharlach, 2009).

Along with the importance of physical community environments for the older population, social resources such as community support groups and recreational groups in the community help older adults remain engaged and socially active in the community (LeClere, 2009). In particular, the effect of community social supports on functional limitations is significant for older adults who have fewer contacts with family members (Shaw, 2005), as supportive relationships with neighbors and monitoring individuals in community increase community safety and prevent escalation of problems by reporting and facilitating tangible assistance for older adults in need (Wethington & Kavey, 2000). While older adults in a favorable community environment are more likely to participate in activities and help each other, poor social environments may decrease feelings of safety and trust in others resulting in less engagement with physical activities and poor health and well-being. It is also noted that poor quality social environments increase barriers to accessing social services and influence functional health by interfering with self-care activities and community participation (Balfour & Kaplan, 2002).

In addition to the effects of structural community social capital on older adults' health, cognitive community social capital is also influential in lowering mortality and improving quality of life and health. Since structural and cognitive community social capital are closely related to older adults' health and well-being, previous studies have included both factors. Higher levels of community social capital are also associated with lower mortality level (Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Lochner, Kawachi, Brennan, & Buka, 2003). For example, Lochner and colleagues (2003)

identified a close association between mortality and neighborhood level social capital measured by reciprocity, trust, and civic participation using geographical boundaries among adults aged 45 to 64 in Chicago. Whites who had higher levels of neighborhood social capital showed lower mortality after controlling for neighborhood economical disadvantage such as the proportion of residents below the poverty line and unemployment rate.

Weaver and Rivello (2006) also identified a close association between mortality and state-level social capital measured with 14 indicators including number of civic and social organizations and number of non-profit organizations as indicators of structural community social capital, and perceived social trust as cognitive community social capital. They found that low level of structural and cognitive social capital had a direct and strong negative effect on mortality rates across 48 U.S. states.

Friedman and colleagues (2012) examined the association between self-assessed quality of life (QOL) and perceived neighborhood safety, social cohesion, and walkability controlling for health status/disability, mental health, chronic conditions as well as demographic factors, economic status, and social support among older adults aged 60 and over attending senior centers. Social support was measured with respondents' perceptions of resource availability. Social cohesion was assessed with respondents' perception of neighborhood trust and reciprocity. Among covariates, physical disability and depression showed significant negative associations with QOL, whereas social support was positively associated with QOL. To run multivariate logistic regression, they

dichotomized the outcome variable (QOL): higher quality of life and lower quality of life. They found that a one standard deviation increase in social cohesion and neighborhood safety increased the likelihood of reporting higher quality of life by around 30% (Friedman, Parikh, Giunta, Fahs, & Gallo).

Cramm and colleagues (2013) also investigated the relationship between social capital and physical and social well-being among older adults. They differentiated individual level social capital and neighborhood level social capital to examine the relationships between both levels of social capital and social cohesion and individuals' well-being, controlling for demographic factors among adults aged 70 and older in the Netherlands. They measured two aspects of well-being: physical (comfort, stimulation) and social (behavioral confirmation, affection, status) well-being. Physical well-being was measured with questions asking about respondents' feeling of discomfort and attitude toward activities. Social well-being was assessed with questions asking about the feeling of how respondents were treated, feeling about themselves, and feeling of other people's attitudes toward them. In this study individual level social capital included emotional social support, membership, civic activities, and social trust; neighborhood level social capital included perception about neighborhood environment, relationships, and social cohesion within the neighborhood. Using multilevel analysis, they reported a positive association between social capital within neighborhoods such as neighborhood services ($\beta=.04$, $p<.05$) and neighborhood social cohesion ($\beta=.16$, $p<.001$) and older adults' well-being as well as a close positive association between individual social capital

($\beta=.07, p<.001$) and individuals' well-being after controlling for individual socioeconomic variables (Cramm, van Dijk, & Nieboer).

Along with the effects of community social capital on health, community social capital is significantly associated with older adults' mental well-being. Glass and colleagues (2006) analyzed longitudinal data from the New Haven, Connecticut site of the Established Populations for Epidemiologic Studies of the Elderly (EPSE) project to identify the protective effects of social engagement against depressive symptoms among community-dwelling adults aged 65 and older. To measure social engagement, respondents were asked how often they had engaged in activities such as volunteer work, participating in social groups, attending religious services, in the previous month. After controlling for sociodemographic factors and health status, social engagement was associated with lower depressive symptoms using cross-sectional analysis ($\beta= -.31, p<.001$), whereas functional disability was positively associated with depressive symptoms ($\beta= .12, p<.001$) (Glass, De Leon, Bassuk, & Berkman). Mair and colleagues (2010) also found that neighborhood stressors were closely associated with an increase in depressive symptoms in both adult men and women in Chicago. They reported that such neighborhood social support variables as social cohesion, reciprocal exchange, social ties, residential stability, and family structure were associated with lower levels of depressive symptoms in women (Mair, Diez Roux, & Morenoff).

Community social capital, similarly to social network and social support, is closely associated with individuals' health and well-being and may play a protective role

by improving older adults' health and well-being and decreasing mental distress. Older adults in the community with abundant social capital are also likely to feel safe participating in activities, trust others, and more easily access social services in the community, which results in better physical and mental health outcomes (Katz, Kling & Liebman, 2000; Leventhal & Brooks-Gunn, 2003).

In summary, this chapter reviews the relationships among physical constraints, social resources including community social capital, and health in older adults. Previous studies have identified physical constraints as a risk factor for older adults' mental health and widely examined the direct and moderating effects of social support and networks on health and well-being. Although older adults who have physical constraints are more likely to experience mental distress, social resources are protective factors of older adult's mental health.

As the stress-buffering model describes, social resources' role as moderators buffering the adverse effects of stressors on health and mental health; while social capital improves older adults' physical and mental health, and attenuates the adverse effects of stressors on mental health. There is growing evidence of close relationships between social resources and mental distress in later life (Hays, Steffens, Flint, Bosworth, & George, 2001; Mair, Diez Roux, & Morenoff, 2010; Newsom & Schulz, 1996; Ziersch, Baum, MacDougall, & Putland, 2005). For instance, perceived social supports from network members decrease depressive symptoms and loneliness (Kahn, Hessling, &

Russell, 2003; Paukert et al, 2010), while large network sizes are associated with less depressive symptoms (Penninx et al, 1997).

Along with the positive effects of social network and support, previous studies have shown that community environment significantly influences older adults' health and mental health (Ostir, Eschbach, Markides, & Goodwin, 2003; Yen, Michael, & Perdue, 2009). In particular, community social capital is associated with decreased mortality (Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Lochner, Kawachi, Brennan, & Buka, 2003) and older adults' higher quality of life (Friedman, Parikh, Giunta, Fahs, & Gallo, 2012).

Despite growing research on social capital, only a few studies have explored the positive effects of community social capital on older adults' mental health (Mair, Diez Roux, & Morenoff, 2010; Ziersch, Baum, MacDougall, & Putland, 2005). Importantly, few studies have examined the possible role of community social capital in modifying the association between physical constraint and mental health problems among older adults. A systematic review of community social capital and mental illness revealed that no study was identified that specifically examined community social capital among older adults and its effects on mental health (De Silva, McKenzie, Harpham, & Huttly, 2005). Limited research on community social capital and mental distress in later life has been conducted, even though the significance of environmental influence on older adults' mental health is increasing (Cagney & Wen, 2008). The primary reason for the lack of research on community social capital and older adults' mental distress may be the limited

data available that contains a nationally representative sample of older adults and community social capital indicators. The paucity of research on community social capital suggests the need for more research on the role of community social capital on mental health. Further, it would be particularly meaningful to identify how community social capital interacts with physical constraints and influences mental distress in older adults.

CHAPTER 3: THEORETICAL FRAMEWORK AND PROPOSED HYPOTHESES

Social environment has been a main interest of social workers who want to develop a holistic understanding of individuals. Social workers have adapted concepts from the eco-systems perspective and have developed the person-in-environment perspective that takes account the physical and social environments surrounding individuals (Kondrat, 2002). According to the eco-systems perspective, individuals are in constant interaction with their environments, and when faced with problems, they try to reach equilibrium by adapting to their environment (Wakefield, 1996). In like manner, person-environment-fit (PEF) perspective views individuals in relationship with their environment. Stress is explained by the relationship between individuals and their environment. In particular, PEF perspective focuses on the match between individuals and their environment. When the fit between individuals and their environment is comparable, interactions can be facilitated; and when individuals have needs to meet, the environment meets their needs (Kristof-Brown, 2007). On the other hand, stress arises when individuals' values and abilities do not correspond to environmental demands, or when the environment does not meet individuals' needs (Edwards & Cooper, 1990). Stress driven from the mismatch between individuals and their environments may adversely affect mental well-being in later life. In this context, stress and resources can be assessed through the PEF perspective. Thus, social workers are interested not only in individuals' problems and strengths but also in their current environments and the

resources which include health and social services that affect individuals' physical well-being and social functioning (Karls & O'Keefe, 2008).

According to stress-coping theory, stress occurs when an individual appraises a situation as exceeding their adaptive resources (Folkman, 1984; Folkman & Moskowitz, 2004; Lazarus & Folkman, 1984). Based on the stress and coping framework, physical constraints act as chronic stressors to older adults and have a negative influence on their health and well-being (Lyon, 2000). Such physical constraints require support from their social environment including family, friends, and community. Longitudinal studies reported that physical constraints such as functional disability and chronic disease can result in chronic stress, which poses a significant risk factor for mental health (Biderman, Cwikel, Fried, & Galinsky, 2002; Huang, Dong, Lu, Yue, & Liu, 2010; Zeiss, Lewinsohn, Rohde, & Seeley, 1996). Older adults with physical constraints may rely on their social resources to cope with their stress by interacting with network members or utilizing community resources. Social capital is a social resource available to individuals through their communities and networks. Previous studies on social capital have reported that social capital not only directly influences mental well-being and health (De Silva, McKenzie, Harpham, & Huttly, 2005; Ziersch, Baum, MacDougall, & Putland, 2005), but also attenuates adverse effects of stressors on mental health (Newsom & Schulz, 1996; Penninx et al., 1997; Schoevers et al., 2000).

Social capital theory explains how social resources influence individuals' health and how social resources interact with stress, consequently impacting mental health. In

particular, the main effects model of social capital illustrates the direct relationships between social capital and mental health. The stress-buffering model of social capital describes the relationship between stress and mental well-being and explains the buffering role of social capital.

This chapter begins with a review of social capital theory and definitions. The main effects model and the stress buffering model are reviewed in the next section. Finally, a conceptual model and hypothesis for the study are suggested to test the effects of physical constraints, community social capital, and their interaction effects on mental well-being in later life.

Social Capital Theory

Social capital describes a number of social phenomena pertaining to social relationships within social structures (De Silva, McKenzie, Harpham, & Huttly, 2005; Macinko & Starfield, 2001). Social capital theory has been used to explain relationships between social resources and individuals' health. Although social capital theory may be a powerful framework for understanding social influence on individual health, because of its complexity, there is no one simple definition of social capital. Two multidimensional aspects often define social capital: micro level (individual) and macro level (collective), and cognitive and structural elements. Each aspect explains what social capital is and how it works within social networks.

In 1961, Jane Jacobs first used the sociological concept of social capital to describe life in urban neighborhoods (Whitley & McKenzie, 2005). Since then, Pierre

Bourdieu and James Coleman have been credited with expanding the concept of social capital (Szreter and Woolcock, 2004; Whitley & McKenzie, 2005). As the concept of social capital is relatively new in health research (Kawachi, Subramanian, & Kim, 2008), it is useful to review definitions of social capital used in earlier health studies to better understand its multidimensional aspects (Table 1).

Review of previous definitions indicated that the concept of social capital is usually defined based on the level of resources available. Bourdieu and James theoretically linked social capital and health on individual and collective levels (Szreter and Woolcock, 2004); Portes (1998) focused on individual level social capital; and Putnam (2000) extended it to state level resources and connected it to individual health and well-being.

Furhter, social capital has been defined in various ways because of its multidimensionality or characteristics (see Table 1). At a micro level, social capital is conceptualized as the resources available to individuals such as social connections and social support; while at a macro level, social capital is defined as a collective resource such as community trust and institutional coherence (Almedom, 2005; Ferlander, 2007; Macinko & Starfield, 2001; Whitley & McKenzie, 2005). According to the definitions in Table 1, concepts of social capital include individual characteristics, group characteristics, or both. Regardless of levels of social capital, all definitions include structural and cognitive aspects. Structural social capital, such as social networks and institutional structures, links people and groups together. Cognitive social capital (i.e.

social capital's subjective elements) consists of values, norms, and reciprocity (Ferlander, 2007; Whitley & McKenzie, 2005).

Portes (1998) defined social capital at a micro level as consisting of cognitive and structural elements (see Table 1). Social capital is considered as individuals' capacity to reap benefits through their membership in the networks. In that line, social network is part of social capital available to individuals through their community. As cognitive aspects of social capital, social introjection refers to networks and groups' internalized values and norms; bounded solidarity refers to a powerful motivational force that encourages individuals to help other members anonymously by identifying them as a member of groups and communities (Portes). As structural aspects, reciprocity exchanges refers to the idea that donors will expect nonmonetary returns from the collectivity as a whole in the form of honors or approval; enforceable trust refers to obligations imposed on individuals so they comply with social expectations and norms (Portes). Although Portes (1998) considered social capital as resources available to individuals, Bourdieu (1986) and Coleman (1988) defined social capital as properties at both the individual and collective level. However, Bourdieu paid particular attention to social relationships themselves, while Coleman emphasized the ability to access resources through membership of social organizations (Portes, 1998).

Both Bourdieu and Coleman regarded social relations as a crucial concept for explaining collective features of social capital. They expected that social relations provided by neighborhoods, workplaces, or even kinship can be established and

maintained, which provide benefits to individuals or communities in the relationships (Bourdieu, 1986; Coleman, 1988; Kawachi & Berkman, 2000). Bourdieu defined social capital as the sum of resources available to individuals and noted that the amount of social capital depends on the size of network connections that an individual can effectively mobilize. As a member of a group such as ones workplace, neighborhood, or family, individuals can utilize collective resources and secure benefits (Bourdieu). Coleman (1988) also argued that social capital is embedded in social structures and can be identified by its function that facilitates certain actions to achieve individual or collective benefits (see Table 1). Coleman described the following cognitive and structural elements of social capital: obligation, expectations, trustworthiness of structures, information channels, and social organization. In social structures, individuals trust each other and establish expectations and obligations through social relations. Social capital functions as information channels for group members using social relations in a network to become informed about social resources and services that may impact their health and well-being. Coleman also argued that social organizations are a source of social capital, which is available to the residents of the community.

Putnam (1993) defined social capital as community level resources such as networks, norms, and trust, which can be understood with traditions of civic engagement, historical roots of the civic community, and density of membership in civic associations. Putnam (2000) also described social networks that have values, such as norm of reciprocity and trustworthiness, as the core idea of social capital. Trust as social capital

Table 1. Definitions of social capital

Author	Definition	Elements	Level
Portes (1998)	“Social capital stands for the ability of actors to secure benefits by virtue of membership in social networks or other social structures.”	Cognitive: value introjection, bounded solidarity Structural and behavioral: reciprocity exchanges, enforceable trust (membership, trust)	Micro (Individual)
Bourdieu (1986)	“Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or in other words, to membership in a group – which provides each of its members with the backing of the collectivity-owned capital, a “credential” which entitles them to credit, in the various senses of the word.”	Structural: sum of the actual or potential resources (elements not specified)	Micro/Mezzo (Individual and collective social relations)

Table 1., cont.

Coleman (1988)	<p>“Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible.”</p>	<p>Cognitive: obligations and expectations, trustworthiness of structures, social norms</p> <p>Structural: information channels, social networks</p>	Micro/Mezzo (Individual and collective social relations)
Putnam (1993)	<p>“Social capital refers to features of social organization, such as networks, norms, and trust that facilitate coordination and cooperation for mutual benefit. Social capital enhances the benefits of investment in physical and human capital.”</p>	<p>Cognitive: norms, and trust, reciprocity</p> <p>Structural: networks, civic engagement, participation,</p>	Macro (Collective)

refers to trust in other people or trust in institutions (Nygqvist, Gustavsson, & Gustafson, 2006) and norms refer to a form of exchange of social support (Ferlander, 2007). Trust and norms are also used to measure the level of social cohesion as a collective property of social capital (Kawachi & Berkman, 2000). Networks that are considered to be a structural property and a core element of social capital consist of formal networks such as voluntary participation in nonprofit organizations and civic engagement in political parties as well as informal involvement in networks such as families and neighbors (Poortinga, 2006; Ferlander, 2007).

Putnam (1993) argued that strong civic engagement such as voter turnout and newspaper readership indicated more equal opportunities and honest leadership in communities. By increasing the density of social networks or creating new productive linkages among community groups, community members can benefit from social capital. On the other hand, communities or specific populations that have low social capital and unequal access to social capital would experience social disadvantages such as unemployment, poor health, and high rates of neighborhood crime (Putnam, 1993). Thus, social capital is considered a collective level property. This definition is commonly used in health sciences to identify the effects of macro level social capital (McKenzie, 2006; Whitley & McKenzie, 2005).

Human capital refers to individual resources that increases or decreases based on individual investment and environmental situations (Macinko & Starfield, 2001). Unlike human capital that is a private good such as education, social capital is considered a

public good that has collective characteristics because social capital functions within a social context and stems from social relations. Individuals benefit most when they are members of communities where social capital is available to access and utilize.

Main Effects Model and Stress-Buffering Model

Social capital has been developed to explain social changes and development (Putnam, 1993, 2000). Since the 1990s, the social capital concept has been applied to health research (Kawachi, Subramanian, & Kim, 2008) and contributed to explaining social determinants of individuals' health and mental health. Relationships between social capital and individuals' health are approached at individual and collective levels. At a macro level, social capital may indirectly influence individuals' health through the properties of communities (Veenstra et al., 2005). Residents of communities with high levels of social capital are more likely to access social resources, to find jobs, to finish school, and to avoid crime; these factors have a positive effect on health (Putnam, 1993; Veenstra et al., 2005).

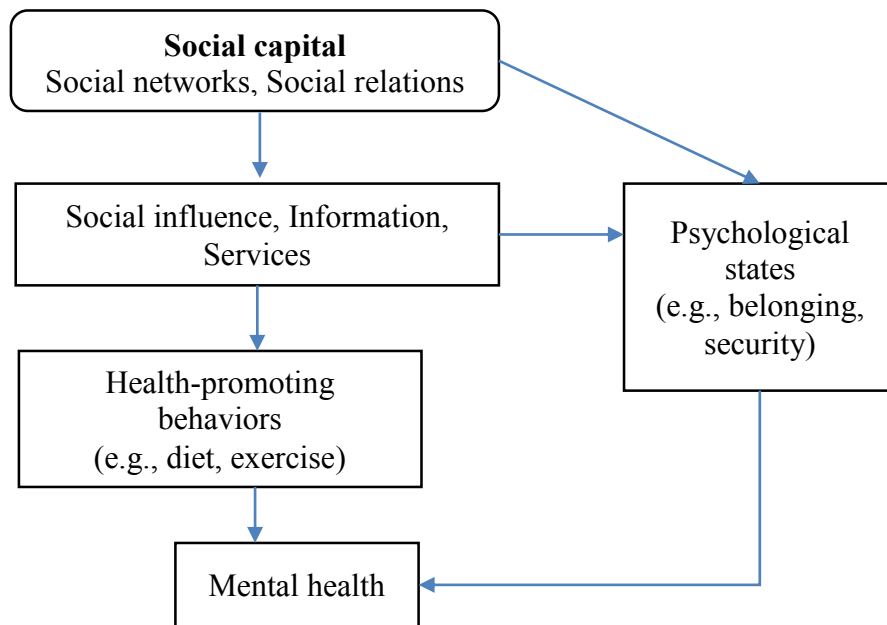
To explain the mechanisms of social capital influencing individual health outcomes, Cohen and Wills (1985) proposed a main effects model and a stress-buffering model. The main effects model explains the general effects of social capital on mental well-being without taking the effects of stress into account, whereas the stress-buffering model suggests specific pathways between stress and mental well-being. The latter model explains how social capital buffers the effect of stress on mental health.

In the main effects model, Cohen and colleagues (2000) posited that social network participants benefit from their networks regardless of the existence of stress. The main effect model (see Figure 1) describes the direct effects of social capital through which network members receive mental health benefits. Main effects refer to health-related benefits that individuals can experience by integrating themselves in social networks. The network members may gain psychological benefits from a sense of belongingness, security, and stability provided by integration in a social network. The individuals in social networks may also benefit because healthy behaviors are promoted through social influences and by accessing services and health information. Psychological benefits and social influence such as peer pressure and shared norms may encourage individuals in a network to stop harmful health behaviors and to adopt healthy behaviors such as regular exercise (Berkman, Glass, Brissette, & Seeman, 2000; Kawachi, & Berkman, 2001).

Social network members may have increased accessibility to information through a wide range of social relations (Coleman, 1988; Macinko & Starfield, 2001). This information may help them avoid stressful situations and access better health services, which in turn influences their mental health. Services in the model refer to tangible and economic services such as food provision and assistance with I/ADLs. Through the formal and informal health care and services provided from the community, network members may experience decreased stress and may prevent health problems. This main

effects model provides guides the understanding of how social network pathways and social capital work to improve individual members' mental health.

Figure 1. Main effect model of social networks and mental health (adapted from Cohen, Underwood, & Gottlieb, 2000)



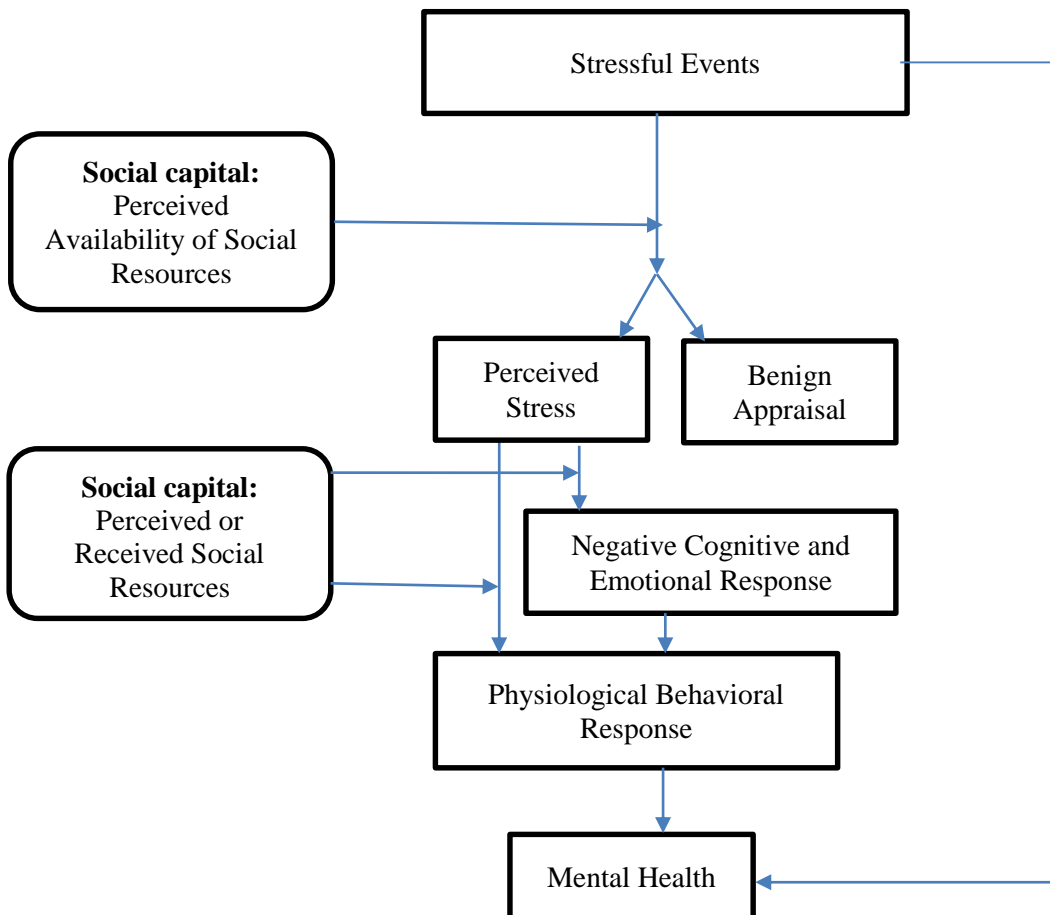
Unlike the main effects model, which explains the major benefits of social capital without considering stress, the stress-buffering model explains the pathways involved in individuals' responses to stressful events as a result of social capital (see Figure 2). The stress-buffering model posits that social networks may reduce the influence of stressful events that might be harmful to individual health (Cohen, Underwood, & Gottlieb, 2000). This model proposes a moderating role for both cognitive and structural components of social capital in individuals' mental health.

When individuals face stressful events, they are first required to evaluate the demands caused by the stressful events and their overall capacity to cope with the stress. In the evaluation process, perceived availability of social resources may decrease perceived stress or lead to benign appraisal of the situation that does not require further coping processes. Second, individuals react to the perceived stress according to the level of perceived or received support. Perceived and received resources may moderate the influence of stressful events on emotional reactions and behavioral responses. Cohen and Wills (1985) indicated that the stress-buffering model was proposed to identify the interaction effects of stress and social networks. The cognitively perceived availability of resources from social networks may influence individuals' appraisal of stressful events and reduce the level of perceived stress, which results in decreased mental health problems. That is, social support may alleviate the impact of stress on individuals' mental health by providing a solution or a distraction from the stressors (Cohen & Wills).

Researchers have applied the stress-buffering model in empirical studies and health studies have identified social capital's buffering effects. For example, Stafford and colleagues (2008) investigated the relationship between common mental disorders measured using the 12-item General Health Questionnaire and neighborhood social capital among the general population aged 16 and older. They aggregated individual social capital to neighborhood level social capital by taking the mean score for all individuals at the zip code level and found that social capital, friendship ties, and tolerance of others buffered the effects of neighborhood level stressors measured with

neighborhood level unemployment and percent of households in lower economic status on individuals' stress levels.

Figure 2. Stress-buffering mold of social capital and mental health (adapted from Cohen, Underwood, & Gottlieb, 2000)



Similarly, Boardman (2004) found that neighborhood stability modified the influence of social stress on individuals' health status noting in particular that residents of

unstable neighborhoods experienced stronger effects of stress on their health. Penninx et al. (1997) also reported the buffering effect of social capital on chronic health conditions. Social support reduced the negative influence of arthritis on depressive symptoms for older adults (Penninx et al.). Bjornstrom, Ralston, and Kuhl (2013) also used both collective level and individual level social cohesion to identify the effects of social capital on self-rated health using the Los Angeles Family and Neighborhood Survey data. They found that individual level social cohesion was directly and positively associated with better health and that there was also an interaction effect between negative neighborhood environments and perceived social cohesion on self-rated health. Social cohesion protected against poor health for residents of neighborhoods characterized by low to moderate disorder. Since the stress-buffering model provides explanatory pathways describing how social capital buffers the effects of stressful events and impacts mental well-being as well as how social capital interacts with individual attributes, this model is applied to identify buffering effects of community social capital on older adults' mental well-being.

A Framework and Proposed Hypotheses

Social support and social networks are individual social resources from which individuals can acquire support from family and friends. Community social capital is community-based resources available to individuals via membership in a group or community (Lochner, Kawachi, & Kennedy, 1999; Putnam, 1993). In general, social

resources play a protective role in influencing older adults' health and their well-being (Kawachi, Subramanian, & Kim, 2008).

However, social resource generally decline as people get older (Roberts, Dunkle, & Haug, 1994), because older adults often experience a decline in network size and fewer contacts with network members (Ajrouch, Antonucci, & Janevic, 2001; Marsden, 1987; Morgan, 1988). Older adults experience a loss of family and friends which results in reduced network sizes as they age (Fiori, Smith, & Antonucci, 2007). They also decrease interactions with network members due to changes of social status such as retirement. Declining income may also result in less ability to maintain their social networks and social activities (Morgan, 1988). Declining network size and fewer social interactions result in a decrease in their social resource (Antonucci, 1986; Baltes & Smith, 2003; Fiori, Smith, & Antonucci, 2007).

Although social networks and other social resources for older adults decreases, the importance of social resources may increase for the older population. According to the socioemotional selectivity theory, individuals who perceive that they have relatively limited time left to live tend to be devoted to maintaining their most intimate social boundaries and utilize their resources to focus on their social and emotional goals (Carstensen, Isaacowitz, & Charles, 1999). To achieve emotionally meaningful goals, older adults interact with their social environments (Iwarsson, 2005), and when physical constraint increases, those community social resources become critical for the older population to stay in their community and maintain their social relationships (Cvitkovich

& Wister, 2001; Yen, Michael, & Perdue, 2009). Thus, the effect of community social capital can be heightened because of the strategies older adults employ to achieve their emotional goals such as gratification from relationships in the network.

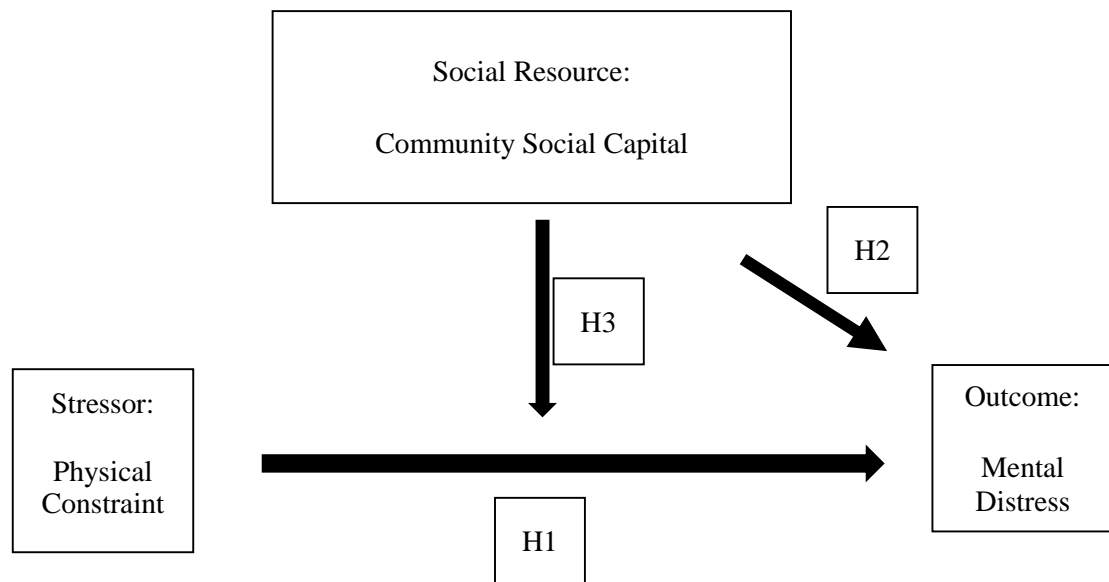
The stress-buffering model also describes protective effects of social support and community social capital which positively impacts mental health. As a social resource, community social capital buffers the effects of stressors on physical and mental health. Previous studies provide evidence of the relationship between community social capital and individuals' health and well-being such as mortality, quality of life, and self-rated health. Structurally, community social capital refers to physical environments such as the number of non-profit organizations and social organizations available in the community (Weaver, & Rivello, 2006). Commonly, community social capital as features of organizations and communities is measured with indicators of trust, norms, and participation based on the concept of social capital suggested by Putnam (Kawachi, 2006; Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Kawachi, Subramanian, & Kim, 2008). Individuals in a group benefit from their community through norms of reciprocity, civic participation, and trust in others by virtue of membership in social networks (Cramm, van Dijk, & Nieboer, 2013).

The positive role of community social capital on mental well-being can be incorporated into the stress buffering model. Social capital theory, and the main effects model and stress-buffering model are useful for understanding the effects of individual and social resources on stress and mental health in later life. In particular, the stress-

buffering model provides a framework for identifying individual and social community protective factors against chronic stress in later life. Based on the stress-buffering model, a model describing the relationships between physical constraint and mental health in later life is proposed. Figure 3 describes the role of community social capital as social resources moderating the effects of stressors on mental health in later life. Since chronic stressors such as functional disability and chronic disease would threaten older adults' mental health, older adults who face stressors may utilize their social resources to mitigate the effects of stress on their mental health. As social resources, community social capital will influence older adults' mental health and buffer the effects of stress.

Older adults who have physical constraints need assistance from their individual social networks and community to decrease their physical burden. Older adults in communities with high social capital may more easily obtain assistance by accessing social services such as health care agencies through supports from network members and high accessibility to services in their community. As a type of structural social capital, tangible supports referring to physical assistance provided by others may decrease older adults' stress by helping with their daily activities. Cognitive social capital may also influence older adults' perception of social relationships and safety and protect older adults from stress. When older adults live in a community with a high level of social capital, they may feel safer and more secure because of the close connections with their community and may rely on their community network members, thereby leading to decreased mental distress.

Figure 3. The role of community social capital in the relationship between stress and mental health in later life



For example, although older adults with functional constraints may experience increased stress in finding appropriate social services to meet their needs, those who have a high level of social capital may acquire beneficial information through their networks about their health status and services that they can use. On the other hand, when older adults have low social capital, they may have limited access to information and resources resulting in poor mental health status. Communities with low social capital also cannot adequately provide appropriate services to older adults due to the lack of appropriate services available in the community, or due to barriers in accessing services caused by a lack of support from community network members, unsafe environments, challenges acquiring safe and efficient transportation, limited social relationships, and lack of available resources.

Despite the importance of community social capital, few studies have investigated the role of community social capital on mental well-being among older adults. Given the gaps in research on social capital and mental health in later life, this study tested: (1) if physical constraints increase older adults' mental distress; (2) if community social capital decrease older adults' mental distress, and (3) if community social capital modifies the effects of physical constraints on mental distress.

Community can be defined as a geographical location or any group in common such as ethnic communities. Community also can refer to smaller geographic areas such as a neighborhood or local area where people can interact with one another. In this study community is defined narrowly as a local area within about a twenty-minute walk or a mile radius from a respondent's home (Cornwell & Cagney, 2014). Community social capital in this study is related to an individual's perception about neighborhood safety, neighborhood attachment, and connectedness. Physical constraint is a status of health that is prevalent among older adults and acts as a chronic stressor. In this study, functional disability and chronic disease are indicators of physical constraint. This study used mental distress to measure the negative level of mental health status in later life. Mental health measures of anxiety and depressive symptoms were used as indicators of mental distress (Lampinen, Heikkinen, Kauppinen, & Heikkinen, 2006).

Given the proposed relationships among the variables, the following three hypotheses are proposed:

H1: Physical constraints will increase mental distress in later life.

H2: Community social capital will decrease mental distress in later life.

H3: Community social capital will modify the effect of physical constraints on mental distress.

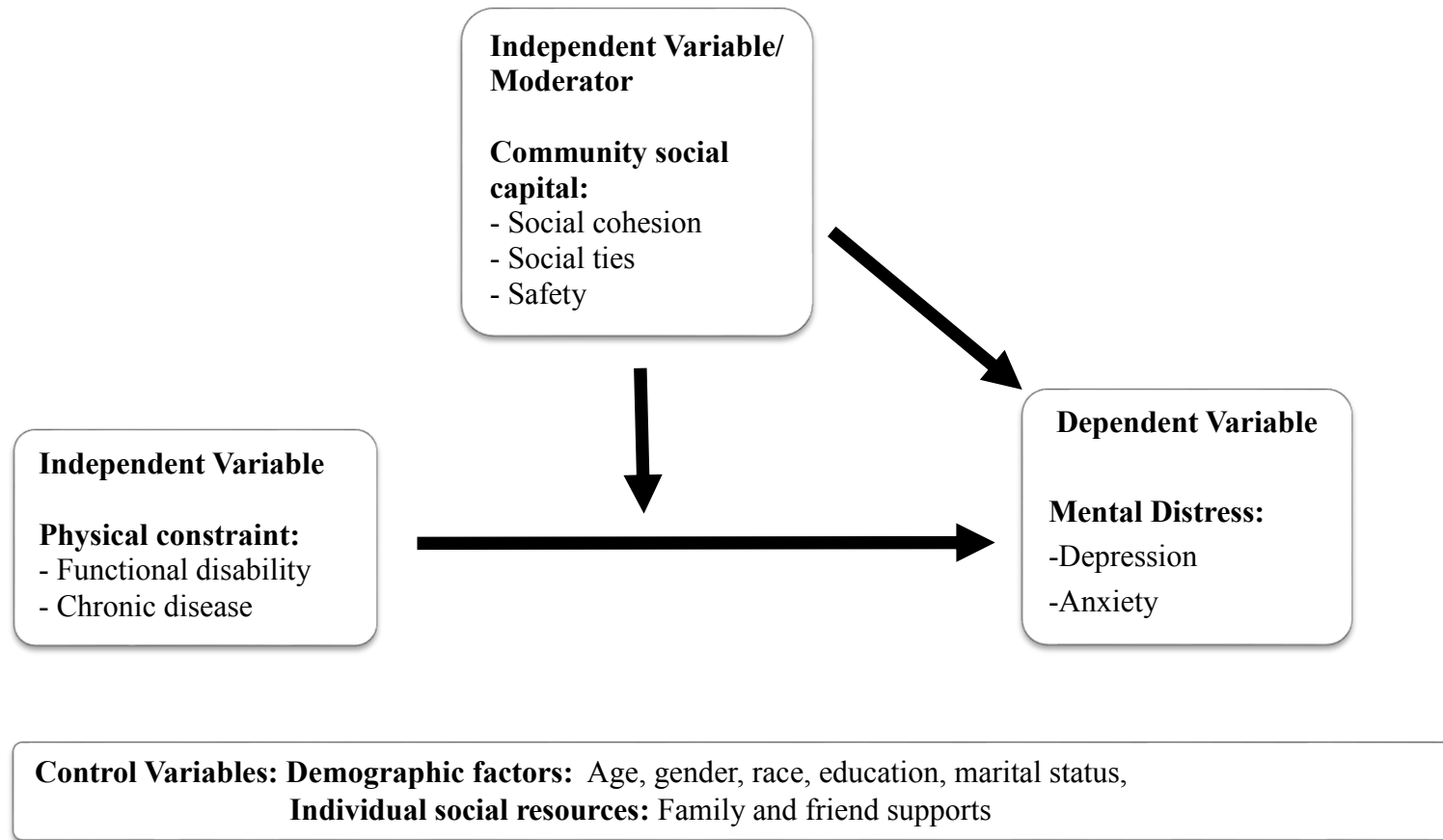
CHAPTER 4: METHODOLOGY

Based on the stress-buffering model and previous studies of social capital and mental distress, a conceptual framework of community social capital's moderating effects is proposed (Figure 4). The research framework describes the relationships between physical constraint and mental distress, as well as the effects of community social capital in the linkage between physical constraint and mental distress. Therefore, this study tested the effects of physical constraint and the role of community social capital on mental distress in later life.

This section describes the data set, variables used in the models, and the analytic plan. Descriptive statistical analysis and structural equation modeling were used to conduct the research. Descriptive statistical analysis described the sample characteristics and provided overall information about the study sample; while structural equation modeling, using Mplus version 7.3 (Muthén & Muthén, 2012), was performed to test the proposed conceptual framework (Figure 4) to answer the proposed research questions:

- (1) Does physical constraint increase older adults' mental distress?
- (2) Does community social capital decrease older adults' mental distress?
- (3) Does community social capital modify the effects of physical constraint on mental distress for older adults?

Figure 4. Conceptual framework of the study: the stress-buffering model of community social capital



Prior to testing the effects of physical constraint and community social capital on mental distress, the validity of the measurements for community social capital, physical constraint, and mental distress scales was examined through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). While controlling for sociodemographic factors and support from family and friends, the main effects of community social capital and physical constraint were tested through structural equation modeling. Finally, the buffering effect of community social capital was tested through latent moderation structural equation modeling.

Data and Population

Data came from the second wave of the National Social Life, Health, and Aging Project (NSHAP, 2010-2012). The NSHAP is a national longitudinal and population-based study of health, social life, and well-being among older Americans. The NSHAP sample was selected from the national area probability sample conducted for the Health and Retirement Study (HRS). To secure a sufficient sample of ethnic minorities for HRS, Blacks and Hispanics were over sampled. The NSHAP was over sampled by age and gender to equalize the distribution of respondents by age and gender and retained minority oversampling of HRS. The first wave of the NSHAP target population was community-residing older adults aged 55-85 years in 2004. In home, face-to-face interviews were conducted and leave-behind questionnaires (to be mailed back) were used to collect information about health, well-being, and social relationships from a total of 3,005 nationally representative sample members of community-dwelling older adults

aged 57–85 in 2004. The response rate for the leave-behind Wave 1 questionnaire was 84%, but the response rate for Wave 2 was not reported. The second wave of NSHAP was collected by revisiting Wave 1 sample members 5 years after the initial interviews, which allows for population-based longitudinal analysis for health and social relationships. Eligible individuals in Wave 1 who did not respond and the partners of the respondents were also included in Wave 2. In wave 2, a total of 3,377 respondents completed the in-person interviews between 2010 and 2011. Since information about community social capital was included in the leave-behind questionnaire (n=2949), this study utilized the sample aged 65 and over who completed the face-to-face interviews and the leave-behind questionnaires (n=2432). The final sample size was 2,362 after removing cases with missing values (70 excluded). More information on sampling procedures and methods of the second wave of the NSHAP is available elsewhere (e.g., O’Muircheartaigh, English, Pedlow, & Kwok, 2014).

Measures

Physical constraints

Physical constraint was defined as physical health status measured by functional disability. Functional disability refers to the degree of difficulty performing Activities of Daily Living (ADL). The ADL scale consisted of 6 items concerned with the extent of limitations in (1) walking across a room, (2) dressing, (3) bathing, (4) eating, (5) getting in or out of bed, and (6) using the toilet. ADL scale items are measured using a 4-point

scale ranging from 0 (no difficulty) to 3 (unable to do). Responses for the 6 items were summed for total scores. Cronbach's alpha from this study sample was .82.

Chronic disease was calculated by how many of the following chronic diseases each respondent reported: hypertension, arthritis, heart problem, skin cancer, other than skin cancer, diabetes, asthma and COPD, osteoporosis, stroke in last 5 years, and hip fracture. Respondents were asked if a medical doctor had ever told them that they have any of these chronic diseases. Respondents answered the questions with a yes or no response.

Community social capital

Community social capital was operationally defined as perceptions about neighborhood safety and social interactions with the neighborhood. Community social capital in NSHAP Wave 2 was measured with items about neighborhood social cohesion, neighborhood social ties, and perceived neighborhood danger. Originally, the items assessing neighborhood social capital were used in the Project on Human Development in Chicago Neighborhood Community Survey (PHDCN-CS) (Sampson, Morenoff, & Felton, 1999). Instead of referring to respondents' neighborhood used in the original measurement, items in the NSHAP Wave 2 asked about their local area as defined by anywhere within a 20-minute walk or within about a mile of respondent's home. Previous studies provided strong evidence of validity and reliability of this community social capital measure with high internal consistency with Cronbach's alpha ranging from .73

to. 91 (Mujahid, Diez Roux, Morenoff, & Raghunathan, 2007; Sampson, Raudenbush, & Earls, 1997).

Community social cohesion was measured with 3 items: (1) “This is a close-knit area.” (2) “People around here are willing to help their neighbors.” (3) People in this area can be trusted.” The response categories for each item were: never (0); hardly ever or rarely (1); some of the time (2); and often (3), with higher values indicating stronger neighborhood cohesion. Cronbach’s alpha from this study sample was .67.

Community social ties was measured with 3 items: (1) “How often do you and people in this area visit in each other's homes or when you meet on the street?”, (2) “How often do you and other people in this area do favors for each other?”, (3) “How often do you and other people in this area ask each other for advice about personal things?” The response categories for each item were: never (0); hardly ever or rarely (1); some of the time (2); and often (3), with higher values indicating stronger neighborhood connectedness. Cronbach’s alpha from this study sample was .75.

Perceived neighborhood safety was measured with 3 items using a 5-point scale ranging from 1 to 5: (1) “Many people in this area are afraid to go out at night.”, (2) “There are places in this area where everyone knows “trouble” is expected.”, (3) “You're taking a big chance if you walk in this area alone after dark.” The response categories for each item were: strongly disagree (1); disagree (2); neither agree nor disagree (3); agree (4); and strongly agree (5). All items were reverse coded to be consistent with other

social capital indicators' direction. Thus, higher value indicated respondents' perception of higher neighborhood safety. Cronbach's alpha from this study sample was .80.

Exploratory factor analyses were conducted to identify the underlying structure of latent variables: community social capital, depression, and anxiety. As a rule of thumb for the minimum loading of an item, .32 was considered to be meaningful criteria (Tabachnick & Fidell, 2012). As for community social capital, a total of 11 items were explored to identify the underlying structure. EFA identified three factors of the observed community social capital and detected two cross loaded items. Social cohesion item 3 and item 4 cross loaded on two factors: social cohesion and community safety. Therefore, cohesion item 3 "People in this area generally don't get along with each other" and cohesion item 4 "People in this area don't share the same values" were eliminated.

Table 2. Factor loading for 9 items of community social capital scale

Items	Cohesion	Tie	Safety
This is a close-knit area	.64		
People around here are willing to help their neighbors	.74		
People in this area can be trusted	.49		
How often visit in each other's homes?		.76	
How often do favors for each other?		.69	
How often ask each other for advice about personal things		.64	
Many people are afraid to go out at night.			.69
There are places where everyone knows "trouble" is expected.			.77
You're taking a big chance if you walk alone after dark.			.84

After removing these two items, EFA with 9 items produced primary loadings over .6 except for the cohesion item “People in this area can be trusted” (Table 2). Since the community social capital measurement originally consisted of the three sub scales, (community cohesion, community tie, and community safety), this EFA result was consistent with the original structure of community social capital measurement. The 9 items in table 2 were used in this study to represent community social capital.

Mental distress

Mental distress was operationally defined in terms of the degree of depressive symptoms and feelings of anxiety. Two indicators captured in the NSHAP, depression and anxiety, were used to assess mental stress in later life. The Center for Epidemiological Studies – Depression (CES-D) scale was used to assess depressive symptomology (Radloff, 1997). Instead of using the original 20 items, NSHAP used the shorter 11-item IOWA form of the CES-D scale (Shiovitz-Ezra, Leitsch, Graber, & Karraker, 2009), which taps the same symptom dimensions as the original CES-D scale (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993). Respondents were asked how often during the past week they felt the following conditions: (1) did not feel like eating, (2) felt depressed, (3) felt everything was an effort, (4) sleep was restless, (5) was happy, (6) felt lonely, (7) people were unfriendly, (8) enjoyed life, (9) felt sad, (10) felt people disliked me, and (11) could not get going. Each condition was measured on a 4-point Likert scale (1= rarely or none of the time; 2 = some of the time; 3= occasionally; 4 =

most of the time), with higher score indicating more depressive symptomology.

Cronbach's alpha from this study sample was .78.

The 11 items in the IOWA form of the CESD scale were tested to identify the underlying structure of the depression measure. EFA identified that CESD scale had 4 factors and all factor loadings were equal to or over .32 (Table 3). This result was consistent with previous literature that identified four factors for the CESD scale: somatic, depressed, positive, and interpersonal (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993; Rhee et al., 1999). This four-factor structure of the depression measure was used in the final analyses for this study.

Table 3. Factor loading for 11 items of CESD scale

	Item	Somatic	Depressed	Positive	Interpersonal
cesd1	did not feel like eating	.40			
cesd3	felt everything was an effort	.65			
cesd4	sleep was restless	.32			
cesd11	could not get going	.63			
cesd2	felt depressed		.45		
cesd6	felt lonely		.51		
cesd9	felt sad		.72		
cesd5	was happy			.63	
cesd7	people were unfriendly			.69	
cesd8	enjoyed life				.44
cesd10	felt people disliked me				.84

Feelings of anxiety were assessed with the seven-item subscale of the Hospital Anxiety and Depression Scale (HADS-A; Zigmond & Snaith, 1983). The original HADS

was developed to assess patients' psychological distress; and studies have established reliability and validity in population based studies (Bjelland, Dahl, Haug, & Neckelmann, 2002; Mykletun, Stordal, & Dahl, 2001). Cronbach's alpha for HADS-A ranges from .68 to .93 (Bjelland, Dahl, Haug, & Neckelmann, 2002). To assess feeling of anxiety, respondents were asked how often during the past week they felt the following: (1) felt tense or wound up, (2) thought something awful was about to happen, (3) worrying thoughts went through their mind, (4) could sit at ease and feel relaxed, (5) felt butterflies in my stomach, (6) felt restless, and (7) had a sudden feeling of panic. Responses for 7 items are summed for total scores. Items on HADS-A scale were measured using a 4-point scale ranging from 1 (rarely or none of the time) to 4 (most of the time), with higher values indicating higher anxiety levels. Item 4 was reverse coded. Cronbach's alpha from this study sample was .72.

As for anxiety, the 7 items on the HADS-A scale were tested to identify the underlying structure of the anxiety measure. EFA identified that HADS-A had 2 factors and all factor loadings were over .32 except for HADS 4 (Table 4) that "could sit at ease and feel relaxed," which had a low factor loading that primarily loaded on factor 2. Since this scale has been already verified from previous literature, all items were retained. Previous studies also identified two factors for HADS-A: psychomotor agitation and psychic anxiety (Dunbar, Ford, Hunt, & Der, 2000; Friedman, Samuelian, Lancrenon, Even, & Chiarelli, 2001). Thus, a two-factor structure of HADS-A with 7 items was applied to CFA.

Table 4. Factor loading for 7 items of HADS-A scale

	Item	Agitation	Anxiety
hads1	felt tense or wound up	0.49	
hads3	worrying thoughts went through mind	0.79	
hads2	something awful about to happen		0.42
hads4	could sit at ease and feel relaxed		0.21
hads5	butterflies in my stomach		0.66
hads6	felt restless		0.42
hads7	sudden feeling of panic		0.74

Control variables

The control variables in this study are demographic factors and supports from family and friends. In order to explore the effects of community social capital on mental distress; effects of individual social resources, family support and friend support were controlled for along with demographic factors.

Four items adapted from the original 10-item social interaction scale by Schuster and colleagues (1990) was used to measure family support in the NSHAP Wave 2. The original social interaction scales consisted of 5 supportive interaction items and 5 negative interaction items which assess supportive and negative social interactions with spouse (Schuster, Kessler, & Aseltine, 1990). Family support was assessed with 2 supportive interaction items and 2 negative interaction items with family. The 4 items that the NSAHP used include: (1) “How often can you open up to members of your family if you need to talk about your worries?”, (2) “How often can you rely on them for help if you have a problem?”, (3) “How often do members of your family make too many

demands on you? “, and (4) “How often do they criticize you?” The response categories for each item were: never (0); hardly ever or rarely (1); some of the time (2); and often (3), with higher values indicating higher support from family. The third and fourth items were reverse coded. Cronbach’s alpha for the 4-item family support scale was .41.

Because the low alpha was likely caused by the small number of items and the heterogeneous questions asking about both positive and negative interactions, this study used only positive interaction questions to improve reliability for the scale. The Cronbach’s alpha for the 2-item family support scale was .60, and the responses for the 2 positive items were summed for total scores.

Friend support in the NSHAP Wave 2 was measured with 4 items from the original 10-item scale developed by Schuster and colleagues (1990). Friend support was assessed with 2 supportive interaction items and 2 negative interaction items. The NSHAP used 4 items: (1) “How often can you open up to friends if you need to talk about your worries?” (2) “How often can you rely on them for help if you have a problem?” (3) “How often do your friends make too many demands on you? “, and (4) “How often do they criticize you?” The response categories for each item were: never (0); hardly ever or rarely (1); some of the time (2); often (3), with higher values indicating higher support from friends. The third and fourth items were reverse coded. The Cronbach’s alpha for the 4-item friend support scale was .54. Since the low alpha was likely caused by the small number of items and heterogeneous questions asking both positive and negative interactions, this study used only positive interaction questions. The

Cronbach's alpha for the 2-item friend support scale was .72, and the responses for the 2 positive items were summed for total scores.

Demographic information included age (in years), gender (male = 1, female = 2), race (minority = 0, white = 1), education (1 = < high school, 2 = > high school), and marital status (0 = not married, 1 = married). The demographic and family and friends social support control variables were added to the structural equation models to explore the effects of community social capital, after considering the effects of these variables.

Analytic Plan

Study data were examined prior to running analyses for missing data, outliers, normality, and multicollinearity. Due to the high proportion of missing values (28%), income was not included as a variable in the research model and analysis. Eight cases were removed because of missing values for ethnic group. Sixty-two cases that had more than three missing values, more than 20% of missing information out of a total of 13 study variables, were removed because of insufficient data. Other missing data were handled by the full information maximum likelihood (FIML) method this is the default missing data handling approach in Mplus. The FIML does not create missing values but estimates parameters based on complete observed data and produces accurate standard errors (Schlomer, Bauman, & Card, 2010).

Mahalanobis distances in Mplus were used to check multivariate outliers that were contributing to the sample's departure from multivariate normality. A total of ninety six observations were detected as multivariate outliers at the .001 level. Because the

results of the final model with outliers were similar to the results without outliers, those observations were included into the final analyses.

Univariate normality for all variables was checked. The skewness for functional disability was greater than 3 and detected to be problematic (Kline, 2011). Log transformation was applied to deal with non-normality of functionality after which skewness was reduced to less than 2. Since the results of structural equation modeling using the transformed variable were similar to the results with original functional disability scores, the original variable was included in the final analyses.

Bivariate correlation and squared multiple correlation were used to check collinearity as Kline suggests (2011). Bivariate correlations between all independent variables in this study ranged from .01 (age and family support) to .27 (marital status and gender). No problematic correlations (multicollinearity) between variables were detected. The squared multiple correlation (R^2) is a regression diagnostic procedure that consists of running several multiple regressions of a measure with the other measures in a model. If R^2 is greater than .90 for a criterion variable, it is suggested that the variable be combined with another or eliminated because of extreme multivariate collinearity (Kline, 2011). Because R^2 for all study variables ranged from .12 to .30 all variables were retained.

As the first step in the analysis, descriptive statistics were presented to describe the study sample and provide a summary of study variables. Second, confirmatory factor analyses were employed to determine if the measurements were applicable to SEM analysis. Third, the results of structural equation modeling for the basic model were

presented to identify the effects of physical constraint and community social capital. As the last step of the analysis, the results of latent moderated structural equation modeling (LMS) were presented to investigate the interaction effects of community social capital and physical constraint.

Descriptive analysis

Descriptive analyses of the independent, control and dependent variables selected for the study provided a general picture of the older population in the sample. The descriptive analysis was conducted included frequency counts, percentages, means, and ranges.

Structural Equation Modeling

To test the proposed hypotheses using Structural Equation Modeling (SEM), this study explored the relationships between latent variables: community social capital, physical constraints, and mental distress. SEM consists of two models: a measurement model and a structural model. As described, prior to testing the structural model of social capital's moderating effect, measurements for community social capital and mental distress were examined through Confirmatory Factor Analysis (CFA). The measurement model tested if indicators created latent variables. The structural model examined the main effects of physical constraint and community social capital, and the moderating effects of community social capital to test the stress-buffering model of community social capital.

CFA verified the factor structures of observed variables and tested if the measurement models fit the data. An acceptable measurement models for latent variables verified by CAF can be used to analyze structural models (Kline, 2011). Thus, in this study, CFA for the community social capital, mental distress, and physical constraint variables were conducted to test if the identified factors constructed latent variables and the identified measurement models fit the data. As the last step in factor analysis, a CFA for a measurement model including all latent variables was conducted to test if the model fit to data and was adequate to use for structural equation modeling analyses (Kline, 2011).

Structural equation modeling was used to test the three study hypotheses. Several advantages of SEM prompted its use, as it handles measurement errors, provides accurate estimates, and explores the relationships between latent variables (Marsh, Wen, & Hau, 2004). SEM also reduces dimensionality by aggregating several observable representing underlying constructs and makes interpretations of the relationships among latent variables more straightforward.

To test the direct effects of physical constraint and community social capital, and the interaction effect of physical constraint and community social capital on mental distress, two structural equation models were tested: a model without the interaction term (main effects model) to test the direct effects and a model with the interaction term (latent interaction model) to test interaction effect.

The main effects model without the interaction term was employed to test hypotheses 1 and 2. Latent moderated structural equation modeling (LMS) was employed to test the buffering effects of community social capital in the relationship between physical constraint and mental distress. The main effects model was compared to the latent interaction model to determine if the latent interaction model improved by adding the interaction term of physical constraint and community social capital.

To assess the model fit, alternative goodness-of-fit indices were presented to supplement the chi-square statistic. Model Chi-square is the overall model goodness of fit that tests if there are no significant discrepancies between the sample covariance matrix and the estimated population matrix. If the model Chi-square test is significant, this means the model is a poor fit, however, this test statistic is known to be extremely sensitive to sample size and the value of Chi-square tends to increase along with sample size (Kline, 2011; Lei & Wu, 2007). Therefore, alternative indices, root mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean square residual (SRMR) that Mplus provided were also used to evaluate model goodness of fit.

RMSEA and SRMR are absolute fit indices. RMSEA indicates badness of fit (lower values indicate a better model) while SRMR is an index to show the overall difference between the observed and predicted correlations. The RMSEA threshold for acceptable fit is less than .08 and SRMS is less than .08 (Hu & Bentler, 1999; Kline, 2011). CFI is an incremental fit index that shows the relative improvement of the test

model compared to the baseline model. A value over .95 is recommended, and between .90 and .95 is considered adequate (Hu & Bentler, 1999; Lei & Wu, 2007).

To assess overall model fit in LMS, the log-likelihood ratio test (LR), often denoted as D, can be used instead of using model fit indices (Klein & Moosbrugger, 2000). Both a log-likelihood value and traditional model indices for the model without interaction are assessed for the LR test. Model goodness of fit for the model without interaction is assessed with chi-square value, RMSEA, CFI, and SRMR. Model improvement for the interaction model is assessed with LR test comparing log-likelihood values of the model without interaction and the model with interaction. To test the significance of the value of D, χ^2 distribution is used. A significant LR indicates that the fit for the LMS model significantly improves compared to the model without interaction term that was assessed with traditional model fit.

CHAPTER 5: RESULTS

This study examined physical and social factors that contribute to mental distress in later life through SEM, and particularly explored the role of physical constraints and community social capital. Primarily, it investigates whether community social capital moderates the effects of physical constraints. This section presents descriptive statistics to provide overall sample characteristics and also presents SEM results to test the proposed hypotheses.

Sample Characteristics

Table 5 shows descriptive information for the study sample (N=2,362). The average age for the study sample was 74.54 (SD = 6.69) with a range from 65 to 99. The sample included 1,117 (47.3%) males and 1,245 (52.7%) females. The majority of the sample population was white (74.9%) and married (66.6%). More than half of respondents graduated from high school (54.83%). As for social support, the mean of family support of the sample was 4.84 (SD = 1.35) with a range from 0 to 6 and friend support was 3.94 (SD = 1.69) with a range from 0 to 6. Specifically, about half of the respondents reported that they often opened up to family members when they need to talk (47.66%), and most of the older adults in the study often relied on family for help for problems (69.53%). One quarter of the respondents often opened up to their friends when they needed to talk about their worries (25.73%), and 42.46% often relied on their friends for help if they had a problem.

Table 5. Characteristics of the study sample (n = 2,362)

Variable	N	mean(SD)	%	range
<i>Age</i>		74.54(6.69)		65-99
<i>Gender</i>				
Male	1,117		47.29	
Female	1,245		52.71	
<i>Race/Ethnicity</i>				
Non-White	592		25.06	
White	1,770		74.94	
<i>Marital Status</i>				
Not married	788		33.36	
Married	1,574		66.64	
<i>Level of Education</i>				
≤ high school	1,067		45.17	
> high school	1,295		4.83	
<i>Family support</i>		4.84(1.35)		0-6
<i>Friend support</i>		3.94(1.69)		0-6
<i>Physical Constraint</i>				
Functional disability		.70(1.69)		0-18
Chronic Condition		2.29(1.49)		0-10
<i>Community Social Capital</i>				
Community cohesion		10.69(1.95)		3-15
Community tie		4.58(2.15)		0 - 9
Community safety		10.63(2.73)		3-15
<i>Mental Distress</i>				
Depressive symptoms (CESD)		4.81(4.74)		0-33
Anxiety (HADS)		4.74(3.66)		0-21

Looking at physical constraint, the study sample had an average of 2 chronic medical conditions. The average functional disability was .70 (SD = 1.69). Functional disability included limitations in walking across a room, dressing, bathing, eating, getting in and out of bed, and using the toilet. Regarding community social capital

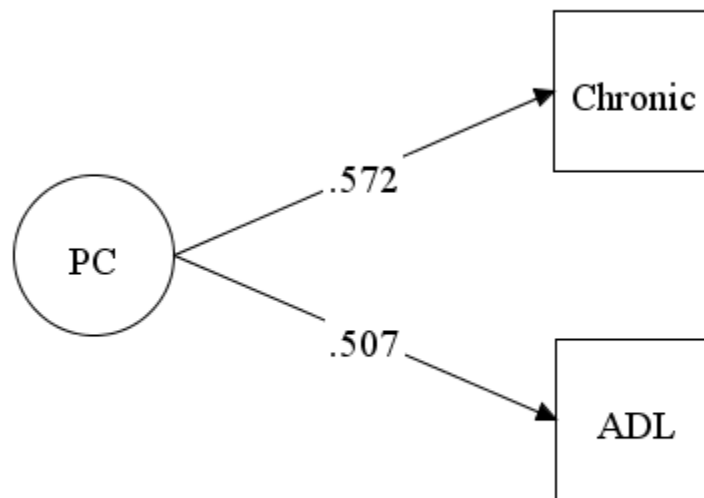
measurements, the average community social cohesion score was 10.45 (SD = 1.95) with a range from 3 to 15, the average community social ties score was 4.58 (SD = 2.15) with a range from 0 to 9, and the average perceived community safety score was 10.63 (SD = 2.73) with a range of 3 to 15. Regarding mental distress, the mean of CES-D scores of the overall sample was 4.81 (SD = 4.74) with a range from 0 to 33. When the suggested cut-point for probable depression was applied (≥ 9), 19% of the study sample fell within this category (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993; Smith et al., 2010). For the anxiety scale, the average HADS-A scores was 4.74 (SD = 3.66) with a range from 0 to 21. When the suggested cut-point (≥ 8) for detecting suspicious anxiety cases was applied (Zigmond & Snaith, 1983), 21% of the study sample fell within this category.

Confirmatory Factor Analysis

Functional disability and chronic disease were used to represent physical constraints in this study. The measurement model for physical constraints was under-identified because physical constraints consisted of only two observed variables; functional disability and chronic disease (Figure 5). An equality constraint was imposed on both factor loadings to allow for estimations. However, model fit could not be assessed because this model was identified with only two fixed factor loadings. Alternatively, a measurement model with all latent variables was examined to assess its' model fit and to test if the measurement model was acceptable (Kline, 2011). Additionally, to create a latent variable for physical constraint, a summed score for functional disability and number of chronic diseases were used as observed values since

chronic disease was measured with a dichotomous question that prevented Mplus from calculating a standardized coefficient in the interaction model.

Figure 5. 1st order confirmatory factor analysis model of physical constraint

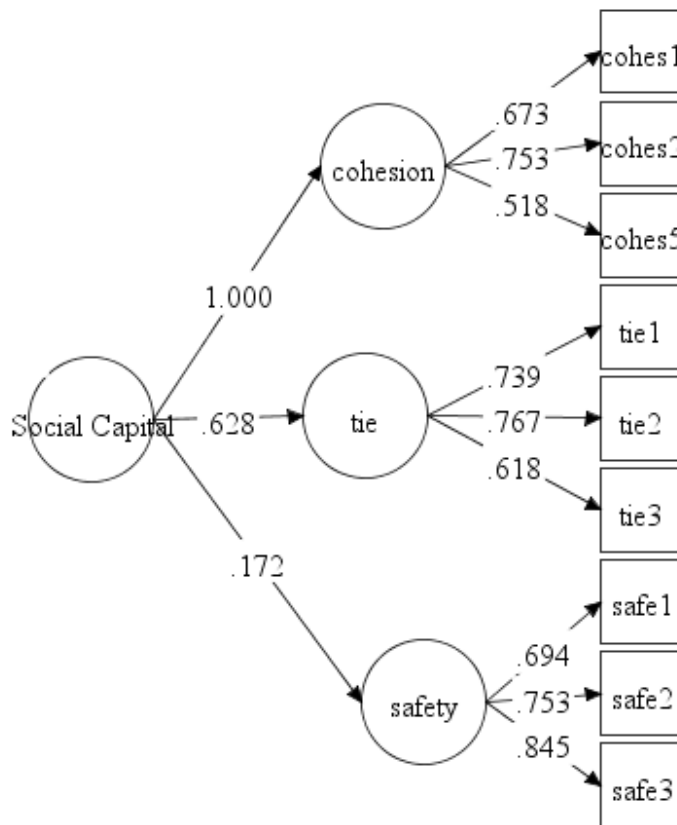


PC: physical constraint, ADL: functional disability, Chronic: chronic disease

Maximum likelihood confirmatory factor analyses were conducted to identify the latent variable structures of community social capital, physical constraint, and mental distress. With regard to community social capital, the original community social capital measurement and the one used in this study, consisted of three indicators: community social cohesion, community tie, and community safety. To determine if community social

cohesion, community social ties and community safety construct one latent variable, i.e., community social capital, 2nd order confirmatory factor analysis was conducted (Figure 6). The main purpose of 2nd order factor analysis in this study was to simplify the complex measurement structures and interpretation (Chen, Sousa, & West, 2005).

Figure 6. 2nd order factor analysis of community social capital



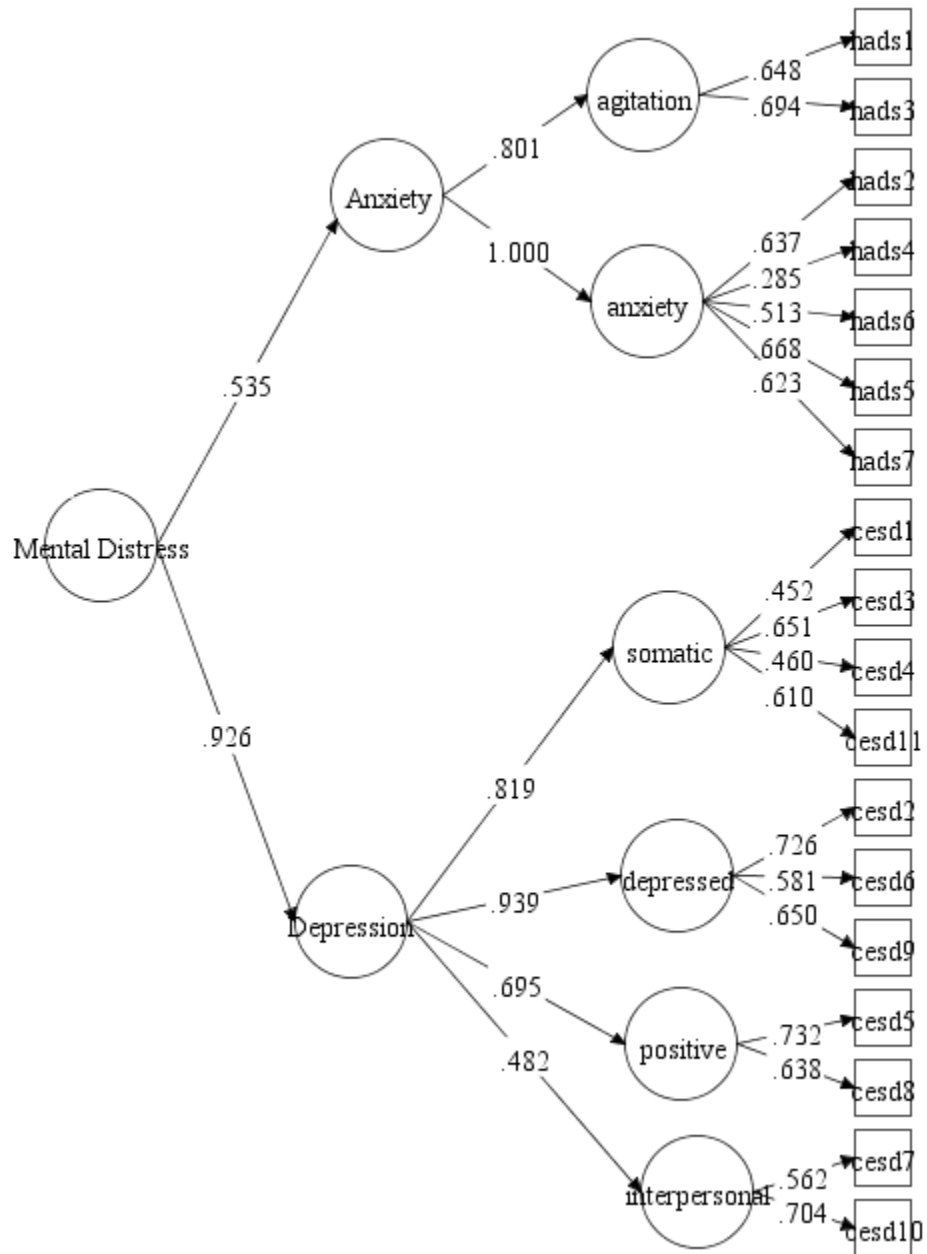
Social Capital: community social capital, cohesion: community social cohesion, tie: community social tie, safety: community safety.

The results of the 2nd order confirmatory factor analysis produced a good model fit: $\chi^2 (25) = 296.520$, $p < .001$, CFI = .955, RMSEA = .068 (90% CI: 0.061, 0.075), SRMR = .053. The significance of the chi-square test was due to the large sample size. As the 2nd order CFA resulted in a good model fit, the factorial structure of community social capital was confirmed for this study population. Thus, this measurement structure for community social capital was used in the structural equation modeling.

Depression and anxiety were indicators of the latent variable of mental distress. Depression was measured by the CES-D scale and anxiety was measured by the HADS-A scale. Eleven indicators, cesd 1 to cesd 11, were used to measure depression; and seven indicators, hads 1 to hads 7, were used to measure anxiety. Since the EFA identified 4 factors for the CESD scale and 2 factors for the HADS-A scale, a 3rd order CFA was performed to create a latent variable for mental distress and examine if the measurement model consisting of measures of depression and anxiety fit the data (Figure 7). This higher order factor model could help simplify the model and interpret results by creating one latent variable for mental distress indicators.

The results of the 3rd order CFA produced a good model fit: $\chi^2 (130) = 477.384$ with $p < .001$: CFI = .958, RMSEA = .034 (90% CI: 0.030, 0.037), SRMR = .032. The results of the indicated that depression and anxiety constructed a latent variable, mental distress, and the measurement model for mental distress fit the data well.

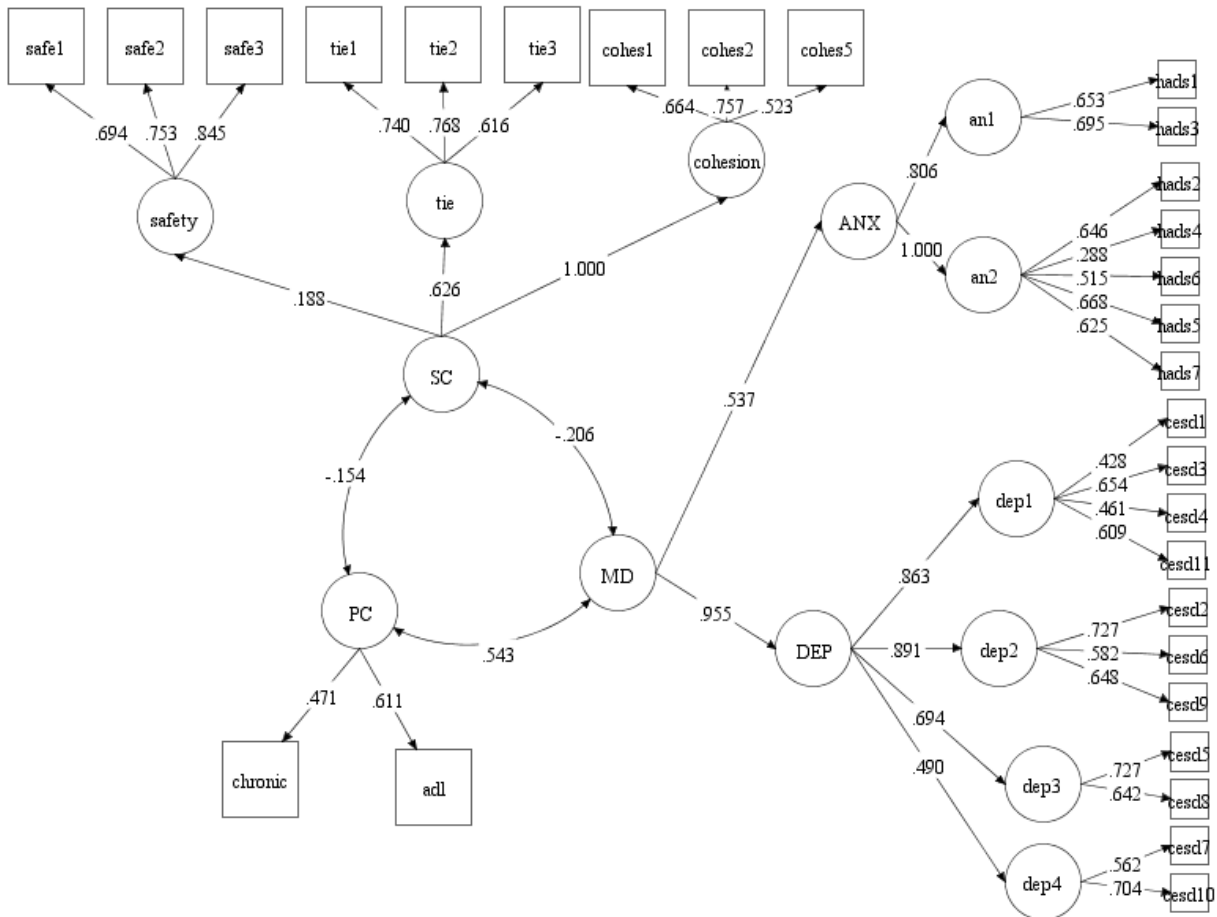
Figure 7. 3rd order confirmatory factor analysis of mental distress



hads: items for HADS-A scale, cesd: items for CESD scale

As the CFA results for community social capital and mental distress showed good model fits, a CFA measurement model including all three latent variables was analyzed to test if the measurement model with three latent variables fit the data (Figure 8).

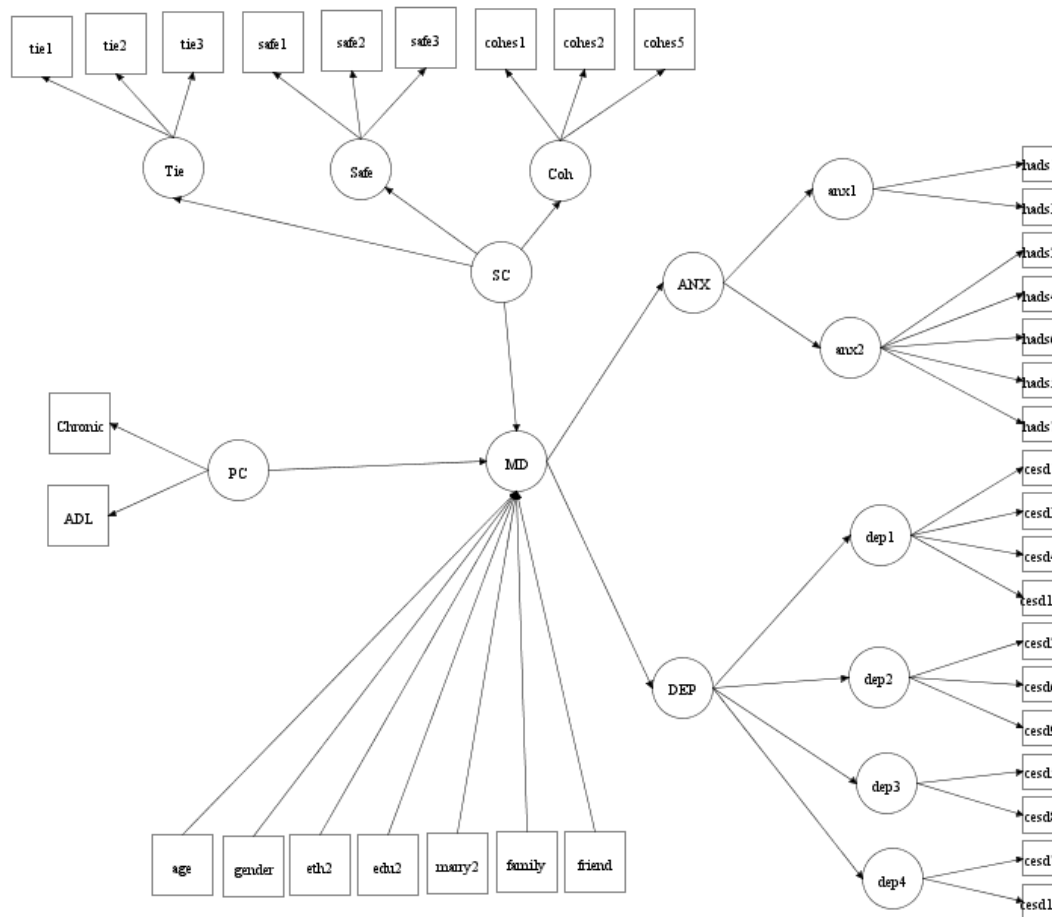
Figure 8. Results of the confirmatory factor analysis for the 3 latent variables' measurement model



adl: functional disability, chronic: Chronic disease, DEP: depression, ANX: anxiety, SC: social capital, PC: physical constraint, MD: mental distress

When the measurement model with three latent variables was analyzed, the CFA produced a good model fit: $\chi^2 (367) = 1370.725$, $p = .000$, CFI = .933, RMSEA = .034 (90% CI: 0.032, 0.036), SRMR = .047. Therefore, the measurement model with three latent variables was used for further analysis in the structural equation modeling.

Figure 9. Measurement model and structural model for mental distress



SC: community social capital, Coh: community social cohesion, Tie: community social tie, Safe: community safety, PC: physical constraint, Chronic: chronic disease, ADL: functional disability, MD: mental distress, DEP: depression, ANX: anxiety

Structural Equation Modeling

The measurement models confirmed through CFA were utilized in a structural model in which mental distress was used as a dependent variable and physical constraints and community social capital were used as independent variables (Figure 9). The structural model included directional paths among independent variables, control variables, and dependent variable.

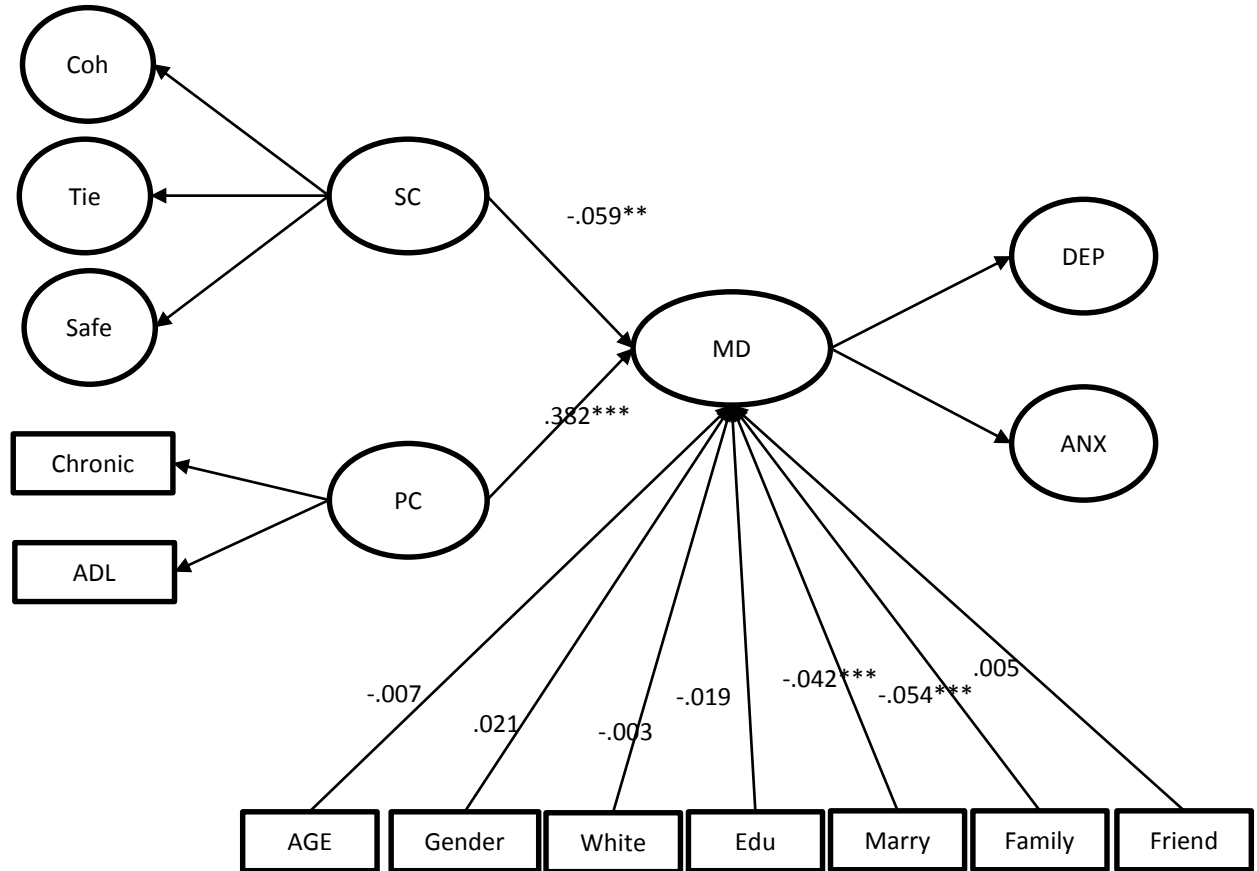
Main effects model for H1 and H2

The main effects model without the interaction terms included three latent variables and observed control variables (Figure 10). Physical constraints and community social capital were independent variables and mental distress was the dependent variable in the model. Age, gender, race, education, marital status, family support and friend support were controlled. Physical constraint was a latent variable that was constructed of two observed variables: number of chronic disease and functional disability. Community social capital was also a latent variable that was constructed of community social cohesion, community social tie, and community safety. As a dependent variable, mental distress was constructed by depression and anxiety. The main effects model tested effects of physical constraint and community social capital on mental distress. The main effects model tested the following hypothesis:

H1: Physical burden will increase older adults' mental distress.

H2: Community social capital will decrease older adults' mental distress.

Figure 10. Main effects model for mental distress without interaction.



The values along the arrows are the standardized regression coefficients (β)
 SC: community social capital, Coh: community social cohesion, Tie: community social tie, Safe: community safety, PC: physical constraint, Chronic: chronic disease, ADL: functional disability, MD: mental distress, DEP: depression, ANX: anxiety

The proposed main effects structural model produced good model fit indices: χ^2 (539) = 2161.207, $p=.000$, CFI = .901, RMSEA = 0.036 (90% CI: 0.034, 0.037), SRMR = 0.043. The Chi-square value was large and significant, which may be due to the large sample size. Except for the Chi-square test, CFI is greater than .90, RMSEA is less than

.08, and SRMR is less than .08. Overall model fit indices indicated that the model was acceptable and fit the data well.

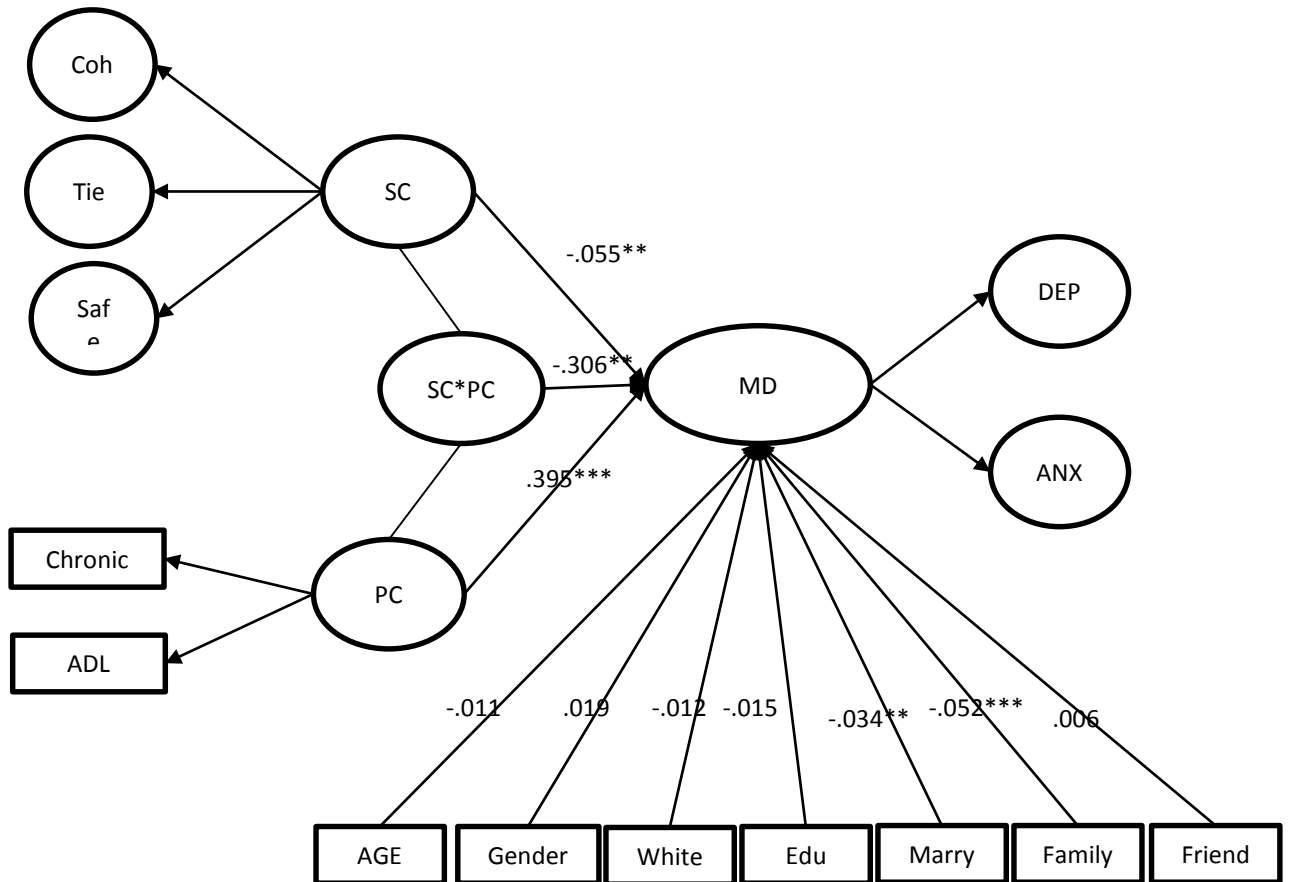
After examining the overall model fit, parameter estimates of individual independent variables were assessed to determine if their effects on mental distress were significant. Controlling for age, gender, race, education, marital status, family support and friend support, the effects of community social capital and physical constraint on mental distress was statistically significant ($\beta = -.059$, $p < .01$, and $\beta = .382$, $p < .001$, respectively). These results indicate that older adults who have higher community social capital experienced less mental distress, while older adults with physical constraints had higher mental distress. The results of the structural equation modeling for the basic model supported hypothesis 1 and 2.

Additionally, marital status ($\beta = -.042$, $p < .001$), and family support ($\beta = -.054$, $p < .001$) had significant effects on mental distress; whereas age, being female, being white, education, and friend support were not significant. Married older adults experienced less mental distress compared to unmarried elderly; and older adults who perceived more family support felt less mental distress.

Stress-buffering model for H3

Latent moderated structural equation modeling (LMS) was employed to test the buffering effects of community social capital in the relationship between physical constraints and mental distress. The main effects model was compared to the latent interaction model to determine if the goodness of fit for the latent interaction model

Figure 11. Latent interaction model for mental distress results



The values along the arrows are the standardized regression coefficients (β)
 SC: community social capital, Coh: community social cohesion, Tie: community social tie, Safe: community safety, PC: physical constraint, Chronic: chronic disease, ADL: functional disability, MD: mental distress, DEP: depression, ANX: anxiety

improved by adding interaction term of physical constraint and community social capital. Similar to the main effects model, community social capital and physical constraints were independent variables and mental distress was the dependent variable. In addition to the main effects model, the interaction term between physical constraints and community social capital was added to test if community social capital modified the adverse effect of

physical burden on older adults' mental distress (Figure 11). This latent interaction model was used to test hypothesis 3: community social capital will decrease the effect of physical burden on mental distress.

There were two major obstacles in running the latent interaction structural equation modeling: (1) previous methods for latent interaction models require researchers to standardize the interaction model since statistic software packages do not produce standardized coefficients, and (2) statistic software packages do not produce traditional model fit indices such as chi-square value, RMSEA, CFI, and SMRA (Kline, 2011; Klein & Moosbrugger, 2000; Maslowsky, Jager, & Hemken, 2014).

In addition, results might vary depending on the created indicators since previous methods required researchers to create product terms by choosing indicators from measurements (Saris, Batista-Foguet, & Coenders, 2007). Because of these limitations of LMS, few studies employ latent interaction models to identify moderators (Maslowsky, Jager, & Hemken, 2014).

To overcome these obstacles, this study followed the steps suggested by Maslowky and colleagues (2014), which involves using Mplus to run LMS models in creating interaction terms, interpreting results, and assessing model fit. First, Mplus creates interaction term by using XWITH command, which enables researchers to perform LMS models without choosing indicators to create interaction terms manually (Maslowsky, Jager, & Hemken, 2014). Second, although Mplus does not provide standardized coefficients by default for the LMS models, the "standardize" option is used

to produce standardized coefficients by standardizing the data prior to analysis (Klein & Moosbrugger, 2000; Maslowsky, Jager, & Hemken, 2014; Muthén & Muthén, 2012).

Third, since Mplus did not produce model indices for the latent interaction model, a general model fit was tested through the log-likelihood test by comparing the basic model and latent interaction model (Maslowsky, Jager, & Hemken, 2014). When the log-likelihood ratio test (referred to as D) is significant, the proposed latent interaction model is regarded as a well-fitted model that results are significant improvement over the basic model.

The equation for D is:

$$D = -2[(\text{log-likelihood for Main Effects Model}) - (\text{log-likelihood for Latent Interaction Model})]$$

The log-likelihood difference value of D between the basic model and the latent interaction model was 56.78 with 1 degree of freedom (Table 6). Using the chi-square distribution, this log-likelihood ratio test was significant at the .001 level, indicating that the latent interaction model was significantly improved compared to the model without the interaction model.

After examining the overall model fit, a parameter estimate of interaction term was assessed to determine if the moderating effect of community social capital was

Table 6. Model comparison between basic model and latent interaction model

	Main effects model			Interaction model		
	Standardized Estimate (β)	Standard Error	95% C.I	Standardized Estimate (β)	Standard Error	95% C.I.
Latent variable						
Social Capital	-.059**	.018	-.095, -.023	-.055**	.020	-.095, -.015
Physical Constraint	.382***	.046	.292, .473	.395***	.066	.266, .525
Latent Interaction						
Social Capital x Physical Constraint				-.306***	.077	-.458, -.154
Control Variable						
Age	-.007	.011	-.028, .013	-.005	.012	-.034, .013
Gender	.021	.010	-.000, .041	.019	.010	-.002, .039
Education	-.019	.010	-.038, .000	-.015	.010	-.035, .004
White	-.003	.010	-.022, .017	-.012	.012	-.036, .011
Married	-.043***	.011	-.069, -.022	-.034**	.012	-.057, -.011
Family support	-.054***	.010	-.074, -.034	-.052***	.012	-.071, -.029
Friend support	-.016	.012	-.018, .028	-.006	.013	-.019, .031
Model fit index						
χ ² (df), p	2161.207(539), p <.000					
RMSEA (90% CI)	.036(.034, .037)					
CFI	.901					
SMRM	.043					
Log-likelihood	-111061.670			-111032.279		
D (df), p	58.78 (1), <.001					

significant. Controlling for age, gender, race, education, marital status, family support and friend support, the standardized estimated coefficient of interaction effect between social capital and physical stress was statistically significant ($\beta = -.306, p < .01$). This result indicated that community social capital attenuated the effect of physical constraint on mental distress among older population. The structural equation modeling result for the latent interaction model supported hypothesis 3.

Additionally, after introducing the interaction term between community social capital and physical constraint, the main effects of social capital ($\beta = -.055, p < .01$) and physical constraint ($\beta = .395, p < .001$) were still statistically significant. Marital status ($\beta = -.034, p < .001$) and family support ($\beta = -.052, p < .001$) had significant effects on mental distress; whereas age, being female, being white, education, and friend support were not significant.

To examine the statistical significance of the interaction effect between physical constraints and community social capital, mental distress values were calculated as community social capital and physical constraint change. The main effects of social capital and physical constraint and the interaction effect on mental distress can be expressed as (Muthén & Asparouhov, 2003):

$$\begin{aligned} MD &= \beta_1 * PC + \beta_2 * SC + \beta_3 * (PC \times SC) \\ &= \beta_1 * PC + (\beta_2 + \beta_3 * PC) * SC \end{aligned} \quad (1)$$

Where MD is mental distress, PC is physical burden, SC is community social capital, and β is standard coefficient.

When the estimates from the latent interaction model are inserted into the equation (1), mental distress can be calculated as:

$$\begin{aligned} \text{MD} &= (.395)*\text{PC} + (-.055)*\text{SC} + (-.306)*(\text{PC} \times \text{SC}) \\ &= (.395)*\text{PC} + (-.055 + (-.306)*\text{PC})*\text{SC} \end{aligned}$$

Table 7 represents the change of expected mental distress values when physical constraint and community social capital values were inserted into the equation (1).

Table 7. Mental distress depending on the effects of physical constraint and social capital

Physical constraint value	Social capital value	Expected mental distress
0	0	0
0	1	-.055
1	0	.306
1	1	.034

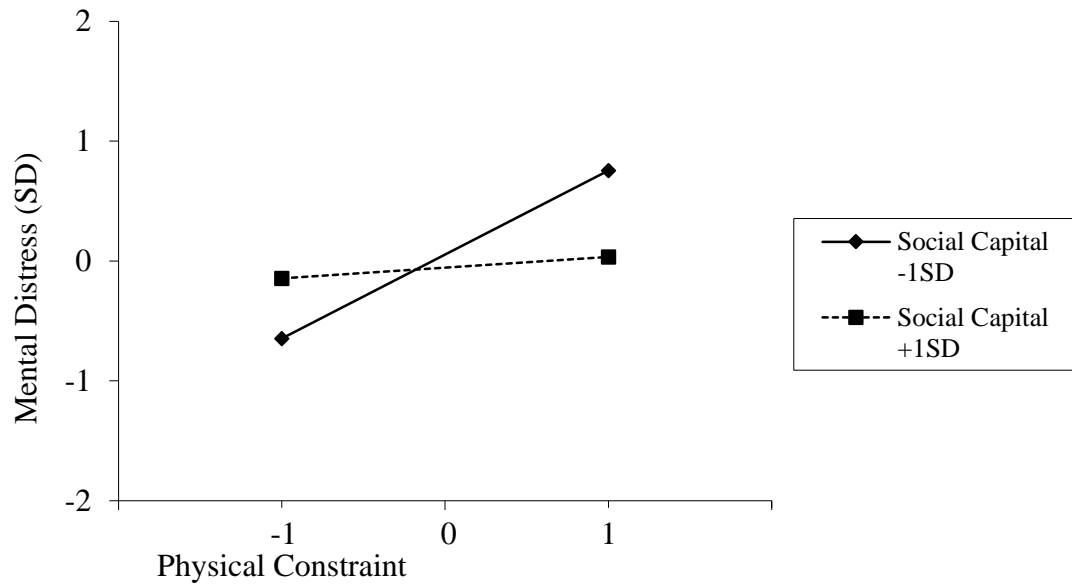
Since the means and intercepts for the latent variables were fixed at zero, when physical constraints and community social capital were fixed at zero, mental distress was expected to be zero. According to the equation (1), when physical constraint was fixed at zero and community social capital was fixed at 1, only social capital impacted mental distress and the expected mental distress was -.055. On the other hand, when physical constraint was fixed at 1 and social capital was fixed at 0, the main effect of physical constraints influenced mental distress and the expected mental distress was .306. If there

was no effect of community social capital, physical constraint significantly increased mental distress. When both physical constraints and community social capital effects were present, the moderating effect of community social capital was identified. When physical constraints and social capital were fixed at 1, expected mental distress was .034. When the effect of social capital was present, the relationship between physical constraint and mental distress significantly dropped from .306 to .034. These results implied that community social capital significantly decreased the effect of physical constraints on mental distress.

In addition to the change in expected mental distress values depending on changes in physical constraints and social capital, an interaction graph also helped interpretation of the relationship between social capital and physical constraints (Maslowsky, Jager, & Hemken, 2014). Figure 12 represents the different relationship between physical constraint and mental distress depending on the level of community social capital. The slope for older adults who had lower community social capital was relatively steep, whereas older adults who had higher community social capital showed a relatively flat line. This graph indicates that community social capital attenuated the effect of physical constraints on mental distress.

In summary, structural equation modeling without the interaction term supported hypothesis 1 and hypothesis 2; community social capital had a negative effect on mental

Figure 12. Interaction of social capital and physical stress predicting mental distress



distress, while physical constraints had a positive effect on mental distress. Latent moderated structural model supported hypothesis 3; the interaction term between community social capital and physical burden had negative effects on mental distress. The group with a high level of social capital presented a relatively stable slope in the prediction of physical constraint on mental distress, suggesting their resilience. The group with a low level of social capital demonstrated a steep slope, indicating their heightened vulnerability to mental distress when faced with an increase in physical constraints.

CHAPTER 6: CONCLUSION AND DISCUSSION

Physical constraints experienced by older adults is a major concern, especially for community dwelling older adults as it often decrease ones quality of life and may cause mental health problems (Bisschop, Kriegsman, Deeg, Beekman, & van Tilburg, 2004; Cole & Dendukuri, 2003). To remain in the community and live independently, social resources are critical for older adults with physical constraints (De Silva, McKenzie, Harpham, & Huttly, 2005; Paukert et al., 2010). Given the importance of social resources, this study sought to confirm adverse effects of physical constraint and positive effects of community social capital on mental distress, and to expand the scope of study on social resources by exploring whether community social capital moderates the relationship between physical constraints on mental distress.

To test the main effects and the stress - buffering effects of community social capital in the relationship between physical constraint and mental distress for the older population, this study sought to answer three research questions:

- (1) Does physical constraint increase older adults' mental distress?
- (2) Does community social capital decrease older adults' mental distress?
- (3) Does community social capital modify the effects of physical constraint on mental distress for older adults?

The overall research question guiding this study was “how does community social capital relate to physical constraints and how does it impact older adults’ mental distress?” Unlike previous studies that focused on the effects of interpersonal protective resources on mental distress, this study investigated the buffering role of community social capital for older adults. Study results illustrated the negative effects of physical constraints and the benefits of community social capital, thus bring a better understanding of the effects of community social capital on mental distress in older adults.

The findings supported the study hypotheses and their theoretical justifications and also highlighted the benefits of community social capital that older adults can access by being a member of a community. As the main effects and stress-buffering models describe, results imply that physical constraints and community social capital directly impact older adults’ emotional and social responses.

First, as expected, this study illustrates that physical constraints increased mental distress in later years of life while controlling for demographic factors and supports from family and friends. This finding is consistent with previous studies that also identified functional disability and chronic disease as chronic stressors and risk factors for poorer mental health in later life (Braam et al., 2005; Huang, Dong, Lu, Yue, & Liu, 2010); Hybels, Blazer, & Pieper, 2001; Penninx et al., 1996; Schoevers, Beekman, Deeg, Jonker, & Tilburg, 2003). As the stress-buffering model describes, physical constraint negatively influences older adults’ emotional response and social activities, which results in increased mental distress. Older adults with physical constraints may feel a loss of

independence because they are more likely to face situations they cannot control (Penninx et al., 1996). For example, chronic diseases may require hospitalization or long-term care for older adults (Bean, Vora, & Frontera, 2004; Nihtilä et al., 2008; Verbrugge & Patrick, 1995), who then may experience loss of control and feelings of depression and anxiety as a result (Penninx et al., 1996). Physical constraints also limit social activities and decrease interactions with network members and may increase social isolation, leading to increased mental distress in later life (Forsman, Herberts, Nyqvist, Wahlbeck, & Schierenbeck, 2013).

Second, community social capital decreased mental distress for older adults after controlling for demographic factors and support from family and friends. As the main effects model explains, a high level of community social capital influences older adults' emotional responses and social activities, which positively influence their mental health (Cohen, Underwood, & Gottlieb, 2000). Older adults who perceive a high level of community social capital may gain emotional benefits from having a sense of belongingness and feeling of security (Katz, Kling & Liebman, 2001). A positive perception of the community and trusting relationships among community members may increase feelings of safety and expectations for community supports, which in turn decrease mental distress. Regarding the social benefits of community social capital, older adults with high community social capital experience strong social ties with their community and community members. Strong connectedness with community members and belongingness to community may positively influence older adults to improve health

behaviors or to stop negative health behaviors, which may lead to better mental health (Berkman, Glass, Brissette, & Seeman, 2000).

The benefits of community social capital are mostly due to accessibility and availability of community resources. Since community social capital is resources embedded in the community, it will be convenient for older adults in the community to access and obtain services and assistance that they need for daily life. In this context, older adults with a high level of community social capital may live in a better community environment where there is more access to appropriate social services. Since availability of quality service is associated with better health status for community residents (Forrest & Kearns, 2001), older adults with a high level of community social capital will experience a decrease in mental distress. Older adults need different social services depending on their needs for physical and mental health status. When older adults live in a community with various social services, they may obtain appropriate services for their needs. As the stress-buffering model describes, perceived availability of resources and received supports from community may decrease their mental distress.

Third, most importantly, this study identified the moderating effects of community social capital in protecting against adverse effects of physical constraints on mental health in later life, after controlling for demographic factors and support from family and friends. In addition to the direct effects of physical constraints and community social capital on mental distress, study results indicate that community social capital decrease the negative effect of physical constraints on mental health.

Study findings imply that older adults with lower community social capital and more physical constraints are the group most vulnerable to mental distress. Older adults who had higher levels of community social capital seem to be more resilient to adverse effects of physical constraints. Conversely, older adults with lower community social capital may be more vulnerable to the effects of physical constraints. With low physical constraints, mental distress for both the group with a high level of community social capital and the group with a low level of community social capital was similarly low. However, as physical constraints increased, mental distress for the group with low community social capital increased rapidly, while the group with high community social capital did not. It appears that the effects of physical constraints on older adults' mental health may escalate when community social capital is low.

Older adults with lower community social capital may experience escalated distress because of lack of community support, while older adults with physical constraints who have high community social capital may more effectively cope with difficulties caused by physical health deterioration with the help of their community. For instance, older adults with physical constraints may feel more anxious about their health issues compared to those who have less physical constraints, due to higher risk of health deterioration. Low community social capital may also increase distress for older adults with physical constraint by inflating the difficulties of approaching and acquiring timely services and assistance for their needs from their networks and community. Such is due to the limits imposed by older adults' health deterioration, which decreases social

interactions and activities, ultimately increasing social isolation (Forsman et al., 2013). In contrast, as the stress-buffering model describes, older adults with physical constraints may feel less stress when they perceive that social resources are readily available compared to those who have less social resources. Even when stress increases because of health deterioration, the effects of physical constraints on mental health would decrease by virtue of perceived or received community social capital.

While older adults with physical constraints may experience a decrease in network sizes and interpersonal contacts due to limited social activities and mobility, community social capital available to older adults with physical constraints may support them in carrying out fulfill daily activities. A community with high community social capital may be more equipped to provide appropriate social services to older adults. Those who live in the community with high social resources can easily access community services and obtain assistance and support from community members. Additionally, older adults participating in community services can increase social networks and interactions, which in turn may increase feeling of connectedness and belonging to their community, thus lead to decrease of mental distress.

Another benefit of community social capital for older adults with physical constraint is the emotional support it provides to this population. When older adults perceive that they can rely on resources of their community and network members, they may feel safer and experience less mental distress. Although older adults face increased

physical health problems, they may experience less emotional distress when they are aware that needed services are readily available and accessible in the community.

Older adults who feel connected to their community may feel safe, which may encourage older adults with physical constraints to participate in social services and social activities. Increased social activities and interactions with community members will positively influence older adults' mental health. This finding implies that community social capital may prevent further health-related problems for older adults with physical constraints. Older adults who have high social capital may use their networks and community environments as coping mechanisms to address various physical constraints experienced and prevent increasing mental distress. Thus, community social capital may be a critical protective factor for older adults with physical constraint who may have reduced network sizes and limited interactions with family and friends.

Social networks and support from family and friends are widely accepted as personal resources that improve individual health and buffer the negative impact of chronic stress (Cohen & Wills, 1985; Zhang & Li, 2011). Adding to previous studies, this study highlights the reliability of community social capital as a critical coping resource for older adults with physical constraints. Study findings support the importance of community social capital and draw attention to older adults' community resources and social relationships with community members as a way to improve their mental health. Specifically, current findings suggest significant public health implications of community social capital on mental health for the older population suffering from physical health

deteriorations. In particular, community social capital may be more critical for older adults with physical constraints and significantly influence their mental health. Although older adults experience physical constraints such as functional disability and chronic diseases, they are resilient to stress caused by health deterioration if they are able to utilize community social capital to cope with their stress.

Even when older adults experience decreases in their social networks and social support, it might be expected that community social capital may supplement the protective role of social network and social support for the elderly with physical constraints because of the geographical advantage of community social capital (Shaw, 2005). It is possible that reduced supports from limited social network are replaced or supplemented by support from community social capital. Study findings suggest that community social capital is critical for older adults' mental health. In particular, mental health for older adults with physical constraints can improve by increasing social cohesion, social ties, and community safety for the older population.

Implications

Despite the importance of community social capital, previous studies have focused on such personal social resources as family supports, friend supports, and social networks. To fill the gaps in research on social capital, this study extended interest in social networks and social support to community social capital, and focused on specifically on environmental resources. Study findings imply that community social capital may improve emotional and social benefits for older adults who have physical

constraints. Community social capital for older adults can be improved by participating in social activities, increasing social interactions, improving community safety. Thus, the practical implications of these findings must be considered. For example, results indicate potential effectiveness of efforts to develop community-based services to maximize the effects of community social capital and increase elders' awareness of their community resources. To cultivate community social capital for older adults, some suggestions and implications for social work practitioners, social work education, and policy makers are presented. In particular, this study emphasized the importance of community-based services to improve social cohesion and social ties for older adults.

Social work practitioners

This study emphasizes the importance of community environment as a protective factor for older adults' mental health. Since interventions focused on social and environmental conditions are recommended to improve older adults' physical and mental health (Smedley & Syme, 2001), social work practitioners need to consider ways to increase community social capital for older adults.

To develop social interactions and increase social ties, a shared space where older adults can be connected to community is an essential element (Prusak & Cohen, 2001). Social work practitioners can take advantage of utilizing existing community-based services for older clients. Since older adults with health problems are likely to rely on support from their social networks or their community, community-based services will be critical to improve mental health and quality of life in later life.

Community-based services include types of social resources available to older adults such as providing necessary space to facilitate various community-based social interaction programs. Since older adults are more likely to remain in their community than to be institutionalized even if they need care in later life (Kaiser 2007), community-based services as social resources play a pivotal role in improving social capital for older adults and helping them remain in community. In particular, social interactions occurring while older adults participate in community based services provide accumulated social resources upon which older community members draw (Scharlach, 2009). Previous studies have showed positive effects of community-based service utilization on older adults remaining at home and in the community, living independently, and maintaining quality of life (Albert, Simone, Brassard, Stern, & Mayeux, 2005; Femia, Zarit, Stephens, & Greene, 2007; Kuzuya et al., 2006; Ryburn, Wells, & Foreman, 2009).

To maximize the benefits of community-based services, social work practitioners need to develop programs to that may increase physical, emotional and social benefits for older adults through community social capital. Community based-services may include programs related to social activities, informational programs, and health programs to improve older adults' physical and mental health status and increase their social networks.

Older adults may maintain and improve their health status by regularly attending health related programs in community-based services. In addition to attending health programs, older adults may gain health benefits through professional relationships. Older

adults can build professional relationships with health professionals in the community-based services and acquire information about health care, social services, and other resources. Favorable relationships between older adults and community service providers may increase their accessibility to health and social services. Since social capital can be developed through personal contacts that help build relationships (Prusak & Cohen, 2001), social workers can facilitate interactions among older adults and increase social cohesion as older adults are participating in community services. Practitioners in community-based services also will help older participants create and maintain social networks, as social networks are expected to develop and expand when individuals participate in groups and organizations (Prusak & Cohen, 2001). Older adults also receive emotional benefits by participating in community programs, such as feeling safe and connected while they are attending community programs and interacting with community members.

As particular examples of community-based services, senior centers and adult day programs in the community provide social supports and resources on which older adults rely. Senior centers offer some of the following services: (1) meal and nutrition programs; (2) information and assistance; (3) health, fitness, and wellness programs; (4) social and recreational activities; (5) transportation services; (6) educational and arts programs; (7) public benefits counseling; (8) volunteer and civic engagement opportunities; (9) intergenerational programs; (10) employment assistance (National Council on Aging, 2011). Senior centers also develop new programs based on the needs

of older adults in the community as the community's racial and ethnic composition shifts (National Council on Aging, 2011). Older adults can choose to participate in senior center programs according to their specific needs and interests.

Older adults may potentially gain two main benefits from participating in senior centers. The first benefit is related to health. Older adults may receive health benefits from senior centers by participating in the programs at senior centers that are designed to prevent physical decline and to better manage chronic disease (Fitzpatrick, McCabe, Gitelson, & Andereck, 2005). Turner (2004) found that health-related programs at senior centers such as physical fitness, health assessments, aerobics, and chair exercise were helpful in improving and maintaining health. Senior centers help older adults remain in the community by providing health services to improve or maintain older adults' physical functionality.

The second type of benefit of senior center participants is social and emotional support it may provide. One of the goals of senior centers is to promote social support for older adults (Fitzpatrick, McCabe, Gitelson, & Andereck, 2005). Turner (2004) found that for older adults senior centers were primary settings for social interactions and activities during the daytime. Older adults valued contact with others at senior centers and perceived them to be beneficial. In the same study, the majority of older adults attending senior centers perceived the meal program as an opportunity for social interactions (Turner, 2004). Older participants used such meal services to develop social interactions and maintain relationships. Older adults also acquire vital information

regarding medical insurance, home health care, and information regarding their finances from senior centers (Turner, 2004). Older adults might also improve their mental health by participating in programs and services in senior centers, which increases older adults' social networks (Fitzpatrick, McCabe, Gitelson, & Andereck, 2005). That is, senior centers can work as a source of social resources to potentially expand and create new social networks for older adults who are feeling socially and emotionally disconnected (Ashida & Heaney, 2008).

Adult day care programs are also a social service that is designed to provide social and health services to the elderly who suffer from physical and mental health problems. Adult day care programs include therapeutic activities, health monitoring, socialization and social services, medical care, transportation, and meal services (O'Keeffe & Siebenaler, 2006). Previous studies reported direct health benefits for older participants such as lower mortality, improved physical and mental health, and improved quality of life for program participants (Dabelko & DeCoster, 2007; Kuzuya et al., 2006; Schmitt, Laura, Weiss, Dowling, & Covinsky, 2010). Adult day care programs might be more beneficial to older adults suffering from physical constraints because of its potential to increase social networks and improve accessibility to health-related programs.

Community social capital can positively influence older adults' emotional process and social activities. Emotionally, perceived availability of community social capital can reduce perceived stress and also help older adults cope with stress, which leads to positive health behaviors. Socially, community social capital can increase interactions

with community members and social activities. Increased activities and interaction also facilitate health information exchange and positive peer influence on health behaviors. Community-based services may improve quality of life and physical and mental health for older adults in the community by improving accessibility to the services and facilitating interactions among community members. Social cohesion and tie among older adults developed while participating in community-based services may improve safety feeling and increase expectations about community supports, which may result in decreased stress for older adults. Social capital which occurs while interacting within wide social networks will help older adults obtain health information and access formal and informal services.

Social work education

To understand social resources surrounding older adults, social workers should be able to assess available social resources for older adults. As social work perspective encourages practitioners to evaluate not only individual resources, but also evaluate environmental resources. Thus, social work educators need to take community resources into account as important resources for clients. Social work education should include content on social capital and its influence on health and mental health, and practice applications. In particular, when social work students have opportunities to become familiar with the community social capital assessment tools, they may be better prepared to assess clients' resources and develop appropriate intervention plans. Familiarizing

students with the different types of assessment tools of social capital may be an important task to improve assessment of client resources.

Social support and social network are usually measured with existing scales such as the Duke Social Support Index (Koenig et al, 1997), Interpersonal Support Evaluation List (Cohen, Mermelstein, Kamarck, & Hoberman, 1985), and the Lubben social network scale (Lubben, 1988). The Duke Social Support scale includes social network, social interaction, subjective support, and instrumental support subscales (Landerman, George, Campbell, & Blazer, 1989). The Interpersonal Support Evaluation List scale consists of four subscales: tangible support, belonging support, self-esteem support, and appraisal support (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). The Lubben social network scale consists of five aspects of social support networks: family networks, friend networks, helping others, confidant relationships, and living arrangements (Lubben, 1988). To assess community social capital, the Social Capital Assessment Tool (Harpham, Grant, & Thomas, 2002) can be used, which consists of one structural factor (connectedness) and three cognitive factors (reciprocity, sharing, and trust). Using different assessment tools, social work students should learn how to evaluate older clients' social resources including social network, social support, and community social capital and utilize them to improve older adults' physical and health status.

To incorporate social capital into social work interventions, community programs for older adults need to be developed. Social work schools should help students develop community intervention skills to increase older adults' social capital. In particular,

specific programs to improve social cohesion, social ties, and safety for the older population in community need to be developed. Community programs may differ depending on community settings and clients' needs. Thus, social work students should learn how to develop community programs to meet clients' needs within the given settings.

As older adults with physical constraint often have multiple social and health issues needing several professional health services. Social work schools should equip gerontology social work students to be able to work as part of a multidisciplinary team. Services from the health professionals are critical social resources for older adults. Gerontology social workers also need to work with several different health professionals to help older clients. For example, older adults with functional disabilities are likely to have chronic conditions such as diabetes and hypotension. They may have multiple needs such as transportation, health services, and social services to fulfill daily activities and meet their emotional needs. To help their older clients, social workers need to communicate with multidisciplinary professionals such as medical doctors, nurses, physical therapists, and dietitians. Working with multidisciplinary professionals helps social workers to increase older adults' community social capital and supports from their community. Therefore, social work students should be prepared to understand other health professionals' perspectives and interventions to efficiently communicate with them and work for their older clients.

For social work educators, incorporating social capital into the social work curriculum is an opportunity to apply the person-in-environment perspective in social work practice. Social work students will be able to better understand individuals in relationships with the social environment and specify the effects of community social capital on their clients' health and mental health through the social work curriculum including, the contents and application of social capital.

Policy makers

Since studies have produced growing evidence of community environmental effects on individuals' health and mental health, policy makers should consider community social resources as methods to improve older adults' health and mental health. Study findings also support the concept that social interactions and community safe environment are important to improve mental health and physical health for the older population. With such findings, policymakers can consider various roles of community social capital in developing programs and distributing resources to improve social environment and social cohesion that ultimately impacts health and mental well-being of the older population.

Policy makers should consider ways to improve community environments as community safety may improve mental health (Katz, Kling, & Liebman, 2000) and increase community members' social activities and connectedness. Older adults who feel safe in their community may increase their social interactions and participation in community activities, which may, in turn, improve their mental health. To improve

community safety, policy makers may support local crime prevention program and provide visible evidence of security measures (Forrest & Kearns, 2001).

Policy makers should also consider ways to increase social interactions and social cohesion among community members. One way to increase social interactions is to develop community activities and encourage community members to participate in the activities. When community members participate in community activities such as annual street parties and annual community festivals, their interactions can increase social cohesion among community members (Forrest & Kearns, 2001). Additionally, participation in community activities may increase community safety and develop social ties among older adults. When policy makers support the development of community social activities in which older adults can participate, older populations in the community can feel connected and safe, thereby influencing positively their mental health.

As a way to improve physical community environments and increase social interactions among community older adults, policy makers should consider increasing community-based services. When services do not exist, older adults would experience difficulty finding appropriate interventions and supports (Li, 2004). In particular, older adults with physical difficulties who need more supports would likely to face obstacles finding services for their needs. On the other hand, additional problems may be prevented when older adults in need of instrumental assistance are able to obtain appropriate social services from their community. Since quality social services may decrease mental distress of community residents (Leventhal & Brooks-Gunn, 2003), increasing the number of

social services that enhance accessibility to social resources may positively impact older adults' mental health. Therefore, policy makers need to utilize resources not only to make community safe but also to increase accessibility to social resources by increasing the number of quality services. Once resources are limited, policy makers should prioritize older individuals who have both physical constraint and low social capital in their provision of services and dissemination of the resources.

Limitations and Suggestions

This study used a nationally representative sample to identify the effects of community social capital. Study findings reveal that community social capital plays a protective role for older adults with physical constraints. However, the study does have some limitations. First, although analyzing secondary data has its advantages in saving time, potentially important variables were not available due to the originally designed data structure. The data set used in this study does not include individual psychological traits such as sense of control and self-efficacy. Psychological resources play significant roles in decreasing perceived mental health problems or mediating the relationships between chronic stressors and mental health in later life. In the relationships between stress and coping strategies, perceived control is widely viewed as a critical factor in later life (Folkman, 1984; Wolinsky & Stump, 1996) and sense of control is closely associated with mental health in later life (Wolinsky, Wyrwich, Babu, Kroenke, & Tierney, 2003). In particular, psychological resources have been identified as a moderator between physical constraint and mental health (Bisschop, Kriegsman, Deeg, Beekman, & van

Tilburg, 2004; Jang Haley, Small, & Mortimer, 2002; Paukert et al., 2010; Roberts, Dunkle, & Haug, 1994). Therefore, future studies should account for the role of individual psychological resources as well as social resources in the relationship between stress and health in later life.

Second, this study included only three indicators to construct a latent social capital variable, which represents limited dimensions of social capital. To understand the comprehensive role of social capital in health research, researchers need to understand these multidimensional aspects of social capital: cognitive, structural, individual, and collective social capital. The three indicators used in this study measured respondents' perception of their community and addressed the role of cognitive aspect of community social capital. Thus, objective community conditions might differ from older adults' subjective community perceptions although the measurements for community social capital in this study were significantly correlated with neighborhood physical conditions (Cornwell & Cagney, 2014). Future studies need to include measurements that assess subjective and objective social capital to explore the effects of cognitive and structural community social capital on older adults' physical and mental health outcomes.

In addition, both individual and collective levels of social capital can be regarded as social resources available to both individuals and communities (Ferlander, 2007; Kawachi, 2006; Lin, 1999; Whitley & McKenzie, 2005). To understand the effects of both individual and collective level social capital, it will be necessary to include both individual and collective level social capital in a model to identify the effects of social

capital on older adults' mental health. Therefore, future studies should use geographic information system (GIS) to incorporate collective level social capital into health studies for the older population. With GIS, future studies can create collective social capital variables by aggregating individual level social capital to community level by taking mean scores. To examine the effects of the broad range of social capital on physical and mental health in later life, future studies need to include not only individual-level cognitive and structural indicators but also collective indicators of social capital.

Third, this study controlled for family support and friend support to identify the effects of community social capital because many previous studies have investigated the effects of social support and original scales produced poor internal consistency. When an interaction model created by supports from family and friends and physical constraint was tested, the model did not converge. It is possible that the interaction models with the scales were not appropriate for the data (Muthén & Muthén , 2012). Therefore, future studies should include individual social resource scales that are more reliable and valid to identify the effects of both individual social resources and community social capital on mental health in later life. Future studies can also analyze models including not only two way interactions but also three way interactions among physical constraint, individual social resources, and community social capital, which can identify the effects of community social capital on the mental well-being of older adults who have physical constraints with low social support from family and friends.

Fourth, this study identified the role of community social capital as a latent variable with three indicators: social cohesion, social ties, and safety. This approach was appropriate to test the proposed stress-buffering hypothesis. However, this study could not specifically test which component among three indicators had a stronger influence on older adults' mental distress. To specify the role of each social capital component, the role of each scale, such as social cohesion, social tie, and safety needs to be investigated separately. Thus, future studies should explore the unique roles of different types of community social capital.

Fifth, the study population was community-dwelling older adults who were relatively healthy, and the variance in functional disability was limited among this population. When more items for functional disability are assessed, the more clearly relationships between functional disability and community social capital can be identified. The role of community social capital for the older population with severe functional disability can also be explored. Alternatively, instrumental activities of daily living (IADL) can be used to assess functional disability for older adults in future studies.

Sixth, physical health severity should be considered (Jones et al., 2004). This study did not take account of severity of chronic disease. However, the level of stress will likely vary depending on the severity of older adults' chronic conditions. Even when older adults have fewer chronic diseases, they might feel high levels of mental distress because of severe chronic conditions. Simply using the number of chronic conditions

may ignore the effects of severe conditions. Thus, it is recommended that future studies include indicators of severity of health conditions.

Seventh, although this study used structural equation modeling, cross-sectional data were used to test the proposed model. Cross-sectional data cannot be used to identify causal relationships between community social capital and mental distress. As an alternative approach, a longitudinal study is recommended to demonstrate the trajectory of mental health and changes in community social capital and physical health. A longitudinal study can test the role of social capital in the causal relationship between physical constraints and mental distress.

Finally, future studies need to test alternative models that might also fit the data. For example, social capital might act as a mediator between physical constraint and mental well-being in later life. Social capital may also interact with sociodemographic factors such as gender, race, and age as well. Therefore, future studies may specify the role of community social capital in relationships between older adults' physical health and well-being by testing different models that fit the data.

Using latent moderated structural equation modeling, this study explored the relationship among latent variables of physical constraints, community social capital, and mental distress with a nationally representative older adults' sample. Despite several limitations, this study contributes to the identification of a moderating role of community social capital in the relationship between physical constraints and mental distress among older adults. Study findings have significance in social work and related fields such as

public health by broadening the focus from individual social support and social network to community social capital for older adults with physical constraints. This study suggests how important the role of community-based services are in improving older adults' physical and mental health and in attenuating the adverse effects of physical constraint on mental health. This study also draws attention from individual resources to community environments and social interactions with community members to improve older adults' mental health.

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