The roles of self and society in the relationship between physical health, self-perception of aging, and depressive symptoms in later life

Dissertation

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Abstract

Possibilities for increased morbidity in physical health in later life have been continuously discussed as important factors that can affect psychological well-being of older people. In addition, perceived emotional support has been widely examined as a protective source against depressive symptoms in later life. However, potential roles of self-perception of aging (one’s own age stereotypes) that might be related to physical health, perceived emotional support, and depressive symptoms have been rarely studied. Furthermore, although there has been considerable interest in examining influence of self-perception of aging on physical and cognitive functioning of older individuals, the influence of self-perception of aging on mental health has not been widely studied. Since cognition can influence behavior and emotion, self-perception of aging can be an important cognitive predisposition of depressive symptoms of older individuals. Stereotype embodiment theory and the buffer theory of social support have suggested that age stereotypes and perceived emotional support can affect the construction of self-perception of aging in later life. However, little research has explored in an integrated manner about how self-perception of aging is related to both a discouraging societal impact on the self as constructing age schema and a protective role of the self through perceived emotional support in the aging process.

In order to address the gaps in the literature, the current study aimed to achieve three goals: (1) to examine the mediating effect of self-perception of aging between
physical health and depressive symptoms; (2) to test the moderating effect of age schema on the relationship between physical health and self-perception of aging; and (3) to estimate the moderating effect of perceived emotional support on the relationship between physical health and self-perception of aging.

Physical health status was hypothesized to have an impact on depressive symptoms and to be mediated through self-perception of aging. Older individuals having age schema were expected to have more negative self-perception of aging than those without age schema under similar physical health conditions. Also, perceived emotional support was expected to moderate the relationship between physical health status and self-perception of aging.

The study used a sample of 1240 community-dwelling older individuals aged 50 and over who participated in the leave-behind surveys from the 2004 and 2008 surveys of the Health and Retirement Study. Data were analyzed using Structural Equation Modeling.

The results provided strong evidence for the mediating effect of self-perception of aging in the relationship between physical health and depressive symptoms. To a lesser extent, the moderating effect of age schema was supported; older individuals who had age schema were more likely to report negative self-perception of aging four years later than older individuals without age schema under the same physical health conditions. Although there was a significant main effect of perceived emotional support on self-perception of aging, no evidence was found for the interaction effect of perceived emotional support with physical health in predicting self-perception of aging. Study limitations and implications for future research and practice were discussed.
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Chapter I: Introduction

Late-life depression has long intrigued researchers and practitioners because of the devastating effects and increased risk factors of depression among older people. Between one to five percent of older people living in the community experiences major depression and the rate rises to 13.5 percent in those who need home health care and to 11.5 percent in older people who stay in hospitals (Hybels & Blazer, 2003). Furthermore, an estimated 5 million have subsyndromal depressive symptoms that fall short of meeting the full diagnostic criteria for major depression. Depression in older people is related to increased medical comorbidity, functional impairment and disability, comorbid dementing disorders, suicide risk, mortality, and use of health services (Blazer, 2009). Furthermore, subsyndromal depression predicts functional decline (Hybels, Piepers, & Blazer, 2009) and is also associated with elevated risk of future episodes of major depression (Horwath, Johnson, Klerman, & Weissman, 1992). Finding effective prevention and intervention programs for late life depressive symptoms is more important than before, considering the accelerating increase of older populations and the elevated levels of depressive symptoms among more recent cohorts of older adults compared to earlier cohorts (Yang, 2007). To expand our understanding of depressive symptoms in later life, in the current study, I examine the potential effect of ageism on depressive symptoms related to physical health decline. Furthermore, emotional social support is
examined as a moderator in the relationship among physical health decline, negative self-stereotypes of older people, and depressive symptoms.

Most investigators who have studied ageism have focused on how negative stereotypes about aging, constructed by the society, adversely influence the life of older people. Younger people’s and health care professionals’ negative attitudes and beliefs about older persons have affected older people’s opportunities and treatment inequalities (Butler, 1987). Moreover, older persons’ own ageism can have an impact (Levy, 2003). The stereotypes about aging can be internalized over the life span and become a self-perception of aging when age stereotypes are directed at oneself in later life (Levy, 2009; Rothermund, 2005). Substantial research has found that self-perception of aging held by older individuals can influence their functioning and health (Levy, Slade, & Kasl, 2002; Levy, Zonderman, Slade, & Ferrucci, 2009). Those studies imply that the aging process might be a social construct, in part, considering that it is affected directly by societal attitude about aging and indirectly through self-perception of aging (Levy, 2009; Wurm, Tesch-Romer, & Tomasik, 2007). Along with limited studies on the impact of aging stereotypes on older people’s mental health, examining the relationship between attitude toward one’s own aging and depressive symptoms among older people might shed light on to what extent ageism affects older people’s mental health. This information can help practitioners to develop better prevention and intervention strategies for late life depression.

In the current study, physical health status is used as a stressor variable that might affect depressive symptoms and activate negative stereotypes toward one’s own aging. Research has consistently shown that declining physical health adversely affects
depressive symptoms and is a primary stressor in later life (Prince, Harwood, Thomas, & Mann, 1998; Zeiss, Lewinsohn, Rohde, & Seeley, 1996). Furthermore, declining physical health is commonly identified as a factor that makes older individuals perceive themselves as older (Barrett, 2003; Schafer & Shippee, 2010; Sherman, 1994), which is assumed as a process of assimilation to an image of old age in society (Levy, 2003). Although research has focused on the effects of self-perception of aging on physical health outcome, physical health decline might result in older persons’ activation of internalized age stereotypes as their own self-perception of aging.

For the first part of the current study, the stereotype embodiment theory is used to examine whether self-perception of aging mediates the association of physical health with depressive symptoms and whether age schemas moderate the relationship between physical health and self-perception of aging.

Stereotype embodiment theory (Levy, 2009) suggests that negative stereotypes can serve as maladaptive schemas which can be activated by aging related changes and influence aging processes. Self-perception of aging refers to activated attitudes toward one’s own aging which might be affected by aging stereotypes of society. Attitudes toward older people and aging have known to be negative among both younger people and older people (Kite, Stockdale, Whitley, & Johnson, 2005). Furthermore, research has shown that negative aging stereotypes in society influence older individuals’ self-perception of aging (Levy, 2009; Rothermund, 2005). Since cognitions can influence behaviors and emotions (Clark & Beck, 1999), negative attitudes toward one’s own aging as a cognitive variable might be an important predisposition to depressive symptoms among older people.
Levy (2003a) stated that age stereotypes can serve as schemas that can affect the aging processes through self-relevance (i.e., the belief that age stereotypes are valid for them). Schema refers to “the basic structural components of cognitive organization through which humans come to identify, interpret, categorize, and evaluate their experiences” (Clark & Beck, 1999). From this point on, I use the term ‘age schema’ to represent age stereotypes that might affect one’s evaluation of one’s own aging experiences. Research has suggested that age schema guides the processing of age related information (Mueller, Wonderlich, & Dugan, 1986) and is related to reactions to age-related life events (Montepare, 1996). Adults who are schematic for age tend to make faster judgments about age-related information than those who were aschematic (Montepare & Clements, 2001). The current study explores whether the cognitive schema of old age (age stereotypes) enhances the influence of physical health on older peoples’ self-perception of aging and depressive symptoms.

The stereotype embodiment theory has rarely been examined to explain the potential impact of negative attitudes toward one’s own aging on depressive symptoms among older people. Furthermore, it has not been used to examine how the relationships among stress (physical health), age-related cognitions and depressive symptoms can be modified. However, successful aging models suggest that older individuals are happier than younger populations despite negative stereotypes toward older people (Sneed & Whitbourne, 2005). Furthermore, the questions about which older people may be more vulnerable and which older people may be more resilient to negative effects of aging stereotypes remain unanswered (Peter, 1971; Kang & Chasteen, 2009).
The second part of the current study examines social support as a potential modifying variable that might influence the effects of physical health on self-perception of aging and depressive symptoms. The abundance of literature focusing on the relationship between social support and mental health in older people has found that more social support is associated with less depressive symptoms and acts as a moderator in the relationship between stress and depressive symptoms (Antonucci, et al., 2002; DuPertuis, Aldwin, & Bosse, 2001; George, et al., 1989). Moreover, social support has been proposed as stimuli for positive self-concept or cognitions, which in turn, affect depressive symptoms (Antonucci, 2001; Antonucci, Birditt, & Akiyama, 2009; Panzarella, Alloy, & Whitehouse, 2006). Specifically, received positive emotional social support might serve as a moderator to mitigate negative effects of negative stereotypes of aging on depressive symptoms in later life by hindering the activation of negative stereotypes of aging (inhibiting information processing related to negative age-stereotypes).

Integrating the stereotype embodiment theory with the buffer theory of social support to explain the relationship among physical health, age schema, self-perception of aging, and depressive symptoms may contribute to the current literature in three ways. First, examining the relations between self-perception of aging and depressive symptoms may reflect the impact of negative aging stereotypes on older people’s mental health. Negative aging stereotypes might be activated through experiencing aging related changes as self-perception of aging (“stereotyping as the process of applying stereotypes in situations”: Hummert, 2003) and affect the aging process itself through various mechanisms. While many researchers have studied the effects of self-perception of aging
on cognitive functioning and physical health, few have examined how self-perception of aging might influence older people’s mental health. Investigations on the influence of self-perception of aging on late life depressive symptoms may enhance our understanding of the impact of aging stereotypes on psychological well-being in later life. Furthermore, examination of the moderating effects of age schema may confirm potential contamination effects of aging stereotypes on self-perception of aging and depressive symptoms rather than define self-perception of aging as only a real assessment in the aging process.

Second, examining the inter-relationships among physical health, self-perception of aging, and depressive symptoms might inform us on how differences in self-perception of aging might be related to interdependent processes among depressive symptoms and physical health. Little has been done about the mechanisms driving the relationship between physical health and depressive symptoms (Bruce, 2001). If physical health decline acts as a cue in activating internalized aging stereotypes and individuals tend to stereotype their own aging, then older individuals might experience psychological distress from self-stereotyping.

Third, using both stereotype embodiment theory and buffer theory of social support provides a balanced perspective about the roles of the self and the society in the aging process regarding depressive symptoms. The theory of stereotype embodiment reflects societal impacts on the self as constructing schemas about aging. The buffer theory of social support presents the proactive role of the self in aging processes since older people are more likely to maximize their emotional benefits through behavioral selections like focusing on intimate relationships (Carstensen, 1992).
In sum, the integration of stereotype embodiment theory with the buffer theory of social support provides the overarching theoretical framework for the current study that examines the relationships among physical health as a stressor, self-perception of aging as a mediator, perceived emotional support and age schema as moderators and depressive symptoms as an outcome. The current study aims to test the integrated theory of depressive symptoms based upon previous research by answering four research questions which are stated below.

1) Does self-perception of aging mediate the relationship between physical health and depressive symptoms?

2) Does age schema moderate the relationship between physical health and self-perception of aging?

3) Does perceived emotional social support moderate the relationship between physical health and self-perception of aging? (Helping emotional regulation and inhibition of negative cognition)

To examine these research questions, the current study used data from the Health and Retirement Study, conducted in 2004 and 2008. A theoretical model was tested using Structural Equation Modeling (SEM) and LISREL 8.8. Methods describing primary analytic skills of SEM, which is described in chapter three, following the literature review of theories and previous studies. In Chapter four and five, I will present findings from data analyses and discuss implications and limitations of the current study. Specifically, I focus on the implications for developing prevention and intervention strategies for depressive symptoms among older people, by decreasing negative self-stereotypes of older people about aging.
Chapter II: Literature Review

2. 1. Depressive Symptoms among Older People

2. 1. 1. Depression in Later Life

Prevalence rates of major depression in community samples of older people range from 1% to 5% (Fiske, Wetherell & Gatz, 2009). Although this prevalence of diagnosed depression among older adults is less than it is among people in mid-life, late-life depression has long intrigued researchers and practitioners because of the devastating effects and increased risk factors of depression among older people. It is related to increased medical comorbidity, functional impairment and disability, comorbid dementing disorders, suicide risk, mortality, and use of health services (Blazer, 2009). Although the rates of diagnosed depression are lower among community dwelling older people, the studies have reported that levels of depressive symptoms are generally high among older people (Balzer et al., 1991, Zarit et al., 1999). Also, studies revealed that 13.5% of older people who need home care experience depression (Hybels & Blazer, 2003) and 25% of older people in primary care report clinically significant depressive symptoms (Schwenk, 2002). Moreover, Yang (2007) found that more recent cohorts of older adults showed elevated levels of depressive symptoms when compared to earlier cohorts.

In fact, there has been debate on the prevalence of depression among older people. Because of the existing logic that older people would face more difficulties that would
lead to depression, the phenomenon of lower prevalence of depression (Blazer & Hybels, 2005) and greater life satisfaction among older people (Diener & Suh, 1998) has been called ‘paradoxical well-being’ in the gerontology field. Researchers have discussed possible reasons for this paradox: inappropriate criteria to determine depression among older people (Bryant, 2010), aggregated strengths among older people to cope with difficulties (Blazer, 2010), and methodological biases in related research (Snowdon, 1997; Yang, 2007). On the one hand, a few theories of positive coping and control skills of older people were developed to explain the paradox of wellbeing. Blazer (2010) also emphasizes that some psychological (i.e., wisdom) and social factors (i.e., social networks) can buffer risk factors for late-life depression.

On the other hand, several researchers have criticized that it can be a spurious finding caused by methodological problems (Bryant, 2010). Along with problems of DSM-IV criteria, Bryant (2010) explained that older people might be under-diagnosed because they are less likely to report emotions, more likely to avoid social situations that invoke negative feelings, and less aware of depression. Methodological problems are also suggested from the findings about the relationship between old age and depression, which are inconsistent depending on studies with different measurements, different age compositions of samples, different sets of covariates and/or different cohorst (Snowdon, 1997; Yang, 2007).

2. 1. 2. Subsyndromal Depression among Older People

Subsyndromal depression, sometimes called subthreshold depression, is defined as clinically significant depressive symptoms below the threshold used in depression
screening while depressive symptoms that satisfy clinical diagnosis criteria are called major depression or depression (Hybles, Pieper, & Blazer, 2009; Lyness, 2008). About 15 percent of community-dwelling older people present clinically significant depressive symptoms, which is a higher rate than those in midlife (Balzer, 2009). Although major depression may become less common and less severe with age (Fiske, Wetherell & Gatz, 2009), depressive symptoms among older people, which may mean emotional suffering and lower life satisfaction, should not be overlooked (Blazer, 2009). Research on late-life depression has focused on predictors, correlates, and consequences related to depressive symptoms as well as major depression. Subsyndromal depression is thought to be of clinical relevance to older adults and has been shown to be associated with poorer outcomes in primary care patients (Lyness, 2008; Grabovich, Lu, Tang, Tu, & Lyness, 2010). Older patients with subsyndromal depressive symptoms typically have poorer psychiatric symptoms and functional status than non-depressed patients after one year, often not significantly different than major depression (Grabovich, Lu, Tang, Tu, & Lyness, 2010). Subsyndromal depressive symptoms are also significant predictors of older people’s quality of life (Chachamovich, Fleck, Laidlaw, & Power, 2008).

2. 1. 3. Risk Factors of Late-life Depression

“The onset and maintenance of depression in late life can be understood as an interaction between certain vulnerabilities, including genetic factors, cognitive diathesis and age-associated neurobiological changes, and the types of stressful events that occur with greater frequency in late life than earlier in the lifespan” (Fiske, Wetherell, Gatz, 2009, pp. 368).
**Biological factors.** Twin studies demonstrate that between 16 and 33 percent of the variance in depressive symptoms among older people is explained by genetic factors although a specific gene related to depression has not been identified (Blazer, 2010; Gatz, Pederson, Plomin, Nesselroade, & McClearn, 1992).

The association between depression and vascular lesions of the brain is another potential biological risk. Vascular depression that shows anhedonia and executive function impairment prominently as symptoms is diagnosed more often among oldest old than at other stages of the lifespan. Also, late-life depression frequently occurs with comorbid medical illnesses such as cardiac and cerebrovascular disease and neurological conditions (Blazer, 2010; Fiske, Wetherell, Gatz, 2009).

**Psychological factors.** Cognitive distortions, such as unrealistic expectations and overgeneralization and overreaction to adverse events, are most frequently discussed as a psychological factor of depression (Blazer, 2010). The model of self-critical cognitions (Fiske, Wetherell, Gatz, 2009) explains onset and maintenance of depression in later life by assuming that older people’s lack of engagement is associated with depression and self-critical cognitions, which might reduce older people’s engagement. Negative cognitions can curtail engagement by punishing the effect of a person’s efforts and by a negative reinforcement effect on continuous negative cognitions. Moreover, those self-critical cognitions are maintained because they provide a rationale not to engage in future behaviors that are considered likely to result in failure. Through these mechanisms, thus, self-critical cognitions can affect depression among older people.

**Social factors.** Reviews on late-life depression (Blazer, 2010; Fiske, Wetherell, Gatz, 2009) describe stressful life events, impaired social support and lower
socioeconomic status as social risk factors for depression among older people. Stressful life events in later life can include bereavement, a new physical illness or disability, and change in living arrangements (Blazer, 2010). Older people with lower socioeconomic status are more likely to experience constant depressive symptoms (Fiske, Wetherell, Gatz, 2009).

2. 2. Physical Health, Functional Impairment, and Depressive Symptoms

Among several stressful life events faced in later life, changes in physical health are thought to be especially prevalent and likely to lead to depressive symptoms in older people (Bierman & Statland, 2010; Moussavi et al, 2007; Ormel & VonKorff, 2000). Since advanced age is generally associated with more risk factors for physical health deterioration and depressive symptoms, research on the relationship between physical health and depressive symptoms in later life has greater importance. Although there is accumulating literature showing both the effects of physical health on depression (Bierman & Statland, 2010; Moussavi et al, 2007; Ormel & VonKorff, 2000) and the effects of depression on physical health (Bremmer et al., 2007), the studies that have examined reciprocal effects between depression and disability have indicated that physical health produced effects rather quickly and strongly on depression than depression influenced by physical health (Aneshensel et al, 1984; Ormel et al, 2002). Furthermore, a longitudinal study has shown that previous physical health predicted changes in depressive symptoms, but prior depressive symptoms did not explain changes in physical limitations (Gayman, Turner, & Cui, 2008).
In the relationship between physical health and depressive symptoms among older people, few psychosocial variables have been examined as mediators or moderators. A longitudinal study using growth model analyses, conducted by Taylor and Lynch (2004), found that trajectories of perceived social support buffered the effects of disability on depressive symptoms. In the same vein, Bierman and Statland (2010) found that physical limitations are positively associated with changes in depressive symptoms in later life. Hence, individuals with older age and higher perceived support show a weaker relationship between physical limitation and change in depressive symptoms. Jang et al (2002) examined the moderating roles of mastery and social support in disability-depressive symptoms relationship. The findings indicated that greater mastery and greater satisfaction with support significantly buffered the effects of disability on depressive symptoms. Gayman, Turner, & Cui (2008) examined a number of mediating variables in the relationship between physical limitation and depressive symptoms, including pain, chronic stress, recent life events, and daily discrimination. Their findings showed that the relationship between prior physical limitations and subsequent change of depressive symptoms were mediated by bodily pain and daily discrimination.

Most studies have focused on limited modifying variables like social support and mastery except for the study conducted by Gayman, Turner, & Cui (2008). Research on the mechanisms driving the relationship between physical health and depressive symptoms should be continued and expanded because they can contribute to practice via targeting mediating risk factors to be interrupted and mediating protective factors to be enhanced (Fraser, 2004). Changes in physical health may be related to increased dependence and declines in self-confidence which can adversely impact well-being.
among older people. Furthermore, negative age-stereotypes, depicting older people as dependent, incompetent, lonely, etc., might elevate the potential that older people would develop self-critical thoughts which, in turn, can lead to depressive symptoms among older people. Although possible psychosocial mechanisms for the relationship between physical health and depressive symptoms have been suggested, the research on this area has rarely been conducted. The current study builds on the previous literature by examining the mediating role of self-perception of aging in the relationship between physical health and depressive symptoms. Furthermore, I examine the moderating roles of age schema and perceived emotional support.

In the following sections, two theories and related previous studies are introduced to develop the conceptual framework for the current study that aims to find potential ways to prevent late life depression regarding physical health declines and negative stereotypes about older people. The theories include stereotype embodiment theory and buffer theory of social support.

2. 3. Self-Perception of Aging

2. 3. 1. Stereotype Embodiment Theory

Levy (2009) proposes stereotype embodiment theory to explain the influence of aging stereotypes on older individuals’ cognitive and physical functioning. Aging stereotypes can harm older people as race stereotypes harm African Americans when people adopt and act out those stereotypes through self-fulfilling prophecies. According to stereotype embodiment theory, “stereotypes are embodied when assimilation from the surrounding culture leads to self-definitions that, in turn, influence functioning and
health” (Levy, 2009, p.332). In order to explain the process and impact of stereotype embodiment, four components underlie this theory: (1) internalization of stereotype across the life span; (2) unconscious operation of stereotypes; (3) salience gain from self-relevance; and (4) utilization of multiple pathways.

According to the stereotype embodiment theory, the internalization of aging stereotypes develops as early as childhood and is reinforced in adulthood without resistance because those stereotypes do not apply until people reach old age. Levy (2003a) states that aging stereotypes become self-stereotypes when individuals get to old age through two stages. First, when the individuals are categorized by the society as old, the aging stereotypes are directed at them regardless of whether they accept these or not as valid. Another stage is the transition of age stereotypes to self-relevance. This transition may be facilitated by older individuals’ encounters of various social cues that indicate they are old. Such cues can be encountered in the interpersonal or institutional level such as in elder speak, denial of access to jobs, or denied medical treatment (Levy, 2009). Also, Levy (2003a) explains that old age identification (i.e., a belief that one is old) may validate age stereotypes as self-relevant information. Although Levy only mentions social cues as factors affecting the process of age stereotypes becoming self relevant, age-related changes (e.g., declining physical health which is strongly related to age identification) may also facilitate the transition (Diehl & Wahl, 2010). Although research on the factors that might facilitate the transition of age stereotypes to self-perception of aging has rarely been conducted, the assumption that age stereotypes tend to become incorporated into the self-concept of older individuals has been supported by
some studies (Rothermund & Brandtstadter, 2003; Rothermund, 2005). Finally, self-relevance determines the effects of age stereotypes when activated (Levy, 2003b).

Levy and her colleagues have used a term ‘self-perception of aging’ to refer to self-stereotypes about aging which are influenced by societal age stereotypes in various studies, which examine the effects of self-perception of aging on health behavior, physical functioning, cardiovascular events and mortality (Levy, Slade, & Kasl, 2002; Levy, Slade, Kunkel, & Kasl, 2002; Levy & Myers, 2004). However, a controversy among gerontologists studying self-perception of aging is how to conceptualize it. The researchers appear to be divided into two camps on the concept of self-perception of aging. One camp focuses on self-evaluation (real assessment), whereas the other camp tends to focus on contaminated stereotypes (not real, but constructed) about the aging process.

A research team from the Max Planck Institute for Human Development has conducted studies on self-perception of aging using the Berlin Aging Study and focuses more on self-perception of aging as real assessment of older people about their own aging (Kleinspehn-Ammerlahn, Kotter-Gruhn, and Smith, 2008; Kotter-Gruhm, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009). In their studies, self-perceptions of aging are referred to as “reflections on one’s own age and aging” (Kotter-Gruhm, et al, 2009, p.654). Feeling younger and being satisfied with one’s own aging are expressions of positive self-perceptions of aging (Kleinspehn-Ammerlahn, et al, 2008). This conceptualization helps researchers focus on factors that influence self-perception of aging while the other way that Levy has used is more useful to test the consequences of self-perception of aging. When Levy (2003) uses the term ‘self-perception of aging’, it is
likely to mean aging-self stereotypes that represent the contaminated attitudes toward one’s own aging from aging stereotypes that exist in the society. Levy (2003) described that aging stereotypes may become self-fulfilling and impose unnecessary limitations in cognitive and physical functioning when individuals define themselves as old and accept aging stereotypes as valid. Thus, self-perception of aging, constructed by society may be since childhood, can, in part, affect the aging process.

In the current study, I conceptualize self-perception of aging as not a general assessment of reality, but a function of the combination between the feedback to be perceived (i.e., evaluation of aging process) and the subjects’ prior beliefs (i.e., stereotypes about aging), reflecting both concepts from two different camps. Examining age-schema as a moderator in the relationship between physical health and self-perception of aging may provide evidence that self-perception of aging is not only an actual evaluation of aging process, but might also be contaminated by evaluation of aging stereotypes.

2. 3. 2. Empirical Research on the Effects of Self-Perception of Aging

Individuals may adopt behaviors and habits that may harm their physical and mental health in later life, based on socially shared negative stereotypes of aging (Palacios, Torres, and Mena, 2009). Recent studies in the field of gerontology show that keeping negative aging stereotypes can affect older people’s functioning and health. This section reviews the studies about how older people’s self-perception of aging influences their aging process, which form the basis for constructing stereotype embodiment theory.
Levy and other colleagues have found that debilitation might be at least partly a result of aging self-stereotypes rather than only biological processes (Levy, 2003). First, in a cross-cultural study, Levy & Langer (1994) looked at how memory was affected by varying cultural stereotypes about memory in older people with samples of Chinese people, deaf Americans and hearing Americans. Chinese people who had the most positive views of aging performed the best and the hearing Americans performed the worst with the most negative views of aging. In a study using a priming technique, Levy (1996) found that older persons exposed to negative-age-stereotype primes had a tendency to perform worse than those exposed to positive-age-stereotype primes on memory tasks and presented less self-efficacy. These results imply that self-stereotypes can affect cognitive processes in older people. Another study using priming showed that positive aging self-stereotypes significantly increased physical functioning in older individuals. Participants who were primed with positive aging self-stereotypes improved swing time and gait speed in their walking (Hausdorff, Levy, & Wei, 1999).

Furthermore, Levy, Ashman, & Dror (1999-2000) found that the older individuals exposed to the positive aging stereotypes tended to accept life-prolonging medical interventions, controlling financial or familial cost, whereas those exposed to the negative aging stereotypes had a tendency to reject life prolonging interventions. These various studies using priming have provided evidence that self-perception of aging can affect older persons’ cognition, behavior, and will to live (Levy, 2003).

In addition, research has shown that older persons’ perceptions of aging can impact their health and longevity. Levy, Hausdorff, Hencke, & Wei (2000) demonstrated that exposures to negative attitudes towards aging increase the level of cardiovascular
response to stress whereas positive attitudes exerted a protective effect. A recent longitudinal study by Levy, Zonderman, Slade, & Ferrucci (2009) examined whether negative stereotypes held earlier in life cause cardiovascular events in later life. The results showed that younger individuals who held more negative age stereotypes at the baseline were significantly more likely to experience a cardiovascular event over the next 38 years than those with positive age stereotypes (Levy, Zonderman, Slade, & Ferrucci, 2009). As another important study, Levy, Slade, & Kasl (2002) analyzed the Ohio Longitudinal Study of Aging and Retirement (OLSAR) data set to explore whether self-perceptions of aging can influence functional health over time. Older individuals with more positive self-perceptions of aging at the baseline reported better functional health over time, after controlling for baseline measures of functional health, self-rated health, age, gender, race, and socioeconomic status. The relationship between positive self-perceptions of aging and functional health was partially mediated by perceived control in this study (Levy, Slade, & Kasl, 2002). Similarly, Macia et al (2009) and Jang et al (2004) found that self-rated health is associated with self-perception of aging.

Levy, Slade, Kunkel, & Kasl (2002) studied the impact of self-perception of aging on survival by analyzing the combined data set from OLSAR data and the National Death Index. Researchers found that older individuals with more positive self-perceptions of aging lived 7.5 years longer than those with less positive self-perceptions of aging, after controlling for age, functional health, gender, loneliness, race, self-rated health, and socioeconomic status. In a more recent study about the relationship between self-perception of aging and mortality, Kotter-Gruhn, Kleinspehn-Ammerlahn, Gerstorf, and Smith (2009) found that higher aging satisfaction, younger subjective age, and less
decline in positive self-perceptions of aging are associated with lower mortality hazards after controlling for age, gender, socioeconomic status, diagnosis of dementia, number of illness, depression, or personality trait.

These results suggest that positive self-perception of aging might be a strong protective factor against the effect of the aging process (Lupien & Wan, 2004). Rodin & Langer (1980) suggested that restructuring the environment might be able to reverse the consequences of major changes associated with aging, over-attribution of physical decline to aging, and the effects of negative stereotypes regarding aging. A study in a nursing home, showed that nursing home residents became more involved, active and self-initiating, as well as happier and showed dramatic health-related benefits when they had the opportunity to make decisions and felt increased responsibility (Langer & Rodin, 1976).

Moor and her colleagues (2006) examined about how personality, perception of aging, and subjective health are related, using a representative older adult sample from Germany. According to their study, perception of aging served as a mediator in the relationship between personality trait (neuroticism) and subjective health. According to Moor and her colleagues, “Unlike many predictors of subjective health, such as age, gender, socio-cultural differences, actual health, or personality traits, negative attitudes about one’s own aging may be modified through adequate intervention”(p.253).

These studies have generally found that negative self-perception of aging is related to health. Most of these studies have focused on physical health outcomes while mental health outcomes have not been examined. In this regard, the current study might fill in the gap in previous literature on stereotype embodiment theory.
2.3.3. Age Schema and Self-Perception of Aging

Stereotype embodiment theory assumes that age stereotypes can serve as schemas that can influence the aging processes. Old age stereotypes can affect older individuals when old age stereotypes are translated into self-perception of aging. Therefore, age schema, representing internalized age stereotypes, is an important concept in stereotype embodiment theory. However, previous empirical studies on stereotype embodiment theory have not included the age schema concept in the framework (Levy, Slade, & Kasl, 2002; Levy, Slade, Kunkel, & Kasl, 2002; Kotter-Gruhn, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009). Levy and her colleagues have found that self-perception of aging predicted physical functioning, health behavior, and longevity in their longitudinal studies using the Ohio Longitudinal Study of Aging and Retirement (OLSAR) data set. Unlike experimental studies using prime invoking internalized stereotypes (Hausdorff, Levy, & Wei, 1999; Levy, 1996), those longitudinal or cross-sectional studies could not conclude that the outcomes predicted by self-perception of aging were due to negative stereotypes toward older people since self-perception of aging can be used as a real assessment of aging process (Ron, 2007; Rothermund, 2005).

As another important variable that might explain the effects of physical health on depressive symptoms among older people, old age schema might be valuable to examine. Although there have been a few critics of the schema concept (see Fiske & Linville, 1980, for detailed information), schema concept has provided a useful way to consider complex knowledge when it is embedded in a particular cognitive framework (Fiske & Linville, 1980).
Old age schema can be referred to as cognitive structures of organized prior knowledge (Fiske & Linville, 1980), in terms of old age and aging process. Old age schemas can guide the processing of new information like aging-related changes (Fiske & Linville, 1980). Stereotypes about old people can serve as old age schemas (Levy, 2003).

Research has found that age schema guide the processing of age related information (Mueller, Wonderlich, & Dugan, 1986) and is related to reactions to age-related life events (Montepare, 1996). Adults who are schematic for age tend to make faster judgments about age-related information than those who were aschematic (Montepare & Clements, 2001). The experimental study conducted by Poon and Knight (2009) revealed that individuals having activated old-age schema pay significantly more attention to physical symptoms than are individuals without activation of old-age schema. This evidence implies that old age schema may promote attention to physical health since poor health is a common theme within aging stereotypes. When an individual is in a certain circumstance, the schema related to the circumstance is activated, in turn, influencing how a person attends to the stimuli in the environment (Alloy, Abramson, Safford, & Gibb, 2006). However, this information process based on schemas can be involved in the development of distortions or maladaptive biases. For example, older individuals can develop negative self stereotypes (or age schemas) on their own aging based on preconceived ideas across life span. These old age schemas may affect self-perception of aging and depressive symptoms by increasing older individuals attention to physical health declines.

Self-perception of aging is an evident theme in the cognitions and evaluations that individuals generate while they encounter the aging process. Negative self-perceptions of
aging can be a cognitive product responding to external or internal stimuli regarding aging process based on internalized negative aging stereotypes (or aging schemas). Self-perception of aging is important to understand depressive symptoms in later life because it likely mediates the emotional impact of external circumstances like loss and deterioration of physical health or functions on depressive symptoms. Self-perception of aging and age schema might characterize individual differences in peoples’ interpretations of personal and environmental events and circumstances in terms of the aging process. Thus, self-perception of aging and age schema may be critical in understanding individual differences in vulnerability to becoming depressed.

2. 3. 4. Physical Health and Self-Perception of Aging

Although research on the factors facilitating the transition of aging stereotypes into self-perception of aging has rarely been examined, the results from the studies on age identity might be useful to understand since old age identification is a process of self-relevance of aging stereotypes (Levy, 2009). Many studies on age identity have found that various factors influence age identity. These factors include education, chronological age, physical health, retirement, widowhood, socioeconomic status, and loneliness (Barrett, 2003; Mutran & Burke, 1989). Specifically, declines of physical health have consistently been identified as a factor of old age identity even across a range of health indicators including objective measures such as number of chronic conditions (Markides & Boldt, 1983; Barrett, 2003) or functional limitations (Bowling et al, 2005; Knoll, Rieckmann, Scholz, & Schwarzer, 2004), and subjective rating of health (Logan et al, 1992; Barrett, 2003). The results from the qualitative study conducted by Sherman (1994)
also showed that changes in physical health are the most frequently cited reasons for beginning to feel older. Based on previous findings, physical health status is considered as a facilitator for developing self-relevance of aging stereotypes in the current study.

2.3.5. Consequence of negative self-perception of aging on mental health

Individuals may adopt behaviors and habits that may harm their physical and mental health in later life, based on socially shared negative stereotypes of aging (Palacios, Torres, and Mena, 2009). Researchers have studied the impact of self-perception of aging on older people by conducting longitudinal studies and primal studies (i.e., participants are exposed to a stimulus that influences response to a later stimulus) and found that maintaining negative aging stereotypes can affect older people’s cognitive functioning, physical health, and even longevity (Levy, 2003). Most of these studies have focused on physical health outcomes while mental health outcomes have rarely been explained. The current study focuses on mental health outcomes, which will add to the literature.

Some empirical studies have examined the relationship between self-perception of aging and depressive symptoms among older people (Chachamovich, et al., 2008; Lu, Kao, & Hsieh, 2009). Lu, Kao, & Hsieh (2009) found that negative attitudes toward aging are related to negative depressive symptoms among Taiwan older people after accounting for age, social support, and community participation. However, health variables that have been known as critical in depression studies were not included in the study. The measurement used for attitude toward aging represented the perception about the general older population rather than older individuals’ perception about their own
aging process. An international study (Chachamovich, Fleck, Laidlaw, & Power, 2008) found the association of attitude toward aging with depression levels in older people from various countries. Furthermore, the relationship was observed not only in the clinically depressed respondents but also in respondents who had subsyndromal symptoms. However, other important variables which might be related to depression and attitude toward aging were not included in the study.

Some other studies (Ward, 1977; Rothermund, 2005) have shown the effects of personal attitudes toward old age and aging on psychological well-being. The study conducted by Ward (1977) found that negative attitudes predict low self-esteem after controlling for self-rated health problems and other age-related changes. Rothermund (2005) also reported that negative views of the typical old person at the baseline predicted negative changes in self-view five years later. Participants were asked to give an evaluation of themselves and of the typical older person on a semantic differential comprising 32 attribute pairs. Moreover, future (possible) self-views were measured by asking how they expected to be in five years on the same semantic differential attribute pairs. Future self-views were related to both current self-views and views of the typical old person. Negative views of the typical old person were associated with depressive symptoms and amplified the negative impact of self-view on depressive symptoms. Although Rothermund (2005) described that personal belief in a negative age stereotype might be a risk factor for preservation of a positive self-concept and for the well-being of older people, other confounding variables were not considered at all and same semantic differential measurements were used for three distinct variables.
Although the relationship between self-perception of aging and depressive symptoms has been found, previous studies have not included other confounding variables such as physical health, functional impairments, and socio-economic status. Furthermore, previous studies on self-perception of aging and depression were not theory-oriented studies. However, Laidlaw and his colleagues (2007; 2010) have proposed that the negative attitudes toward aging may act as a stress-diathesis and could be involved in the development of depression based on cognitive vulnerability theory of depression. The current study might be meaningful by including important variables and using relevant theory to explain the association between self-perception of aging and depressive symptoms.

Next, integrating perceived emotional social support with stereotype embodiment theory to explain depressive symptoms among older people can be beneficial given that older people are more likely to maintain or enhance their positive affect through selecting stimuli that give positive emotional feedback. Perceived positive emotional support that are selected and achieved by older individuals may inhibit information processing related to negative age-stereotypes or weaken the relationship between negative self-perception of aging and depressive symptoms.

2.4. Perceived Social Support

Cobb (1976) defined social support as “information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligation” (p.300). The abundance of literature focusing on the relationship between social support and mental health in older people has found that social support is
associated with depressive symptoms and acts as a moderator in the relationship between stress and depressive symptoms (Antonucci, et al., 2002; DuPertuis, Aldwin, & Bosse, 2001; George, et al., 1989). As a result, socio-emotional selectivity theory has been proposed that the selection of emotionally meaningful social relationships might be a strategy for successful adjustment to stressors that can be confronted in old age (Carstensen, 1992).

2. 4. 1. Main Effect of Social Support on Depressive Symptoms

A number of studies have indicated that social support is significantly related to depressive symptoms in older people (Antonucci, Fuhrer, & Dartigues, 1997; Antonucci, Lansford, & Akiyama, 2001; Antonucci, et al., 2002; DuPertuis, Aldwin, & Bosse, 2001; Koizumi, et al., 2005). Although the types and sources of social support are associated with depressive symptoms, both cross-sectional and longitudinal studies have found that perceived emotional support is the most influential social support factor for explaining depressive symptoms in older people (Antonucci, Fuhrer, & Dartigues, 1997; Antonucci, et al., 2002; Bosworth, Hays, & George, 2002; Fiori, Antonucci, & Cortina, 2006; George, et al., 1989; Oxman, Freeman, & Manheimer, 1995) and having diverse sources of social support tend to be more favorable than having support from only family (DuPertuis, Aldwin, & Bosse, 2001; Fiori, Antonucci, & Cortina, 2006). Furthermore, gender differences in the relationship between emotional social support and depression have been reported. Older women were more likely to be susceptible to the quality of support in relating to depressive symptoms than older men were (Antonucci, Lansford, &
Akiyama, 2001; Antonucci, et al, 2002). On the other hand, George et al (1989)’s findings differed from these.

In relating to the causal relationship between social support and depressive symptoms, Maher, Mora, & Leventhal (2006) indicated that the cognitive component of depression predicts changes in support and demand prospectively. However, Krause, Liang, & Yatomi (1989) found that satisfaction with social support at time 1 was significantly related to subsequent depressive symptoms at time 2, whereas initial level of depressive symptoms was not associated with subsequent satisfaction with social support. Although the findings are not consistent, overall, studies on the relationship among social support and depressive symptoms in older people have examined the effects of social support on depressive symptoms. Most of the reviewed studies of social support and depression have assumed a direct effects model by using a correlational or regression analysis. This bivariate approach has found that the less social support is perceived or received, the greater psychological distress. However, the simple association between social support and depression do not tell us anything about the all-important question of the mechanisms through which social support affect depression. Examining moderating and mediating effects can help us understand such mechanisms (Aldwin, 2007).

2.4.2. The buffering effect of social support

The buffering model posits that social support has an effect on depression to the extent that social support moderates the effects of stress on depression. That is, social support will affect depression because it reduces the negative effects of stress, especially at higher stress levels (Aldwin, 2007). Chou and Chi (2001) pointed out that social
support plays a role as a moderator rather than as a mediator in the relationship between life stress and depressive symptoms among older people of Hong Kong.

Previous research has provided evidence of the buffer effects of social support against various stressors (Jang, Haley, Small, & Mortimer, 2002; Lee & Dunkle, 2010; Taylor & Lynch, 2004; Revicki & Mitchell, 1990). Specifically, the studies that examined the effects of emotional social support have found strong evidence for the protective role in predicting psychological distress. However, the studies on the quantity domains of social support such as size of social network, number of contacts, or frequency of social support have neither reported consistently significant relationships to depression nor moderating influences (Arling, 1987; Roberts, Dunkle, & Haug, 1994).

2.4.3. Perceived Emotional Support and Cognition

A plethora of research has examined either main or buffering effects of social support against stress for psychological well-being and has led to the general conclusion that support is indeed a crucial factor in older people’s depressive symptoms. Moreover, research has found that perceived and emotional support are more important in depressive symptoms among older people than are received and instrument support. Along with these findings, many studies have been conducted to discover possible mechanisms involved in the relationship between perceived or emotional support and depressive symptoms (Bisconti & Bergeman, 1999; Fiori et al., 2006; Krause, 1997 & 2007). One possible underlying factor between the support and psychological well-being relationship is cognition (Antonucci & Jackson, 1987). Social support is referred to as “the cumulative expression of support by one or several individuals to another that
communicate to the target person that he or she is an able, worthy, and capable person or perhaps in the case of an elderly person, continues to be an able, worthy, and capable person” (Antonucci, 2001, p.442). Thus, the supported person tends to believe they can solve a problem and successfully meet life’s challenges because they have come to interpret and internalize supportive others’ communications to them. Perceived emotional support also can help individuals develop a positive belief about the self, which can provide optimal conditions for individuals to cope with life stress.

In the same vein, researchers have integrated cognitive theories with the buffer theory of social support (Alloy, Abramson, Safford, & Gibb, 2006; Panzarella, Alloy, & Whitehouse, 2006). Social support may reduce the likelihood of maladaptive inferences for particular negative events and may influence the appraisal of coping abilities and resources (Cohen & Wills, 1985; Panzarella, Alloy, & Whitehouse, 2006). In the prospective study conducted by Panzarella, Alloy, & Whitehouse (2006), social support predicted more positive inferences for stressful events.

Social support may play a protective role in cognitive processes which might be developed when physical health declines affect depressive symptoms. Social support might counteract the impact of negative stereotypes on self-perception of aging and depressive symptoms by either hampering the activation of negative stereotypes of aging or increasing positive appraisal of coping abilities and resources when physical health deterioration occur. Based on the importance of pairing support and cognition for depression, the current study examines perceived emotional support as a possible modifying factor in the relationships among age schemas, physical health, and self-perception of aging which, in turn affect depressive symptoms among older people.
2. 5. Research Hypotheses

2. 5. 1. Summary of Literature for Research Question 1

The first research question and hypotheses examine the effect of self-perception of aging on depressive symptoms and the mediating role of self-perception of aging on the relationship between physical health and depressive symptoms.

There has been considerable interest in testing the influence of physical health on depressive symptoms, but little research has explored the mechanisms by which physical health influences depressive symptoms. Also, previous studies have examined the effects of self-perception of aging on physical and cognitive functioning among older people, but the effect of self-perception of aging on mental health has rarely been studied.

The stereotype embodiment theory suggests that self-perception of aging can affect the aging process, such as physical and cognitive functioning. The current study examined the relationship of self-perception of aging with depressive symptoms in older people because cognitions can influence emotions. Although physical health variables have been used for outcome or control variables for the studies of self-perception of aging, physical health variables can play a role as facilitators in constructing self-views in terms of the aging process. Research on age identity has found that physical health variables were the most important factors for changing age identity. To decrease the gap in the current literature, I examine the association of self-perception of aging with depressive symptoms, and the mediating effect of self-perception of aging in the relationship between physical health and depressive symptoms.
Research question 1. Does self-perception of aging mediate the relationship between physical health and depressive symptoms?

Hypothesis 1.1. Worse physical health will be associated with more depressive symptoms.

Hypothesis 1.2. Worse physical health will be related to more negative self-perception of aging.

Hypothesis 1.3. Negative self-perception of aging will be associated with more depressive symptoms.

Hypothesis 1.4. The effect of physical health on depressive symptoms will be mediated by self-perception of aging.

Figure 1
Mediating Effect of Self-Perception of Aging: Structural Equation Model

2. 5. 2. Summary of Literature for Research Question 2

Stereotype embodiment theory has built upon the studies conducted by Levy and her colleagues by using the variable ‘self-perception of aging’, in part. However, there is
a controversy about how to conceptualize the term ‘self-perception of aging’. It could be interpreted as actual evaluation of the aging process, but Levy and her colleagues used this term as an evaluation by aging stereotypes (or activated age stereotypes). The current study examines age schema (age stereotypes) as a moderator in the relationship between physical health and self-perception of aging to see whether stereotype embodiment theory can be supported in terms of conceptualization of self-perception of aging.

Age schema as a form of age stereotypes can influence the processing of information individuals generate while they experience the aging process. That is, older individuals who have age schema might develop more negative self-perceptions of aging when they experience physical health declines.

Research question 2. Does age schema moderate the relationship between physical health and self-perception of aging?

Hypothesis 2.1. The effect of physical health on self-perception of aging will be stronger with the presence of age-schema.
2. 5. 3. Summary of Literature for Research Question 3

Empirical studies have generally provided evidence for the protective role of perceived emotional support in predicting psychological distress. Still to be discovered, however, is how this perceived emotional support influences depressive symptoms. A possible mechanism is through changes in cognition. The current study explores the relationship between perceived emotional support and self-perception of aging. Specifically, the moderating effect of perceived emotional support in the relationship between physical health and self-perception of aging is examined.

Research question 3. Does perceived emotional social support moderate the relationship between physical health and self-perception of aging?
Hypothesis 3.1. The effect of physical health on self-perception of aging will be stronger with less perceived emotional support.

Figure 3
Moderating Effect of Emotional Support: Latent Variable Interaction Term Model
Chapter III: Methods

3. 1. Data and Sample

3. 1. 1. Description of Health and Retirement Study

Overview

The Health and Retirement Study (HRS) is an ongoing nationally representative longitudinal survey of individuals over the age of 50 and their spouses. The HRS has been conducted every 2 years since 1992 by the Institute for Social Research at the University of Michigan. HRS is sponsored by the National Institute on Aging (NIA) with support from the Social Security Administration (SSA). The goal of the HRS is to provide panel data that enable research and analysis in support of policies on retirement, health insurance, physical and mental health, family support systems, and economic well-being. The surveys include information about demographics, income, assets, health, cognition, family structure and connections, health care utilization and costs, housing, job status and history, expectations, and insurance (HRS, 2010).

Cohorts

in 1993 and 1995 from people who were born in 1923 or earlier. In 1998, 2000, and 2002, the HRS, AHEAD, and two new cohorts, War Baby (WB, born 1942 to 1947) and Children of the Depression Age (CODA, born 1924 to 1930), were interviewed. In 2004, 2006, and 2008, HRS, AHEAD, WB, CODA, and another new cohort, Early Baby Boomer (EBB, born 1948-1953), were interviewed (Servais, 2010).

3. 1. 2. Survey Design

The HRS uses a national area probability sample of U. S. households with supplemental oversamples of Blacks, Hispanics, and residents of the state of Florida. A multi-stage area probability sample design is used to select the HRS sample.

*Leave behind questionnaire*

The assessment of psychosocial issues was not a goal of the HRS when it was launched. However, in 2004, HRS added a new feature for data collection in the form of self-administered questionnaires that were left with respondents upon the completion of an in-person Core Interview, designed to collect additional information without adding to the interview length.

Two separate questionnaires on different topics were included in HRS 2004 and one of them was focusing on psychosocial issues (i.e., Participant lifestyle Questionnaire). A random sub-sample of living, non-institutionalized respondents who completed face-to-face interviews in 2004 was assigned to the questionnaire for psychosocial issues. The leave-behind questionnaire was designed as a self-administered questionnaire and it was left with the selected respondents at the end of the core interview. Respondents were asked to complete the questionnaire and mail it back to the main field office at the
University of Michigan. In 2006, the updated and revised psychosocial questionnaire was administered through enhanced face to face interviews which were initiated as a new feature of data collection. In addition to the core interviews, a few assessments were included in the enhanced face to face interview: a set of physical performance measures, collection of biomarkers, and a leave-behind questionnaire on psychosocial topics. The enhanced face to face interview was conducted for a random one-half of households in 2006 and the other half of the sample was interviewed in 2008. Respondents, who were non-institutionalized at the time of the interview and either they or a proxy completed at least part of the interview in person, were eligible for the Leave-Behind Questionnaire. Both couple members in coupled household were selected. Every household will repeat enhanced face to face interview part every other wave (HRS). The Leave-Behind Questionnaire on psychosocial topics includes questions on participation in activities, relationships with others, and views on their lives (Clarke, Fisher, House, & Smith, 2008).

3.1.3. Data set

The current study used the RAND HRS (j ver.) data file and 2004 and 2008 HRS Core data files (final ver. 1.0). The RAND HRS data file contains cleaned and processed variables with consistent imputations across 11 waves of HRS; however, this longitudinal file contains only a subset of variables (i.e., health status, demographics, etc.). Since the RAND HRS data file does not include psychological variables, the section LB, which contains variables from the Leave-Behind Interview, of 2004 and 2008 HRS Core data file was merged with the RAND file at the respondent level after creating a HHIDPN variable (HHID*1000+PN). The 2004 HRS interviews were conducted from March 2004
through February 2005 with 20129 respondents in 13645 households (response rate: 87.8%). The 2008 HRS interviews were conducted from February 2008 through February 2009 with 17217 respondents in 11897 households.

3. 1. 4. Sample

In 2008, interviews were conducted with 17217 individuals. About half of the participants (N=8296) were assigned to the enhanced face-to-face interview in 2008. Most of them (N=7500) were eligible for the Leave-Behind Interview, but 796 participants were not eligible because they were in a nursing home and were interviewed by proxy or self by telephone for the core interview. Among eligible participants for the Leave-Behind Interview, 6568 participants completed the Leave-Behind Interview by either mail or phone. Among eligible persons, 932 participants did not complete the Leave-Behind Interview. Although there were data obtained from the respondents who were not eligible for Leave-Behind Interview, I decided to use data only from eligible participants. For this study, therefore, the sample size, only considering 2008 HRS participants, is 6568 older people.

In 2004, interviews were conducted with 20129 individuals, and 3273 respondents answered the psychosocial questionnaire. Among respondents who completed the core interview in 2004 and were eligible for the psychosocial leave-behind, the response rate was 76.8%.

The respondents who answered the Leave-Behind Questionnaires in both 2004 and 2008 were 1284. Since I needed to used variables that were surveyed in 2004 and 2008, I used the sample of 1284 respondents who participated in the both leave-behind
questionnaires in 2004 and 2008. Among 1284 respondents, 44 were excluded from the sample since they were younger than 50 years old. Therefore, the final sample was 1240 individuals who were over the age of 50 at the baseline (2004).

3. 2. Measures

3. 2. 1. Dependent Variable

*Depressive symptomatology*

Depressive symptoms were assessed at both 2004 and 2008 data points using the Center for Epidemiologic Studies Depression Scale (CES-D). The original 20 item CES-D was a screening scale designed to measure self-reported current depressive symptoms in the general population and has been judged among the best screening instruments for symptoms of depressed mood in older people with high levels of reliability and validity (Andersen, Carter, Malmgren, & Patrick, 1994). The version used in the current study consists of 8 items that used dichotomous response categories signifying the presence (1) or absence (0) of a symptom during the week preceding the interview. This revised 8 items-CESD was developed for large epidemiologic studies because a full assessment of depression was not feasible (Turvey, Wallace, & Herzog, 1999). The revised 8 items-CESD was tested with an earlier cohort of HRS participants (AHEAD cohort) and showed an internal consistency and factor structures comparable to that of prior versions of CES-D (Turvey, Wallace, & Herzog, 1999). The items included felt depressed, everything an effort, sleep was restless, felt lonely, sad, could not get going, enjoyed life, and was happy. Positively worded items were reverse-coded. Possible scores ranged from 0 to 8 with a higher score signifying greater level of depressive symptoms. Two parcels
in this scale formed a latent variable, depression: mood (felt depressed, felt lonely, sad, enjoyed life, and was happy) and somatic complaints (everything an effort, sleep was restless, and could not get going).

3. 2. 2. Independent Variable

Physical health

A latent variable ‘physical health’ was constructed by creating three groups of indices for physical health: self-rated health, functional limitation, and diagnoses of specific health conditions from the 2004 wave. Physical health indices measured in the 2004 wave were used because the current study tests how age schema and perceived emotional support modified the effect of prior physical health on later self-perception of aging and depressive symptoms.

Self-rated health was measured by a commonly used global rating item. Each participant was asked the question “How would you rate your overall health at the present time?” Five responses were available: (1) excellent, (2) very good, (3) good, (4) fair, and (5) poor.

Functional limitation was measured by asking if the respondent had difficulty performing a task (0=no difficulty; 1=difficulty). This index was used as the sum of the number of difficulties in five activities of daily living (ADL): walking across room, dressing, bathing or showering, eating, getting in/out of bed.

Health condition was used as the sum of indicators for whether a doctor has ever told the respondent that he or she has ever had a particular disease. The seven included
diseases were high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, and arthritis.

3.2.3. Mediator

*Self-perception of aging*

Most related studies of self-perception of aging have used the subscale ‘the Attitudes Towards Own Aging’ of the Philadelphia Geriatric Center Morale Scale (e.g., Levy and her colleagues; Kleinspehn-Ammerlahn and her colleagues; Lawton, 1975). This subscale has been only included in 2008 HRS dataset so far. The participants responded by indicating how much they agreed with 5 statements: “Things keep getting worse as I get older” (WORSE), “I have as much pep as I had last year” (PEP), “As you get older, you are less useful” (USEFUL), “As I get older, things are better than I thought they would be” (BETTER), and “I am as happy now as I was when I was younger” (HAPPY). Six responses were available: (1) strongly disagree to (6) strongly agree. The responses of the last two statements were reversely coded. Higher scores referred to more negative self-perception of aging. The five items were used to indicate a latent variable.

3.2.4. Moderators

*Perceived emotional support*

The social support measures that were used in the current study focused on individuals’ perceived support, and thus, may not accurately reflect received support. However, given research findings that perceived support is more influential on older individuals’ psychological well-being than actual support measures, it is important to
examine how perceived emotional support plays a role in the relationship between declining of physical health and self-perception of aging.

Indicators for the latent variable perceived emotional support were constructed separately from four sources: spouse, family, friend, and neighbor. Each index of perceived social support from these four sources included positive and negative emotional support items: “How much do they really understand the way you feel about things?”, “How much can you rely on them if you have a serious problem?”, “How much can you open up to them if you need to talk about your worries?”, “How often do they make too many demands on you?”, “How much do they criticize you?”, “How much do they let you down when you are counting on them?”, and “How much do they get on your nerves?” For seven questions, response categories are: (1) a lot, (2) some, (3) a little, and (4) not at all. The responses from the first three questions (positive perceived support items) were reverse-coded so that higher values indicated higher level of perceived positive emotional support. The mean scores of all items for each support sources were used as the four indicators for the latent variable perceived emotional support. Thus, high values on these four indicators means higher positive support from the respondents’ spouse, family, friend, and neighbor. In the current study, I used perceived emotional support assessed in 2004.

*Age schema*

Schema refers to people’s organized generalizations about themselves. A few studies have used the concept of age schema to present people’s organized generalizations about old age (Montepare & Clements, 2001). After a review of ageism studies, Kite and her colleagues (1988; 2005) found that people showed more negative
attitudes toward older people when competence was assessed. A question, which assessed the extent to which participants felt that their age played an important role in their competence of doing things, is used to measure age schema. In 2004 each participant was asked how often they feel that “Age prevents me from doing things”. Four responses were available: (1) often, (2) sometimes, (3) not often, and (4) never. To create two groups either with age schema or without age schema, (1)-(3) was re-coded to (1) indicating the group with age schema and (4) was re-coded to (0) indicating the group without age schema.

3.2.5. Control Variables

Demographics

Information on gender, race, education, age, marital status, poverty ratio, employment status, and number of people in household was obtained from the RAND HRS J version. Gender was coded for male (0) and female (1). Race was coded for Whites (0) and minorities (1). Education was measured by years of education (from 0 to 17 or more). Marital status was coded for non-married (0) and married or partnered (1). Poverty ratio was calculated as the ratio of family income to poverty threshold by RAND. Smaller poverty ratio means more likely to be poor. Employment status was coded for working as part or fulltime (0) and not in the labor force (1). Living situation was coded for living with two or more people (0) and living alone (1).

Baseline characteristics

Depressive symptoms at the baseline (2004) were used as control factors on self-perception of aging and depressive symptoms at 2008.
3. 3. Data Analyses

3. 3. 1. Descriptive and Exploratory Analyses

In order to obtain a detailed view of the sample, exploratory data analyses were conducted. Descriptive statistics included frequency, percentage, mean, standard deviation, and range. Correlation analysis was conducted to examine the first-order relations between variables. Descriptive statistics were used to test potential problems given the assumptions of Structural Equation Modeling (SEM): multicollinearity, outliers, and normality. The independent t-test was used for examining mean differences in primary variables among groups (age schema group). For all these statistical tests, the current study used the SPSS 19.0 computer program to analyze the data set. All hypotheses were tested with the criterion of significance at p<.05.

The percentage of missing values in all variables used in the current study was less than one percent in the sample. The multiple imputation method based on Monte Carlo Markov Chain (MCMC) was conducted to impute missing values across multiple variables in the sample by using LISREL PRELIS 8.80 rather than removing values. (Schumacker & Lomax, 2010).

3. 3. 2. Structural Equation Modeling (SEM)

After exploring and screening the data set, SEM was performed to test main research hypotheses using LISREL 8.8. In constructing a structural model that included factor analysis and path analysis, the measurement model using confirmatory factor analysis was tested to estimate how well observed variables represented the latent variables. Following the measurement model, the structural model was tested to examine
research hypotheses. Specifically, multiple group comparison models (Lomax, 1983) and the latent variable interaction model were used (Little, Bovaird, & Widaman, 2006).

Although SEM was originally developed using continuous variables in a variance-covariance matrix, SEM models (Mixture models) with continuous and categorical observed variables can be used in SEM. To test mixture models, using other types of matrices than the Pearson correlation matrix and associated variance-covariance matrix is required in SEM programs (Schumacker & Lomax, 2010). In the current study, the polyserial correlation matrix was used because the models included observed variables that were either categorical or continuous. Since the data included categorical variables (i.e., non-normal distribution), Robust Maximum Likelihood (i.e., Satorra-Bentler scaled Chi-square) was used for estimation. The Satorra-Bentler (SB) scaled Chi-square statistic value was used to interpret the fit statistic instead of using a normal theory chi-square statistic for this mixture model (Schumacker & Lomax, 2010). This adjusted chi-square functions similarly as the normal theory chi-square statistic. A non-statistically significant SB chi-square value means that the model-implied covariance matrix is similar or the same as the sample covariance matrix (Hu & Bentler, 1999). However, the SB chi-square statistic is too conservative and sensitive when the sample size is large as the normal theory chi-square statistic is also affected by sample size. Larger sample sizes tend to produce a significant chi-square statistic even if there is a small discrepancy between the suggested model and the population model. As a result, using various model-fit criteria has been recommended to assess model fit as global fit measures (Schumacker & Lomax, 2010; Kline, 2005). There are several fit indices less influenced by sample size and have interpretive norms (Kline, 2005)
First of all, root-mean-square error of approximation (RMSEA) tests how poorly the model fits by estimating the amount of error per model degrees of freedom and takes sample size into account (Kline, 2005). Therefore, higher values indicate worse fit (Kline, 2005). The RMSEA value of .08 or less is considered an acceptable fit and a value of less than .05 is considered to indicate a good fit (Hu & Bentler, 1999). Comparative fit index (CFI) is the proportion in the improvement of overall fit of the study model to a null model and CFI value of greater than .90 is considered to indicate an acceptable model fit (Hu & Bentler, 1999). Goodness-of-fit index (GFI) measures the amount of variance and covariance in the sample data matrix that is predicted by the model-implied covariance matrix, with greater values indicating more correspondence between them. GFI value of greater than .90 is considered to indicate an acceptable fit (Schumacker & Lomax, 2010).

Standardized root-mean square residual (SRMR) is a standardized summary of average covariance residuals which indicate differences between model-implied covariance and sample covariance. The values of less than .10 are considered favorable (Kline, 2005).

Thus, the fit of the data to the hypothesized model is evaluated based on five indices: Satorra-Bentler chi-square statistics, RMSEA, CFI, SRMR, and GFI.

*Measurement model*

The measurement model examines a priori hypotheses about relationships between observed variables and latent constructs. The first analytic step is done to demonstrate that the identifiers are related to their latent constructs as hypothesized and that these relationships represent what is present in the data. For model identification, each latent variable was scaled by fixing the loading of one of its indicators at 1.0.
After constructing the latent variables through the measurement model tests, I identified a structural equation model that synthesizes the path and measurement models. Figure 4 presents both the measurement model and path model.
Figure 4
Structural Equation Model.
See Table 4 for indicators of the latent variables.
Mediating effect test

The current study used the causal steps approach to test mediation. The Sobel test was used to show the significance of the mediating effect of self-perception of aging on the relationship between physical health and depressive symptoms.

The causal steps approach is the most widely used method to assess mediation (MacKinnon, Fairchild, & Matthew, 2007). Four steps are involved in this approach. First, the relationship between the independent variable and dependent variable is examined. Second, the relationship of the independent variable to the hypothesized mediating variable is examined. Third, the relationship of the mediating variable to the dependent variable is tested when both independent and mediating variables are predictors of the dependent variable. Finally, based on these three equations, we can conclude mediation if three relationships are significant and the coefficient relating the independent variable to the dependent variable is larger than the coefficient relating the independent variable to the dependent variable with both the independent variable and mediating variable predicting the dependent variable (Baron & Kenny, 1986).

Full mediation is indicated if all of the significant variance of the relationship between independent variable and dependent variable is explained by the indirect influence through a mediator. If the indirect influence through a mediator accounts for a significant amount of variance in the dependent variable, but the relationship between independent variable and dependent variable remains significant, it indicates a partial mediation. Although the terms like full and partial have been used, caution is advised when using these terms since they are essentially informal effect size descriptors. Furthermore, a fully mediated relationship can never logically exist in the population.
because it requires that the coefficient for the relationship between the independent variable and dependent variable be zero once the mediator is included in the model (Little, Card, Bovaird, Preacher, & Crandall, 2007). Therefore, investigating the statistical significance of a mediation effect has been suggested. One way to find support for mediation is using the Sobel test.

The Sobel test estimates the standard error of the mediated effect and can be used to test whether the mediation effect of the independent variable on the dependent variable through the mediator is significantly different from zero. The reported p-values are drawn from the normal distribution under the assumption of a two-tailed z-test of the hypothesis that the mediated effect equals zero in the population. Although using the standard error in testing the significance of the mediation effect can be biased since the mediation effect is not normally distributed, the study using simulated data (Cheung & Lau, 2008) shows that the normality assumption in general holds when the sample size reaches 500, except when all the components of the mediation effect are small. When the sample size is small and/or the effect sizes of mediation paths are small, bootstrapping (i.e., re-sampling technique used to obtain more accurate estimates of statistics relying on the computer) is strongly recommended for the accurate estimation of mediation effect significance (Cheung & Lau, 2008).

*Latent variable interaction model*

To examine whether perceived emotional support can change a relationship between physical health and self-perception of aging, I used the latent variable interaction term in SEM since perceived emotional support was measured in a continuous manner. Although a number of techniques to represent the latent variable interactions in SEM
have been developed, I used the orthogonalizing approach in SEM that provides
estimates that are comparable to other approaches and it is not complex.

The orthogonalizing approach is a two-stage ordinary least squares procedure. First, product terms are created from the indicators of the independent variable and the moderator. Next, each product term is regressed onto the indicators and the residual of this regression is then saved and subsequently used to form the latent interaction variable as an indicator in SEM (Little, Card, Bovaird, Preacher, & Crandall, 2007). I used SAS software to generate the data for the orthogonalized latent variable interaction factor (see Little, Bovaird, & Widaman, 2006).

The orthogonalizing approach has a number of advantages for estimating interaction effects. First, the coefficients and standard errors of the main effect terms remain unchanged when the product term is entered into the model. Second, the significance of the product term is unbiased by the orthogonalizing process. Third, orthogonalizing totally removes the collinearity problem between the product term and its constituent main effect terms (Little, Card, Bovaird, Preacher, & Crandall, 2007).

**Multiple group comparison**

As a final stage in the SEM analyses for the measurement model as well as the structural model, multiple group comparison tests of the structural model were conducted with two groups of age schema to examine the moderating effect of age schema in the relationship between physical health change and self-perception of aging. When a moderator is categorical, a multiple group comparison in SEM can be used to assess moderation (Shumacker & Lomax, 2010). Different relationships between latent variables in different groups are evidence of moderation. The differences can be tested by
constraining relationships to be equal and using a chi-square difference test. If the model without the equality constraint fits better than the model with the equality constraint, it indicates that a moderation effect exists. Because the current study uses the Satorra-Bentler $\chi^2$ and the difference between the Satorra-Bentler $\chi^2$ values is not distributed as $\chi^2$, the difference test was adjusted through dividing the difference between two $\chi^2$ values by a difference test scaling correction (i.e., $T_s$ statistic, Satorra & Bentler, 1994).
4.1. Descriptive Statistics

The demographic characteristics for 1240 older individuals are presented in Table 1. The mean age of respondents in this sample was 65.53 years old (SD=9.27) ranging from 50 to 95 years old. Nearly 60% of the respondents were female and approximately 87.5% of respondents were White Americans. The average number of years of education was 12.65 (SD=2.85) ranging from 2 to 17 years. The mean poverty ratio was 5.06 (SD=6.23) which indicates that the sample, on average, was middle class. Two thirds of the respondents (67.6%) were married. One fifth of the respondents (18.3%) were living alone. Of 1240 older individuals, 32.4% of respondents reported that they were employed either part-time or full-time. Bivariate analyses by age schema indicated that individuals in the age schematic group (people with age schema) were on average 2.76 years older than those in the age aschematic group (people without age schema). The aschematic group was likely to have more income for their household. Table 2 presents the mean differences in primary variables by age schema. Older individuals in the age schematic group reported more negative self-perceptions of aging and more depressive symptoms at both T1 and T2 than those in the age aschematic group. Although there was no significant difference in functional impairment between the two groups, older individuals in the age aschematic group were more likely to have better health conditions than those in the age schematic group. Older individuals in the age aschematic group were more likely to
perceive positive emotional support from family and friends. Two groups did not show differences in perceived support from spouse and children.

<table>
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<th></th>
<th>Baseline Total (N=1240)</th>
<th>Age schematic(f) (N=785)</th>
<th>Age aschematic(g) (N=419)</th>
<th>T value</th>
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<td></td>
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<tr>
<td>Mean (SD)</td>
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<tr>
<td>Mean (SD)</td>
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<td>12.70 (2.98)</td>
<td>12.66 (2.61)</td>
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<td>Mean (SD)</td>
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<td>4.73 (5.41)</td>
<td>5.78 (7.58)</td>
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<td>Female(a)</td>
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<td>56.8%</td>
<td>61.3%</td>
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<td>African American(b)</td>
<td>12.5%</td>
<td>10.3%</td>
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<td>Not in labor force(e)</td>
<td>68.6%</td>
<td>71.1%</td>
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Table 1
Sample Characteristics at Baseline (2004). Before missing imputation. \(a\)Male; \(b\)White/Caucasian; \(c\)Married; \(d\)Living with two or more people; \(e\)employed. \(f\)Age schematic group refers to people who thought that age prevent them doing things. \(g\)Age aschematic group refers to people who never thought that age prevent them doing things. *\(p<.05\), ***\(p<.001\).
<table>
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<tr>
<th>Variables</th>
<th>Age schematic Mean (S.D.)</th>
<th>Age aschematic Mean (S.D.)</th>
<th>t-value</th>
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<td><strong>Self-perception of Aging (T2)</strong></td>
<td>3.25 (1.09)</td>
<td>2.59 (1.13)</td>
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<td><strong>Depressive symptoms (T2)</strong></td>
<td>1.52 (2.06)</td>
<td>.92 (1.56)</td>
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<td><strong>Depressive symptoms (T1)</strong></td>
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<td>.97 (1.62)</td>
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<td>Diagnosis of illness</td>
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<td>Spouse/Partner</td>
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<td>Friends</td>
<td>2.94 (0.99)</td>
<td>3.14 (0.84)</td>
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Table 2
Mean Differences in Primary Variables between Age Schematic Group and Age Aschematic Group (before imputation of missing variables/ sum of items for self-perception of aging and depressive symptoms). *p<.05, ***p<.001.
Table 3 provides the standardized variance-covariance matrix (i.e., correlations) among the study variables. The table reveals several important findings.

First, the association between physical health at T1 and depressive symptoms at T2 is significant. Self-perception of aging at T2 was significantly related to physical health at T1 and depressive symptoms at T2. These correlations provided initial support for a mediating hypothesis for self-perception of aging between physical health and depressive symptoms.

Second, physical health at T1 was significantly related to perceived emotional support at T1 and age schema at T1. It is best that the moderator is not significantly related to the independent variable to provide a clearly interpretable interaction term (Baron & Kenny, 1986), but this might not always be the case particularly in the social sciences. Since moderating effects of perceived emotional support and age schema in the model are supported by theories, these correlations are not problematic.

Third, self-perception of aging at T2 was significantly correlated with depressive symptoms at T1 and T2, physical health at T1, perceived emotional support at T1, and age schema at T1. Baseline age and race were also related to self-perception of aging at T2. While depressive symptoms at T1 was significantly related to most demographic variables and primary variables, depressive symptoms at T2 was only associated with self-perception of aging at T2, physical health at T1 and depressive symptoms at T1. These correlations provide evidence for the distinction in concepts between self-perception of aging at T2 and depressive symptoms at T2 although these variables are highly correlated.
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</table>

Table 3
Correlation Matrix for study variables (Completely Standardized Eta and Psi Matrix for the Latent Constructs in the Structural Model).
Attitude: Self-perception of aging, Edu: Education, Dep1: Depressive symptoms at T1, Dep2: Depressive symptoms at T2. **p<.05, ***p<.01, ****p<.001.
4. 2. SEM Analyses for the Single Sample

4. 2. 1. Measurement Model

A measurement model was tested to verify the relationship between the indicators and latent constructs. One indicator of each latent factor had an arbitrary value of 1.0 assigned to its unstandardized factor loading to identify the model. As part of the measurement model, all relationships between latent constructs were free to vary. The measurement model showed acceptable fit Satorra-Bentler $\chi^2=549.24$ (df=94, $p<.001$); CFI=0.95; RMSEA=0.060 (.058; .068); SRMR=0.046; GFI=0.94. Although Satorra-Bentler $\chi^2$ was significant, this could be due to the large sample size of the current study. Other fit indices, which are not sensitive to sample size and present acceptable fits to data, supported that the significance of Satorra-Bentler $\chi^2$ could be due to the sample size and not necessarily due to theoretical problems with the model.

All indicators had reasonably high loadings (above 7.0) on their respective factors except for ADL for physical health (0.31). All factor loadings and measurement errors were significant at $p<.001$ levels. Although the factors (i.e., latent variables) identified in the measurement model were significantly correlated with each other, the result of the good model fit indices indicated that each construct was separate. Four correlations among measurement errors were allowed to be free taking into account theoretical considerations and statistical criteria. Since depressive symptoms at T1 and T2 were measured with the same scale, their measurement errors were allowed to be correlated. Two indicators of self-perception of aging were worded to ask about how negatively respondents perceived the aging process and the other two indicators of self-perception of
aging indicated whether respondents viewed them as better than expected. Because these similar question formats can affect relations in measurement errors and the modification indices suggest that those questions need to be correlated, I allowed them to be correlated.

After including these four relations of measurement errors in the model, the model fit was significantly improved Satorra-Bentler $\chi^2=277.11$ (df=90, p<.001); CFI=0.98; RMSEA=0.041 (.036; .046); SRMR=0.039; GFI=0.97. The confirmatory model specified latent factors used in subsequent structural equation models. Table 4 presents unstandardized loadings for the indicators and correlated measurement errors in the measurement model.
### Indicator variables

<table>
<thead>
<tr>
<th></th>
<th>Means (SD)</th>
<th>Factor loading (s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-perception of Aging</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worse</td>
<td>3.40 (1.59)</td>
<td>0.75 (0.05)</td>
</tr>
<tr>
<td>Pep</td>
<td>3.16 (1.57)</td>
<td>0.74 (0.05)</td>
</tr>
<tr>
<td>Less useful</td>
<td>2.58 (1.64)</td>
<td>0.79 (0.06)</td>
</tr>
<tr>
<td>Better</td>
<td>3.12 (1.74)</td>
<td>1^a</td>
</tr>
<tr>
<td>Happy</td>
<td>2.89 (1.53)</td>
<td>0.85 (0.04)</td>
</tr>
<tr>
<td><strong>Depressive symptoms(T2)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood (T2)</td>
<td>0.61 (1.22)</td>
<td>1^a</td>
</tr>
<tr>
<td>Somatic (T2)</td>
<td>0.72 (0.96)</td>
<td>0.96 (0.06)</td>
</tr>
<tr>
<td><strong>Depressive symptoms(T1)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood (T1)</td>
<td>0.64 (1.22)</td>
<td>1^a</td>
</tr>
<tr>
<td>Somatic (T1)</td>
<td>0.69 (0.93)</td>
<td>0.93 (0.07)</td>
</tr>
<tr>
<td><strong>Physical health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-rated health</td>
<td>2.74 (1.09)</td>
<td>1^a</td>
</tr>
<tr>
<td>Diagnosis of illness</td>
<td>1.84 (1.34)</td>
<td>0.87 (0.07)</td>
</tr>
<tr>
<td>Functional impairment</td>
<td>0.18 (0.60)</td>
<td>0.31 (0.04)</td>
</tr>
<tr>
<td><strong>Perceived emotional support</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse/Partner</td>
<td>2.29 (1.57)</td>
<td>0.70 (0.14)</td>
</tr>
<tr>
<td>Children</td>
<td>2.91 (1.14)</td>
<td>0.93 (0.12)</td>
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<tr>
<td>Family</td>
<td>2.91 (1.00)</td>
<td>1^a</td>
</tr>
<tr>
<td>Friends</td>
<td>2.99 (0.96)</td>
<td>0.84 (0.12)</td>
</tr>
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</table>

**Correlated Measurement Error Estimates (s.e.)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Worse – useful</td>
<td>0.57 (0.07)</td>
</tr>
<tr>
<td>Better - happy</td>
<td>0.54 (0.08)</td>
</tr>
<tr>
<td>Dep_som1 - dep_som2</td>
<td>0.07 (0.02)</td>
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<tr>
<td>Dep_emo1 - dep_emo2</td>
<td>0.17 (0.04)</td>
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</tbody>
</table>

^aFixed reference indicators

Table 4: Variable Means, Standard Deviations, Factor Loadings, and Correlated Measurement Errors in CFA (N=1240). Model Fit: Satorra-Bentler $\chi^2$=277.11 (df=90, $p<.001$) CFI=0.98 RMSEA=0.041 SRMR=0.039 GFI=0.97. All factor loadings and correlated measurement errors were statistically significant ($p<.001$).
4. 2. 2. Orthogonalizing Procedures

Orthogonalizing procedures as presented by Little, Bovaird, and Widaman (2006) were implemented to form the physical health at T1 * perceived emotional support at T1 interaction term in the SEM. First, all possible product terms were calculated from the three indicators of physical health and from the four indicators of perceived emotional support, resulting in 12 product terms. Next, each of these product terms were regressed on the 7 first-order indicators. The 12 resulting residuals were saved to the data set and used as indicators for the latent interaction variable in the SEM analyses. SAS software was used to create these indicators for the latent interaction variable.

4. 2. 3. Structural Equation Model

After constructing all latent variables, the structural component of the model (i.e. the measurement model with the addition of the hypothesized paths) was tested, including an orthogonalized interaction between physical health and perceived emotional support. The structural equation model was constructed to examine (1) the mediating effect of self-perception of aging at T2 on the relationship between physical health at T1 and depressive symptoms at T2; and (2) the moderating effect of perceived emotional support at T1 on the relationship between physical health at T1 and self-perception of aging at T2. I controlled for depressive symptoms and age schema at T1. Several demographic variables such as age, gender, race, education, employment status, and poverty ratio at T1 were also controlled.

The orthogonalized interaction term was not allowed to correlate with either of the two main latent variables involved in the interaction since the covariance matrix
would contain covariances of zero for the possible relations between the main effect indicators and interaction indicators. Correlations between the residual variances of the interaction indicators were allowed to account for the shared variance among the residuals for product terms that shared one of the same first-order indicators (Little, Bovaird, & Widaman, 2006).

The structural model testing the degree to which physical health and self-perception of aging contributed to the explanation of depressive symptoms with the interaction term (physical health * perceived emotional support) showed acceptable fit Satorra-Bentler $\chi^2=969.590$ (df=493, p<.001); CFI=0.966; RMSEA=0.027 (.025; .030); SRMR=0.044; GFI=0.939. This model explained 56.5 percent of total variance in self-perception of aging and 58.6 percent of total variance in depressive symptoms.

Table 5 provides the unstandardized coefficients associated with the structural equation model used to test the hypotheses. Table 6 presents the estimates of the correlated measurement errors in the model.

4. 2. 4. Moderating Effect of Perceived Emotional Support

Although physical health and perceived emotional support had significant main effects on self-perception of aging, the interaction (moderating) effect of perceived emotional support at T1 on the relationship between physical health at T1 and self-perception of aging at T2 was not significant. Additionally, the interaction term did not significantly predict depressive symptoms at T2. Figure 5 presents the standardized coefficients for these results.
<table>
<thead>
<tr>
<th>Structure coefficient</th>
<th>Estimate (s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-perception of aging→depressive symptoms</td>
<td>.512 (.081)*****</td>
</tr>
<tr>
<td>Physical health→depressive symptoms</td>
<td>.342 (.142)*</td>
</tr>
<tr>
<td>Support→depressive symptoms</td>
<td>-.012 (.075)</td>
</tr>
<tr>
<td>Physical health*support→depressive symptoms</td>
<td>-.178 (.106)</td>
</tr>
<tr>
<td>Dep1→ depressive symptoms</td>
<td>.241 (.149)</td>
</tr>
<tr>
<td>Age schema→ depressive symptoms</td>
<td>-.077 (.058)</td>
</tr>
<tr>
<td>Race→depressive symptoms</td>
<td>.040 (.044)</td>
</tr>
<tr>
<td>Gender→depressive symptoms</td>
<td>.049 (.042)</td>
</tr>
<tr>
<td>Education→depressive symptoms</td>
<td>-.002 (.051)</td>
</tr>
<tr>
<td>P upheld</td>
<td></td>
</tr>
<tr>
<td>Physical health→self-perception of aging</td>
<td>.584 (.134)*****</td>
</tr>
<tr>
<td>Support→self-perception of aging</td>
<td>-.225 (.079)**</td>
</tr>
<tr>
<td>Physical health*support→self-perception of aging</td>
<td>.136 (.094)</td>
</tr>
<tr>
<td>Dep1→ self-perception of aging</td>
<td>.387 (.128)**</td>
</tr>
<tr>
<td>Age schema→ self-perception of aging</td>
<td>.335 (.057)*****</td>
</tr>
<tr>
<td>Race→self-perception of aging</td>
<td>-.105 (.045)*</td>
</tr>
<tr>
<td>Gender→self-perception of aging</td>
<td>-.045 (.046)</td>
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<tr>
<td>Education→self-perception of aging</td>
<td>.099 (.054)</td>
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<tr>
<td>Age→self-perception of aging</td>
<td>.149 (.058)*</td>
</tr>
<tr>
<td>Poverty→self-perception of aging</td>
<td>-.044 (.045)</td>
</tr>
<tr>
<td>Employ→self-perception of aging</td>
<td>-.084 (.057)</td>
</tr>
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</table>

Table 5
Structural Model (N=1240) for Moderating Effect. Unstandardized coefficients are shown. Model fit: Satorra-Bentler $\chi^2=969.590$ (df=493, p<.001); CFI=0.966; RMSEA=0.027; SRMR=0.044; GFI=0.939. *p<.05; **p<.01; ***p<.001.
Figure 5
Moderating Effect of Perceived Emotional Support (T1). Standardized regression coefficients are shown. Significant effects of demographic information on both self-perception of aging and depressive symptoms at T2 were controlled for in the model but not shown. Model fit: Satorra-Bentler $\chi^2=969.590$ (df=493, p<.001); CFI=0.966; RMSEA=0.027; SRMR=0.044; GFI=0.939. Moderating effect was not significant. *p<.05, **p<.01, ***p<.001.
<table>
<thead>
<tr>
<th>Correlated Measurement Error</th>
<th>Estimates (s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worse - less useful</td>
<td>.472 (.069)</td>
</tr>
<tr>
<td>Better - happy</td>
<td>.673 (.081)</td>
</tr>
<tr>
<td>Dep-som1 - dep-som2</td>
<td>.079 (.021)</td>
</tr>
<tr>
<td>Dep-emo1 - dep-emo2</td>
<td>.157 (.039)</td>
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<tr>
<td>Product term 1 - Product term 2</td>
<td>.331 (.089)</td>
</tr>
<tr>
<td>Product term 1 - Product term 3</td>
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<td>Product term 1 - Product term 5</td>
<td>.395 (.079)</td>
</tr>
<tr>
<td>Product term 1 - Product term 9</td>
<td>1.262 (.130)</td>
</tr>
<tr>
<td>Product term 2 - Product term 3</td>
<td>.354 (.087)</td>
</tr>
<tr>
<td>Product term 2 - Product term 4</td>
<td>.206 (.075)</td>
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<td>Product term 2 - Product term 6</td>
<td>.168 (.058)</td>
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<td>Product term 2 - Product term 10</td>
<td>.771 (.160)</td>
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<td>.094 (.032)</td>
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<td>Product term 3 - Product term 11</td>
<td>.496 (.106)</td>
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<td>Product term 4 - Product term 8</td>
<td>.159 (.046)</td>
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<td>Product term 5 - Product term 7</td>
<td>.042 (.042)</td>
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<td>Product term 5 - Product term 8</td>
<td>-.009 (.077)</td>
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<td>Product term 6 - Product term 8</td>
<td>.043 (.044)</td>
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<td>Product term 6 - Product term 10</td>
<td>.212 (.102)</td>
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<tr>
<td>Product term 7 - Product term 8</td>
<td>.070 (.019)</td>
</tr>
</tbody>
</table>

Table 6
Correlated Measurement Errors and Correlated Measurement Errors between Orthogonalized Product Term Indicators of the Latent Physical Health*Perceived Emotional Support Interaction in the Structural Model
4. 2. 5. Mediating Effect of Self-Perception of Aging

The mediating effect of self-perception of aging on the association between physical health and depressive symptoms was tested, after adjusting for depressive symptoms at T1, age schema at T1, perceived emotional support at T1, gender, race, poverty ratio, age, education, and employment status. Figure 6 presents these findings. I included control variables in the model but do not show them here. I excluded two paths from physical health*perceived emotional support interaction term to self-perception of aging and depressive symptoms from the model since it was not significant for self-perception of aging and depressive symptoms at T2. When those two paths were removed, the model fit was not different from the previous model $\Delta \chi^2(2)=3.25$, $p=.197$.

Table 7 presents the results from the structural model for the mediating effect of self-perception of aging. The results from the structural model indicated that older individuals experiencing worse physical health at T1 were significantly more likely to
have negative self-perception of aging at T2 (b=.637, p<.001). Further, older individuals who reported negative self-perception of aging at T2 were more likely to experience depressive symptoms at T2 (b=.483, p<.001). The direct path from physical health at T1 to depressive symptoms at T2 was reduced from 1.24 to 0.27 (p<.05). With respect to mediating effects, the Sobel test yielded a highly significant z score of 3.90 (p<.001). The effect sizes for two paths used for calculating mediation effect are medium to large (0.637; 0.483), and the sample size for the model is large enough (N=1240). Therefore, the current study supported high power for the significant test of mediation through the Sobel test (Cheung & Lau, 2007). Taken together, the results demonstrated support for the mediating effects of self-perception of aging on the association between prior physical health status and later depressive symptoms.

I tested this mediating effect after controlling for depressive symptoms at T1, age schema at T1 and perceived emotional support at T1. Older individuals who reported more depressive symptoms and more age schema were more likely to report negative self-perception of aging at T2. Older individuals who perceived more emotional support at T1 showed less negative self-perception of aging at T2. I also included age, gender, race, poverty ratio, education, and employment status as control variables (but these are excluded from the figure for the sake of simplicity). The control variable, older age, was significantly related to more negative self-perception of aging at T2. White groups reported significantly more negative self-perception of aging at T2 compared to minority groups.
<table>
<thead>
<tr>
<th>Structure coefficient</th>
<th>Estimate (s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-perception of aging→depressive symptoms</td>
<td>.483 (.075)***</td>
</tr>
<tr>
<td>Physical health→depressive symptoms</td>
<td>.272 (.130)*</td>
</tr>
<tr>
<td>Support→depressive symptoms</td>
<td>.005 (.075)</td>
</tr>
<tr>
<td>Dep1→ depressive symptoms</td>
<td>.355 (.123)</td>
</tr>
<tr>
<td>Age schema→ depressive symptoms</td>
<td>-.071 (.055)</td>
</tr>
<tr>
<td>Race→depressive symptoms</td>
<td>.039 (.043)</td>
</tr>
<tr>
<td>Gender→depressive symptoms</td>
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</tr>
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<td>Education→depressive symptoms</td>
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<td>Age→depressive symptoms</td>
<td>-.105 (.055)</td>
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<tr>
<td>Poverty→depressive symptoms</td>
<td>.062 (.041)</td>
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<td>Employ→depressive symptoms</td>
<td>-.017 (.052)</td>
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<tr>
<td>Physical health→ self-perception of aging</td>
<td>.637 (.130)***</td>
</tr>
<tr>
<td>Support→ self-perception of aging</td>
<td>-.239 (.079)**</td>
</tr>
<tr>
<td>Dep1→ self-perception of aging</td>
<td>.306 (.109)**</td>
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<tr>
<td>Age schema→ self-perception of aging</td>
<td>.335 (.056)***</td>
</tr>
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<td>Race→ self-perception of aging</td>
<td>-.106 (.045)*</td>
</tr>
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<td>Gender→ self-perception of aging</td>
<td>-.038 (.046)</td>
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<td>Education→ self-perception of aging</td>
<td>.094 (.054)</td>
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<tr>
<td>Age→ self-perception of aging</td>
<td>.140 (.057)*</td>
</tr>
<tr>
<td>Poverty→ self-perception of aging</td>
<td>-.035 (.044)</td>
</tr>
<tr>
<td>Employ→ self-perception of aging</td>
<td>-.091 (.057)</td>
</tr>
</tbody>
</table>

Table 7
Structural Model for Mediating Effect. Interaction term was excluded. Unstandardized coefficients are shown. Model fit: Satorra-Bentler $\chi^2=971.280$ (df=495, p<.001); CFI=0.966; RMSEA=0.027; SRMR=0.045; GFI=0.939. *p<.05; **p<.01; ***p<.001.
Figure 6
Mediating Effect of Self-Perception of Aging. Standardized regression coefficients are shown. N=1,240. Significant effects of other demographic information on both self-perception of aging and depressive symptoms at T2 were controlled for in the model but not shown. Model fit: Satorra-Bentler $\chi^2=971.280$ (df=495, $p<.001$); CFI=0.966; RMSEA=0.027; SRMR=0.045; GFI=0.939. *$p<.05$, **$p<.01$, ***$p<.001$. 

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4. 3. Multiple Group Comparison Models for Testing Moderating Effect of Age Schema

To test for the moderating effect of age schema on the association between physical health at T1 and self-perception of aging at T2, multiple group comparisons in SEM were performed. First, I specified an initial baseline model with no constraints that was used for comparison purposes. I then tested a model in which the factor loadings for both groups were posited as equal. I hypothesized that the factor loadings would be equivalent between the groups. This finding allowed me to proceed to the examination of invariance of the coefficient between physical health at T1 and self-perception of aging at T2. Next, I evaluated the moderating effect of age schemacity on the relationship between physical health and self-perception of aging by using a constrained comparison of two paths. This comparison determined whether the path coefficients for the relationships between physical health and self-perception of aging were equal across the two groups (age schematic and aschematic groups).

4. 3. 1. Baseline Model

When I constructed the initial structural model for each group, a loading of support from spouse for perceived emotional support was not significant in the age aschematic group. Therefore, I set the factor loading between support from spouse and perceived emotional support to ‘0’ for both groups.

4. 3. 2. Measurement Model Invariance

To test for partial measurement (i.e., only factor loadings) invariance across groups, the chi-square from a model (MODEL1) with all parameters allowed to be
unequal across groups was compared to the chi-square from a model (MODEL2) with only the loadings constrained to be equal across groups. The model with all parameters freely estimated in the two groups has acceptable fit to the data: Satorra-Bentler $\chi^2=885.791 \ (df=316, \ p<.001); \ CFI=0.941; \ RMSEA=0.054 \ (.049; .058)$. Table 9 presents factor loadings for the hypothesized latent factors in the age schemacity and aschemacity groups. All measured variables loaded significantly on their hypothesized latent factors in both groups. Table 10 presents all regression coefficients among paths for both groups in the model.

A model in which the factor loadings were constrained to equality between groups led to a non-significant decrement in fit $\Delta \chi^2(10)=13.276, \ p=.209$ (adjusted $\Delta \chi^2$ was also not significant). I thus concluded that the relationships between the indicators and latent variables were highly similar across the age schemacity and aschemacity groups and that the factors had a similar meaning for both groups. This finding is important for my further substantive analysis: interpretation of the subsequent comparison of the path coefficient for the age schemacity and aschemacity groups would not be complicated by differences in their factor meanings.

4.3.3. Moderating Effect of Age Schema

Next, I constrained the path between physical health at T1 and self-perception of aging at T2 to be invariant across the groups. This constrained model (Model 3) was then compared with the previous model (Model 2) in which only factor loadings were imposed to be equal across groups. A model (Model 3) in which the factor loadings and a path coefficient was constrained to equality between groups led to a marginally significant
decrement in fit $\Delta \chi^2(1)=3.769$, $p=.052$ (adjusted $\Delta \chi^2$ was also marginally significant at the level of $p<.10$). This constrained comparison of the paths indicated that the paths were significantly different from each other. I thus concluded that age schemacity moderated the relationship between physical health and self-perception of aging. Table 8 presents the summary of model comparisons. Since I used Robust Maximum Likelihood, the difference between two Satorra-Bentler $\chi^2$ was separately calculated and reported in Table 8.

Additionally, there were different significant pathways for the groups. Depressive symptoms at T1 was significantly related to depressive symptoms at T1 for the age schematic group, but this was not a significant predictor among the age aschematic group. In contrast, perceived emotional support at T1 predicted self-perception at T2 for the age aschematic group, but was not a significant predictor for the age schematic group. Figures 7 and 8 show the final models depicting paths for each group.

<table>
<thead>
<tr>
<th>Model</th>
<th>Equality constraints</th>
<th>$\chi^2$</th>
<th>$df$</th>
<th>Comparison</th>
<th>$\Delta \chi^2$/adjusted$^a$ ($\Delta df$, $p$)</th>
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<td></td>
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<td>(885.79)</td>
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<td>(889.38)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>Factor loadings &amp; Path (physical health – self-perception of aging)</td>
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<td>327</td>
<td>2-3</td>
<td>3.76/2.92 (1, $p=.052/.089$)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(892.30)</td>
<td></td>
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</table>

Table 8
Results of Nested Chi-Square Tests for Age-Schema Groups Differences. $\chi^2$ in parentheses is Satorra-Bentler $\chi^2$. $^a$Satorra-Bentler $\chi^2$ difference test with scaling correction.
# Indicator variables

<table>
<thead>
<tr>
<th>Indicator variables</th>
<th>Schematic (N=817)</th>
<th>Aschematic (N=423)</th>
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</thead>
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<td>Factor loading (s.e.)</td>
<td>Factor loading (s.e.)</td>
</tr>
<tr>
<td><strong>Self-perception of Aging</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude 1</td>
<td>0.70 (0.07)</td>
<td>0.72 (0.08)</td>
</tr>
<tr>
<td>Attitude 2</td>
<td>0.70 (0.07)</td>
<td>0.71 (0.09)</td>
</tr>
<tr>
<td>Attitude 3</td>
<td>0.83 (0.08)</td>
<td>0.58 (0.08)</td>
</tr>
<tr>
<td>Attitude 4</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Attitude 5</td>
<td>0.83 (0.06)</td>
<td>0.82 (0.06)</td>
</tr>
<tr>
<td><strong>Depressive symptoms (T2)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood (T2)</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Somatic (T2)</td>
<td>0.89 (0.06)</td>
<td>1.09 (0.18)</td>
</tr>
<tr>
<td><strong>Depressive symptoms (T1)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood (T1)</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Somatic (T1)</td>
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<td>1.07 (0.16)</td>
</tr>
<tr>
<td><strong>Physical health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-rate health</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Diagnosis of illness</td>
<td>0.97 (0.09)</td>
<td>0.77 (0.09)</td>
</tr>
<tr>
<td>Functional impairment</td>
<td>0.36 (0.06)</td>
<td>0.31 (0.06)</td>
</tr>
<tr>
<td><strong>Perceived emotional support</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse/Partner</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Children</td>
<td>0.81 (0.13)</td>
<td>0.89 (0.19)</td>
</tr>
<tr>
<td>Family</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Friends</td>
<td>0.79 (0.13)</td>
<td>0.97 (0.20)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Fixed reference indicators

Table 9
Factor Loadings for Each Indicator from the 2-Group Age Schema Model. Model Fit: Satorra-Bentler $\chi^2$=885.791 (df=316, p<.001); CFI=0.941; RMSEA=0.054.
<table>
<thead>
<tr>
<th>Structure coefficient</th>
<th>Schematic (N=817) Estimate (s.e.)</th>
<th>Aschematic (N=423) Estimate (s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-perception of aging→depressive symptoms</td>
<td>.340 (.068)***</td>
<td>.252 (.079)**</td>
</tr>
<tr>
<td>Physical health→depressive symptoms</td>
<td>.263 (.162)</td>
<td>.061 (.103)</td>
</tr>
<tr>
<td>Dep1→ depressive symptoms</td>
<td>.291 (.098)**</td>
<td>.337 (.218)</td>
</tr>
<tr>
<td>Support→depressive symptoms</td>
<td>-.040 (.084)</td>
<td>.112 (.179)</td>
</tr>
<tr>
<td>Race→depressive symptoms</td>
<td>-.007 (.119)</td>
<td>.053 (.083)</td>
</tr>
<tr>
<td>Gender→depressive symptoms symptoms</td>
<td>.074 (.067)</td>
<td>-.078 (.078)</td>
</tr>
<tr>
<td>Education→depressive symptoms</td>
<td>.009 (.013)</td>
<td>-.009 (.014)</td>
</tr>
<tr>
<td>Age→depressive symptoms</td>
<td>-.006 (.004)</td>
<td>-.003 (.005)</td>
</tr>
<tr>
<td>Poverty→depressive symptoms</td>
<td>.006 (.006)</td>
<td>.003 (.005)</td>
</tr>
<tr>
<td>Employ→depressive symptoms</td>
<td>-.012 (.097)</td>
<td>-.042 (.072)</td>
</tr>
<tr>
<td>Physical health→ self-perception of aging</td>
<td>.802 (.202)***</td>
<td>.522 (.217)*</td>
</tr>
<tr>
<td>Dep1→ self-perception of aging</td>
<td>.217 (.129)</td>
<td>.635 (.397)</td>
</tr>
<tr>
<td>Support→ self-perception of aging</td>
<td>-.163 (.133)</td>
<td>-.787 (.388)*</td>
</tr>
<tr>
<td>Race→ self-perception of aging</td>
<td>-.313 (.146)*</td>
<td>-.262 (.194)</td>
</tr>
<tr>
<td>Gender→ self-perception of aging</td>
<td>-.052 (.096)</td>
<td>-.001 (.179)</td>
</tr>
<tr>
<td>Education→ self-perception of aging</td>
<td>.021 (.018)</td>
<td>.081 (.029)**</td>
</tr>
<tr>
<td>Age→ self-perception of aging</td>
<td>.017 (.006)**</td>
<td>.018 (.010)</td>
</tr>
<tr>
<td>Poverty→ self-perception of aging</td>
<td>.005 (.008)</td>
<td>-.014 (.008)</td>
</tr>
<tr>
<td>Employ→ self-perception of aging</td>
<td>-.327 (.131)**</td>
<td>.078 (.166)</td>
</tr>
</tbody>
</table>

Table 10
Multiple Group Model (N=1240). Unstandardized coefficients are shown. Model fit: Satorra-Bentler $\chi^2$=885.791 (df=316, p<.001); CFI=0.941; RMSEA=0.054 *p<.05; **p<.01.
Figure 7
Standardized Coefficients Predicting Depressive Symptoms among 423 Age Aschematic Older People. Model fit: Contribution to Chi-Square: 362.135 (36.8%) SRMR=.054 GFI=.931. *p<.05, **p<.01.
Figure 8
Standardized Coefficients Predicting Depressive Symptoms among 817 Age Schematic Older People. Model fit: Contribution to Chi-Square: 621.82 (63.2%) SRMR=.053 GFI=.935. **p<.01, ***p<.001.
Chapter V: Discussion

5. 1. Summary of Findings

The current study examined the inter-relationships among physical health, self-perception of aging, and depressive symptoms. First, I focused on the mediating effect of self-perception of aging in relation to physical health and depressive symptoms. Second, I tested the moderating effects of age schema and perceived emotional support on the association between physical health and self-perception of aging.

5. 1. 1. The Mediating Effect of Self-Perception of Aging

The first research question was “Does self-perception of aging mediate the relationship between physical health and depressive symptoms?” I used the Sobel test to examine the mediating effect of self-perception of aging based on the path coefficients and their standard errors from the structural model. Older individuals who reported worse health conditions at T1 were likely to have more depressive symptoms at T2. However, after including self-perception of aging as a mediator between physical health and depressive symptoms, the effect of physical health on depressive symptoms was markedly reduced. The relationship between physical health and self-perception of aging was significant and the association between self-perception of aging and depressive symptoms was also significant. Older individuals who reported a more negative self-perception of aging at T1 were more likely to report more depressive symptoms. As
expected, older individuals with worse health conditions at T1 were more likely to report a negative self-perception of aging at T2. Furthermore, the result from the Sobel test indicated that the mediating effect of self-perception of aging was significantly different from zero. Taken together, I concluded that self-perception of aging at T2 mediated the relationship between physical health at T1 and depressive symptoms at T2.

Consistent with prior research (Gayman, Turner, & Cui, 2008), I found that prior health conditions predicted later depressive symptoms over a four-year period. This finding supports the perspective that physical health represents a source of chronic stress that predicts depressive symptoms (Turner, Wheaton, & Lloyd, 1995). Although previous studies have found that the relationship between prior physical limitations and subsequent change of depressive symptoms were mediated by bodily pain and daily discrimination (Gayman, Turner, & Cui, 2008), there is lack of research on possible mechanisms by which physical health problems get translated into elevated mental health risk. Adding to the previous literature, I found strong evidence to support the conclusion that self-perception of aging mediates the relationship between prior physical health status and later depressive symptoms. These results suggest that physical health not only has a direct effect on depressive symptoms, but it also indirectly influences depressive symptoms by increasing negative self-critical thoughts about the aging process.

Future studies should explore a possible reciprocal relationship between self-perception of aging and depressive symptoms among older people. Furthermore, future research should explore the mechanisms by which self-perception of aging affects either depressive symptoms or physical health. For example, self-perception of aging might
affect older people’s health behaviors and activities which might influence depressive symptoms or physical health.

5.1.2. Moderating Effect of Age Schema

The second research question was to examine whether age schema moderated the relationship between physical health and self-perception of aging. The current study presents evidence to support that prior age schema changes the strength of the relationship between physical health and self-perception of aging. The multiple group comparison models in SEM revealed that older individuals holding an age schema are more likely to report a negative self-perception of aging four years later than those without an age schema under similar physical health conditions. This finding is consistent with the view that age stereotypes tend to become incorporated into the self-concept of older individuals (Rothermund, 2005). When older individuals have stereotypes about aging, they are more likely to develop a negative self-perception of aging over a four year period as they experience the aging process. This finding concurred with the finding from Montepare (1996)’s study that age schema is related to reactions to age-related life events. Therefore, this finding suggests that one’s self-perception of aging is not only based on one’s assessment of the aging process, but it is also partially influenced by age-related stereotypes (Levy, 2009).

In previous research, it has been found that old age schema is likely to increase attention to physical symptoms among older individuals (Poon & Knight, 2009). Older individuals who have age schema might attend more to physical health which in turn would lead to age stereotypes that become self-relevant information.
However, one might cautiously interpret these findings because the moderating effect of age schema was marginally significant after controlling for depressive symptoms at T1 and perceived emotional support at T1. Future studies should examine more thoroughly how age schema affects self-perception of aging and depressive symptoms after constructing age schema with a number of indicators.

5.1.3. Moderating Effect of Perceived Emotional Support

The third research question of the current study was to test whether perceived emotional support moderated the relationship between physical health and self-perception of aging. A latent interaction term between physical health and perceived emotional support was created and used in the structural model to examine this research hypothesis. I hypothesized that perceived emotional support would inhibit developing negative self-perception of aging even if a person experienced declining physical health. The results showed that perceived emotional support had main effects on self-perception of aging but the moderating effect was not statistically significant after controlling for age schema and depressive symptoms at T1. The findings on the main effect of perceived emotional support are consistent with the view that perceived emotional support can help individuals develop a positive belief about the self (Antonucchi, 2001). The failure to observe a buffering effect of perceived emotional support in the relationship between physical health and self-perception of aging is consistent with some previous studies (Krause, 1987; Panzarella, Alloy, & Whitehouse, 2006). Those studies also failed to observe buffering effects of social support on the relation between stress and cognition (i.e., self-concept or inferential style) although the main effects of social support on the
cognitive variables were found. However, previous studies (e. x., Krause, 1987) including the current study used a global concept of social support. Some social support researchers have suggested that more specific concepts of social support should be used instead of using a global concept of social support (Dunkel-Schetter & Bennett, 1990). Testing the moderating effect of emotional support that is more precise for stress rather than the general concept of support might provide different results from the current study. For example, the study using adaptive inferential feedback (AIF; giving more stress specific support), which is a subtype of support and a more precise concept, indicated that AIF has greater impact on reducing negative inferences than other general social support (Dobkin et al., 2004). Panzarella, Alloy, and Whitehouse’s study (2006) also found that AIF is related to adaptive inferences for negative events even when controlling for general social support and cognitive risk. Future studies should build upon this study and examine how specific and precise support affect the aging-related changes and interact with stereotypes of aging to influence self-perception of aging. Furthermore, future research should explore the effects of three-way interactions among age schema, physical health, and perceived emotional support on self-perception of aging and depressive symptoms.

Instrumental social support might also affect self-perception of aging in a different way. That is, these social supports might inversely affect self-perception of aging by increasing or confirming aging related stereotypes like dependency. Future studies might explore how the other aspects of social support affect self-perception of aging and depressive symptoms.
5.2. Limitations and Future Directions

Several limitations to the current study are worth noting. For one thing, age schema was measured with a single item for which validity and reliability remain undetermined. Although there is a developed scale for this construct, HRS has not collected information on this specific construct. Since I used a single item for age schema, the results about the effect of age schema could have measurement errors. Future research should replicate the current study using a standardized instrument for age schema. Using a panel study design, stereotypes about aging that are measured at younger ages might serve as a type of age schema that might influence self-perception of aging and depressive symptoms in later life.

Since I used a single item with four response categories to define a group (i.e., four categories were re-coded into two categories) for age schema, group specification might not be accurate. However, I created a group of respondents who never thought that age prevented them from doing things and another group of respondents who did believe that age prevented them from doing things. This is a better approach than using an arbitrary cut-off value like mean or quartile.

Another limitation for the current study is that limited time points were used. I used data from two waves of HRS (2004 and 2008) since only those two waves had samples that overlapped for psychosocial variables. The item used for age schema was asked in 2004 and the scale for self-perception of aging has started to be used in HRS since 2008. Because I used both self-perception of aging and depressive symptoms measured at the same time point, the causal relationship between those two variables could not be determined although I controlled for depressive symptoms T1. I used
physical health and self-perception of aging that were measured at different times, but it would be worthwhile to examine how changes in physical health are related to changes in negative self-perception of aging and depressive symptoms in later life. Another limitation from using only two time points is the relationship between age schema and physical health. There is a possibility that physical health status already affected age schema. Models that estimate the dynamics of change over time in physical health, self-perception of aging, and depressive symptoms will help to determine if there is a true mediation effect. More measurement points and a longer time period will be necessary for this purpose.

Self-reported physical health measures rather than objective assessments of physical health were used to construct physical health variable. Although it is possible that subjective measurements of physical health might yield different results, prior studies showed that these measures resemble objective measures of physical health status (Everson-Rose, et al., 2005).

The sample of the current study did not include institutionalized older individuals since the HRS excludes them from the sample of the leave-behind survey that includes psychosocial questions. Institutionalized older individuals might have more physical health problems than community dwelling older individuals. Furthermore, lack of independence in residential facilities might elevate more negative self-perceptions of aging because dependency is a prevalent stereotype about aging. The effect of the environment on self-perception of aging might help understand experiences of older individuals who are institutionalized.
The current study only focused on the effect of ageism on the individual level. Future comparative studies among different cultures or different cohorts over the lifespan might reveal whether general societal attitudes or policies can affect the aging process.

5. 3. Significances of the Current Study

Despite these limitations, the current study builds on prior research in several important ways. First, the current study expands the understanding of the impact of self-perception of aging on the aging process. Prior research in this area has found that self-perception of aging affects physical and cognitive functioning. The current study contributes to previous literature by showing the impact of self-perception of aging on mental health.

Second, the findings on the moderating effect of age schema in the relationship between physical health and self-perception of aging provide support that internalized age stereotypes can possibly affect older people’s self-perception of aging. These findings partially support the stereotype embodiment theory developed by Levy (2009).

Third, the current study contributes to prior research by finding another mechanism by which prior physical health affects later depressive symptoms through self-perception of aging while controlling for prior depressive symptoms, age schema, perceived emotional support, and demographics.

The fourth important contribution to the literature is that perceived emotional support was integrated into the model explaining self-perception of aging and depressive symptoms based on the stereotypes embodiment theory. The present study provided evidence to support that perceived emotional support may affect self-perception of aging.
and the aging process independent of the effects of prior age schema, depressive symptoms, and physical health. The significant main effect of perceived emotional support not only indicates the resilience of older individuals, but also the main effect of age schema shows the possible effect of the society’s age stereotypes on growing older.

5.4 Implications for Research

First, future researchers should examine the effects of self-perceptions of aging on depressive symptoms using longitudinal research design. Although I found the mediating effect of self-perceptions of aging on the relationship between physical health and depressive symptoms, since the current study cannot determine causal effects among variables, there might be other possibilities in relationships among physical health, self-perceptions of aging, and depressive symptoms. For example, self-perceptions of aging could affect physical health (Levy, Slade, & Kasl, 2002). Furthermore, depressive symptoms could influence physical health although prior studies have shown that the reverse effect is stronger (Gayman, Turner, & Cui, 2008). Also, depressive symptoms could affect self-perception of aging (Laidlaw, 2010). Persons who have depressive symptoms might be more likely to perceive their aging more negatively. Longitudinal research would provide better pictures on relationships among physical health, self-perceptions of aging, and depressive symptoms.

Second, the effects of implicit ageism on mental health among older people could be examined in future studies. Implicit ageism is stereotypes and attitude towards aging and older people that exist and operate without conscious awareness, intention, or control (Levy & Banaji, 2002). Although implicit ageism has been examined using stereotype
priming (Levy, 1996) and Implicit Attitude Test (Hummert, Garstka, O’Brien, Greenwald, & Mellott, 2002), the influences of implicit ageism on older people’s mental health have not been studied. Furthermore, the studies using implicit ageism have been limited to the experimental studies. How would the effects of earlier implicit ageism impact the aging process in later life? Would they differ from the effects of earlier explicit ageism (i.e., measured with traditional ageism scales through survey)? Which one might be related to behavioral and emotional outcomes in the aging process? Do the effects change over the lifespan?

Third, future studies should explore the effects of different aspects of social support on self-perception of aging. Researchers have shown that negative and positive support can have a distinct influence on older people’s well-being (Lincoln, 2008 & Ha, 2010). Positive support can help older people better cope with physical health declines through prohibiting information processing related to negative age-stereotypes. However, negative support can increase a risk of accepting negative age-stereotypes. As a potential mechanism between support and psychological distress, self-perception of aging can be examined and each aspect of support could be examined if they have distinct impacts on self-perception of aging in later life.

Furthermore, future studies should explore the impact of perceived emotional support from the other sources such as health care professionals. When older people attend to senior center or day care, the practitioner’s support might act as a significant source for their psychological well-being. The effects of practitioners’ stereotypes on older people also would be a valuable research question for future studies.
5. 5. Implications for Prevention and Intervention

The findings from the current study have important implications for practice in developing various strategies to help older people and our future selves. Social workers and other professionals working with older people might need to consider several factors in their practice: 1) the influence of self-perceptions of aging on depressive symptoms, 2) the effect of perceived emotional support on self-perceptions of aging, and 3) the effect of age stereotypes on self-perceptions of aging.

First, the findings that self-perception of aging is associated with depressive symptoms among older people suggest that dealing with negative self-stereotypes of aging in treatment may relieve depressive symptoms by helping these older adults gain insight into how they view themselves, based on societal constructions that perpetuate depressive symptoms. Laidlaw, Thompson, and Gallagher-Thompson (2004) stated that psychotherapy outcomes can be enhanced by consideration of the age-specific issues facing older people. The negative aging stereotypes which might be internalized across the lifespan among older people can be challenged as erroneous thinking that may intensify and maintain depressive symptoms (Laidlaw, Thompson, & Gallagher-Thompson, 2004). Self-perception of aging focused interventions might be beneficial in psychotherapy focusing on either behavior activation or cognitive modification.

Second, the findings on the effect of perceived emotional support on self-perceptions of aging imply that practitioners should help older individuals maximize the benefits they receive from their various support systems. These implications can be applied by practitioners working with older individuals at various agencies like senior centers, adult day care centers, assistive living facilities, and nursing homes. Practitioners
can help older individuals maintain and develop positive self-perceptions of aging by encouraging a supportive environment. Furthermore, practitioners can help older individuals think about their emotional support seeking behaviors and how they benefit more from their social relationships.

Third, the findings indicate that age schema (age stereotypes) might exaggerate the effect of physical health on self-perception of aging. Clinically, this finding implies that practitioners working with older individuals should consider older persons’ beliefs about aging given how they influence one’s interpretation of stress (physical health problems). This could be a target for intervention. Practitioners should explore their perceptions of themselves as older persons and consider how their perceptions might impact the psychological well-being of older people.

When older people experience physical health declines, practitioners can empower and complement their older clients with positive connotations about aging. Both empowerment and cognitive interventions might ameliorate depressive symptoms related to physical health and negative self-perception of aging among older clients.

Specifically, institutionalized individuals should be considered for self-enhancement interventions because these older persons are at greater risk for depression and negative self-perceptions of aging from physical health declines than their non-institutionalized older peers. A few experimental and observational studies have shown that these individuals benefit from environmental interventions (i.e., giving more opportunities for making decisions) (Rodin & Langer, 1980) and mutual aid groups (Berman-Rossi, 2005).
Although it is important to intervene with older individuals who experience physical health declines and depressive symptoms to reduce the effect of stereotypes about aging, practitioners working with older people at a variety of settings can empower older adults to recognize and resist the effects of negative self-stereotypes of aging in their daily lives. Alternatively, practitioners can help older people attribute more positively about the causes behind their situations and behaviors and help older people to put their lives into an overall perspective and framework that would help them to experience greater self-fulfillment (Breytspraak, 1984). In addition to the assessment of age schema when physical health problems present, practitioners might assess age schema before aging-related changes. This might be also helpful to decrease the development of self-perceptions of aging from age schema among older persons. Breytspraak (1984) described that the self in later life is threatened by negative aging stereotypes and some people are more vulnerable to these stereotypes than others. Attention should be given to identifying and enhancing psychosocial resources that individuals may develop to resist internalizing negative aging stereotypes. These active efforts could prevent the development of negative self-perceptions of aging and depressive symptoms when older individuals become physically ill.

Next, more broadly, the main and moderating effects of age schema (stereotype about aging) provide evidence to support interventions that focus on eliminating ageism in the general population. According to Levy (2003a), individuals internalize negative stereotypes of aging beginning at childhood. Furthermore, attitudes toward aging seem to be stable across the life span. Students who took educational gerontology courses showed no changes in anxiety toward one’s own aging (Harris & Dollinger, 2001) and only little
change in negative attitudes of aging was found following an education intervention program (Scott, Minichiello, & Browning, 1998). However, researchers have suggested that earlier interventions that include intergenerational contact will more successfully promote positive attitudes toward older people (Scott, Minichiello, & Browning, 1998). In fact, Paluck and Green (2009)’s review on the effectiveness of prejudice reduction interventions indicated that intergroup contact, cooperative learning, and media interventions appear promising for stereotype reduction.

Age integrated social networks is another way to challenge ageism. Studies on intergenerational programs in child care show that children who participated in the intergenerational contact had a more positive attitude toward older people (Femia, Zarit, Blair, Jarrott, & Bruno, 2008; Hannon & Gueldner, 2008; Holmes, 2009). Palmore (2005) also proposed that personal contact with equal-status persons in cooperative activities can reduce negative stereotypes of aging. According to Hagestad and Uhlenberg (2005), stable and lasting age-heterogeneous networks are necessary as valuable age-cross interactions. For example, the cross generational family is mentioned as an important network to combat ageism and age-segregation except in some instances (i.e., childlessness among older people) (Hagestad & Uhlenberg, 2005).

The alteration of social attitudes must occur on both individual and societal levels (Breytspaak, 1984). Along with intervention programs like education and intergenerational activity, institutional interventions in society should be promoted to reverse negative attitudes towards aging that evolve from the social structure (Scott, Minichiello, & Browning, 1998). Critical gerontologists argue that aging is socially constructed as a social problem through discourses used by policy makers, mass media,
and social gerontologists for controlling and regulating the experiences of older people (Powell, 2001; Townsend, 1981). According to critical gerontology, ageism results from the abuse of power to control society, such as under capitalism. Ageism is a tool of control, so it should be eliminated by allowing the elderly to reconstruct meaning of aging (Katz, 1996). Donlon, Ashman, and Levy (2005) found that a lot of television exposure during one’s lifetime resulted in more negative images of aging among older individuals than it did among those who rarely watched television. Although the interventions to increase awareness of ageism in television did not change participants’ age stereotypes, the interventions focusing on increasing awareness and critiquing age stereotypes might be applied with future generations of older people (Donlon, Ashman, & Levy, 2005).

5.6. Conclusion

The current study adds important information to our understanding of the effects of age-stereotypes on depressive symptoms in older people by exploring the mediating effect of self-perception of aging on the relationship between physical health and depressive symptoms and the influence of age schema (or age stereotypes) on self-perception of aging. Also, the current study provides information on the relationship between perceived emotional support and self-perception of aging in later life. The findings underscore the importance of considering not only support, but also, age-schema and self-perception of aging in working with older people. By intervening with existing ageism in older people and society, and by helping older people maximize the benefit of support, practitioners can help older people be happier. Building on the current study,
future researchers need to consider the inter-relationships between age schema (or stereotype about aging), self-perceptions of aging, and their interactive effects on well-being among older people.
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