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HEALTH ISSUES AND AGING IN AMERICAN INDIAN OLDER ADULTS: RESILIENCE THROUGH ADVERSITY

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Health Issues and Aging in American Indian Older Adults: Resilience Through Adversity

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The average life expectancy of American Indian (AI) older adults has paralleled mainstream aging trends and is set to continue growing as global increases in longevity continue to improve (Jervis, Boland, & Fickenscher, 2010). However, the disproportionately high levels of chronic health conditions (e.g., diabetes, hypertension, cerebrovascular diseases) observed in this group may outstrip the coping resources of some individuals, potentially leading to unsuccessful aging outcomes such as adverse mental health outcomes (specifically depression). As described in Goins and Pilkerton (2010, p. 346), comparatively higher rates of chronic health conditions have created an "expansion of morbidity," where American Indians are developing chronic diseases earlier and living with them for longer periods of time. In the present study, secondary analyses were conducted with 158 AI older adults and elderly (aged 50 years or older) to determine how demographic variables, physical health factors, and personal coping resources influence the development of depression symptoms as measured by the Center of Epidemiological Studies Depression Scale (CES-D). A multiple hierarchical linear regression with nine predictors was used to examine CES-D scores as a continuous variable. The overall three-step linear model accounted for significant variance in total CES-D scores [$R^2 = .485$, $R^2_{change} = .106$, $p < .001$], with education status, number of reported chronic health conditions, self-reported health status, perceived social support, and personal mastery emerging as significant predictors. A multiple hierarchical logistic regression was also conducted to assess the model's ability to differentiate asymptomatic (i.e., CES-D ≤ 15) from symptomatic (i.e., CES-D ≥ 16) depression subgroups. The three-step logistic model added statistically significant improvement over the constant-only model [$\chi 2$ (9, $N = 157$) = 62.671, $p < .001$]. In the full three-step logistic model, only chronic health conditions and personal mastery were found to differentiate the two depression subgroups. These findings are discussed in the context of enhancing resiliency against depression in late life.

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Health Issues and Aging in American Indian Older Adults: Resilience Through Adversity

As noted in Lewis (2010), we are "aging as a society" (p. 285), and as increasingly more individuals reach old age and live longer lives, there are both individual and societal concerns that will need to be addressed. This shift towards increased longevity is well documented in the research literature. The U.S. Census Bureau (2009) recorded exponential growth of the older adult population over the course of the entire 20th century (from 3.1 million in 1900 to 35.0 million in 2000). Enhanced overall health is a major contributor to individuals beginning to live longer lives than in the past: average life expectancy has increased dramatically from 47.3 years in 1900 to 76.9 years in 2000 (U.S. Census Bureau, 2009). During this 100 year time period the entire U.S. population over age 65 outpaced the growth of the total population and those 64 or younger (U.S. Census Bureau, 2009). This trend in population demographics is predicted to continue. By 2030, these figures are expected to effectively double, resulting in nearly one-fifth (72 million people) of the entire U.S. population being 65 or older (U.S. Census Bureau, 2009). Of these individuals, the fastest growing segment of older adults will be those age 85 or older.

Minority Elderly Subpopulation

The aging nature of our society has many potential implications and will require focusing our resources into research on how to best approach increased longevity. However, researchers who lead these efforts may fail to investigate the full range of experiences existent in our complex and heterogeneous American society. Simply put, if we only focus on the majority culture, and not that of minorities, then we risk forming an incomplete representation of what it means to be an aging American. This is especially crucial given the fact that the highest rates of population growth have been observed in racial minority groups (U.S. Census Bureau, 2010). Not only are we an aging society, we are also an ethnically and culturally diverse aging society.

American Indian (AI) Elderly

Given their status as one of the smallest U.S. ethnic groups, consisting of approximately 0.9% of the total population (U.S. Census Bureau, 2010), American Indians and Alaska Natives (AI/AN) are a group especially at risk for being overlooked in these widespread efforts to understand our aging society. Interestingly, although the AI/AN population expanded by 18.4% between 2000 and 2010, this growth has stayed proportional to overall total population growth. Despite substantial population increases during this ten year period, from 2.48 to 2.93 million individuals, AI/ANs continued to account for less than one percent of the U.S. population. Relatively small population numbers likely play into the tendency to overlook this group; however, other factors may also be operating. Citing institutional bias, racism, and stereotyping, Kramer (1991) asserted that "the United States is a society in which American Indians, as an ethnic group, are not represented" (p. 214). As noted here, AIs have often been disregarded or ignored. However, if the underrepresentation of American Indians continues, at least in terms of research into old age, then crucial resources may not be provided to those who need them.

Like the aging American population, the proportion of elderly individuals has increased substantially for American Indian groups. As noted in Jervis, Boland, and Fickenscher (2010), the American Indian older adult population now "constitutes one of the fastest growing groups of nonwhite elderly in the United States" (p. 356). Like their counterparts in non-Indian society, this age group is expected to continue growing in number as increased life expectancy becomes more common. In 2008, the U.S. Census Bureau (as cited in Goins & Pilkerton, 2010) predicted that between 2010 and 2050 there will be a 350% increase in American Indians aged 65 years or older. Unfortunately, very little is known about the aging process in older AIs. In this regard, it will be highly important for researchers to not only examine the obvious parallels between

mainstream aging trends and AI aging trends, but to also distinguish those unique aspects of aging faced by American Indians which are deserving of both recognition and resources.

American Indian elderly are a disproportionately low income population (Jervis, Jackson, & Manson, 2002) and face tremendous social and economic pressures (Kramer, 1991). It may be such that the difficulties that accompany aging in general may manifest differently in AIs. A compounding effect, involving the interaction of growing older and being American Indian, may be present. The disadvantages faced by American Indians as they age could be exacerbated by both below-average income levels and reduced access to vital resources (Jervis et al., 2002).

Health Disparities of AI Elderly

One of the natural consequences of older age is the greater likelihood of chronic health conditions. Goins and Pilkerton (2010) highlighted the comparatively high rates of chronic conditions and "expansion of morbidity" found in AI populations; they suggested that "the chronological pace of aging among American Indians might exceed that of other racial groups" (p. 346). The impact of chronic conditions is not simply a matter of concern for the oldest AIs as relatively younger individuals are now beginning to develop life-long disabling conditions earlier in life. Clearly then, not only are AI elderly suffering from higher incidences of these chronic health conditions, but they seem to be acquiring them sooner and therefore experiencing them for longer periods of time. Henderson and Henderson (2002) posit that this expansion of morbidity is likely to be coupled with the demographic cross-over effect described by John (1999), resulting in those American Indians surviving past 75 years of age outliving their White counterparts. For American Indians, living longer lives ultimately involves facing chronic health conditions and an increased likelihood of requiring additional assistance (Jervis et al., 2002).

According to the Indian Health Service (IHS, 2009) *Trends in Indian Health 2002-2003 Edition*, the leading causes of death for AI/ANs ages 65 and older are: (1) diseases of the heart, (2) malignant neoplasms, (3) diabetes mellitus, (4) cerebrovascular diseases, (5) chronic lower respiratory disease, (6) pneumonia/influenza, (7) unintentional injuries, (8) kidney dysfunction, (9) Alzheimer's disease, and (10) chronic liver disease/cirrhosis. Although most causes of mortality are shared with the general population and other racial minority populations, the rates of health afflictions in American Indians are significantly higher. Despite current medical advances, improved quality of life is not represented in morbidity and mortality statistics of older American Indians (Goins & Pinkerton, 2010). Many factors contribute to AI differences in health status and it is crucial to understand how they can both generate and exacerbate chronic illnesses.

Chronic health conditions among AIs are undoubtedly amplified by the presence of having multiple conditions. John, Kerby, and Hennessey (2003) posited that health disparities may reflect differences in comorbidity. Using cluster analysis, they arrived at a four-factor comorbidity structure for AI chronic conditions: (a) cardiopulmonary, (b) sensory-motor, (c) depression, and (d) arthritis. Diseases falling within each category tend to co-occur whereas those in separate clusters tend to operate independently. Goins and Pilkerton (2010) pointed out that additive and synergistic effects may be occurring that create specific combinations of chronic conditions that have negative outcomes greater than those expected from having either condition alone. In addition to higher levels of physical disability, the increased mortality associated with comorbidity can manifest as increased utilization of medical resources, more time seeking medical care, a higher risk of institutionalization, and mental health repercussions.

Goins and Pilkerton (2010) have suggested that, given the detrimental combination of chronicity and comorbidity, targeted efforts should be made towards providing American Indian

elderly with chronic disease prevention, health promotion, and chronic disease management opportunities in order to better prevent or more effectively manage the health concerns of this population. It should be understood, however, that the many disadvantages associated with poverty have complicated "elders' efforts to obtain health care as well as caregivers' attempts to provide it" (Jervis et al., 2002, p. 297). For certain individuals, Indian Health Service (IHS) is the major provider of biomedical services for American Indians. These services, the provision of which was established through historical treaty contracts between the U.S. government and American Indian tribes, are only available to eligible members of federally-recognized tribes. Regrettably, IHS services are often marked by inadequate resources, long waits for services, high staff turnover rates, and limited time spent in direct consultation (Schoenberg, Traywick, Jacobs-Lawson, & Kart, 2008). IHS primarily provides acute care services (versus preventative and geriatric care), which is inconsistent with the long-term health care needs of this population (Jervis et al., 2002). Overall, the need to "manage" rather than simply "treat" the health problems of older AI adults is clearly evident and necessary. However, community services such as those provided by Community Health Representative (CHR) programs and the Older Americans Act of 1965 are unable to meet the expansive needs of this vulnerable population (Jervis et al., 2002). This finding is especially disheartening given that non-institutional long-term care is preferred by American Indian elderly (Jervis et al. 2002). This dismal situation led Jervis (2010) to question whether community resources, including the underfunded and overstretched IHS system, will be able to deal effectively with the high costs associated with treating chronic and comorbid conditions in a population whose life expectancy is predicted to continue increasing. The current circumstances suggest far greater need compared to the actual resources presently available.

Overall, the research literature (Goins & Pilkerton, 2010) suggests a dire situation for American Indians who are confronted with potential health complications linked to increased longevity. Given the high rates of chronic conditions that confront American Indians, combined with aging trends that have increased their exposure to the detrimental effects of having chronic medical conditions, it is highly probable that these individuals are at a higher level of risk for the development of negative outcomes associated with unsuccessful aging[1]. Of the potential adverse mental health outcomes associated with later life, depression is likely to be a pressing concern for some. In these regards, examination of depression in AI older adults appears to be a useful means for examining non-normative aging processes. Although it can be reasoned that health disparities contribute to differences in the aging process, it is useful to examine how aging in AI older adults parallels previous findings found with non-minority elderly groups. Similarities and differences between the two cultures may be especially helpful in determining qualities of resilience that help prevent the development of depression symptoms in AI older adults.

Elderly Aging Trends (General Population)

Orfila et al. (2007) highlighted that current worldwide trends in aging are especially relevant to the elderly, who will continue to grow in both absolute numbers and their proportion relative to other age groups. Schnittker (2005) related the phenomenon of a rapidly aging population to declines in mortality and higher fertility rates in the early 20th century. Specifically, technological advances, improved medical care, preventative health practices, and higher living standards have substantially lengthened life expectancy and decreased death rates (Unsar & Sut, 2010). Average life spans have increased more in the past century than in all centuries combined,

[1] Successful aging refers to the positive coping abilities of older adults to successfully adapt to normal age-related declines in abilities and functioning, with particular emphasis on emotional well-being (e.g., Depp, Vahia, & Jeste, 2010). "Unsuccessful aging" therefore refers to the negative outcomes associated with inadequate coping abilities.

and "Americans alive today are living longer than have any of their predecessors and can rightfully maintain greater confidence in their life expectancy" (Schnittker, 2005, p. 13).

Katon (2003) reported that historical declines in mortality rates are largely attributable to recent improvements in the treatment of chronic medical illness. However, mortality declines have had the unintended consequence of prolonging the life course of those with chronic medical illness, which ultimately means that these individuals will live with chronic illness for extended segments of their lifetime. In the context of decelerated case-fatality rates, decreased mortality and the resultant increases in longevity have posed considerable risks for increased morbidity among the elderly population (Schnittker, 2005). As noted by Benedict (1995), "health status becomes increasingly important with age as temporary acute illnesses are replaced by chronic conditions that have long-term effects on the overall quality of life" (p. 50). Additionally, aside from the impact on physical functioning, the lengthening of life expectancies will require elderly adults to cope with the mental health needs that accompany physical health declines. For many, the coping resources available to them will offset the stressors associated with chronic medical illness; however, others do not have adequate resources and will develop outcomes that represent unsuccessful aging. In order for us to get a better understanding of how individuals are able to cope with these age-related chronic conditions, we will use depression in this study as a proxy for unsuccessful aging. Examination of individuals who develop depression and those who do not will better enable us to fully understand successful coping and aging among AI older adults.

Depression in the Elderly (General Prevalence Rates)

Depressive symptoms are highly prevalent in the elderly population and tend to increase with age (van't Veer-Tazelaar et al., 2008). However, multiple studies have consistently found that elderly adults exhibit more symptoms of depression, and yet have paradoxically lower rates

of clinical diagnoses than younger individuals (Blazer & Hybels, 2005; Jorm, 2000; Kessler et al., 2010; Schnittker, 2005; van't Veer-Tazelaar et al., 2008). Given that depressive symptoms are more common in the elderly than depressive diagnoses (i.e., symptoms can be present but do not meet the diagnostic thresholds needed for diagnosis), true prevalence estimates are naturally obscured. In addition, diagnostic criteria and varying operational definitions of the sample used to assess prevalence rates can have a dramatic impact on prevalence estimates (Draper, 2000).

Alexopoulos (2005) estimated that approximately 1 - 4% of elderly adults suffer from depression. Furthermore, prevalence rates of depression vary across settings: with 3 - 5% in community settings, 5 - 10% in primary-care settings, and 10 - 14% in inpatient medical settings (Katon, 2003; Katon & Ciechanowski, 2002). When depression rates include elderly groups with chronic health conditions, the prevalence rates jump dramatically. In three separate community-based studies that used different assessment measures for depression (Gallegos-Carrillo, 2009; Niti, Ng, Kua, Ho, & Tan, 2007; van't Veer-Tazelaar et al., 2008), the prevalence of late-life depression in elderly individuals with comorbid chronic illness varied considerably from 13.3% - 31.1%. A more conservative estimate of elderly depression (across varying definitions, settings, and procedures) is posited to be 4 - 25% (Himelhoch, Weller, Wu, Anderson, & Cooper, 2004).

Chronic Health Conditions (General Prevalence Rates)

In the U.S., it has been estimated that approximately 50% of the adult population has at least one chronic health condition (Rothrock et al., 2010). Anderson & Horvath (2004) estimated that 84% of those aged 65 and older have at least one chronic condition and 62% have two or more. Similarly, Hoffman, Rice, and Sung (1996) estimated that of those aged 65 and older, 88% have one or more chronic conditions and approximately 25% have four or more. Given the well-established connections between chronic illness and elderly depression (Gallegos-Carrillo et al.,

2009), the markedly high rates of chronic health conditions among AIs are concerning. These comparatively high rates may place American Indians at special risk for depression in later life.

Comorbidity of Depression with Medical Illness (General Population)

Clinically-significant depression in old age is estimated to be highest among elderly with chronic medical conditions and in those with increased severity of medical illness (Himelhoch et al., 2004). In 1992, The National Institutes of Health (NIH) Consensus Development Conference Statement on the Diagnosis and Treatment of Depression in Late Life (as cited in Katz, Streim, & Parmelee, 1994) highlighted that "the hallmark of depression in older people is its comorbidity with medical illness" (p. 142). Importantly, the debilitating effects of depression are especially salient in elderly individuals who have multiple comorbidities (Noel et al., 2004). Penninx et al. (1996) reported strong linear associations between the number of chronic diseases and symptoms of depression: psychological distress was more pronounced in the presence of multiple diseases. The frequent coexistence of comorbidity of physical health conditions in old age places the elderly at a heightened risk for depression. However, the relationship between physical health conditions and depression symptoms is clearly bidirectional and reciprocal (Katz et al., 1994).

It is known that depression can create additional functional impairment in those with chronic physical health conditions (Katon & Ciechanowski, 2002). Noting the bidirectional influence between depression and health conditions, Katz and his colleagues (1994) remarked that "the path from depression to disability is highly significant and comparable in strength to that leading from disability to depression" (p. 142). Loi and Chiu (2011) demonstrated that depression can affect the outcomes of chronic medical conditions and can hasten mortality independently from the effects of physical illness. Depression has also been associated with increased health-risk behaviors (e.g., low activity, poor eating habits, substance use), which are

known to increase the risk for the development of chronic medical illness (Katon, 2003). Regardless of the influence of each factor, comorbid depression and physical illness outweigh the directional influences of each variable considered in isolation (Gallegos-Carrillo et al. 2009).

As demonstrated by Mirowsky and Ross (1992), later life would be less characterized by depression than earlier stages of life if it weren't for physical changes in health. Multiple researchers (Bisschop, Kriegsman, Beekman, & Deeg, 2004; Kivela, Viramo, & Pahkala, 2000; Murphy, 1982) have found that the most frequently stressful events directly related to the onset of late life depression are: (1) the development of a life threatening medical illness and (2) novel decrements in physical functioning. Functional disability has been found to be an especially potent moderator of the relationship between depression and chronic illness (Schnittker, 2005). Although the influence of disability has been shown to be dependent on age (i.e., the degree of association between depression and disability lessens with age), the main effects of disability are nonetheless strong (Schnittker, 2005). Multiple authors (Bisschop et al., 2004; Niti et al., 2007) have established that levels of depressive symptoms vary across different chronic diseases. Furthermore, the authors noted that within each disease, the role of physical limitations and time of onset was critical in determining depression. Depression has been found to most prevalent in conditions that have aversive symptoms that affect quality of life and result in higher levels of impairment (Katon, 2003). The most important disease-related characteristic that affects the development of depression is the amount of medical burden associated with a given illness: overall, the greater the medical burden the higher the risk of depression (Alexopoulos, 2005). However, chronic illnesses may also place differential restraints on the psychosocial resources that are available to a person, and therefore separate diseases may affect depression differently

(Bisschop et al., 1994). Nevertheless, despite disease-specific influences on depression, the mere presence of comorbidity between depressive symptoms and chronic conditions is disconcerting.

Harman, Edlund, Fortney, and Kallas (2005) identified the following outcomes associated with the co-occurrence of depression and chronic illness: (1) symptom amplification, (2) compromised adherence to treatment regimens, (3) worse prognosis for chronic conditions, and (4) higher mortality rates. Konsman, Parnet, and Dantzer (2002, as cited in Katon, 2003) posited the following causes for increased prevalence of depression in the elderly: (1) depression is a risk factor for specific chronic illnesses, (2) depression is a secondary psychological reaction to disease, (3) depression is secondary to the complications or aversive symptoms of disease, (4) depression is secondary to the side-effects of the medication used to treat illness, and (5) depression may have direct pathophysiologic effects on the brain or indirect physiologic effects.

Depression and Perceived Health Status

Self-rated health is positively correlated with adequate physical functioning and freedom from pain (Liebson et al., 1999). Self-rated health is a known predictor of quality of life and longevity in aging elderly adults (Kawada & Suzuki, 2009). Liebson et al. (1999) demonstrated that self-rated health is not related to age (i.e., self-rated did not significantly differ across age groups). Fascinatingly, the authors found that those age 85 years and older had more positive perceptions of their health than 65 - 74 year olds after controlling for medical illness, pain, and physical functioning. Nonetheless, with increased aging, the physical abilities of elderly adults begin to decline, which results in reduced social opportunities, unmet psychosocial needs, and subsequently lower self-rated health (Kawada & Suzuki, 2009). Ruthing and Chipperfield (2007) found that individuals with higher perceived health scored higher in psychological well-being,

perceived control, and physical functioning. Those with negative health assessments had less life-satisfaction, more negative emotional displays, and were predisposed to functional decline.

Self-rated health has been found to be negatively correlated with clinically defined illness and depression (Leibson et al., 1999; Nicolosi et al., 2011). However, the multiple associations between depression, physical illness, and self-rated health appear bidirectional in nature. In a meta-analysis examining the relationship between health status and risk of depression in the elderly, Loi & Chiu (2011) determined that the presence of chronic disease and poor self-rated health were the strongest risk factors for elderly depression, with poor self-rated health being more strongly related to depressive outcomes. Furthermore, the association between self-rated health and depression has been proven to be independent of self-reported physical illnesses (Leibson et al., 1999). Overall, the reciprocal interactions between self-rated health, physical illness, and depression clearly interact to determine a given individual's perceived health status. Importantly, lower perceived health status may ultimately inform the development of depression.

Depression and Age

It is often mistakenly assumed that the aging process inevitably leads to depression. However, Nicolosi et al., 2011 indicated that no direct relationship between age and depressive symptoms exists. Kraaij, Kremers, and Arensman (1997) demonstrated that life events related to adult depression were similar to those related to the development of depression in the elderly. Overall, the increase in depressive symptoms that accompanies old age has been shown to be attributable to age-related changes in the risk factors associated with aging, rather than aging itself (van't Veer-Tazelaar et al., 2008). These findings verify the conclusion that depression is not inevitable and support conceptualizations of depression as a non-normative aging outcome.

Depression and Gender

Alexopoulos (2005) estimated that approximately twice as many women than men are affected by major depression within the general elderly population. Orfila et al. (2006) found that gender differences were primarily attributable to higher prevalence rates of disability and chronic conditions; more specifically, they cited health statistics that consistently revealed higher rates of morbidity for women and higher rates of mortality for men (i.e., men developed more fatal conditions, whereas women developed more disabling conditions). Given that women tend to outlive men by 6 - 8 years, longer lives for women often translate into more functional impairment caused by medical illness, lower health-related quality of life, and subsequently higher rates of depression. Interestingly, the gender gap has been shown to disappear with increasing age. In one study, gender differences disappeared after age 85 (van't Veer Tazelaar et al., 2008). Overall, it should be recognized that women are highly susceptible to the development of depression in later life. Aside from the higher rates of medical conditions and resulting disability, sociological contributions such as gender roles and differential reporting have also contributed to the higher likelihood of women developing depression (Orfila et al., 2006). Gender differences in relationship saliency where shown to have important implications for the mental health of women (Hagedoorn et al., 2001). Furthermore, women are disproportionately represented in low SES groups. As noted in Nicolosi et al., 2011, women are often exposed to less favorable living conditions that increase their risk for the later development of depression.

Depression and Socioeconomic Status

Low socioeconomic status (SES) is related to higher prevalence and incidence rates of depression (Koster et al., 2006; Lorant et al., 2003). According to Koster et al. (2006), level of education and household income are the two primary dimensions of socioeconomic status. Level

of education, the more sociocultural component of SES, is an indicator of social class at an earlier stage of life. In contrast, household income is more representative of socioeconomic status in later life. Research in this area has demonstrated that both low schooling and low family income are key risk factors for late life depression (Koster et al., 2006; Nicolosi et al., 2011). In addition, SES dimensions are inextricably linked: lower schooling often results in lower household income. As noted in Nicolosi et al. (2011), the onset of elderly depression is at least partially related to the adverse contingencies associated with low SES: hardship, stress, less access to access to health care, higher rates of physical disability, and lower perceived health. Most importantly, those with low SES have less psychosocial resources than those with high SES (Koster et al., 2006). Given the connection between depression and chronic health issues, the influence of SES on health is of paramount concern for elderly adults; low SES is a risk factor for many physical health diseases and is a strong predictor of associated functional disability (Koster et al., 2006). Overall, findings from studies on SES suggest that elderly adults with less schooling and lower income levels are especially vulnerable to developing depression.

Depression and Perceived Social Support

Social support has been found to be a general protective factor across the lifespan: social support has been shown to have both direct and indirect effects on physical and mental health (Karel, 1997). In terms of direct effects, low levels of instrumental and emotional support increase depression risk. In terms of indirect effects, social support has been shown to moderate the influence of stressors associated with depression. Not only does social support fulfill inherent human social needs, but it can modify associations between stressors and subsequent depression.

According to Mazzella et al. (2010), elderly adults are particularly susceptible to the effects of low social support, primarily as it relates to increases in mortality. In their review of

the literature, Mazzella et al. found that limited social networks, decreased social participation, and feelings of loneliness can produce age-related indirect effects on mortality through their influence on chronic disease, functional decline and self-rated health. In addition, Mazzella and colleagues cited several studies that examined the role of social support on morbidity and mortality that found lower death rates among elderly with a greater degree of social support. In their own study, Mazzella and colleagues examined the longitudinal associations between social support and mortality. Their results at follow-up demonstrated that mortality progressively increased with low social support and higher levels of comorbidity. Further analyses revealed that social support only predicted mortality in those with the highest degrees of comorbidity (i.e., low social support is predictive of long-term mortality in the elderly within the context of significant medical comorbidity). Similarly, Bisschop et al. (2004) noted a preponderance of studies demonstrating how social support modifies the relationship between depression and chronic illness by creating variability in the impact of these medical conditions. The authors also discussed how social support is especially relevant for elderly individuals with chronic diseases as these individuals place expectations and demands on their social networks that differ from those without chronic illness. Having chronic illness also limits one's ability to preserve and interact with their social networks due to disease-related effects on social functioning and potential negative reactions to their illnesses. Clearly, low social support can act as a liability.

Importantly, it is useful to understand the subjective nature of social support. Although social support has been found to be a general resilience factor, social support may not be perceived positively by all elderly adults. In addition to the detrimental influence of negative social ties (Karel, 1997), well-intentioned efforts of supporting the elderly can inadvertently contribute to depression through their impact on control, helplessness, and dependency

(Bisschop et al., 2004). Multiple researchers have concluded that it is the perception of social support, rather than the actual amount of support received, that is more closely tied to overall well-being. Shmuely, Baumgarten, Rovner, and Berlin (2001) suggested that, in terms of coping with psychological distress, the perception of one's social network is more important than the actual use of that social network. Despite the tendency of a person's mood to influence their perception of social networks, an individual's perception of social support has been shown to be more predictive of depressive outcomes than objective clinical assessments. Bisschop et al. (2004) showed that received social support (assessed through instrumental and emotional support provided) did not moderate the influence of chronic disease on depression. However, perceived support (assessed through loneliness) was found to impact the relationship between depression and chronic illness. Speaking to the subjective nature of social support, the authors discussed how adequate support for non-ill elderly populations may not suffice for those with chronic disease. Overall, these authors concluded that quality of social support, rather than the quantity of social support is most important in determining the course of elderly depression (Karel, 1997).

Of the multiple forms of social support, relationship with a partner is thought to be particularly important in meeting social support needs. Bisschop et al. (2004) showed that living with a partner had both direct positive effects and a buffering effect on depression. Having a partner modified the relationship between most chronic diseases and depression, especially in those diseases characterized by gradual onset and progressive deteriorations in function. These results support the contention that partners are a valuable psychosocial resource in old age.

Depression and Personal Mastery

Mastery refers to the extent that an individual perceives themselves to be in control of events and the perception of their ability to manage these situations (Bisschop et al., 2004).

Koster et al. (2006) found that lower mastery, low self-efficacy, and small social network size are predictors of incident depression. Although mastery is generally assumed to be a stable trait across adulthood, Penninx et al. (1996) demonstrated that mastery is affected by the presence of chronic diseases (i.e., chronically ill individuals experiences significantly lower mastery). According to Penninx and colleagues, differences in disease characteristics accounted for observed psychological differences across diseases. Diseases characterized by functional impairment and limited illness controllability were found to be partial determinants explaining psychological distress, with limited illness controllability linked directly to mastery. Given the link between low mastery and depression, the authors concluded that diseases which offer few opportunities for medical and personal control contribute to depression through their influence on mastery. Bisschop et al. (2004) also found that psychosocial resources (including self-esteem, mastery, and self-efficacy) directly impacted the negative effect of specific chronic diseases on depression symptoms. Mastery was found to buffer the effect of diabetes. This was posited to occur through self-care management and self-monitoring behaviors (i.e., these individuals are able to adhere to disease-specific constraints and can subsequently manage their daily regimens).

Positive psychosocial adjustment to medical illnesses has been shown to be associated with higher feelings of control, even across diseases of varying types and severities (Bisschop et al., 2004; Penninx, et al., 1996). Psychosocial resources, including self-efficacy and self-mastery, fulfill general needs of positive self-evaluation and are thought to influence depression through their impact on attitudes, thoughts, or beliefs regarding illness (Bisschop et al., 2004). The development of depression is believed to be caused either directly by reduced psychosocial resources related to the chronic illness, or through the influence of functional disability that impairs an individual's ability to control important aspects of their lives (Tsang, Cheung, & Lak,

2002). Interestingly, the process of adult development may generally act to protect against perceived loss of control (Karel, 1997). Although uncontrollable events are more frequent in old age, most individuals are able to forego their ability to change their environment, and instead make emotional or cognitive internal changes that protect their overall sense of control. By switching between assimilative and accommodate processes, older adults have been shown to limit self-blame, thus contributing to the formation of a stable and generalized sense of control. Development of personal mastery therefore appears to be a protective factor against depression.

Depression and Communal Mastery

Communal mastery is defined as the process in which "individuals see themselves as able to be effective in achieving their goals and coping with life challenges by virtue of their being attached to significant others" (Hobfoll, Schroder, Wells, & Malek, 2002, p. 363). Communal mastery is contrasted with attributes of personal agency (including self-efficacy, mastery, and internal locus of control), in which individuals tend to view themselves as being independent and in control of their own success. By balancing their own needs with the needs of others, those who use communal mastery approach problem-solving prosocially by reaching out to others, rather than relying on themselves or working against others. Coping is thus facilitated through social interaction. Differences between personal agency and communal mastery are hypothesized to arise from differences underlying collectivist and individualistic views of self-effectance.

Hobfoll, Schroder, et al. (2002), examined a series of four studies using North American samples and found that communal mastery and self-efficacy were conceptually distinct from each other. The authors also found that communal mastery better predicted prosocial coping and obtaining social support, but was less predictive of depression than self-mastery. Self-mastery was also found to be a stronger predictor of anger and physical symptoms. The authors suggested

that the greater efficacy of personal agency in individualized cultures was related the differential impact these variables had on the various aspects of well-being that were assessed in their study.

The shared efficacy that defines communal mastery appears to be consistent with the collective culture of American Indians. However, most studies of communal mastery have not focused on personal versus communal mastery in collectivist cultures (e.g., Ennis, Hobfoll, & Schröder, 2000). Given that success is defined in relation to the group, and the distinction between self and others is more permeable in many AI tribal groups, communal mastery should be expected to be more relevant than personal agency (Hobfoll, Jackson, Young, Pierce, & Hobfoll, 2002). However, there is a paucity of research examining the influence of communal mastery on the collective agency of American Indians. Hobfoll, Jackson, et al. (2002) compared differences in self-mastery and communal-mastery in a sample of 103 rural Native American women (ages 16 to 29) from multiple reservations in Montana. Results demonstrated that anger and depressed mood were negatively correlated with both self-mastery and communal mastery. Although both forms of mastery were strongly related to each other, they exhibited a high degree of unshared variance that suggested they are conceptually distinct from each other. Social support and communal mastery were also shown to be distinct concepts. Most importantly, communal mastery was found to have a stress-buffing effect in those with high communal mastery. Those with lower communal mastery had more pronounced impacts from stress and were more likely to develop depression. The protective role of communal mastery was further supported in a sample of 164 AI community college students (Belcourt-Dittloff, 2006). Communal mastery was found to be a significant predictor of adversarial growth (i.e., posttraumatic growth), which supports the role of collective agency in helping individuals recover and grow from adverse life experiences. In addition, communal mastery was found to be

significantly associated with other identified protective factors in the study (e.g., general resilience). Overall, communal mastery is identified as a protective factor for American Indians.

Depression as a Proxy for Unsuccessful Aging

The research literature has identified a myriad of influences that operate as risk and protective factors for the development of unsuccessful aging outcomes in late life. In order to understand how individuals can better manage the challenges of managing chronic illness and continue to navigate normative age-related changes, symptoms of depression can be used as one potential marker for the identification of older adults and elderly who do not have the proper coping resources to manage their symptoms and continue to age into late life successfully. Given that comorbidity between depression and chronic illness causes symptom amplification, worsens the prognosis of chronic conditions, and compromises adherence to medical treatment (Harman et al., 2005), identification of depression can serve as a useful proxy for unsuccessful aging. Examination of depression can help inform how general risk factors and personal coping resources influence the link between chronic health conditions and unsuccessful aging outcomes.

Coping with Chronic Comorbidity (Resilience Framework)

When examining depression in the elderly, it should be recognized that the majority of individuals do not develop depression. This can be extended to American Indian elderly as well. Regardless of research findings that describe the disproportionately high rates of depression in American Indian populations, it must be continually appreciated that most elderly AIs do not develop depression. Even with considerable health problems, depression is not always inevitable.

In response to health concerns that emerge in old age, Katon (2003) argues that most individuals must either learn to adapt or habituate to the chronic and aversive symptoms of medical illness. As such, it is expected that coping with disproportionately higher rates of

chronic health conditions will stand as a challenge for American Indians reaching old age. However, those with chronic illnesses are often able to adequately adapt to their illnesses. It is only when an individual's threshold of functioning is exceeded that severe levels of aversive symptomatology start to impact functioning (Katon & Ciechanowski, 2002). Overall, the research literature examined herein has tended to focus on only those who are found to have disrupted adaptation and who exhibit outcomes of unsuccessful coping. However, by examining American Indians older adults who do not develop depression, it is hoped that a greater understanding can be gained of those aspects within these individuals that contribute to resilience. Additionally, a focus on those AI elderly who do not develop depression while in the presence of multiple health conditions can help identify those specific qualities that allow them to traverse health afflictions associated with late life and embrace their increased longevity.

Hypotheses (General)

It is expected, given the current literature findings on the development of depression in older adults and elderly in the major culture, that the following hypotheses will be supported:

1. In the preliminary statistical analyses, it is predicted that the four demographic variables of *gender*, *income level*, *education status*, and *marital status* will be correlated with depression scores as measured by the CES-D. Reflecting trends found in the literature, it is hypothesized that lower total scores on the CES-D will be associated with being male, having relatively higher income, attaining higher levels of education, and being married.
2. In the preliminary statistical analyses, it is predicted that the two physical health factors of *number of reported chronic health conditions* and *self-reported health status* will be correlated with total CES-D scores. Based on previous research findings, it is expected that individuals who report having lower numbers of chronic health conditions will also

have lower CES-D scores. It is expected that individuals who have higher ratings of perceived health status will tend to have lower endorsement of items on the CES-D.

3. In the preliminary statistical analyses, it is predicted that the three personal coping resources of *social support*, *personal mastery*, and *communal mastery* will be negatively associated with individual CES-D scores. Based on previous literature, it is predicted that lower scores on the CES-D will the associated with higher ratings of perceived social support, higher ratings of personal mastery, and higher ratings of communal mastery.

Method

Sample and Participant Selection

The current analyses used archival data from a combined qualitative and quantitative research study on American Indian resilience (Wallace & Swaney, 2007). The "Coping in Later Life" Survey (CLLS) was completed by 160 American Indian older adults (aged fifty and older) who resided on an American Indian reservation in the northwestern United States. The CLLS, which combined multiple well-validated assessment measures, is one component of the combined qualitative and quantitative study that was intended to examine American Indian resiliency in old age. Although the definition of elderly individuals is relatively low compared to most studies examining elderly adults, conceptualizations of culturally-valued members of society (i.e., "elders") are often not directly tied to age in American Indian culture. The distinction between "elder" and "elderly" in AI culture is based more to the presence of sociocultural responsibilities and upholding cherished cultural mores, rather than being gained simply by age. This cultural component allows for more flexibility in the definition of individuals who are classified as elderly. In addition, this cut-off has several unintended effects: 1) it allows for a more accurate representative of American Indian health disparities by including

younger individuals who likely face chronic medical illness and physical disability, and 2) it accounts for the relatively high mortality rates found in American Indian populations.

A local tribal agency (i.e., elderly program) developed the mailing list of potential participants who met requirements for inclusion into the study. The initial pool included a total of 624 enrolled tribal members who were 50 years or older. Every third name on the mailing list was mailed the Coping in Later Life Survey. Multiple waves of surveys were mailed until an adequate sample size was achieved. The response rate was approximately 32%, and resulted in the final sample size ($N = 160$), with a gender distribution of 42.5% male ($n = 68$) and 57.5% female ($n = 92$). To ensure confidentiality, the local tribal elderly program was used as an intermediary: the mailing list was never released to the researchers and all prepared survey packets were mailed directly to the participants from the local tribal agency itself. All individuals who completed and returned the Coping in Later Life Survey were compensated 30 dollars.

Measures and Procedures

Depression. The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was used to assess participant's self-reported level of depressive symptomatology. For the Coping in Later Life Survey, the CES-D was presented as "Thoughts, Attitudes, and Feelings" (See Appendix A). The 20 questions of the CES-D assessed typical symptoms of depression that occurred during the past week and were rated on a four-point ordinal Likert scale (0 = *rarely or none of the time,* 1 = *some or a little of the time,* 2 = *moderate amount of time,* and 3 = *most or all of the time*). Scores are summed across four factors including depressed affect, positive affect (reversed scored), somatic signs, and interpersonal distress. Higher endorsements of items on the CES-D indicate higher levels of depressive symptoms. Scores range from a minimum of 0 to a maximum of 60. When developing the CES-D, Radloff (1977) designated a score of 16 or

greater as the standard cut-off point for the presence of probable depression (with scores at this level being indicative of mild but significant depressive symptoms). Although there is some debate on the validity of this measure with racial and ethnic groups, the CES-D does appear to be a reliable and consistent measure of depression[2]. Cronbach's Alpha (internal consistency) for the CES-D in this data set demonstrates good-to-excellent reliability (.89; Haidle-Billow, 2008). In addition, administration of the CES-D through mail, as performed in this study, is considered to produce reliable and valid protocols (Geerlings, Beekman, Deeg, van Tilburg, & Smit, 2006).

General considerations for use of the CES-D with elderly populations. The validity of the CES-D in elderly populations is complicated by the higher levels of medical illness that often accompany advanced age (Schein & Koenig, 1997). Although somatization in the elderly is recognized and elderly adults tend to express psychological distress as medically-unexplainable somatic symptoms (Sheehan & Banerjee, 1999), prototypical depressive symptoms that define depression in younger populations are usually more pronounced in the elderly (Drayer et al., 2000). The degree of overlap between symptoms of chronic physical conditions and depression in the elderly creates a diagnostic dilemma that enhances the potential for incorrect classification.

Alternative measures that exclude somatic content, including the Geriatric Depression Scale (GDS; Yesavage, 1982), have been developed in an effort to account for and minimize variance in depression scores that is attributable solely to physical health conditions. However, although these measures are more accurately able to capture the core construct of depression, the loss of crucial diagnostic information greatly outweighs the benefits of removing somatic items. Furthermore, the influence of somatic items is potentially overemphasized and may have less bearing on results than would be expected. Berkman et al. (1986) found that physical disability

[2] The CES-D measures depression symptoms, which do not necessarily equate with diagnoses of clinical depression. The CES-D is used as a screening measure, with additional assessment and clinical attention required to make an informed diagnostic decision. Nonetheless, high CES-D scores (≥ 16) refer to symptomatic cases of depression.

was associated with nearly every item on the CES-D, rather than being associated only with somatically-based items. Citing the fact that physical disabilities did not inflate CES-D scores exclusively through somatic items, the authors concluded that the physical disabilities associated with medical illness do not appear to threaten the validity of the CES-D scale in elderly adults.

Cultural considerations for use of the CES-D with American Indian elderly. Cultural differences are known to influence how individuals experience the symptoms of medical illness (Drayer et al., 2005). Cross-cultural differences are also evident in the prevalence of depression, attributions for the causes of depression, and the expression of symptoms (Jenkins, Kleinman, & Good, 1991; Kirmayer, 2001). Mui, Burnette, and Chen (2001) highlight how most standardized scales for assessing depression in the elderly are normed in reference to the general population, and therefore differ in their applicability to the multiple cultural subgroups of the United States. For American Indian elderly, cultural conceptualizations of medical illness and depression may or may not align with those of the normative population used to standardize the CES-D. Overall, it should be assumed that when the experience and subsequent expression of depression varies between cultures, interpretations based on less culturally-relevant measures may be questionable.

Appropriateness of the standard CES-D cut-off score in American Indian elderly. In addition to sociocultural factors that influence how physical illness is perceived, interpreted, and tolerated by a given cultural group, genuine between-group discrepancies in rates of medical illness and functional disability surely contribute to biases in the estimated prevalence rates of depression (Mui, Burnette, & Chen, 2001). As noted previously, American Indian elderly are especially prone to developing chronic health conditions, which in turn increases their risk for depression. These health disparities may translate into inflated CES-D scores that reflect the presence of medical illness instead of depressive symptoms. The disproportionately high rates of

medical illness and associated functional disability experienced by AI elderly pose questions regarding the appropriateness of the traditional CES-D cut-off score (≥ 16). When used without modification in AI elderly, false positives rates can increase (i.e., erroneous classification of non-depressed individual as depressed), leading to the systematic over-classification and a portrayal of AI elderly that is characterized by non-normatively high levels of depressive symptomatology. For example, the standard cut-off score of 16 in 309 Great Lakes American Indian elderly (55 years and older) classified 18.3% as depressed (Curyto et al., 1998). Although the CES-D was found to have high internal consistency (.85), the authors argued that a higher cut-off should be used to offset the potential impact of false positive results when researching AI older adults.

When considering the American Indian population as a whole, use of the standard CES-D cut-off has been shown to result in artificially high rates of depression among American Indians. Somervell et al. (1993) used the 16 or greater cut-off and found that 20% of 120 Northwest Coast American Indian tribal members aged 20 years or older were classified as depressed. In a sample of 605 American Indian college students, 45% of the participants scored above 16, with 13.3% scoring higher than 28 (Beals, Manson, Keane, & Dick, 1991). Although higher rates of depression are expected within an adolescent sample, an astounding 58% of 188 American Indian boarding school students were classified as depressed when the standard CES-D cut-off score was used (Manson, Ackerson, Dick, Baron, & Fleming, 1990). Findings such as these suggest that there is a cultural component, independent of American Indian health disparities, which could undermine the utility and validity of the standard cut-off with AI older adults.

In response to consistent findings regarding the inadequacy of the traditional CES-D cut-off with American Indians, especially elderly members with medical illness, establishing a higher cut-off score appears to be a reasonable means of counteracting the tendency for members

of this group to have inflated CES-D scores. Manson et al. (1990) utilized Receiver Operating Characteristic (ROC) curves to develop an optimal cut-off score: analyses revealed that a cut-off of 28 maintained CES-D sensitivity (i.e., detection of true cases of depression) and created much needed improvements in specificity (i.e., correct identification of non-depressed cases). Although the authors do not recommend this score with all AI groups, they maintain that a cut-off of 16 will not always be appropriate and may require adaptations based on additional information. Baron, Manson, Ackerson, & Brenneman (1990) used a cut-off of 24 and maintained sensitivity while allowing for enhanced specificity. Overall, the need to balance the competing needs of sensitivity and specificity calls for flexibility in identifying cut-off scores for American Indians.

Appropriateness of the dimensional structure of the CES-D. Kim, DeCoster, Huang, and Chiriboga (2011) conducted an extensive meta-analysis (N = 84,760) that examined the four-factor structure of the CES-D across five racial/ethnic groups. Results from 28 individual studies converged on the conclusion that use of the four-factor model originally found by Radloff (1977) produces considerable variability in the level of fit across racial/ethnic groups and may require modifications tailored exclusively to the nuances specific to each of the five cultural groups. The influence of a given culture, primarily in the expression of depression, leads to qualitative cultural differences in the factor structure of the CES-D within each cultural subgroup. More precisely, the differential functioning of individual items among racial/ethnic groups within the CES-D led to the development of culturally-specific factor structures: culturally-bound items and items assessing universal manifestations of depressive symptom contribute separately to the dimensional structure of the CES-D for each population. The observed discrepancies in average individual scores and group prevalence rates among various cultures may therefore not reflect genuine differences in depressive symptomatology. Instead, measurement properties of the

CES-D may account for these reported differences. Considering these results, cross-cultural comparisons using CES-D summary scores risk incorrectly gauging overall risk for depression.

Further analyses by Kim et al. (2011) compared results based on the use of either Exploratory Factor Analysis (EFA) or Confirmatory Factor Analysis (CFA): Evaluating the structure of the CES-D with CFA tended to show consistent results between racial/ethnic groups, whereas EFA resulted in substantial variations between racial/ethnic groups. In contrast to the EFA meta-analysis, which did not include American Indians due to limited EFA data, the four-factor dimensional structure was successfully replicated in four of the five racial ethnic groups (including American Indians) using the CFA studies. Based upon the EFA findings, the authors concluded that non-mainstream cultures construct their own unique conceptualizations of depression that are potentially incompatible with the Western-based assumptions underlying the factor structure of the CES-D originally chosen by Radloff. The similarity seen with CSA and the discrepancies within EFA are clear demonstrations that choice of statistical analysis used can color findings. Kim et al. (2011) noted that CFA, with its theoretical basis, is predisposed to finding results consistent with theory (i.e., four-factor model). EFA, which relies on a data-driven approach, is theoretically expected to produce more variation between cultural groups.

In a CFA analysis using the CES-D scores of 277 elderly American Indians (aged 55 or greater), a three-factor (combined affective and somatic) and four-factor model provided the most superior fit (Chapleski, Lamphere, Kaczynsi, Lichtenberg, & Dwyer, 1997). In addition, both models were found to be statistically comparable to each other. Rather than deciding to collapse the two factors into a single index, the authors concluded that the four-factor model was most appropriate given its *a priori* theoretical support. Somervell et al. (1992), using EFA to assess the factor structure of the CES-D in a sample of 120 Northwest Coast American Indian

tribal members, found depressed affect and somatic activity to be conflated and not easily distinguishable from each other. Results show that both the four-factor and three-factor models provided adequate fit, with no apparent differences in relative performance. A high correlation (r = .95) between depressed affect and somatic activity suggests that these dimensions can be collapsed into a single factor to provide a parsimonious means of assessing depression in American Indian elderly. Despite endorsing different models, the similarity of results between these two studies demonstrates a lack of clear distinction between affective and somatic factors for American Indians. These results also speak to the potentially high prevalence of somatic presentations of depression in AI culture, which are consistent with past research demonstrating similar differences found in African American and Asian American populations (Chapleski et al., 1997). These cultural differences in somatization are known to confound the detection of individuals with clinically-relevant depression and contribute to racial disparities in depression rates between different cultures (Drayer et al., 2005; Wells, Klap, Koike, & Sherbourne, 2001).

Demographic Variables. The Coping in Later Life Survey assessed the following demographic variables: gender, marital status, age, level of education, average annual household income, living arrangement, tribal enrollment, tribal affiliation, and number of years spent living on a reservation (see Appendix B). Previous analyses of this quantitative data set, Kirby (2008) and Haidle-Billow (2008), examined the extent to which the outcome variable of depressive symptomatology was differentially related to different levels of several demographic variables.

Age. Both prior analyses consistently found that age, when examined as a continuous variable, was not significantly related to depression symptoms as measured by the CES-D.

***Gender*.** A significant difference in CES-D scores between males and females, such that females were more likely to report depressive symptoms, was documented in both Kirby (2008)

and Haidle-Billow (2008). Further analysis by Haidle-Billow (2008) revealed the magnitude of differences[3] (i.e., effect size) between the two groups in this sample was quite small ($\eta^2 = .04$).

Income level. Income level, although measured continuously in the Coping in Later Life Survey, was falsely dichotomized in the studies of both Kirby (2008) and Haidle-Billow (2008) in order to better assess group differences as they relate to CES-D scores. Independent-samples *t*-tests revealed that individuals who reported comparatively lower average annual household income levels were also more likely to report higher levels of depressive symptomatology. This finding was consistent despite differences between the two authors in the specific cut-offs they chose to separate the two income groups. Kirby (2008) found that those earning $24,999 or less had higher CES-D scores than those earning $25,000 or more. Similarly, Haidle-Billow (2008) found significant differences in levels of reported depression symptoms between individuals who made more or less than $15,000. Furthermore, the magnitude of the difference between these two groups, as reported by Haidle-Billow (2008), was determined to be relatively large ($\eta^2 = .14$).

Level of education. Unlike the other demographic variables examined in Kirby (2008) and Haidle-Billow (2008), education level was not consistently related to CES-D scores. This observed difference between studies may have more to do with artifacts of statistical analysis rather than true discrepancies within the sample. Kirby (2008), using independent-samples *t*-tests and a dichotomized transformation of education level, found that individuals who had pursued education beyond high school were less likely to report depressive symptomatology versus those who did not receive education beyond high school. In contrast, Haidle-Billow (2008), utilizing a one-way between-groups analysis of variance (ANOVA), did not observe significant differences

[3] The relative effect sizes reported here occur in the context of the other predictors used by Haidle-Billow (2008); for more information on the use of effect sizes please refer to Cohen (1992), Ferguson (2009), and Kirk (1996).

between highest education levels attained and reported depressive symptoms on the CES-D. The choice of statistical technique used by each author likely contributed to their respective findings. Haidle-Billow's choice to compare eight groups versus two is understandable, but may simply have not had enough statistical power to demonstrate true effects within this particular sample.

***Marital status*.** Marital status (i.e., married, widowed, divorced, single, and separated), falsely dichotomized into either "married" or "not married," was found in both Kirby (2008) and Haidle-Billow (2008) to be a significant predictor of CES-D scores, such that those who were unmarried had a greater likelihood of reporting more depressive symptoms. Additionally, the magnitude of difference, as found in Haidle-Billow (2008), was in the moderate range ($\eta^2 = .07$).

Physical Health Factors. Two physical health factors, subsumed under "Physical Health," were assessed in the Coping in Later Life Survey number of reported chronic health conditions and self-reported health status. Both of these factors were examined separately. Chronic health conditions were assessed using a list of chronic medical conditions and physical ailments. Self-reported health status was assessed using six questions related to perceived health.

Comorbid chronic health conditions. The chronic condition checklist used in the CLLS (see Appendix C) is adapted from John, Kerby, and Hennessey (2003). In addition to the original 11 items selected by John et al. (2003), several additions (including an unspecified "other" category) were made to better reflect the chronic health conditions typically experienced by American Indian older adults and elderly. Overall, a total of 29 items were incorporated into the final checklist. Items are encoded as either endorsed or unendorsed. In order to form a composite measure of comorbidity, endorsements were summated across the broad range of available items (including chronic conditions listed under the "other" category). This measure will provide an

index score for each participant. This total score will be examined continuously and will provide a relative gauge of the level of chronic and comorbid conditions experienced by each individual.

Self-reported health status. The six-question self-rated health scale used in the CLLS (see Appendix D) is adapted from Harris, Pederson, Stacey, McClearn, and Nesselroade (1992). In addition to the four question used in Harris et al. (1992), which were shown to have high internal consistency (alpha = .76), the CLLS self-reported health scale integrated two additional questions that assessed energy and exercise levels. The questions quantify the individuals self-reported level of exercise within the past year (1 = *hardly any*, 2 = *some*, 3 = *average*, 4 = *a lot*), overall general health status (1 = *poor*, 2 = *reasonable*, 3 = *good*), present health status compared to five years previously (1 = *worse*, 2 = *same*, 3 = *better*), health status compared to others in similar age group (1 = *worse*, 2 = *same*, 3 = *better*), level of limitations associated with their health status (1 = *extensive*, 2 = *partial*, 3 = *none*), and level of energy compared to people in similar age group (1 = *less*, 2 = *same*, 3 = *more*). Individual items are scored such that positive or adaptive endorsements are rated higher than negative or worsening endorsements. The overall score is a measure of positive self-reported health, ranging from 6 to 19, with lower scores representing lower ratings of perceived health status. The resulting variable is continuous and is calculated at the summative response scale of measurement (i.e., includes ordinal and interval properties of measurement; see Meyers, Gamst, & Guarino, 2006 for additional information).

Personal Coping Resources. Three personal coping resources assessed in the Coping in Later Life Survey were used in the present study: perceived social support, personal mastery, and communal mastery. These constructs were assessed using multiple well-validated measures.

Perceived social support. The Coping in Later Life Survey assessed social support (see Appendix E) using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet,

Dahlem, Zimet, & Farley, 1988). The MSPSS has been shown have a three-subscale factor structure: Family, Friends, and Significant Other. The factorial validity of the MSPSS has been confirmed in additional populations (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). The MSPSS has been found to have good internal consistency. Coefficient alphas for the MSPSS have been found to range from .84 to .92. The coefficient alpha values for the subscales are quite similar: Family (.81 to .90), Friends (.83 to .98), and Significant Other (.83 to .98). In addition, the MSPSS has been shown to have good test-retest reliability, with coefficients in the range of .72 to .85 in the original study. In the CLLS, participants were asked to indicate the extent of their agreement with each statement of the MSPSS. The 12 individual MSPSS items are rated on a 7-point Likert Scale: 1 = *very strongly disagree*, 2 = *strongly disagree*, 3 = *disagree*, 4 = *agree somewhat and disagree somewhat*, 5 = *agree*, 6 = *strongly*, and 7 = *very strongly agree*. The resulting variable is a continuous measure of perceived social support, ranging from 12 to 84, with scores in the higher range representing relatively higher levels of perceived social support.

Personal mastery. The Coping in Later Life Survey assessed participants' personal sense of mastery (see Appendix F) using the Pearlin Mastery Scale (PMS; Pearlin, Menaghan, Lieberman, & Mullen, 1981). The PMS measures personal control beliefs by assessing the degree of control that individuals feel they have over important influences on their life. In the CLL survey, participants were asked to indicate the answer that comes closest to resembling how they feel about a given statement. Each of the 7 items is rated on a 4-point Likert Scale: 1 = *strongly agree*, 2 = *agree*, 3 = *disagree*, and 4 = *strongly disagree*. The resulting variable is continuous and ranges from 7 to 28, with higher scores representing a greater sense of mastery and scores in the lower range indicating a lower sense of mastery (i.e., high external control).

Communal mastery. The Coping in Later Life Survey assessed sense of communal mastery (see Appendix G) through the use of the Communal Mastery Scale (CMS; Hobfoll, Schroder, Wells, & Malek, 2002). The Communal Mastery Scale measures collective sense of agency. Communal mastery, in comparison to self-mastery or self-efficacy, assesses the degree to which individuals perceive their effectiveness in achieving goals and coping with challenges by virtue of their being attached to significant others. The social interactional component of communal mastery, in which individuals approach problem solving in relation to others (rather than alone or in competition with others), distinguishes it from personal mastery. In the CLLS, participants were asked to choose the response to show how they felt about each statement. Each of the 10 PMS items were rated on a 4-point Likert Scale: 1 = *strongly disagree*, 2 = dis*agree*, 3 = *agree*, and 4 = *strongly agree*. The resulting variable is continuous and ranges from 10 to 40, with scores in the higher range representing greater endorsement of collective sense of agency.

Statistical Analyses

Two forms of regression were conducted: linear and logistic. Linear regression, which analyzes CES-D scores as a continuous outcome, determined how each of the nine predictor variables contributed to the prediction of total depression scores. Logistic regression, which required dichotomizing CES-D scores into two subgroups (*asymptomatic* and *symptomatic*) using the standard CES-D cut-off of 16, was used to assess the relative importance of the nine predictors in enhancing the classification of participants into each of the two subgroups. In addition to these two analyses, descriptive statistics and bivariate correlations were examined.

In both the linear and logistic models, the nine predictors were separated into three blocks: *demographic variables* (gender, income level, education status, and marital status), *physical health factors* (number of chronic health conditions and self-reported health status), and

personal coping resources (perceived social support, personal mastery, and communal mastery). Each block was entered hierarchically into the model to examine how each set of explanatory factors influenced the predictive utility of the overall model. The first block was used to establish a baseline level of vulnerability for depression based on simple demographic variables. The second block was used to demonstrate the role chronic health conditions and perceived health status play in the development of depression. The third block was used to assess the influence each of the personal coping resources has in off-setting the risk factors that inform depression.

Linear Regression. Multiple linear regression is an extension of simple linear regression and is used when a set of predictor variables are used to predict a quantitatively measured criterion variable. In addition to the goal of prediction, multiple linear regression can also serve an explanatory function, which is especially useful with dependent variables that are multiply determined. Meyers et al. (2006) stated that multiple regression can be used to explain the dynamics underlying a theoretical construct by indicating which combinations of variables are more strongly associated with the outcome. The hierarchical design further enhances the ability of the linear model to explicate the processes by entering explanatory factors as separate steps and observing how each addition adds incremental changes to the amount of variance explained.

The outcome variable for the multiple hierarchical linear regression analysis consisted of continuous CES-D scores. When examined, total CES-D scores were found to be positively skewed. In order to meet the normality assumptions required to run a multiple hierarchical linear regression analysis, total CES-D scores were transformed using a square root function. The resulting transformed variable met all necessary statistical requirements for linear regression (including normality, linearity, and homoscedasticity). Multicollinearity was assessed by examining variance inflation factor and tolerance scores for each individual predictor in the

model. Variance inflation factor values were less than 1.73 and collinearity tolerance values were greater than .57, providing no evidence of problematic levels of multicollinearity in the analysis.

Criterion variable. Total CES-D scores, which were examined as a continuous variable, were used as the criterion (or dependent) variable in the hierarchical linear regression analysis.

Predictor variables. The following demographic variables, which formed the first block of the three-step linear model, were included in the statistical model due to previously observed associations with CES-D scores in prior secondary analyses (Haidle-Billow, 2008; Kirby, 2008): gender, average annual income level, highest level of education obtained, and marital status.

Gender was coded as either *female* (0) or *male* (1). Average annual household income level was dichotomized into relatively lower and higher income subgroups. The cut-off chosen by Haidle-Billow (2008) will be used in this design, such that those who make less than $14,999 are classified as *low income* (0) and those making more than $15,000 are classified as *high income* (1). The highest of level of education obtained was be similarly dichotomized into lower and higher education level groups. Rather than using eight groups as in Haidle-Billow (2008), the present analysis will follow Kirby (2008) and classify the groups such that those who did not attain education beyond high school are classified as *lower education* (0) and those who attained education beyond high school are classified as *higher education* (1). Marital status was also dichotomized into two separate groups. Following both Haidle-Billow (2008) and Kirby (2008), those who endorsed being either widowed, divorced, single, or separated will be classified as *non-married* (0), and those who endorsed being married will be classified as *married* (1).

Physical health factors (reported number of chronic health conditions and self-reported health status), entered as the second block of the three-step linear model, were included in the model to assess how both health variables contribute to the prediction of depression scores in the

context of demographic risk factors. The number of reported chronic health conditions, which also acts as a general indicator of comorbidity, was analyzed continuously instead of being separated into subgroups. Self-reported health status scores were also examined as a continuous variable (with higher scores representing more positive evaluations of general health status).

Personal coping resources (perceived social support, personal mastery, and communal mastery), entered as the final block of the three-step linear model, were included to investigate how coping resources affected the development of depression in the context of health factors and demographic variables. All three variables, which are well-established measures of each construct, were analyzed as continuous scores and not dichotomized. Higher MSPSS scores indicate higher social support levels. Higher PMS scores indicate individuals with a higher sense of personal mastery. Similarly, higher scores on the CMS indicate higher communal mastery.

Logistic Regression. Binary logistic regression is a specific form of regression analysis included within the broad family of generalized linear statistical models. Logistic regression is used when the response (dependent) variable is categorical or dichotomous[4]. Importantly, predictor (independent) variables can be either continuous (i.e., quantitative) or categorical (i.e., nominal). The overarching goal of logistic regression is the prediction of group membership based on a set of independent variables. In addition, logistic regression allows for the description of the influences and relationships of the independent variables to the outcome measure. Logistic regression can be used to: (1) predict a categorical response variable on the basis of categorical or continuous variables, (2) determine the effect sizes of the predictor variables in relation to the

[4] Use of logistic regression was balanced with the alternative strategy of using discriminant function analysis (DFA). However, DFA restricts the scale of measurement underlying predictors to continuous variables, which would limit our ability to analyze categorical demographic variables. In addition, DFA requires normally-distributed continuous variables, a condition which is not met in the current sample. Potential causes of non-normality include outliers, skewed distributions, insensitive measures, subgroups, and the possibility of unique responses (Meyers et al., 2006).

categorical response variable, (3) rank relative importance of the response variables, (4) examine interaction effects, and (5) gauge the influence of covariate control variables (Garson, n.d.).

The outcome variable for a logistic regression analysis must be binary. The variable in the present study consists of two dichotomous subgroups that were created by categorizing individuals based on their total CES-D scores. Participants who scored less than the standard CES-D cut-off score of 16 were classified into the *asymptomatic* subgroup (i.e., were coded as a "0"). Participants who scored 16 or higher on the CES-D were classified into the *symptomatic* subgroup (i.e., were coded as a "1"). The model is hierarchical and examines how each set of predictors (i.e., demographic variables, physical health factors, and personal coping resources) influenced the model's ability to accurately classify individuals into each of the two subgroups.

Given that the outcome of multiple hierarchical logistic regression analysis is categorical, less stringent statistical assumptions are required. Specifically, the three assumptions required to run logistic regression are: (a) absence of perfect multicollinearity, (b) no specification errors, and (c) independent variables must be measured at the summative response, interval, or ratio level. Variance inflation factor and tolerance scores were examined, with no evidence to suggest concerns regarding multicollinearity. Specification errors (i.e., including all relevant predictors while excluding irrelevant predictors) were minimized by using a three-step hierarchical model with nine variables identified as significant predictors of depression in the research literature. Finally, all continuous predictor variables were measured at the proper scale of measurement.

Response variable. The response (or dependent) variable in this study will be self-reported depression symptomatology as measured by the CES-D and will be artificially separated into two dichotomized groups: *asymptomatic* (CES-D $\leq$ 15) and *symptomatic* (CES-D $\geq$ 16).

Predictor variables. The multiple hierarchical logistic regression analysis used the same coding schemes and three steps as the hierarchical linear model. The four demographic variables (gender, income level, education status, marital status) were entered into the model first. At the second step, the two physical health factors (reported number of chronic health conditions and self-reported health status) were included in the model. The three personal coping resources (social support, personal mastery, and communal mastery) were added at the third and final step.

Hypotheses (Model-Specific)

Depression scores, as measured by the CES-D, were conceptualized in two different ways. First, total CES-D scores were examined as a continuous variable. In order to determine the predictive power of the nine individual predictors in the model, a multiple hierarchical linear regression analysis was conducted. Next, in order to determine the predictive utility of the nine predictors in classifying each participant as either *asymptomatic* (i.e., CES-D $\leq$ 15) or *symptomatic* (i.e., CES-D $\geq$ 16), a multiple hierarchical logistic regression analysis was used.

In both the linear and logistic regression models, predictors were entered hierarchically into the model in three separate steps (demographic variables, physical health factors, and personal coping resources). The only difference between the linear and logistic models were in how the CES-D scores were conceptualized (i.e., as a continuous or dichotomous variable).

4. Using linear regression, it was hypothesized that the four demographic variables (gender, income level, education status, and marital status) will explain a significant amount of variance in CES-D scores. It was expected that physical health factors (reported number of chronic health conditions and self-reported health status) will further improve the amount of variance explained. Finally, the inclusion of personal coping resources (social

support, personal mastery, and communal mastery) will add additional predictor power to the model beyond that provided by demographic variables and physical health factors.

5. Using logistic regression, it was predicted that the four demographic variables will provide statistically significant improvement over the constant-only model. It was expected that inclusion of the two physical health factors will further improve the models ability to differentiate between each subgroup. Finally, after all three personal coping resources are added, it was predicted the full three-step model will significantly improve the ability to predict if individuals will score above or below the standard CES-D cut-off.

Results

Descriptive Statistics and Correlations

Depression (CES-D). Individual CES-D total scores ranged from a minimum of 0 to a maximum of 44. The average CES-D score for all 160 participants was $M = 11.56$ ($SD = 9.507$). Using the standard CES-D cut-off score, most individuals (72.5%, $n = 116$) had total scores below the threshold used by Radloff (1977) to differentiate individuals who are unlikely to meet a depression diagnosis (≤ 15) from those with possible mild to moderate symptomatology (≥ 16). Dichotomizing the sample into two subgroups, *symptomatic* (CES-D ≥ 16) or *asymptomatic* (CES-D ≤ 15), resulted in 27.5% ($n = 44$) of the sample being classified as having reported depressive symptoms potentially significant enough to warrant further assessment by a clinician. Refer to Table 1 for all inter-correlations between CES-D outcomes and all predictor variables.

Demographic Variables. Participants[5] ranged in age from 56 to 89 years old ($M = 68.38$, $SD = 6.418$). Separated into different age strata[6], most participants were in the 65-74 age range (49.4%, $n = 79$), with the remaining distribution as follows: 55-64 (31.3%, $n = 50$), 75-84

[5] Statistics are based on $N = 159$; one participant was excluded because they did not provide information on age.
[6] These strata reflect distinctions made in gerontological research (e.g., Leppik, 2006; Newson & Kemps, 2006)

(16.9%, *n* = 27), and 85+ (1.9%, *n* = 3). Most participants were classified as either older adults[7] (OA; 55-64) or young-old (YO; 65-74). Relatively fewer individuals were in the middle-old (MO; 75-84) and oldest-old (OO; 85+) categories. When examined continuously or separated by age strata, age was not found to be significantly associated with CES-D scores (including total and dichotomized scores), demographic variables (i.e., gender, income, education, and marital status), physical health factors (i.e., number of chronic health conditions, self-rated health), or personal coping resources (i.e., social support, personal mastery, and communal mastery).

Females (57.5%, *n* = 92) outnumbered males (42.5%, *n* = 68) by a small margin. Gender was found to be significantly associated with depressive scores on the CES-D, both in terms of overall total scores ($r = -.194$, $p < .05$) and when individuals were stratified into two separate depression subgroups ($r = -.190$, $p < .05$). When gender was independently examined in relation to depression symptoms, being male was negatively associated with higher overall CES-D scores (i.e., males were less likely to have CES-D scores that exceeded the standard cut-off of ≥16).

Using a cut-off of $15,000 to separate the sample[8], most of the group was found to have relatively higher levels of reported annual income (60.6%, *N* = 97). More specifically, the distribution of reported income is as follows: less than $7,500 (15.0%, *n* = 24); $7,500 to $14,999 (24.4%, *n* = 39); $15,000 to $24,999 (21.9%, *n* = 35); $25,000 to $40,000 (20.0%, *n* = 32); and more than $40,000 (18.8%, *n* = 30). Income, based on the above groupings, was significantly related to the CES-D, both as total scores ($r = -.266$, $p < .01$) and when separated into two groups using the standard CES-D score cut-off score ($r = -.213$, $p < .01$). A negative association between income and CES-D scores was observed such that participants with a reported income of $15,000 or higher were found to have relatively lower CES-D scores.

[7] This term was chosen due to the lack of a consistent research label for those between the ages of 55 and 64.
[8] In the original dataset, *n* = 8 participants chose not to report their income level. Median split was used to replace the missing values (*Mdn* = $15,000-$24,999). These individuals were classified as having relatively higher income.

A larger proportion of participants (58.1%, $n = 93$) achieved a level of education beyond high school or graduate equivalency than those participants who did not. The distribution of highest education level attained is as follows: 2.5% ($n = 4$) completed education through grade school (Grades 1-6); 8.1% ($n = 13$) completed education through middle school (Grades 7-9); 21.3% ($n = 34$) completed high school (Grades 10-12); 10.0% , ($n = 16$) earned a GED; 15.6% ($n = 25$) completed vocational education; 25.0% ($n = 40$) completed some college classes; 12.5% ($n = 20$) earned a college degree; and 5.0% ($n = 8$) obtained a professional degree. Participants' highest level of education attained was found to be significantly associated with total CES-D scores ($r = -.269$, $p < .01$) and dichotomized depression subgroups ($r = -.187$, $p < .05$). When examining education level in isolation, those with education beyond a high school or a graduate equivalent degree were less frequently categorized as *symptomatic* (i.e., CES-D ≥ 16).

More participants (51.6%; $n = 82$) endorsed a category other than being married (which consisted of being widowed, divorced, single, and separated). The distribution of marital status is as follows: separated (1.3%, $n = 2$); single (9.4%, $n = 15$); divorced (20.1%, $n = 32$); widowed (20.1%, $n = 33$); and married (48.4%, $n = 77$). One individual did not report their marital status. Similar to the other demographic variables, marital status was found to be significantly associated with continuous CES-D scores ($r = -.246$, $p < .01$) and dichotomized CES-D subgroups ($r = -.234$, $p < .01$). Being married was found to be negatively associated with higher CES-D scores, with married adults less likely to have scores above the standard CES-D cut-off.

Physical Health Factors. The number of self-reported chronic health conditions ranged from 0 to 18 ($M = 4.96$, $SD = 3.524$). The most frequent number of reported health conditions was 4. Separated into five categories, the distribution of chronic health conditions is as follows: none (0.6%, $n = 1$), 1-2 (25.0%, $n = 40$), 3-4 (31.9%, $n = 40$), 5-6 (17.5%, $n = 51$), and 7 or more

(25.0%, $n = 40$). When examined continuously, the number of health conditions reported was significantly associated with total CES-D scores ($r = .503$, $p < .001$) and when stratified into two separate depression subgroups ($r = .394$, $p < .001$). Individuals who reported having more comorbid chronic health conditions were shown to have significantly higher total CES-D scores than those who reported having relatively lower numbers of chronic health conditions.

The average perceived health status rating was 13.16 ($SD = 2.903$), ranging from a possible low of 6 to a possible high of 19. The median score for perceived health status was 13 and the most frequent health rating was 16. When examined as a continuous variable, self-rated physical health scores showed a significant negative association with CES-D. This was true for total CES-D scores ($r = -.454$, $p < .001$) and dichotomized CES-D subgroups ($r = -.369$, $p < .001$). Those who had higher self-rated health scores (i.e., perceived their physical health to be relatively higher than other individuals their age) tended to have lower scores on the CES-D.

Personal Coping Resources. The average score on the Multidimensional Scale of Perceived Social Support (MSPSS) was 66.70 ($SD = 11.614$). Scores on the MSPSS ranged from a low of 28 to a high of 84. The distribution was negatively skewed, with most individuals reporting levels of social support on the higher end of the continuum ($Mdn = 67.5$; $Mode = 79$). MSPSS scores were shown to have a significant negative association with total CES-D scores. Participants who scored higher on the MSPSS (i.e., had higher levels of perceived social support) had lower total scores on the CES-D ($r = -.266$, $p < .01$). Individuals with higher MSPSS scores were also less likely to be classified into the *symptomatic* subgroup ($r = -.212$, $p < .01$).

Scores on the Personal Mastery Scale (PMS) ranged from a possible low of 7 to a possible high of 28. The average score on the PMS was 20.87 ($SD = 3.214$). The median score was 21, with the most frequent score also being 21. Personal Mastery scores were significantly

associated with both total CES-D scores (r = -.502, p < .001) and dichotomized CES-D subgroups (r = -.439, p < .001). Individuals with higher ratings of personal mastery were found to have relatively lower levels of depression symptomatology as measured by the CES-D.

The average Communal Mastery Scale (CMS) score was 29.33 (SD = 3.753). Scores on the CMS ranged from a low of 18 to a high of 40 (Mdn = 29; $Mode$ = 30). Communal Mastery scores were negatively associated with the CES-D: both total CES-D scores (r = -.214, p < .01) and when separated into asymptomatic and symptomatic subgroups (r = -.182, p < .05). Individuals with higher ratings of communal mastery generally had less depression symptoms.

Multiple Hierarchical Linear Regression Analysis

Table 2 contains the model summary of the full linear model. Refer to Table 3 for the variable coefficients and significance levels of the nine predictors contained in all three steps of the full model. The overall multiple hierarchical regression model uses N = 158 participants who completed the Coping in Later Life Survey. Two individuals were removed list-wise from the analysis because they did not answer at least 70% of the items on at least one predictor variable. After these individuals were removed, mean replacement was used to estimate any missing values for self-reported health status, social support, personal mastery, and communal mastery.

Block 1. Demographic variables previously found to significantly relate to total CES-D scores (i.e., gender, average annual income, highest level of education attained, and marital status)[9] were entered into Block 1 of the model. Overall, Block 1 accounted for significant variance in total CES-D scores, [R^2 = .177, R^2_{change} = .177, F_{change} (4,152) = 8.178, p < .001].

In the context of the four demographic variables entered in Block 1, gender [B = -.337, SE = .230, β = -.111, p = .146], income [B = -.148, SE = .101, β = -.131, p = .147], and marital status [B = -.481, SE = .263, β = -.161, p = .069] were not found to be significant predictors of

[9] Age was excluded due to the lack of established relationship with total CES-D scores (r = 0.97, p = .222).

total CES-D scores. Only education [B = -.768, SE = .237, β = -.254, p < .01] significantly predicted total CES-D scores when all four variables were simultaneously entered into Block 1.

Block 2. Physical health factors (number of chronic health conditions and self-reported health status) were entered into Block 2 of the model. Block 2 accounted for significant variance in total CES-D scores, [R^2 = .379, R^2_{change} = .202, F_{change} (2,150) = 24.396, p < .001]. Physical health factors accounted for significantly more variance than demographic variables alone.

Participants' reported number of chronic health conditions [B = .143, SE = .032, β = .337, p < .001] and self-rated health scores [B = -.113, SE = .040, β = -.220, p < .01] were found to be highly predictive of total CES-D scores. However, the direction of the relationship was different for each variable: higher numbers of chronic conditions predicted higher CES-D scores and higher (i.e., positive) self-rated health scores predicted lower total scores on the CES-D.

When all six predictors (demographic variables and physical health factors) were entered into the model, education level remained a significant predictor of total CES-D scores [B = -.823, SE = .207, β = -.272, p < .001]. However, unlike Block 1, marital status reached significance [B = -.465, SE = .230, β = -.156, p < .05] in Block 2. In the context of chronic health conditions and self-rated health, gender [B = -.068, SE = .206, β = -.023, p = .741] and income [B = .026, SE = .094, β = .023, p = .784] were not found to be significant predictors of total CES-D scores.

Block 3. Personal coping resources (perceived social support, personal mastery, and communal mastery) were entered into Block 3 of the model. Block 3 accounted for significant variance in total CES-D scores, [R^2 = .485, R^2_{change} = .106, F_{change} (3,147) = 10.125, p < .001]. Personal coping resources added significant predictive power to the overall model, above that provided by demographic variables and physical health factors (alone or in combination).

Only two personal coping resources were found to be significantly predictive of total CES-D scores when all eight variables were included in the full hierarchical model: perceived social support [B = -.021, SE = .009, β = -.164, $p < .05$] and personal mastery [B = -.124, SE = .035, β = -.265, $p < .001$]. Communal mastery [B = .002, SE = .030, β = .004, p = .955] did not perform as expected and was not found to be a reliable predictor of total CES-D scores.

In the final model, the number of reported chronic health conditions [B = .140, SE = .030, β = .331, $p < .001$] and self-reported health status [B = -.091, SE = .039, β = -.177, $p < .05$] remained significant predictors of total CES-D scores. As throughout the entire model, education remained a significant predictor [B = -.610, SE = .197, β = -.202, $p < .01$] in the final model. Gender, income, and marital status were not found to be reliable predictors of CES-D scores.

Multiple Hierarchical Logistic Regression Analysis

Previous research (Baron et al., 1990; Manson et al., 1990) using the CES-D with American Indians has suggested the use of higher cut-off scores to account for the relatively higher levels of depression symptoms observed with this population. Additional logistic regression analyses were conducted using alternate CES-D cut-off scores of 24 (see Table 5) and 28 (see Table 6).When the standard cut-off of 16 was used, 27.2% (n = 44) of the group was classified as having *symptomatic* depression (i.e., scored 16 or greater). A cut-off score of 24 resulted in 11.9% (n = 19) of the sample exceeding the defined cut-off score. This percentage decreased to 6.9% (n = 11) when a cut-off score of 28 was used to separate the two groups.

Results were generally similar when these alternate cut-off scores were used to create the dichotomized CES-D subgroups required for conducting logistic regression. Using a cut-off score of 16, the full hierarchical model (consisting of all 9 predictor variables) correctly classified individuals into the two groups 82.9% of the time. Higher cut-off scores resulted in

enhanced predictive power over the standard cut-off score of 16, with the percentage of correct classification being 93.0% when a cut-off of 24 was used and 95.5% when a cut-off score of 28 was used. Although higher cut-off scores enhanced the predictive power of the overall hierarchical models, a corresponding trend was observed with each model having decreased ability to accurately predict individuals who fell into the *symptomatic* depression subgroup (i.e., had relatively higher CES-D scores). A cut-off score of 16 resulted in 58.1% of the sample being correctly classified as having more depression symptomatology. In comparison, a cut-off score of 24 predicted 57.9% of these cases and a cut-off score of 28 predicted 45.5% of these cases. Table 7 compares the influence of each CES-D cut-off on the prediction success of each model.

Given that our interest is focused on those individuals who exceed a given cut-off score, the model's ability to accurately predict these individuals is the most concern. In order to preserve the model's ability to correct classify those who warrant further clinical attention, a cut-off score of 16 was chosen for the current model. In addition, the average score for the CES-D was only $M = 11.56$ when the standard cut-off score of 16 was used. Since the sample, as a whole, tended to score below the standard cut-off score used by Radloff (1977), the use of a more flexible CES-D cut-off score did not appear to be necessary for the present analyses.

The logistic regression analysis was conducted with $N = 157$ individuals used in the linear regression analysis[10]. Table 4 presents the regression coefficients (B), Wald statistics, significance levels, odds ratios (OR) and confidence intervals (CI) for each predictor when the standard CES-D cut-off score (i.e., ≥ 16) was used to separate the two depression subgroups.

Block 1. Results from the logistic analysis indicates that the Block 1 model provides a statistically significant improvement over the constant-only model [$\chi 2$ (4, $N = 157$) = 20.002,

[10] One individual was removed from the previous analysis ($N = 158$) due to missing information on marital status.

$p < .001$]. The Nagelkerke pseudo R^2 indicated that the four demographic variables (i.e., gender, income, education, and marital status) accounted for 17.3% of the total variance at Block 1.

Gender [$B = .711$, $SE = .416$, $OR = 2.035$, $p = .087$], income level [$B = .747$, $SE = .411$, $OR = 2.111$, $p = .090$], education status [$B = .702$, $SE = .400$, $OR = 2.018$, $p = .079$], and marital status [$B = .605$, $SE = .452$, $OR = 1.832$, $p = .181$] were not found to be significant predictors when entered into the first block of the logistic model. However, three of the four demographic predictors approached statistical significance: gender, income level, and education status.

Block 2. The inclusion of physical health factors (reported number of chronic conditions and self-reported health status) into the model at Block 2 provided statistically significant improvement over the four predictors in Block 1 [$\chi 2$ (2, $N = 157$) = 21.561, $p < .001$] and the constant-only model [$\chi 2$ (6, $N = 157$) = 41.563, $p < .001$]. The Nagelkerke pseudo R^2 indicated that the six predictors in the model at Block 2 accounted for 33.7% of the total variance.

Both the number of reported chronic health conditions [$B = .167$, $SE = .066$, $OR = 1.182$, $p < .05$] and self-reported health status [$B = -.190$, $SE = .086$, $OR = .827$, $p < .05$] were shown to be significant predictors that enhanced the discrimination of those with CES-D scores below and above the standard cut-off score of 16. At Block 2, education status [$B = .961$, $SE = .443$, $OR = 2.615$, $p < .05$] was the only significant demographic variable in the model: gender [$B = .440$, $SE = .465$, $OR = 1.553$, $p = .344$], income level [$B = .218$, $SE = .494$, $OR = 1.244$, $p = .659$], and marital status [$B = .666$, $SE = .491$, $OR = 1.946$, $p = .175$] produced non-significant results.

Block 3. Personal coping resources (perceived social support, personal mastery, and communal mastery) added statistically significant improvement over the six predictors in Block 2 [$\chi 2$ (3, $N = 157$) = 21.108, $p < .001$] and the constant-only model [$\chi 2$ (9, $N = 157$) = 62.671, p

< .001]. The Nagelkerke pseudo R^2 indicated that with all nine predictors in the model at Block 3, the full hierarchical logistic model accounted for 47.6% of the total variance at Block 3.

Personal mastery [B = -.364, SE = .108, OR = .695, $p < .01$] was the only personal coping resource that was a significant predictor at Block 3. With all nine predictors in the full model, perceived social support [B = -.034, SE = .022, OR = .967, p = .116] and communal mastery [B = .064, SE = .082, OR = 1.066, p = .436] were not shown to have significant predictive power in discriminating the *asymptomatic* (CES-D ≤ 15) and *symptomatic* (CES-D ≥ 16) subgroups. In relation to physical health factors, the only significant predictor variable was the reported number of chronic health conditions [B = .187, SE = .079, OR = 1.205, $p < .05$], with self-reported health status being marginally significant [B = -.192, SE = .101, OR = .825, p = .057]. With the inclusion of all nine variables into the full logistic model, none of the four demographic variables were found to be significant: gender [B = .316, SE = .508, OR = 1.372, p = .534], income level [B = .230, SE = .547, OR = 1.259, p = .674], education status [B = .575, SE = .498, OR = 1.777, p = .248], or marital status [B = .145, SE = .549, OR = 1.156, p = .792].

Discussion

CES-D Depression Scores

Descriptive statistics of depression scores were informative. Given that the average score on the CES-D was 11.56, with a potential range from 0 – 44, results show that the sample of 160 participants had generally low levels of reported depression symptoms. In fact, 72.5% (N = 116) of the sample were classified as *asymptomatic* (CES-D ≤ 15). As a whole, the sample did not exceed the standard CES-D cut-off of 16, which suggests that depression is a non-normative outcome among American Indian older adults and elderly. In itself, this finding highlights that depression is not inevitable and the presence of adverse mental house in late life comes as the

result of failed coping in response to normative aging processes. For American Indians, even in the face of health disparities related to chronic medical illnesses, depression is not the norm, hinting at the possibility that this sample continues to be resilient in the face of chronic illness.

Demographic Variables

Age. Age did not significantly relate to CES-D scores. This finding was expected based on previous research findings which demonstrated a lack of relationship between age and depressive symptoms. This finding supports the idea that age does not invariably lead to depression outcomes. In the context of a resiliency model, this lack of an established relationship indicates that older adults will not inevitable develop depression as they grow older. Instead, the focus on the development of depression likely reflects changes in age-related risk factors. This finding supports the contention that depression is a marker of unsuccessful aging outcomes, with obstacles to normal development resulting in the high depression levels found in this age group.

Gender. Gender was found to have a significant negative association with CES-D scores, with males being less likely to report higher levels of depressive symptoms. This finding supports the idea that women face comparatively more challenges in old age. Given that women tend to live longer than men, this finding suggests that women are at higher risk for symptoms of depression. Potential explanations include the fact that increased longevity in women may result in more functional impairment, lower quality-of-life, and subsequently higher depression rates. In addition, potential confounds with gender (e.g., gender roles, differential reporting, and less favorable living conditions) may inform the higher levels of depression observed in women. In both the linear and logistic regression models, gender was not found to be a significant predictor. This suggests that in the context of the other demographic variables, gender is less important in determining whether an individual develops clinically-significant depression symptomatology.

Income level. Similarly to gender, income level was not found to be a significant predictor of CES-D scores in either the linear or logistic models. In the context of the three other demographic variables, income level did not significantly predict scores on the CES-D. Nonetheless, there was a strong negative correlation between income level and CES-D scores. Individuals who reported household incomes greater than $14,999 tended to have lower CES-D scores. Income level, which is one component of socioeconomic status, does not appear to be a useful gauge for predicting CES-D scores or grouping individuals into *asymptomatic* and *symptomatic* subgroups. As noted in the research literature, SES is a risk factor for depression. However, this risk is likely accounted for by the hardships associated with low SES (e.g., hardship, stress, less access to health care), rather than due to the effects of low SES itself.

Education level. Education level was found to be significantly correlated with CES-D scores, with higher levels of education being associated with lower CES-D scores. In terms of prediction, the highest level of education attained was found to be the only demographic variable that consistently predicted CES-scores. Education was found to be a significant predictor of CES-D scores in all three steps of the linear regression model. This result indicates the power of education in influencing the development of depression symptoms. Education level, which is one marker of SES, might influence depression by increasing access to health care or by enhancing psychosocial resources. Given the model tested, education status was significant only in the second block of the logistic regression model, where individuals with education beyond high school or a graduate equivalency degree were less likely (*OR* = .378) to be categorized as being *symptomatic* (CES-D $\geq$ 16). This could indicate that education level can help differentiate *asymptomatic* from *symptomatic* individuals only in the context of physical health factors and demographic risk factors (but not when personal coping resources are considered). As noted in

the literature, low education status can impact depression through its operation as a risk factor for physical health disease and its ability to exacerbate the loss of function for a given condition. As such, those with chronic health issues and less schooling are especially vulnerable to depression.

Marital Status. Marital status was found to a have a significant association with CES-D scores, such that those who endorsed being married were less likely to have higher CES-D scores. Although marital status was not a significant predictor in distinguishing individuals into *asymptomatic* and *symptomatic* subgroups using logistic regression analysis, results from the linear regression analysis indicate that marital status may play a role in predicting CES-D scores. Marital status, which was non-significant in Block 1, reached statistical significance when physical health factors were added to the model in Block 2. This result suggests that being married (versus being widowed, divorced, single, or separated) can offset the impact of chronic health conditions. Findings in the literature demonstrate the role of partners in meeting important social needs in later life. In addition to having direct positive effects, being married also has a buffering effect on depression by modifying the relationship between chronic diseases and the development of depression. This is especially true in diseases with gradual onset and progressive loss of functioning. At Block 3, when personal coping resources were added to the model, marital status was no longer a significant predictor of CES-D scores. Given that marital status appears to predict depression in the context of physical health factors, where having a partner has clear implications for management of health conditions, the inclusion of other personal coping resources likely outweighs the role marital status has in the prevention of depression symptoms.

Physical Health Factors

Number of reported chronic health conditions. Overall, there was a high level of comorbidity in the sample, with most participants averaging 4.96 health conditions. Comorbidity

appeared to be the exception rather than the norm, which was reflected in the finding that 74.4% endorsed three or more conditions and 25% endorsed seven or more conditions. A positive association was found between the number of reported health conditions and endorsement of items on the CES-D, chronic conditions were found to be a robust predictor in both the linear and logistic regression analyses. In the linear model, the chronic health conditions were found to be a significant predictor when added at Block 2, and remained significant when personal coping resources were added at Block 3. These results suggest that the number of chronic conditions has a significant role in predicting CES-D scores, even in the context of protective coping resources.

In the logistic model, chronic conditions were similarly significant at both Block 2 and Block 3. In the context of the current variables, these results suggest the utility of chronic health conditions in differentiating individuals into *asymptomatic* and *symptomatic* subgroups. In fact, chronic conditions were only one of two variables that remained significant in the full hierarchical logistic regression analysis. For chronic conditions at Block 2, the odds of an individual being categorized as *symptomatic* (CES-D $\geq$ 16) increases by 18.4% with each additional chronic health condition endorsed (OR = 1.184). At Block 3, for each additional chronic health condition reported, there was a 20.8% increase in the odds of an individual exceeding the standard CES-D cut-off score (OR = 1.208). The strength of these findings may reflect the high comorbidity between depression and medical illness that occurs among older individuals. As noted in the research literature, the relationship between these variables is bidirectional and reciprocal: not only do chronic health conditions worsen depression, but depression can complicate the management of these health conditions, which in turn increases depression. Overall, these findings confirm the disproportionately high rates of medical illness

found in AI populations and highlight the undeniable role of chronic conditions in the development and maintenance of depression symptoms in AI older adults and elderly.

Self-reported health status. Self-reported health status was found to negatively correlate with CES-D scores. Participants who positively endorsed more items on the measure were less likely to have higher CES-D scores. Linear regression further confirmed the importance of perceived health status in explaining depression scores, as this variable was found to be significant at both Block 2 and Block 3. These findings support previous literature which demonstrated that self-rated health is associated with depression scores, independent of the presence of chronic disease. As such, perceived health status has its own pathway towards the development of depression, with positive self-evaluations acting as a protective factor.

In the logistic model, self-reported health status was only significant when entered into Block 2. Given the model tested at Block 2, the odds of an individual being categorized as *symptomatic* (CES-D $\geq$ 16) decreased for each one point increase on the six-item selfpreported health status scale (*OR* = .827*).* Although self-rated health status was no longer significant after the inclusion of personal coping resources at Block 3, perceived health status "approached" statistical significance in the full nine-predictor model (p = .057). Although it is possible that the logistic model was underpowered, a more conservative interpretation is that the benefits associated with positive self-ratings are only partially effective in explaining CES-D scores, with the reality of having chronic illnesses eventually overpowering the protective function associated with positive perceived health status (i.e., positive perceptions are helpful up to a certain point).

Personal Coping Resources

Perceived Social Support. Total scores on the Multidimensional Scale of Perceived Social Support (MSPSS) were negatively correlated with total CES-D scores. Individuals who

had higher perceived social support were significantly less likely to have higher CES-D scores. The protective role of social support was supported by the linear regression analysis. When entered into Block 3, social support was found to be a strong predictor of CES-D scores, even in the presence of demographic predictors and the influence of chronic health conditions. As such, these results highlight that social support is especially relevant for older adults and elderly with medical illnesses. The liability associated with low social support on the development of depression in older individuals is well established in the research literature. In addition to the direct effects of instrumental and emotional support, social support has been shown to moderate the influence of chronic illnesses on depression by limiting the impact medical conditions have.

In the logistic regression analysis, social support was non-significant and did not aid in the classification of individuals into *asymptomatic* (CES-D $\leq$ 15) and *symptomatic* (CES-D $\geq$ 16) depression subgroups. Results from the logistic model did not support previous research findings that identify social support as a general protective factor against depression. Given that social support was found to be a strong predictor of CES-D scores in the linear model, it is quite possible that although MSPSS scores are helpful in predicting continuous CES-D scores, they are not strong enough of a predictor to properly classify individuals into two separate subgroups.

Personal Mastery. Pearlin Mastery Scale (PMS) scores were negatively correlated with the CES-D, such that individuals with higher perceptions of mastery were significantly less likely to endorse items on the CES-D. Results from the linear regression analysis support the role of personal mastery as a protective factor against the development of depression in those with chronic physical illnesses. The finding that personal mastery is a significant predictor of CES-D scores, in the context of demographic variables and physical health factors, supports the hypothesis that perceptions of mastery can change how the presence of medical illness informs

depression. In the research literature, it has been shown that psychosocial resources (including personal mastery) directly impact the negative effects specific chronic conditions have on depression symptoms. In addition to direct effects, mastery is thought to moderate the effects of physical disease through the processes of increased self-monitoring and self-care management.

In the logistic regression model, personal mastery was found to be a significant predictor when added to the model at Block 3. Given the model tested, personal mastery was only one of two significant predictors in the full three-step model (the other significant predictor was number of reported chronic conditions). For every one unit increase in the Personal Mastery Scale, individuals were less likely (*OR* = .694) to be categorized as *symptomatic* (CES-D ≥ 16). Although personal mastery is generally considered a stable trait across adulthood, the presence of chronic health conditions has been shown to have a drastic impact on how individuals cope with chronic illness. Previous research findings highlight that diseases with less illness controllability and higher levels of functional impairment are more likely to cause depression. In contrast, diseases that offer higher levels of medical and personal control are less likely to contribute to depression, likely due to the greater likelihood of mastery being preserved in these conditions. In the research literature, it has been noted that self-mastery can be facilitated by making emotional or cognitive internal changes in the face of uncontrollable events. In addition, it is posited that personal mastery prevents depression by contributing to positive self-evaluations and the through the development of more adaptive attitudes, thoughts, or beliefs regarding chronic illness.

Communal Mastery. A significant negative correlation was found between Communal Mastery Scale (CMS) scores and depression as measured by the CES-D. Individuals with higher endorsement of items on the CMS were less likely to have higher scores on the CES-D. Despite the significant correlation between depression and communal mastery, communal mastery was

not found to be a significant predictor of CES-D scores. Communal mastery was non-significant when added to Block 3 of both the linear and logistic regression analyses. This finding was inconsistent with the literature, which generally found positive benefits associated with using prosocial problem-solving approaches that involves reaching out to others rather than relying on oneself. Furthermore, the results do not support the hypothesis that having a collective sense of agency will be especially relevant within collectivist cultures such as American Indians.

One potential explanation for the non-significance of communal mastery is that it failed to account for variance in depression scores above that already provided by personal mastery. Although the research literature indicates that personal mastery and communal mastery are separate concepts, there are also findings that communal mastery is less predictive of depression than self-mastery. If personal mastery is the more powerful predictor, then communal mastery's effect on depression scores may be minimized by the high levels of shared variance with personal mastery. As such, it is possible that personal mastery scores may act as a suppressor variable if there is high multicollinearity between both predictors. Given the strong correlation between the personal mastery scale and the communal mastery scale (r = .484), the presence of multicollinearity was assessed by examining tolerance and variance inflation factors scores for the linear model. However, there was no indication of problematic levels of multicollinearity.

Given that communal mastery showed a significant negative association with depression scores as predicted (r = -.218, p = .003), another potential explanation is that communal mastery wasn't a significant predictor only when examined in the context of eight other variables in the full three-step model. When a simple linear regression[11] was ran with communal mastery scores predicting continuous CES-D scores, the results showed that communal mastery scores

[11] The simple linear regression analysis used CES-D scores (with a square root transformation) as the outcome variable. Was based on a final sample size of N = 158 (with two participants removed due to missing data).

significantly predicted scores on the CES-D [B = -.552, SE = .198, β = -.218, $p < .01$]. Independent of any other predictors, communal mastery explained approximately 5% of the variance in scores on the CES-D [R^2 = .048, F_{change} (1,156) = 7.796, $p < .01$]. Considered in isolation, higher levels of communal mastery do act as a protective factor against depression. Overall, the results highly paralleled the observed trends documented in the research literature on mainstream older adult and elderly populations. All predictors were significantly associated with the CES-D. As predicted, these variables were correlated with the CES-D in the direction (i.e., negative or positive associations) documented in previous research studies. The overall model, whether tested through linear or logistic regression, helped elucidate the role specific demographic variables, physical health factors, and personal coping resources play in the development of depression for American Indian older adults and elderly. Both risk and protective factors were identified that can be used to predict if an individual is likely to develop depression.

Model-Specific Findings

As hypothesized, each block in the hierarchical linear regression model added incremental predictive utility to the full model. In the first step, demographic variables explained 17.7% of the variance in continuous CES-D scores. This finding demonstrates how basic demographic-based risk factors serve as a significant baseline level of prediction for depression scores. At the second block, physical health factors accounted for 20.2% of the variance explained beyond that provided by demographic factors alone. This finding demonstrates the powerful role that chronic health conditions and self-reported health status have in the development of depression. Personal coping resources accounted for an additional 10.6% of the variance in CES-D scores (above that provided by demographic variables and physical health

factors), showing that protective factors can be used to offset the risks associated with chronic health conditions and the risks conferred to individuals based on simple demographic factors.

Findings were similar in the hierarchical logistic regression model. At each successive step, each set of explanatory factors added significant predictive utility to the model's ability to differentiate individuals into *asymptomatic* and *symptomatic* subgroups. Nonetheless, there were important differences in the significance of individual predictors compared to the linear model. Generally, only the strongest predictors were found to be significant in the logistic model. Logistic regression, which focuses on classifying individuals into two exhaustive and mutually-exclusive groups, is akin to the need for clinicians to make simple "yes" or "no" decisions based on limited clinical information. As such, the significant predictors identified through logistic regression (education status, chronic health conditions, self-reported health status, and personal mastery) may serve as the most useful predictors of depression in American Indian older adults and elderly. In a sense, assessment of these specific five variables could be used by clinicians to make informed assessments of relative depression risk based on only a small set of variables.

Treatment Implications

With the availability of this information, identification of personal resilience factors becomes possible and corresponding strategies can be developed to help assist American Indian older adults cope with the seemingly inevitable chronic conditions that accompany old age. In order to target the detrimental effects of chronic health conditions and enhance successful aging outcomes, psychoeducation surrounding the importance of chronic illness as a risk factor for depression will be a necessary component of treatment, with an emphasis on the positive steps that can be taken to offset the risk conferred by health disparities. Importantly, although efforts at preventing the onset of chronic illnesses could be undertaken, chronic health conditions are

likely to have already developed for many individuals. In this case, where physical illness is already established, decreasing the associated risk for depression can be managed by targeting how individuals perceive their overall health status. Enhancing how an individual perceives their health status can be a useful way to limit the risk for depression. Positive perceived health status could be potentially facilitated by the use of cognitive-behavioral strategies that lead to more adaptive self-perceptions of health status and balanced beliefs regarding the level of impairment associated with their chronic conditions. This approach will likely be one that focuses on both acceptance and change, with these individuals recognizing their limitations while identifying areas of relative competence. In other words, perceived health status can by improving by focusing on areas where change is possible rather than areas where change is less likely to occur.

In terms of the protective factor of social support, maintaining individual's connections to their social support networks can help buffer the effects of chronic health illnesses on depression. In addition to making sure that individuals can maintain these valuable networks, efforts can be used to further expand their social networks. Another strategy could involve targeting obstacles that limit their social interactions or personal barriers that prevent them from effectively reaching out to people. Although the importance of instrumental and emotional support provided through relationships is highly important, it should also be recognized that an individual's perception of social support is more important than the actual support received. Given that quality (rather than quantity) of social support is a more influential in the prevention of depression, focusing on how an individual perceives the availability of their social support network may lead to more adaptive consequences than those simply provided by increasing the amount of available social support. Cognitive-behavioral strategies therefore appear useful in not only increasing engagement with social networks, but also in creating fundamental changes in how those networks are perceived.

Another identified protective factor against the development of depression in late life, especially among those with chronic comorbid illnesses, is the maintenance of personal mastery. For many, the functional impairment and lowered quality-of-life associated with medical illness can be greatly detrimental to their sense of mastery. In this regard, two strategies can be used to enhance personal mastery for these individuals: 1) treatment can focus on developing mastery over the management of their conditions, and 2) treatment can focus on sources of mastery that are not directly related to health. In the first strategy, gaining a heightened sense of efficacy over their medical condition can have the dual benefit of enhancing personal mastery and increasing treatment adherence. In the second strategy, identification of other sources of personal mastery can be useful in counterbalancing the loss of personal mastery associated with chronic illnesses. In this sense, treatment can help individuals realize that there are still areas of their life where they can be efficacious. Despite the detrimental effects chronic health conditions have on personal mastery, it will be useful to have individuals to not overemphasize how damaging these effects actually are. Importantly, increasing personal mastery has beneficial effects on perceived health status, especially in diseases marked by high impairment and loss of physical functioning.

Limitations and Generalizabilty

The primary limitation of the current study rests on the use of archival data (Wallace & Swaney, 2007) and secondary analyses. Given that the data have already been collected, the current analyses inherit the methodological short-comings of the parent study. In terms of sampling, the method used to collect participants may have resulted in a non-representative sample through sampling error or non-response bias. Older adults who completed the Coping in Later Life Survey may have different significantly from those who did not return the survey.

Another limitation of the Coping in Later Life Survey is the reliance on self-report data. These data are difficult to corroborate and are sensitive to multiple measurement issues (e.g., scale of measurement limitations, operationalization issues, order effects, response styles, response sets, cognitive biases, and subjectivity). As such, most of the measures may not measure constructs directly. However, research has revealed that individual's perceptions are often more important than their actual abilities or competencies, suggesting that asking respondents directly is an effective means of gauging important psychological constructs.

Another limitation of the current study is that we are limited to only those measures that were used in the original study. Given that the data were already collected, we are unable to test additional questions through the use of alternative or additional instruments. As such, we are unable to focus on the role of factors that were not originally assessed in the Coping in Later Life Survey. In addition, it is possible that other measures of a given construct may have been more informative than the measures selected by Wallace and Swaney (2007). Although the full three-step models (both linear and logistic) explained nearly 50% of the variance in CES-D scores, there are still a hsot of other potential variables than can explain depression scores beyond the demographic variables, physical health factors, and personal coping resources examined here. Further research can further explore and identify other explanatory factors for depression.

In terms of the outcome variable, it is important to recognize that CES-D scores do not necessarily correspond to clinical diagnoses of depression. The CES-D is not a stand-alone measure of depression. The CES-D is only intended to be a screening measure and requires a follow-up clinical interview to determine the presence of clinically significant symptomatology. As such, CES-D scores serve as a useful indicator of depressive symptoms, but high CES-D scores cannot be equated with an individual "being depressed." Although we have focused on the

CES-D, the results are most accurately conceptualized as endorsement of items on the CES-D, rather than being viewed as the actual presence of clinically significant depression levels.

A final consideration is the generalizability of these results to other American Indian populations. In general, given the significant between-group and within-group heterogeneity observed within AI tribal groups, it is possible that results from this study may not be applicable to other populations, especially those that do not share the basic demographics of the group under study (i.e., relatively younger, higher education levels, and higher income status). The current sample consisted primarily of younger individuals (e.g., older adults and young old), raising questions to whether these results would apply to the older age groups (e.g., middle old and oldest old). In addition, our sample was relatively higher in education and income status. It is unclear if these factors played a role in the resilience observed among this group. It is possible that American Indian groups with fewer resources related to income and education could have higher levels of depression. Given that the current analyses were conducted with one northwest American Indian reservation sample, it is possible that other factors such as cultural resources, regional differences, environmental limitations, and other unidentified differences from the current sample may change how these findings manifest in other American Indian tribal groups.

Overall, the key finding from the current study is that depression is not inevitably associated with older age in American Indian older adults and elderly. Although a minority will develop depression, resources can focus more on identifying those individuals who are not aging adaptively. Once identified, these individuals can be connected to the proper resources and social supports in the community. Effective interventions can be developed and implemented to offset the risks associated with chronic physical illnesses. Increasing controllability of their lives and enhancing meaningful social support can be used to offset adversity and enhance resilience.

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Appendix A

Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977)

Check the box (☑) for each statement that best describes how often you felt or behaved this way *during the past week*.

		Rarely or None of the Time (Less than 1 day)	**Some or a Little of the Time (1-2 days)**	**Moderate Amount of Time (3-4 days)**	**Most or All of the Time (5-7 days)**
1	I was bothered by things that usually do not bother me.	☐	☐	☐	☐
2	I did not feel like eating; my appetite was poor.	☐	☐	☐	☐
3	I felt that I could not shake off the blues even with help from my family and friends.	☐	☐	☐	☐
4	I felt that I was just as good as other people. (*)	☐	☐	☐	☐
5	I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐
6	I felt depressed.	☐	☐	☐	☐
7	I felt that everything I did was an effort.	☐	☐	☐	☐
8	I felt hopeful about the future. (*)	☐	☐	☐	☐
9	I thought my life had been a failure.	☐	☐	☐	☐
10	I felt fearful.	☐	☐	☐	☐
11	My sleep was restless.	☐	☐	☐	☐
12	I was happy. (*)	☐	☐	☐	☐
13	I talked less than usual.	☐	☐	☐	☐
14	I felt lonely.	☐	☐	☐	☐
15	People were unfriendly.	☐	☐	☐	☐
16	I enjoyed life. (*)	☐	☐	☐	☐
17	I had crying spells.	☐	☐	☐	☐
18	I felt sad.	☐	☐	☐	☐
19	I felt that people disliked me.	☐	☐	☐	☐
20	I could not get “going.”	☐	☐	☐	☐

Appendix B

CLLS Demographic Information (Coping in Later Life Survey; Wallace & Swaney, 2007)

Gender: ☐ Male ☐ Female

Marital Status: ☐ Married ☐ Single
☐ Widowed ☐ Separated
☐ Divorced

Date of Birth: _____
(Month) (Day) (Year) (Age)

Level of Education: ☐ Grade School (grades 1-6)
(Check highest ☐ Middle School (grades 7-9)
level attained) ☐ High School (grades 10-12)
☐ GED
☐ Vocational Education
☐ Some College Classes
☐ College Degree
☐ Post College Professional Degree
☐ Graduate, Medical or Law Degree

Average Annual ☐ Less than $7,500
Household Income: ☐ $7,500 to $14, 999
☐ $15,000 to $24,999
☐ $25,000 to $40,000
☐ Over $40,000

Do You Live: ☐ Alone ☐ With Friend(s)
(Check all ☐ With Spouse ☐ With Grandchild(ren)
that apply) ☐ With Child(ren) ☐ Other, Please specify:
☐ With Sibling(s) _____

Are you tribally enrolled? ☐ No ☐ Yes

Tribal Affiliation: _____

Number of Years Living on a Reservation(s): _____

Appendix C

CLLS Chronic Conditions Checklist (John, Kerby, & Hennessy, 2003)

Here is a list of medical conditions / physical ailments. Have you had any of these conditions *during the past 12 months*? Please check the box (☑) if you have.

	Condition
☐	High blood pressure
☐	Heart trouble
☐	Stroke
☐	Chronic bronchitis
☐	Asthma
☐	Arthritis or Rheumatism
☐	Epilepsy
☐	Diabetes
☐	Cancer
☐	Tuberculosis
☐	Stomach ulcer / duodenal ulcer
☐	Chronic gallbladder problems
☐	Chronic liver problems
☐	Frequent cramps in the legs
☐	Pain in the heart or tightness in the chest
☐	Trouble breathing or shortness of breath
☐	Swollen Ankles
☐	Pains in the back or spine
☐	Frequent pains in the stomach
☐	Frequent headaches
☐	Constant coughing or frequent chest colds
☐	Paralysis of any kind
☐	Stiffness, swelling, or aching in any joint or muscle
☐	Getting very tired in a short time
☐	Difficulty seeing
☐	Trouble eating or chewing because of gum disease or tooth loss
☐	Urinary tract disorders or bladder control problems
☐	Trouble hearing
☐	Other, please specify:

Appendix D

CLLS Self-Reported Health (Harris, Pederson, Stacey, McClearn, & Nesselroade, 1992)

1) Please state below how much exercise you get. Which answer applies to you the best if you consider the year as a whole?

- ☐ I hardly get any exercise at all
- ☐ I get some exercise, but not a lot
- ☐ I exercise an average amount
- ☐ I get a lot of exercise

2) How would you rate your general health status?

- ☐ Good
- ☐ Reasonable
- ☐ Poor

3) How would you rate your present health status compared to five years ago?

- ☐ Better
- ☐ About the same
- ☐ Worse

4) How would you rate your health status compared to others in your age group?

- ☐ Better
- ☐ About the same
- ☐ Worse

5) Do you think your health prevents you from doing things you would like to do?

- ☐ Not at all
- ☐ Partly
- ☐ To a great extent

6) Would you say that you have more or less energy than most people your age?

- ☐ Less
- ☐ About the same
- ☐ More

Appendix E

Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988)

Below are statements about your personal experience. For each statement indicate the extent of our agreement by checking the appropriate box (☑).

		Very Strongly Agree	Strongly Agree	Agree	Agree Somewhat & Disagree Somewhat	Disagree	Strongly Agree	Very Strongly Disagree
1	There is a special person who is around when I am in need.	☐	☐	☐	☐	☐	☐	☐
2	There is a special person with whom I can share my joys and sorrows.	☐	☐	☐	☐	☐	☐	☐
3	My family really tries to help me.	☐	☐	☐	☐	☐	☐	☐
4	I get the emotional help and support I need from my family.	☐	☐	☐	☐	☐	☐	☐
5	I have a special person who is a real source of comfort to me.	☐	☐	☐	☐	☐	☐	☐
6	My friends really try to help me.	☐	☐	☐	☐	☐	☐	☐
7	I can count on my friends when things go wrong.	☐	☐	☐	☐	☐	☐	☐
8	I can talk about my problems with my family.	☐	☐	☐	☐	☐	☐	☐
9	I have friends with whom I can share my joys and sorrows.	☐	☐	☐	☐	☐	☐	☐
10	There is a special person in my life who cares about my feelings.	☐	☐	☐	☐	☐	☐	☐
11	My family is willing to help me make decisions.	☐	☐	☐	☐	☐	☐	☐
12	I can talk about my problems with my friends.	☐	☐	☐	☐	☐	☐	☐

Appendix F

Pearlin Mastery Scale (PMS; Pearlin, Menaghan, Lieberman, & Mullan, 1981)

Please check the box (☑) under the answer that comes the closest to the way you feel about the statement.

		Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
1	There is really no way I can solve some of the problems I have.	☐	☐	☐	☐
2	Sometimes I feel that I am being pushed around in my life.	☐	☐	☐	☐
3	I have little control over the things that happen to me.	☐	☐	☐	☐
4	I can do just about anything I really set my mind to. (*)	☐	☐	☐	☐
5	What happens to me in the future mostly depends on me. (*)	☐	☐	☐	☐
6	I mostly feel helpless in dealing with the problems in life	☐	☐	☐	☐
7	There is little I can do to change many of the important things in my life.	☐	☐	☐	☐

Appendix G

Communal Mastery Scale (CMS; Hobfoll, Schroder, Wells, & Malek, 2002)

Below are statements about your personal experience. For each statement, indicate the extent of your agreement by checking the appropriate box (☑).

		Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
1	By joining with friends and family, I have a great deal of control over the things that happen to me.	☐	☐	☐	☐
2	Working together with friends and family, I can solve many of the problems I have.	☐	☐	☐	☐
3	There is little I can do to change many of the important things in my life, even with the help of my family and friends. (*)	☐	☐	☐	☐
4	Working together with people close to me, I can overcome most of the problems I have.	☐	☐	☐	☐
5	What happens to me in the future mostly depends on my ability to work well with others.	☐	☐	☐	☐
6	I can do just about anything I set my mind to do because I have the support of those close to me.	☐	☐	☐	☐
7	With the help of those close to me, I have more control over my life.	☐	☐	☐	☐
8	What happens to me in the future most depends on my being supported by friends, family, or colleagues.	☐	☐	☐	☐
9	I can meet my goals by helping others meet their goals.	☐	☐	☐	☐
10	Friends, family, and colleagues mainly get in the way of my accomplishing goals. (*)	☐	☐	☐	☐

Table 1

Intercorrelations Between Outcome and Predictor Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Depression (continuous)	-										
2. Depression (binary)	.836***	-									
3. Gender	-.177*	-.179*	-								
4. Annual Income	-.296***	-.275***	.102	-							
5. Education Level	-.284***	-.195*	.011	.293***	-						
6. Marital Status	-.255**	-.231**	.261***	.468***	.022	-					
7. Chronic Health Conditions	.488***	.393***	-.250**	-.199*	-.019	-.187*	-				
8. Perceived Health Status	-.449***	-.371***	.121	.383***	.109	.185*	-.504***	-			
9. Social Support (MSPSS)	-.298***	-.236**	-.013	.200*	.102	.163*	-.079	.022	-		
10. Personal Mastery (PMS)	-.497***	-.438***	.116	.231**	.246**	.284***	-.132*	.272**	.347	-	
11. Communal Mastery (CMS)	-.246**	-.192*	-.050	.204*	.082	.172*	-.014	.262**	.411***	.484***	-

Note: *$p < .05$, **$p < .01$, ***$p < .001$

Table 2

Hierarchical Linear Regression Results: Model Summary

Model	R^2	R^2_{change}	$F_{change}(df^1, df^2)$	p
Block 1[a] (Demographic Predictors)	.177	.177	8.178 (4, 152)	* $p < .001$
Block 2[b] (Physical Health Factors)	.379	.202	24.396 (2, 150)	* $p < .001$
Block 3[c] (Personal Coping Resources)	.485	.106	10.125 (3, 147)	* $p < .001$

Note: Total CES-D scores were transformed using a square root function to meet statistical assumptions

Note: a. Gender, Income Level, Education Status, Marital Status

b. Gender, Income Level, Education Status, Marital Status, Chronic Health Conditions, Self-Reported Health

c. Gender, Income Level, Education Status, Marital Status, Chronic Health Conditions, Self-Reported Health, Social Support (MSPSS), Personal Mastery (PMS), and Communal Mastery (CMS)

Table 3

Linear Regression Results: Individual Predictors

Variable	*B*	*SE*	*β*	*p*
Block 1				
Gender	-.337	.230	-.111	.146
Income Level	-.148	.101	-.131	.147
Education Status	-.768	.237	-.254	.001 **
Marital Status	-.481	.263	-.161	.069
Block 2				
Gender	-.068	.206	-.023	.741
Income Level	.026	.094	.023	.784
Education Status	-.823	.207	-.272	.000 ***
Marital Status	-.465	.230	-.156	.045 *
Chronic Conditions	.143	.032	.337	.000 ***
Self-Reported Health	-.113	.040	-.220	.006 **
Block 3				
Gender	-.077	.192	-.025	.689
Income Level	.043	.088	.038	.628
Education Status	-.610	.197	-.202	.002 **
Marital Status	-.215	.217	-.072	.325
Chronic Conditions	.140	.030	.331	.000 ***
Self-Reported Health	-.091	.039	-.177	.022 *
Social Support (MSPSS)	-.021	.009	-.164	.018 *
Personal Mastery (PMS)	-.124	.035	-.265	.000 ***
Communal Mastery (CMS)	.002	.030	.004	.955

Note: Total CES-D scores were transformed using a square root function to meet statistical assumptions
Note: *$p < .05$, **$p < .01$, ***$p < .001$

Table 4

Logistic Regression Results: Standard CES-D Cut-off Score (≥ 16)

Variable	*B*	*Wald*	*p*	*OR*	*CI (95%)*
Block 1					
Gender	-.702	2.846	.092	.495	.22 - 1.12
Income Level	-.772	3.082	.079	.462	.20 - 1.09
Education Status	-.713	3.170	.075	.490	.22 - 1.07
Marital Status	-.582	1.663	.197	.559	.23 - 1.35
Block 2					
Gender	-.433	.864	.353	.649	.26 - 1.62
Income Level	-.235	.227	.633	.790	.30 - 2.08
Education Status	-.973	4.807	.028 *	.378	.16 - .902
Marital Status	-.650	1.749	.186	.522	.20 - 1.37
Chronic Conditions	.169	6.557	.010 *	1.184	1.04 - 1.35
Self-Reported Health	-.191	4.860	.027 *	.827	.70 - .98
Block 3					
Gender	-.308	.366	.545	.735	.27 - 1.99
Income Level	-.248	.206	.650	.780	.27 - 2.28
Education Status	-.585	1.375	.241	.557	.21 - 1.48
Marital Status	-.126	.052	.819	.882	.30 - 2.58
Chronic Conditions	.189	5.709	.017 *	1.208	1.03 - 1.41
Self-Reported Health	-.192	3.615	.057	.825	.68 - 1.01
Social Support (MSPSS)	-.034	2.443	.118	.967	.93 - 1.01
Personal Mastery (PMS)	-.366	11.498	.001 **	.694	.56 - .86
Communal Mastery (CMS)	.063	.595	.441	1.065	.91 - 1.25

Note: CES-D scores were dichotomized into 2 groups: *asymptomatic* (CES-D ≤ 15) and *symptomatic* (CES-D ≥ 16)
Note: *$p < .05$, **$p < .01$, ***$p < .001$

Table 5

Logistic Regression Results: Alternative CES-D Cut-off Score (≥ 24)

Variable	*B*	*Wald*	*p*	*OR*	*CI (95%)*
Block 1					
Gender	.711	2.921	.087	2.035	.90 - 4.60
Income Level	.747	2.871	.090	2.111	.89 - 5.01
Education Status	.702	3.080	.079	2.018	.92 - 4.42
Marital Status	.605	1.790	.181	1.832	.76 - 4.45
Block 2					
Gender	.119	.032	.858	1.127	.30 - 4.18
Income Level	.140	.038	.845	1.150	.28 - 4.70
Education Status	.763	1.551	.213	2.144	.65 - 7.12
Marital Status	.299	.182	.670	1.348	.34 - 5.31
Chronic Conditions	.124	2.492	.114	1.132	.97 - 1.32
Self-Reported Health	-.447	11.128	.001 **	.640	.49 - .83
Block 3					
Gender	-.226	.076	.782	.798	.16 - 3.96
Income Level	.999	1.163	.281	2.715	.44 - 16.6
Education Status	-.430	.287	.592	.650	.14 - 3.14
Marital Status	-1.053	1.280	.258	.349	.06 - 2.16
Chronic Conditions	.080	.605	.437	1.084	.86 - 1.33
Self-Reported Health	-.647	9.178	.002 **	.524	.34 - .80
Social Support (MSPSS)	-.033	.616	.433	.968	.89 - 1.05
Personal Mastery (PMS)	-.759	14.628	.000 ***	.468	.32 - .69
Communal Mastery (CMS)	.243	3.005	.083	1.275	.97 - 1.68

Note: CES-D scores were dichotomized into 2 groups: *asymptomatic* (CES-D ≤ 23) and *symptomatic* (CES-D ≥ 24)
Note: *$p < .05$, **$p < .01$, ***$p < .001$

Table 6

Logistic Regression Results: Alternative CES-D Cut-off Score (≥ 28)

Variable	*B*	*Wald*	*p*	*OR*	*CI (95%)*
Block 1					
Gender	1.262	2.302	.129	3.532	.69 -18.03
Income Level	.741	.877	.349	2.097	.45 - 9.88
Education Status	1.182	2.616	.106	3.261	.78 -13.65
Marital Status	-.105	.018	.894	.900	.19 - 4.25
Block 2					
Gender	.902	1.009	.315	2.465	.42 -14.33
Income Level	.231	.062	.804	1.260	.20 - 7.82
Education Status	1.433	3.232	.072	4.193	.88 -20.01
Marital Status	-.166	.036	.849	.847	.15 - 4.71
Chronic Conditions	.188	4.271	.039 *	1.207	1.01 - 1.44
Self-Reported Health	-.191	1.516	.218	.826	.61 - 1.12
Block 3					
Gender	.711	.533	.465	2.036	.30 -13.73
Income Level	.732	.459	.498	2.080	.25 -17.29
Education Status	.967	.923	.337	2.630	.37 -18.91
Marital Status	-1.086	1.012	.314	.338	.04 - 2.80
Chronic Conditions	.189	3.269	.071	1.208	.98 - 1.48
Self-Reported Health	-.123	.442	.506	.884	.62 -1.27
Social Support (MSPSS)	-.009	.054	.816	.991	.92 - 1.07
Personal Mastery (PMS)	-.465	8.458	.004 **	.628	.46 - .86
Communal Mastery (CMS)	.115	.761	.383	1.121	.87 - 1.45

Note: CES-D scores were dichotomized into 2 groups: *asymptomatic* (CES-D ≤ 27) and *symptomatic* (CES-D ≥ 28)
Note: *$p < .05$, **$p < .01$, ***$p < .001$

Table 7

Logistic Regression Results: Comparisons Across Alternative CES-D Cut-off Scores

Cut-off Score	*CES-D ≥ 16*			*CES-D ≥ 24*			*CES-D ≥ 28*		
	% Correct Classification			% Correct Classification			% Correct Classification		
Constant-Only Model	0[a]	1[b]	Total[c]	0	1	Total	0	1	Total
	100.0	0.0	72.6%	100.0	0.0	87.9%	100.0	0.0	93.0%
Block 1 (Demographic Predictors)	0	1	Total	0	1	Total	0	1	Total
	93.0	27.9	75.2%	100.0	0.0	87.9%	100.0	0.0	93.0%
Block 2 (Physical Health Factors)	0	1	Total	0	1	Total	0	1	Total
	93.0	46.5	80.3%	97.8	21.1	88.5%	99.3	27.3	94.3%
Block 3 (Personal Coping Resources)	0	1	Total	0	1	Total	0	1	Total
	92.1	58.1	82.8%	97.8	57.9	93.0%	99.3	45.5	95.5%

Note: a. "0" refers to the correct percentage of individuals classified as *asymptomatic* (i.e., were below the cut-off)
b. "1" refers to the correct percentage of individuals classified as *symptomatic* (i.e., exceeded the cut-off)
c. "Total" refers to the overall prediction success rate based on the set of predictors at each step of the model