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# The Impact of Depression on Long-Term Care Needs and Utilization

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The Impact of Depression on Long Term Care Needs and Utilization

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## Introduction

The population of the United States will soon experience a dramatic rise in its older population. This rise is largely attributed to increased life expectancy and the aging baby boomer generation.[1] The first baby boomers will turn 65 years old in 2011 with the last turning 65 in 2030.[1] By 2030, one in five individuals will be 65 years or older. [2] Put another way, the 65 and older population is expected to double (38.7 million to 88.5 million) and the 85 and older population expected to triple (5.4 to 19 million) between 2008 and 2050.[2] This trend towards an older population will result in a populace with greater chronic conditions, cognitive impairment, and disability.[3] Consequently, there will be a much greater need for health care and long-term care services to sustain the health and functional independence of the population.

In the United States, over 10 million people required long-term care services in 2000. This number is predicted to more than double to 27 million people by 2050.[3,4] This projected increase in long-term care needs, coupled with barriers[5] to obtaining care (e.g., inability to pay for care, inability to access quality care), reinforce the importance of addressing the nation's long-term care needs.

An important part of preparing for and potentially addressing the projected increase in long-term care needs would be to identify a subgroup of the population at increased risk for high resource utilization. It has been documented that mental illness, in particular depressive illness, is associated with health care utilization (e.g., primary care visits, ED visits, and hospitalizations). However, there is a paucity of research available

regarding the effects of mental illness on long-term care utilization (e.g., home health care, institutional care).

This study will focus on the impact of a positive depression screen, an indicator of depressive illness, on long-term care needs and utilization. Depressive illness, in particular Major Depressive Disorder (MDD), has been shown to be associated with functional impairment and increased health care utilization.[6,7] Furthermore, the epidemiologic characteristics of depressive illness merit attention and intervention. MDD is a common mental illness with a lifetime prevalence estimated at 16%.[8] Furthermore, depressive illness often goes under recognized and under-treated.[8,9] An understanding of the relationship between depressive illness and long-term care outcomes (i.e., needs and utilization) would reveal a subgroup of the population at risk for high utilization of long-term care services. Knowledge of such a high utilizing group would allow preparation for future long-term care needs as well as provide a target for intervention to decrease the burden on long-term care resources. Secondary data from the Connecticut Long-Term Care Needs Assessment (2007),[10] a cross-sectional survey of Connecticut residents, will be utilized to investigate the relationship between a positive depression screen and the outcomes of long-term care needs and utilization.

## Background

### *I. Long-Term Care*

Long-term care (LTC) refers to a wide range of services used to meet the health and functional needs of individuals over an extended period of time.[11,12] Individuals requiring long-term care are typically limited due to chronic illness, disability, or

trauma.[11] Although services provided include medical and non-medical care, much of long-term care consists of services aimed at providing assistance with the functional activities necessary for life and independence.[5] Functional activities can range from basic activities of daily living (ADLs) to more advanced instrumental activities of daily living (IADLs).[13] ADLs are basic activities necessary for physical independence. ADLs include eating, bathing, toileting, dressing, transferring, and ambulating.[14] IADLs are more advanced activities necessary for independence in the community.[15] IADLs include financial management, medication management, transportation use, meal preparation, shopping, housework, and using the telephone.[16] The long-term care services addressing these needs can be direct (e.g., home health aide) or indirect (e.g., reminders or prompts). Additional services include therapy and assistive equipment (e.g., walkers, grab-bars) aimed at increasing functional capabilities.[5]

Long-term care services can be provided in a variety of settings including the home, community, residential living, and institutional living.[12] Approximately 80% of individuals requiring long-term care live at home or in the community.[17] Long-term care providers include informal and formal caregivers. Informal caregivers (e.g., family members and friends) are the most common, providing up to 80% of home and community care.[3,13] Formal care is typically delivered by home health aides, personal care assistants, and certified nursing assistants.[5]

Individuals of any age may need long-term care. However, the risk of such need increases with age. Thus, older adults (i.e., 65 years old and older) account for the majority of individuals needing long-term care and make up an estimated 63% of the population requiring long-term care.[5] This can be largely attributed to the effects of

chronic conditions (e.g., hypertension, heart disease, arthritis, hearing loss, and ocular disorders) leading to disability and functional impairment.[18]

*II. Depression in the Elderly*

Depression is a broad term encompassing several clinical disorders including major depressive disorder (also known as major depression or unipolar depression), minor depressive disorder (also known as minor depression or subsyndromic depression), and dysthymic disorder. Each disorder has specific diagnostic criteria defined by the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). [19] The criteria for two of the most common depressive illnesses, major depressive disorder and minor depressive disorder, will be detailed in a forthcoming section of this thesis.

*A. Depressive Disorders*

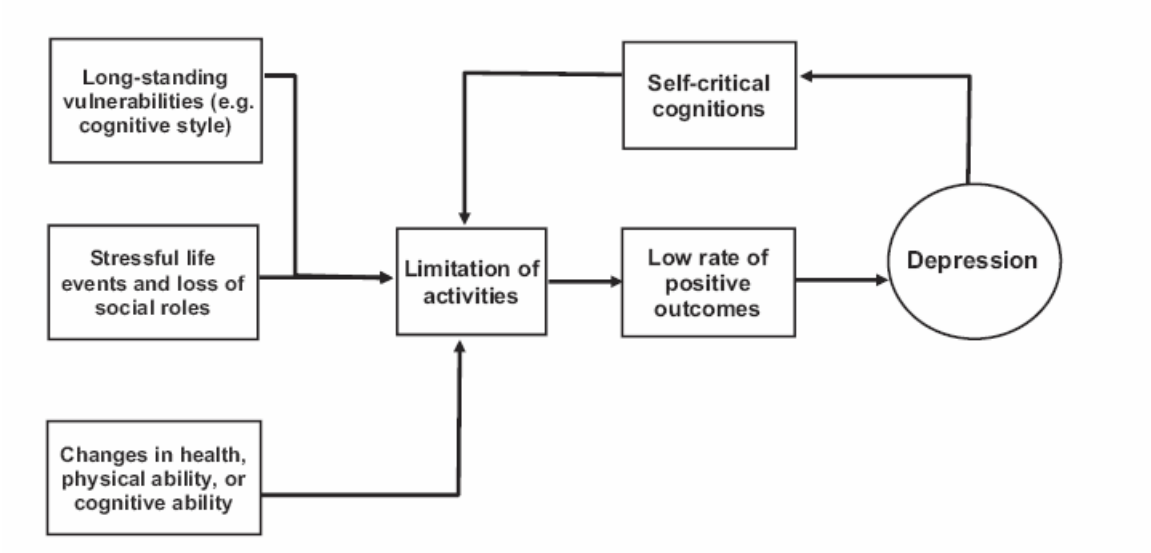
Major depressive disorder and minor depression are two of the most commonly diagnosed psychiatric disorders in the elderly population.[20] Although the prevalence of major depressive disorder among community-dwelling elderly is relatively low, ranging from 1% to 5%,[21] prevalence increases significantly for hospitalized and institutionalized elders. Prevalence of depression in older patients hospitalized for medical reasons ranges from 10 to 15%.[21] Prevalence of depression for older residents of long-term care facilities ranges from 14 to 42%.[21] The prevalence of minor depression (i.e., subsyndromal or subthreshold depression) ranges from 4 to 13% of the community-dwelling older adult population. [22,23,24]

*B. Etiology of Depression*

The time of onset of depression, whether occurring in early life or in late life is thought to be indicative of risk factors for depression.[21] For example, family history is more strongly associated with early-onset depression than late-onset depression.[21] Vascular risk factors (e.g., history of cerebrovascular disease) are more strongly associated with late-onset depression.[21]

The etiology of late life depression is thought to be multifactorial. Biological factors (e.g., normal aging, chronic disease), psychological factors (e.g., stressful life events), and psychosocial factors (e.g., functional decline, social isolation) are all thought to play a role in depression of older adults.[21,27] Fiske *et al.* describe the onset of depression in late-life as an "interaction between certain vulnerabilities, including genetic factors, cognitive diathesis, age-associated neurobiological changes, and the types of stressful events that occur with greater frequency in late life than earlier in the life span."[21(p368)] Fiske *et al.* further define a behavioral model[21] (Figure 1) describing the factors involved in the onset and maintenance of late-life depression. In this model, multiple risk factors cause a person to become less engaged in life activities. This decline in activity decreases social engagement and the opportunity for positive outcomes, leading an individual to become depressed. Further, depressed individuals are often less social and more self-critical.[21] These traits reinforce a withdrawal from stimulating activities.

**Figure 1. Behavioral Model of the Onset and Maintenance of Late-Life Depression (**from Fiske *et al.*[21]**)**




*C. Diagnosis of Depression*

*1. DSM-IV Criteria for Major Depressive Disorder*

The DSM-IV criteria[19] define (Table 1) Major Depressive Disorder (MDD) as being "characterized by one or more Major Depressive Episodes (i.e., at least 2 weeks of depressed mood or loss of interest accompanied by at least four additional symptoms of depression)."[19(p327)] Further, these symptoms must "cause clinically significant distress or impairment in social, occupational, or other important areas of functioning."[19(p327)] Symptoms that meet the criteria for a mixed episode (i.e., criteria for both manic and depressive episodes are met simultaneously) are excluded from diagnosis as major depressive disorder.[19] Symptoms secondary to a general medical condition, substance, or bereavement also exclude the diagnosis of major depressive disorder.[19]

**Table 1. DSM-IV Criteria[19] for Major Depressive Episode (MDE)**

To meet the criteria for a MDE, ≥5 of the following symptoms must have been present nearly every day for the same two week period. At least one of the symptoms has to include either 1) a depressed mood or 2) loss of interest or pleasure.

1) Depressed mood most of the day
2) Diminished interest or pleasure in all or most activities
3) Significant weight loss or gain or significant change in appetite
4) Insomnia or hypersomnia most days
5) Psychomotor agitation or retardation
6) Fatigue or loss of energy
7) Feelings of worthlessness or excessive or inappropriate guilt
8) Diminished ability to think or concentrate
9) Recurrent thoughts of death or suicidal ideation or suicide attempt

*2. DSM-IV Criteria for Minor Depressive Disorder*

Minor depressive disorder is not recognized with a clinical diagnostic category in the DSM-IV. Instead, minor depressive disorder is classified in the DSM-IV Appendix: Criteria Sets and Axes Provided for Further Study.[19] Disorders included in this section do not have enough information supporting inclusion as an official DSM-IV category and are consequently described using research criteria "to provide a common language for researchers and clinicians who are interested in studying these disorders."[19(p703)] Having said this, the DSM-IV describe minor depressive disorder as being "one or more periods of depressive symptoms that are identical to Major Depressive Episodes in duration, but which involve fewer symptoms and less impairment."[19(p719)] As in Major Depressive Disorder, diagnosis requires either 1) a depressed mood or 2) loss of interest or pleasure. At least one, but fewer than four additional symptoms (Refer to Table 1) must be present. Symptoms must cause clinically significant impairment in one of life's major functional areas (e.g., occupation). Notably, individuals can present with near-normal function by

putting forth increased effort to compensate for their symptoms.[19] Symptoms due to a general medical condition, substance, or bereavement exclude the diagnosis of minor depression. History of a "Major Depressive, Manic, Mixed, or Hypomanic Episode"[19(p719)] excludes the diagnosis of minor depression. Additionally, symptoms must not meet the criteria for Dysthymic or Cyclothymic Disorder and cannot occur exclusively in the presence of a psychotic disorder (e.g., schizophrenia).[19]

Despite the existence of the DSM-IV research criteria, the actual criteria used to define *minor depression* in the research literature is varied. This variation is largely due to the "existing clinical and semantic overlap"[25(p243)] of the various forms of non-major depression . For example, the term *minor depression* is often used to denote all forms of depression that do not meet criteria for MDD.[25] As a consequence of this ambiguity, drawing conclusions from various studies regarding the epidemiologic and clinical characteristics of minor depressive disorder can be difficult.

*3. Diagnostic Characteristics Particular to Geriatric Depression*

The diagnosis of depression in the elderly is often complicated by a number of factors including the presence of multiple comorbid conditions, polypharmacy, and altered clinical presentation.[21,26] In particular, illnesses causing pain or cognitive dysfunction often disguise or distract from the diagnosis of depression.[26] Furthermore, elderly patients are less likely to display affective components of their illness or report the emotional components of their condition.[21,27] Instead, older adults often present with anxiety, anhedonia, memory impairment, or somatic complaints (e.g., headache, dizziness, chest pain, joint pain, abdominal pain, gastrointestinal complaints, and sexual

dysfunction).[27,28] Due to the complexity in diagnosing depression in the elderly, the illness is often underestimated, misdiagnosed, and inadequately managed.[26]

*D. Sequelae of Depression*

*1. Sequelae of Major Depressive Disorder*

Major Depressive Disorder (also known as major depression) often follows a chronic and remitting course,[22] although continuous chronic depression also occurs.[27] Depression is associated with significant morbidity and mortality.[20] Depression has been shown to have a negative impact on a variety of medical conditions. Depression is a risk factor for and negative contributor to cardiovascular disease including coronary artery disease and heart failure.[22] Depression is associated with greater reporting of diabetes symptoms, decreased adherence to diabetes treatment and management regimens, and decreased physical function.[29] Depression is also associated with cognitive decline in the community-dwelling elderly.[30] Other sequelae of depression include weight loss, osteoporosis, and poor self-rated health.[22] In addition to these effects on comorbid illness, depression has a significant effect on mortality. In a recent review of the literature, depression was associated with non-suicide geriatric mortality in 72% of 61 studies examined.[31]

*2. Sequelae of Minor Depressive Disorder*

Less is understood regarding the sequelae and natural history of minor depressive disorder as compared to MDD. Various studies of older adults have shown minor depression to be associated with increased morbidity, mortality, and non-mental health service use.[24,25,32] A recent study of adults age 60 and older found those with minor

depression to be at increased risk for developing major depression at one year as well as increased functional impairment when compared to non-depressed individuals.[33] The minor depression group included those meeting the DSM-IV criteria for dysthymic disorder, those with clinically significant depressive symptoms not meeting the criteria for dysthymic disorder or minor depression (per DSM-IV), and those who had minor depression as defined by the PROSPECT criteria (four threshold depressive symptoms, a Hamilton Depression Rating Scale score of 10 or higher, and a symptom duration of four weeks or more).[33]

*E. Treatment of Depression in Older Adults*

*1. Treatment of Major Depressive Disorder*

Treatment of depression includes multiple modalities such as psychotherapy, pharmacologic therapy, and electroconvulsive therapy. Psychotherapy includes multiple intervention types such as behavioral therapy, cognitive-behavioral therapy, and bibliotherapy.[21] Pharmacotherapy involves several classes of drugs including selective serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants (TCAs), and monoamine oxidase inhibitors (MAOIs). Randomized control trials have shown similar efficacy among the SSRIs, TCAs, and MAOIs for treatment of older people.[21] Electroconvulsive therapy (ECT) is an efficacious treatment alternative for depression, but one with the potential for severe side effects including cardiac complications and memory loss. Therefore, ECT is reserved for severe forms of major depression that are deemed life-threatening.[21]

Expert Consensus (2001) recommends a combination of antidepressant and psychotherapy for treatment of mild and severe depression in older patients.[34] This recommendation is supported by two randomized control trials that found the combination of antidepressant therapy and psychotherapy to be more efficacious than either therapy alone for treating depression in older adult patients.[35,36]

A recent review[37] of the literature compared the effects of psychosocial interventions (e.g., systems of care, psychotherapy, psychoeducation) to that of usual care (i.e., care provided by a primary care physician) for the treatment of depressed older adults. Integrated models of care (i.e., multidisciplinary models where each discipline operated independently) and interdisciplinary care (i.e., coordinated care with each discipline) both result in greater improvement of depressive symptoms compared to usual care.[37]

*2. Treatment of Minor Depressive Disorder*

Appropriate treatment for minor depressive disorder has not been clearly defined. A recent paper[38] reviewed the findings of ten randomized treatment trials for minor depression and found little evidence among these trials for the effectiveness of antidepressants and counseling while brief, nonpharmacologic interventions were found to have the largest effect sizes (i.e., the difference in proportions that responded/remitted to the intervention v. the control group). Minor depression was defined in eight of the studies using the DSM-IV criteria, but without the exclusion criteria of a history of MDD. Two of the trials used the Research Diagnostic Criteria defined as: 1) a clear cut episode; 2) without the full depressive syndrome of MDD; 3) persistent, depressed mood

dominates; 4) not limited by number of symptoms, includes 16 additional possible symptoms).[38] Trial participants varied in age (mean 38 to 71 years old) and gender (range of 41 to 87% women). Interventions for depression also varied among trials. Interventions included cognitive-behavioral therapy, interpersonal-based therapy, antidepressants, and exercise. Treatment times varied from 6 to 24 weeks among the trials.[38]

*3. Additional Considerations Regarding Treatment of Geriatric Depression*

Additional factors must be considered when treating depression in older adults including the presence of multiple medical and psychiatric comorbidities, polypharmacy, compliance issues, and preference for care.[1,34] Notably, there is evidence that primary care patients, in a study of patients age 17 and older, prefer psychotherapy to pharmacotherapy.[39]

*F. Screening for Depression*

Multiple screening instruments have been validated to screen for depression. These instruments range in length, complexity, and accuracy.[40] Some of the more complex screens[40] include the Beck Depression Inventory[41], Hamilton Depression Rating Scale[42], Zung Self-Rating Depression Scale[43], and Center for Epidemiologic Studies Depression Scale[44] (CES-D). Due to their length and complexity, these scales are primarily used for research and treatment response monitoring.[40] More widely used instruments include the Geriatric Depression Scale[45], General Health Questionnaire[46], and the two-item PRIME MD[47] (Primary Care Evaluation of Mental Disorders Procedure).

*III. Depression in the Literature*

In the literature, the term *depression* is frequently used in a nonspecific manner to signify depressive disorders (e.g., major or minor depression) and depressive symptoms. As such, unless otherwise indicated, the term *depression* will be used nonspecifically to include depressive disorders and depressive symptoms in the following literature review. Additionally, studies across the literature have used a variety of methods to assess for depressive disorders and symptoms. These methods include screening questionnaires, diagnostic interview, and diagnostic coding by clinicians.

*IV. Depression and Health Care Utilization*

The impact of depression and other mental illnesses on health care utilization and health care costs has been well documented in the literature. A recently published (2007) review[7] identified 11 studies published from 1990 through 2005 demonstrating the finding of increased high health care utilization among depressed individuals. Many of the studies used health care costs as a proxy for health care utilization, finding such costs to be significantly increased in the depressed population.[7]

Further studies support the relationship between depression, in addition to other mental illnesses, with health care utilization. Pearson *et al.*[48] showed that a large percentage of high medical care utilizers suffered from major depression that was either undiagnosed or inadequately treated. In this study of age 25 to 63 year olds, high utilizers were defined as having had seven or more ambulatory visits per year for the previous two years.[48] Similar results were found in a case-control study[49] where high utilizers of health care were found to have increased rates of depressive disorder, anxiety,

and addictive disorders. This study defined high utilizers as individuals with a total number of primary care visits two standard deviations above the mean.[49] In a study[50] of age 18 and older Medicaid patients, affective (e.g., manic, bipolar disorders), anxiety, schizophrenic, and paranoid disorders were associated with increased use of outpatient services including primary care and emergency department visits.

Given the high prevalence of and interaction between depression and comorbid illness, particularly in older adults, recent studies have focused on the effects of depression in individuals with chronic disorders. One such study[51] utilized the 1999 National Health Interview Survey of over 30,000 adults. The presence of major depression and a chronic condition were found to be associated with greater ambulatory and emergency department visits when compared to individuals with only a chronic condition. Chronic conditions included hypertension, diabetes, coronary artery disease, congestive heart failure, stroke, chronic obstructive pulmonary disease, and end-stage renal disease.[51] A study[52] of adult primary care patients with osteoarthritis showed that those with concomitant depression were more likely to visit their general practitioner, visit their orthopedist, and obtain x-ray services compared to individuals with osteoarthritis alone.

While the aforementioned studies support the relationship between depression and increased health care utilization, this finding is not unequivocal, as some studies have shown an absence or opposite effect. Fogerty *et al.*[53] found only minor depression to be associated with an increase in primary care visits. Otherwise, neither major nor minor depression was associated with increased health care usage defined as primary care visits, emergency department visits, and nonpsychiatric hospitilizations.[53] A study[54] of

Veterans Affairs patients found that those age 50 and older with a diagnosis of depressive, bipolar, anxiety, posttraumatic stress, and substance abuse disorders were less likely to utilize medical care, defined as primary care and specialty care visits. A study[55] of primary care patients, age 17 and older, found depression to be associated with inconsistent utilization (i.e., cancellations and no-shows) of primary care services over a two year period.

*V. Depression and Health Care Utilization in the Elderly*

Several studies have investigated the effects of depression on health care utilization particular to the older adult population. Some of these studies date from the 1980s.[56,57,63] In a study[56] of older adults from senior centers, depression was associated with significantly more general practitioner visits than for individuals without depression. Depression was assessed using Zung's Self-rating Depression Scale. Notably, those with the greatest number of depressive symptoms averaged nearly four times as many general practitioner visits per year as those with the fewest depressive symptoms.[56] A Veterans Affairs (VA) study[57] found depressed individuals to use greater outpatient services (e.g., private practitioner visits, emergency department visits, and walk-in services), but did not find a correlation with depression and primary care visits. This study also used the Zung Self-Rating Depression Scale to assess depression.[57]

More recent studies[58-68] also support the relationship between geriatric depression and health care utilization. In a study[58] of primary care patients age 65 and older, depression assessed via physician diagnosis was associated with increased outpatient service use (e.g., appointments, laboratory tests, consultations) independent of medical

comorbidities. Similar findings were found in a nationwide epidemiologic study[59] of Italian elder primary care patients. This study found depression, assessed with a general health questionnaire, to be associated with frequent primary care visitation independent of comorbid illness and somatic complaints.[59] Longitudinal studies,[60,61] where medical utilization was followed over time, have further supported the association between geriatric depression and increased outpatient service use. Depression was assessed with the Center for Epidemiologic Studies Depression Scale and Geriatric Depression Scale/Diagnostic Interview Schedule in these studies.[60,61] A retrospective study[62] by Koenig *et al.* reported that depressed hospitalized patients were likely to have had more inpatient and outpatient service utilization in the year prior to the current admission. Depression was assessed with the CES-D, Hamilton Depression Rating Scale, and National Institute of Mental Health Diagnostic Interview Scale in this study.[62]

In addition to the use of outpatient services described above, utilization of inpatient resources has also been investigated. A VA study[63] of elderly inpatients found that patients with depression, assessed by the Geriatric Depression Scale, had longer hospital stays than patients without depression. In a cohort of community-dwelling older adults, depressive symptoms measured by the CES-D were associated with increased risk of hospitalization for men age 75 and older independent of comorbid illness including heart disease, stroke, cancer, diabetes, and hypertension.[64]

In light of the interaction between depression and cardiovascular disease,[22] Blanchette *et al.*[65] investigated the effects of depression following a thromboembolic event (TEE) such as heart attack or stroke in Medicare patients 65 and older. Depression, identified via International Classification of Diseases (9$^{th}$ Revision, Clinical Modulation)

Codes, was considered related to the TEE if it was recorded within six months of having the TEE. The study reported an association for depression with risk of hospitalization, emergency department visits, and outpatient visits for the one year following the TEE.[65]

As a measure for health care utilization, some studies[66-68] have focused on the outcome of health care costs, an indicator of health service use. In an elderly sample of Medicare patients, individuals with depression assessed with the CES-D were found to have increased total health care costs over four years independent of chronic comorbidities (e.g., heart disease, hypertension, diabetes).[66] Retrospective studies[67,68] in primary care patients had similar findings. Katon *et al.*[67] utilized the PRIME-MD two-item screen and Structured Clinical Interview for DSM-IV to assess for depression. Luppa *et al.*[68] utilized the Geriatric Depression Scale to assess for depression. Mental health costs did not account for the observed increase in health care costs for any of these studies.[66-68]

*VI. Impact of Depression Treatment on Health Care Utilization*

The effects of depression treatment on health care utilization have been investigated with varying results. One small study[69] of high health care utilizers identified depressed patients (n=20), age 18 and older, and treated them with antidepressants. After six months of treatment, depressed patients reported decreased depressive symptoms, functional impairment, and health service utilization. Health service utilization was measured in totals costs of service use.[69]

Smits *et al.* published (2008) a literature review[70] regarding interventions on frequent attenders (i.e., high health care utilizers). The study identified five randomized

control trials focused on treatment of depression and other psychiatric illness (e.g., anxiety) based in primary care settings. These five trials included samples age 14 and older. The trials varied in their definition of frequent attendance (ranging from 3 months to 2 years of high use) and groups selected for intervention (i.e., two of the trials intervened on all frequent attenders and three intervened only for those at risk of psychiatric disorders). Interventions also varied (three studies used screening and depression management with psychiatric intervention, one used an educational group, one used primary care physicians). None of the trials assessed in this review demonstrated evidence that psychiatric interventions could influence health care utilization.[70]

Another review[71] of the literature (2003) focused on the role of disease management programs in improving depressive symptoms, health care utilization, and costs. Pooled results from the 24 depression management programs investigated showed improvements in depressive symptoms, treatment satisfaction, and compliance. As one might expect, disease management programs were associated with increased psychiatric health care utilization and costs from psychiatric associated primary care visits, medication, and hospitalizations. Notably, non-psychiatric health care costs were not evaluated in this meta-analysis.[71] A recent study[72] by Bosmans *et al.* focused on the effects of disease management programs in the depressed elderly population. In this study, patients treated with a disease management program had no statistically significant relationships with total clinical or cost outcomes compared to that of the usual care group.[72]

A study[73] by Cipher *et al.* specifically focused on health care utilization by long-term care residents. This study investigated long-term care utilization retrospectively in

patients who had been treated, two months prior, with multimodal cognitive behavioral therapy. These patients, mean age of 82 years, all had some form of cognitive impairment. The treated group was compared to controls matched for age, gender, ethnicity, education, dementia level, and functional capacity. Health care measures included hospital, emergency, physician visits, and changed orders. The long-term care residents treated for depression had significantly decreased physician visits and order changes compared to the control group.[73]

*VII. Depression, Depression Treatment, and Long-Term Care Utilization*

As described above, the majority of the literature has focused on the impact of depression on health care utilization (e.g., inpatient, outpatient services). Distinct from these types of services, long-term care services refer predominately to the non-medical services provided over an extended period of time, typically in a home, community or institutional setting.[12] These services are devoted to the maintenance of function and independent living.[13] In contrast to the abundant research on health care outcomes, there is a scarcity of research on long-term care outcomes associated with depression. Articles identified through the literature review are discussed in the following section.

A study[74] of medical inpatients, age 75 and older, investigated the relationship between depressive symptoms, assessed with the Geriatric Depression Scale, and nursing home placement for the six month period following discharge. The initial bivariate analysis demonstrated an increased risk for nursing home placement for individuals with depressive symptoms. After adjustments for comorbidities, demographics, socioeconomic status, and functional status, this finding was no longer significant.

Similarly, Kempen *et al.*[75] showed that elderly patients with depressive symptoms were more likely to require professional home care, but these findings were insignificant after adjustment for functional impairment, feelings of loneliness, and health satisfaction. Depression was assessed with Zung's Self-rating Depression Scale.[75] A study[76] by Banerjee *et al.* investigated the association between depression and home service use (e.g., help with housework, shopping, personal care) in older adults. Depression, assessed with the Geriatric Mental State Exam, was associated with higher risk of living in sheltered accommodations, dependence in shopping, and independence in walking. Depression was not significantly associated with home care utilization measured in hours and visits. Despite this, the authors note that home care provision to those with depression was only partially explained by activity limitation, "suggesting that depression itself rather than physical activity limitation may be associated with home care provision."[76(p755)] Lastly, a study[77] utilizing the National Long-Term Care Channeling Demonstration reported an association between depressive symptoms, assessed with an eight-item questionnaire, and decreased odds of using community-based services (e.g., congregate meal programs, health promotion programs, social center, and counseling services). Significant associations were not found between depressive symptoms, in-home care (e.g., home health care), and nursing home care.[77]

**Significance of this Study**

This study will contribute to the relatively sparse literature available describing the impact of depression on long-term care outcomes, namely long-term service utilization and needs. Bearing in mind the societal impact of depressive illness as well as anticipated long-term care needs, an understanding of such a relationship would

contribute to 1) increasing the recognition and treatment of a prevalent, under recognized, and inadequately treated mental illness; 2) potentially alleviating the many consequences of depressive illness; and 3) potentially alleviating the burden on long-term care and health care resources.

## Hypotheses

1. A positive depression screen is associated with functional impairment and unmet need for long-term care services independent of demographic factors and disability.
2. A positive depression screen is associated with long-term care service utilization independent of demographic factors and disability.
3. A positive depression screen is associated with dissatisfaction with long-term care services.

## Methodology

### *I. Literature Review*

Literature searches were conducted using the MEDLINE and PsychINFO databases for English language articles. First, a search was conducted for studies on depression and health care utilization. Search terms used included *health care*, *utilization*, *depression*, and *elderly*. Second, a search was conducted for studies on depression and long-term care utilization. This search used various combinations of the terms: *long-term care, services, utilization, depression, depressive disorders, older adults,* and *elderly.* Additionally, relevant articles were obtained from the references of articles returned from the initial literature search.

## *II. Connecticut Long-Term Care Needs Assessment*

The data used for this study were obtained from the Connecticut Long-Term Care Needs Assessment[10] (2007) database. This database was collected primarily via self-administered, written surveys sent to a random sample of 10,500 Connecticut residents. Two groups of individuals were targeted via the randomized survey to assess the current use of, as well as future needs for, long-term care. These groups are: 1) older adults aged 61 years or older (n=5,250) and 2) baby boomers age 40 to 60 (n=5,250).[10] The sample size, generalizability, and variables assessed in this database contribute to its appropriateness as a means to address the hypotheses of this study.

### *A. Survey Instrument*

The survey instrument, a 12-page booklet, was constructed via literature review, examination of surveys completed in other states, and consultation with the Connecticut Long-Term Care Advisory Council. The survey instrument assessed for various topics using quantitative and qualitative questions. These topics included current and future plans (e.g., current and future living arrangements, perceived need and plans for payment of long-term care), current use and needs for long-term care services, and unmet long-term care needs. Health (e.g., self-rating of health status, depressive symptoms), functional status, disability status, demographics, financial resources, employment, transportation, social support, and caregiving responsibilities were also assessed.[10]

*B. Sample Selection*

Individuals were randomly chosen using voter registry and Department of Motor Vehicle records. Each randomly chosen individual was sent a survey booklet, introductory letter, and return envelope. After four weeks, individuals who had not responded were sent an additional survey, envelope, and reminder to encourage participation. Each group was assigned a different color survey booklet (i.e., green for 60 and older, blue for baby boomers) to allow for analysis without the use of personal identifiers.

In addition to the random sample chosen for the mailed survey, the survey was opened to the public via the internet and through various state agencies. Several websites including the University of Connecticut and AARP provided access to the survey. The media (e.g., television, newspaper, radio, internet) was used to promote the online survey. Promotion was aimed at reaching a diverse population (i.e., a variety of ages, ethnicities, etc.) throughout the state. State agencies (e.g., Area Agencies on Aging, Community Action Agencies) were also contacted to assist with distribution of the survey. Member organizations (e.g., senior centers) belonging to these agencies were then provided the survey for distribution to their members.[10]

*C. Survey Response*

A total of 2,761 surveys were completed via randomized mailing. Of this randomized sample, 1,607 surveys were completed by adults 61 and older and 1,154 by baby boomers. This translates to a response rate of 34% for the 60 and older group and 24% for baby boomers. In addition to the random sample, statewide survey distribution

returned 764 general surveys and an additional 1,175 surveys were completed online. Combined, 4,700 surveys were completed. Exclusion criteria were then applied. Individuals younger than 42 years old were excluded. Respondents that did not answer the question on current caregiving were excluded. After exclusions, the total sample size equaled 4,041 people.[10]

*D. Generalizability*

Generalizability of the random survey respondents was assessed via comparison to the initial random sample of 10,500 individuals identified for the mail survey. The respondent older adult age group was similar in mean age (71.5 v. 72.3), gender (46% male v. 48% male), and geographic distribution to that of the random sample. The respondent baby-boomer age group was similar to the total random sample in mean age (52.0 v. 50.1) and geographic distribution. The respondent baby-boomer group differed in gender distribution, 59% female versus 50% female in the random baby-boomer group.[10]

Survey respondents were further compared to the entire population of Connecticut via use of the 2005 United States Census. Comparisons were made by age group (i.e., baby-boomer and older adult) looking for age, gender, education, race, disability status, and income. For the majority of these characteristics, the survey respondents were found to reflect the overall population of Connecticut very closely.[10]

In determining the generalizability of the non-random (i.e., statewide and online surveys) to the random sample, comparisons were made of age, ethnicity, income, disability, and region. Small differences between the non-random and random sample

were seen. More random respondents reported higher incomes (56% random v. 49% nonrandom). The Latino participants also differed (3% in random v. 7% in nonrandom groups). Regional differences were also noted with the nonrandom sample coming more from the northern portion of the state (53% nonrandom v. 36% random). This is largely attributed to the presence of the research team and government agencies in the northern region of the state. Further analyses done by region revealed few differences in results.[10]

*III. Variables*

This study explores the relationship between screening positive for depression and the long-term care outcomes of unmet needs, utilization, and satisfaction. Additional independent variables included in the analyses include age, gender, ethnicity, marital status, income, employment status, education, and disability status. (Refer to the Appendix for actual survey questions addressing each variable.)

*A. Depression Screen*

Depression was assessed via the PRIME-MD[47] (Primary Care Evaluation of Mental Disorders Procedure) two-item screen for depression. This instrument[47] utilizes a yes/no answer format and consists of two screening questions: 1) "During the past month, have you often been bothered by feeling down, depressed, or hopeless?" and 2) "During the past month, have you often been bothered by little interest or pleasure in doing things?" An answer of yes to either question constitutes a positive screen for depression. It is important to note that answering yes to either or both questions does not constitute a diagnosis of depression. The PRIME-MD two-item screen was initially validated in a study[78] of 536 adult primary care patients. Using a standardized clinical interview as the

gold standard for diagnosing depression, the two-item PRIME-MD was found to have a sensitivity of 96% and specificity of 57% in identifying depression. More recent studies[79,80,81] have verified the validity of the two-item screen for depression.

*1. Impact of Depression Screening*

The impact of depression screening on health outcomes has been demonstrated. In a review[82] performed for the U.S. Preventive Services Task Force, the impact of depression screening was analyzed through a meta-analysis of findings from various randomized trials. Screening for depression was found to improve recognition of depression by primary care providers and reduce risk for persistent depression. In a randomized control[83] trial of long-term care residents, screening with the Geriatric Depression Scale was associated with increased frequency of depression treatment and referral to a mental health specialist by primary care physicians.

*B. Long-Term Care Needs and Use*

Long-term care needs and use were assessed with two questions. The first question assessed for ADL and IADL functional needs. ADLs included taking a bath or shower, getting dressed, getting in and out of a bed or chair, using the toilet, eating, maintaining control of your bowel/bladder function, and getting around inside the house. IADLs included preparing meals, shopping for groceries, doing routine household chores, managing money including keeping track of bills, doing laundry, taking medications correctly, getting to places out of walking distance, and using the telephone. Each functional need was assessed on a Likert Scale with choices of: *No help, A little help, A lot of help*, and *Cannot do it at all*. These choices were recoded to ranks of 0, 1, 2, and 3

for analysis. Individual sum scores were then created for ADLs and IADLs. The sum score for the seven ADLs ranged from a minimum of 0 to a maximum of 21. A score of 0 indicates needing no help at all and a score of 21 indicates being completely dependent on help for ADLs. The sum score for the eight IADLs ranged from a minimum of 0 to a maximum of 24. A score of 0 indicates needing no help at all. A score of 24 indicates being completely dependent on help for IADLs.

The second question assessed for unmet need for and current use of long-term care services. These services included home health aides, homemaker services, visiting nurse visits, home-delivered meals, transportation service, friendly visitor services, care management, and adult day programs. Answer choices for this questions included: *Not using now and Do not need*, *Not using now but Do need*, *Using now and receiving Enough*, and *Using now but Need More*. Long-term care use was determined by combining the responses from the *Using now and receiving Enough*, and *Using now but Need More* categories. The long-term care use score ranges from a minimum of 0 to a maximum of 8 number of long-term services used. Unmet need for long-term services was determined by combining the responses from *Not using now but Do need* and *Using now but Need More* responses. The unmet need score ranges from a minimum of 0 to a maximum of 8 number of long-term services needed.

*C. Additional Independent Variables*

*1. Age*

The impact of age on depression risk is unclear. Some studies[84] show an increase in depression risk with increasing age. Other studies have showed an absence of association between age and depression.[85] The impact of age on long-term care

utilization, however, is more clearly established with age being a strong predictor for long-term service use.[77,86,87]

*2. Gender*

Female gender is associated with increased depressive symptoms and depressive disorders.[85,88] Gender has also been associated with long-term care utilization.[77,86]

*3. Ethnicity*

Ethnicity was assessed with the categories of: *White or Caucasian, Black or African-American or Caribbean Black, Asian (including Asian Indian, Chinese, Filipino, Korean, or other Asian), American Indian or Alaska Native*. Given the predominance of the Caucasian ethnicity (91%) in the sample, respondents were reclassified as either *Caucasian* or *non-Caucasian* to allow for simplification of analysis.

An association between ethnicity and varying rates of depression has been demonstrated in the literature.[22] For example, some studies have suggested that Mexican Americans experience increased rates of depression compared to non-Hispanic Caucasians and African Americans.[22] Ethnicity has also been shown to be associated with long-term care use. One epidemiologic study found Caucasians to utilize more in-home and nursing home services while minority groups use greater informal care.[77]

*4. Marital Status*

Marital status was assessed with the choices of: *married, widowed, separated, divorced, never married,* and *living together as though married*. The *married* and *living together as though married* responses were recategorized into the category of *married*.

*Widowed*, *separated*, *divorced*, and *never married* categories were categorized into the category of *unmarried*.

Unmarried status (i.e., separated, divorced, widowed) has been associated with increased rates of depression.[23,88] Unmarried status is also associated with increased risks for long-term care needs.[87]

*5. Income*

Monthly income was classified into one of five categories ranging from less than $1,000 to greater than $9,000.

Lower income is associated with an increased risk of depression.[89] Further, low incomes are associated with risk factors for depression including unstable housing/neighborhoods, poor nutrition, and poor physical health.[90,91] Additionally, income has been associated with long-term care utilization.[87]

*6. Employment*

Employment was assessed using the choices of: *work full time*, *work part time*, *retired*, *homemaker*, *volunteer*, *attend school full or part time*, and *unemployed*. The categories of *work full time* and *work part time* were recoded as *employed*. The categories of *retired*, *homemaker*, *volunteer*, and *attend school* were recoded as *unemployed*.

Unemployment is associated with low income and socioeconomic status, factors associated with depression and long-term care utilization.

*7. Education*

Education was assessed with choices of: *8$^{th}$ grade or less*, *some high school*, *high school diploma or GED*, *technical school/community college*, *some college*, *two-year*

*college degree*, *four-year college degree*, and *post graduate degree*. The categories of *some college, two-year, and four-year college* were recoded into the category of *college*.

Lower education has been associated with depression in several studies.[24,89] Lower education is also associated with lower income, a risk factor for depression and long-term care utilization.

*8. Disability*

Disability was defined as a physical or mental impairment that limits major life activities. Categories of disability queried include *physical disability*, *intellectual disability*, *mental illness or psychiatric disability*, *deafness*, or *blindness*. An answer of yes to any of the categories, except for mental or psychiatric disability, was recoded to a positive for having a disability. The category of mental illness or psychiatric disability was not included in the recoded variable due to the possibility for inclusion of depressed individuals and the potential for skewed results. Additionally, individuals that answered "no" to four out of five disability categories while skipping one were recoded as negative for having a disability. Thus, when the variable of disability appears in the results and discussion section of this paper, it includes physical disability, intellectual disability, deafness, and blindness.

Disability is associated with depressive symptoms and severity of depression.[92,93] As would be expected, disability including cognitive impairment and functional impairment is associated with long-term care use in older adults.[77]

*D. Satisfaction with Long-Term Care Services*

Satisfaction with long-term care services was assessed with the question, "Overall, how well do the long-term care services you receive meet your needs?" Answer choices included: *I do not use any services*, *very well*, *somewhat well*, and *not very well*.

*IV. Analysis*

Data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 17.0. First, descriptive statistics and bivariate analyses were completed to characterize the study sample. Second, multivariate analyses were completed to examine the relationship between a positive depression screen and long-term care needs and utilization. Each analysis was completed using the same set of independent variables to control for possible confounding effects of age, sex, ethnicity, marital status, income, employment status, education, and disability. To address the hypotheses of this study, the following analyses were completed:

1. To assess the impact of depression on long-term care needs, multivariate linear regression was used to determine the relationship between individuals who screened positive for depression and functional needs. Functional activities have historically been categorized as either ADLs[14] or IADLs.[16] Thus, separate analyses were carried out examining ADL and IADL functional needs. Covariates in this model included age, sex, ethnicity, marital status, income, employment status, education, and disability.

2. Further assessment of the impact of depression on long-term care needs was carried out by examining the relationship between a positive depression screen and unmet need for long-term care services. This was done using multivariate linear regression with the same covariates as in analysis number one.
3. The impact of depression on long-term care utilization was assessed by examining the relationship between a positive depression screen and utilization of various long-term care services. This relationship was assessed using multivariate linear regression with the same covariates as in analysis number one.
4. To assess the relationship between a positive depression screen and satisfaction with long-term care services, bivariate analysis with chi-square was used.

**Results**

*I. Sample Characteristics*

*A. Demographics*

Table 2 displays the background characteristics of the study sample grouped by positive or negative screen for depression. Both groups were approximately 63 years old. More females screened positive for depression than males (24% versus 20%, p=.002). Fewer Caucasians screened positive for depression compared to the other ethnic groups combined (21% versus 35%, p<.0001). Unmarried individuals tended to screen higher for depression than married (30% versus 19%, p<.0001). Unemployed individuals tended to screen higher for depression than employed (24% versus 20%, p=.003). Lower levels of education were associated with increased depressive symptoms (range of 16% for individuals with post-graduate education to 31% for high school or less, p<.0001).

Lower levels of income were associated with increased depressive symptoms (ranging from 51% to 15% for the lowest to highest incomes polled, $p<.0001$). The presence of a disability (physical disability, intellectual disability, blindness, or deafness) was associated with increased depressive symptoms compared to individuals without disabilities (42% versus 17%, $p<.0001$).

*B. Functional and Long-term Care Needs*

Approximately 8% of the total respondents reported needing help with at least one ADL and 22% with at least one IADL. Further, the mean sum scores (see Methodology) for total respondents needing help with ADLs and IADLs are 0.31 (sd = 1.66) and 1.09 (sd = 3.19), respectively. Approximately 8% of the total respondents reported unmet need for at least one long-term care service and 7% reported using at least one long-term care service. (Above data is not shown in tables.)

Individuals who screened positive for depression reported higher functional needs (both ADLs and IADLs) than individuals who screened negative for depression (Table 3, Figures 2, 3). Individuals who screened positive for depression also reported greater unmet need and utilization of long-term care services (Table 3, Figures 4, 5).

*C. Satisfaction with Long-Term Care Services*

Individuals with a positive depression screen were more likely to report decreased satisfaction with how well their long-term care services met their needs compared to individuals that screened negative for depression (Table 4). Conversely, individuals who screened negative for depression were more likely to report satisfaction with long-term care services compared to individuals who screened positive.

**Table 2. Descriptive Characteristics**

| | Positive Depression | | Negative Depression | | |
|---|---|---|---|---|---|
| *Variable* | *n or mean* | *%* | *n or mean* | *%* | *Statistical Test* |
| **Age (years)** | 63.5 ± 12.7 | | 63.7 ± 11.9 | | t=.378, p=.706 |
| **Gender** | | | | | |
| *Female* | 576 | 24.1 | 1810 | 75.9 | |
| *Male* | 298 | 19.8 | 1204 | 80.2 | $\chi^2$=9.783, p=.002 |
| **Ethnicity** | | | | | |
| *Caucasian* | 758 | 21.3 | 2800 | 78.7 | |
| *Other* | 120 | 34.8 | 225 | 65.2 | $\chi^2$=32.771, p<.0001 |
| **Marital Status** | | | | | |
| *Married* | 496 | 19.0 | 2119 | 81.0 | |
| *Unmarried* | 381 | 29.9 | 892 | 70.1 | $\chi^2$=58.895, p<.0001 |
| **Employment Status** | | | | | |
| *Full or Part-time* | 324 | 20.2 | 1279 | 79.8 | |
| *Unemployed* | 532 | 24.3 | 1655 | 75.7 | $\chi^2$=8.952, p=.003 |
| **Education** | | | | | |
| *High school or less* | 291 | 31.2 | 642 | 68.8 | |
| *Some college* | 415 | 21.8 | 1491 | 78.2 | |
| *Post-graduate* | 166 | 16.0 | 870 | 84.0 | $\chi^2$=65.896, p<.0001 |
| **Income** | | | | | |
| *<1,000* | 107 | 50.7 | 104 | 49.3 | |
| *1,0000-2,999* | 265 | 30.4 | 606 | 69.6 | |
| *3,000-4,999* | 149 | 18.7 | 648 | 81.3 | |
| *5,000-8,999* | 195 | 18.4 | 865 | 81.6 | |
| *9,000+* | 95 | 15.0 | 540 | 85.0 | $\chi^2$=164.161, p<.0001 |
| **Disability** | | | | | |
| *+ Disability* | 331 | 41.7 | 463 | 58.3 | |
| *- Disability* | 508 | 17.3 | 2433 | 82.7 | $\chi^2$=213.966, p<.0001 |

**Table 3. Additional Descriptive Characteristics**

| | **Positive Depression** | **Negative Depression** | |
|---|---|---|---|
| *Variable* | *mean (sd)* | *mean (sd)* | *Statistical Test* |
| ADLs (#) | .57 (1.45) | .10 (.614) | t= -13.58, p<.0001 |
| IADLs (#) | 1.54 (2.32) | .43 (1.27) | t= -18.05, p<.0001 |
| Unmet Need for LTC Services (#) | .48 (1.38) | .16 (.928) | t= -7.94, p<.0001 |
| Long-Term Care Services Used (#) | .35 (1.05) | .08 (.476) | t= -10.77, p<.0001 |

**Figure 2. ADL Needs by PRIME-MD Depression Screen**

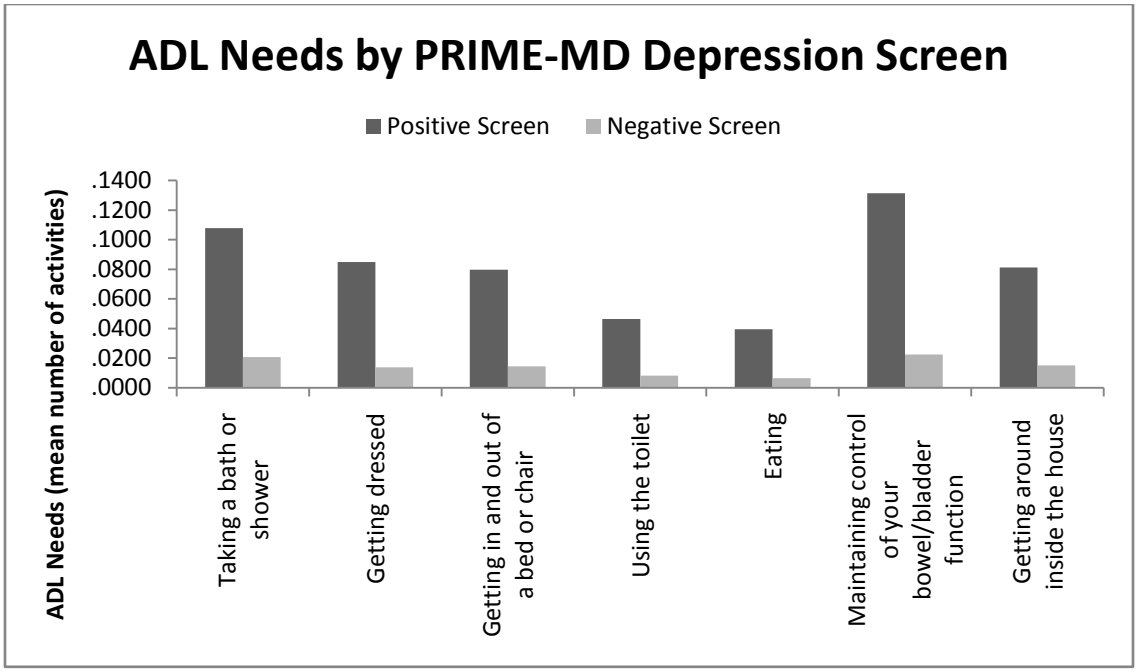


**Figure 3. IADL Needs by PRIME-MD Depression Screen**

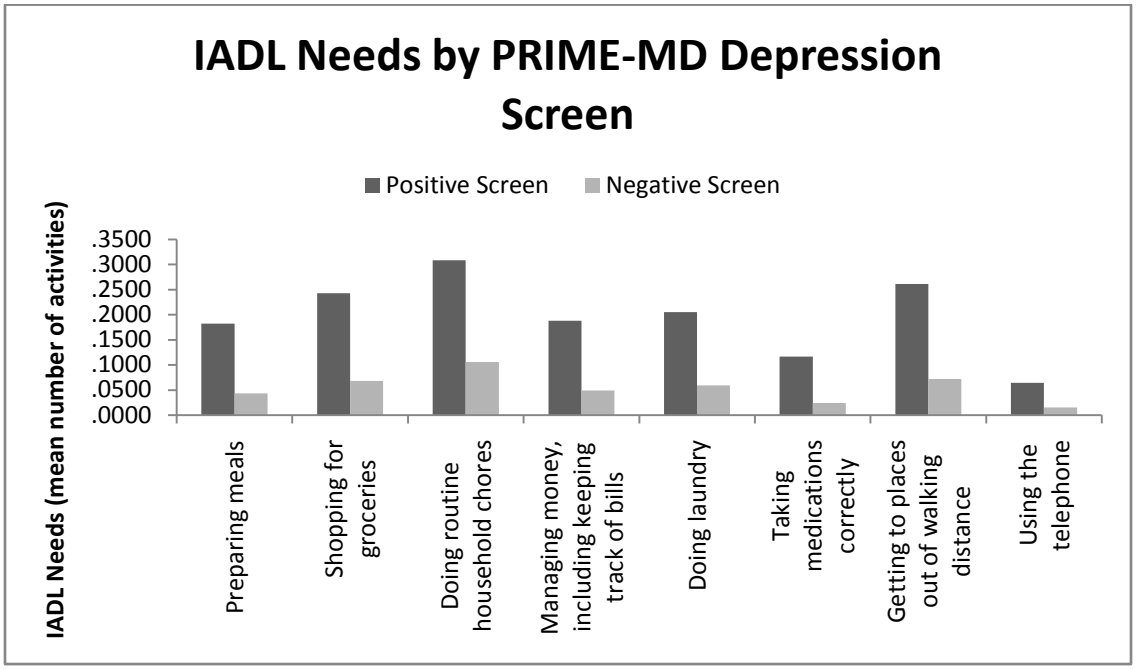



**Figure 4. Long-Term Care Service Unmet Need by PRIME-MD Depression Screen**

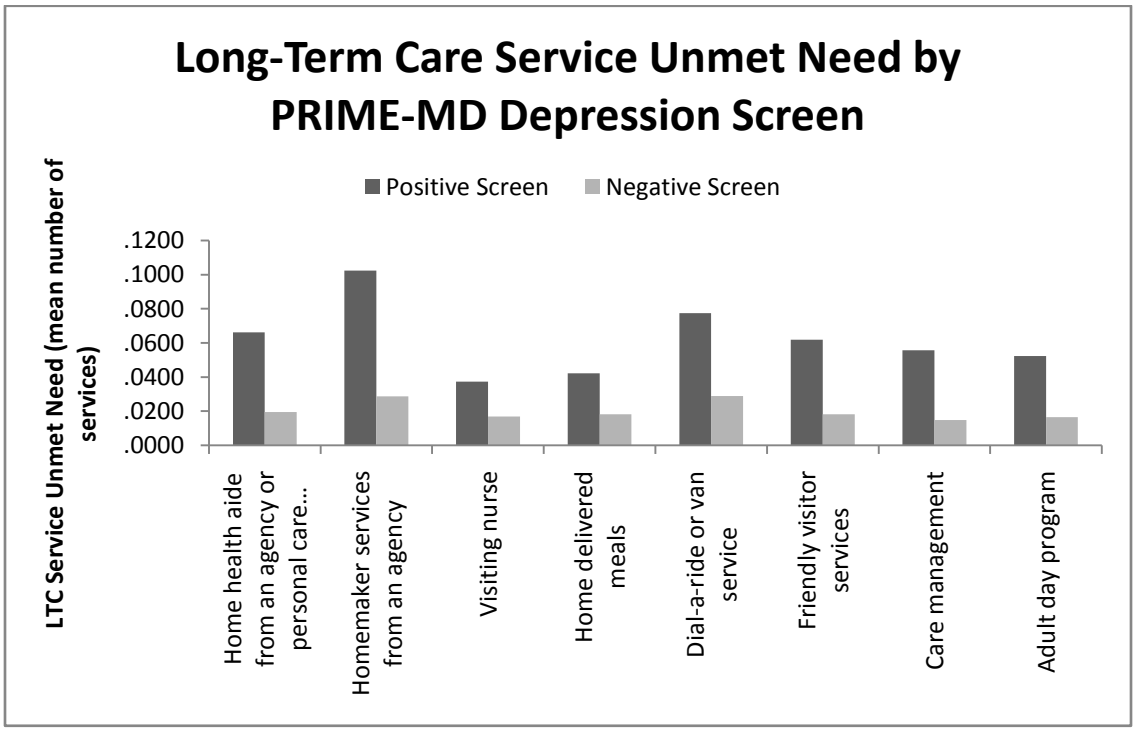


**Figure 5. Long-Term Care Services Used by PRIME-MD Depression Screen**

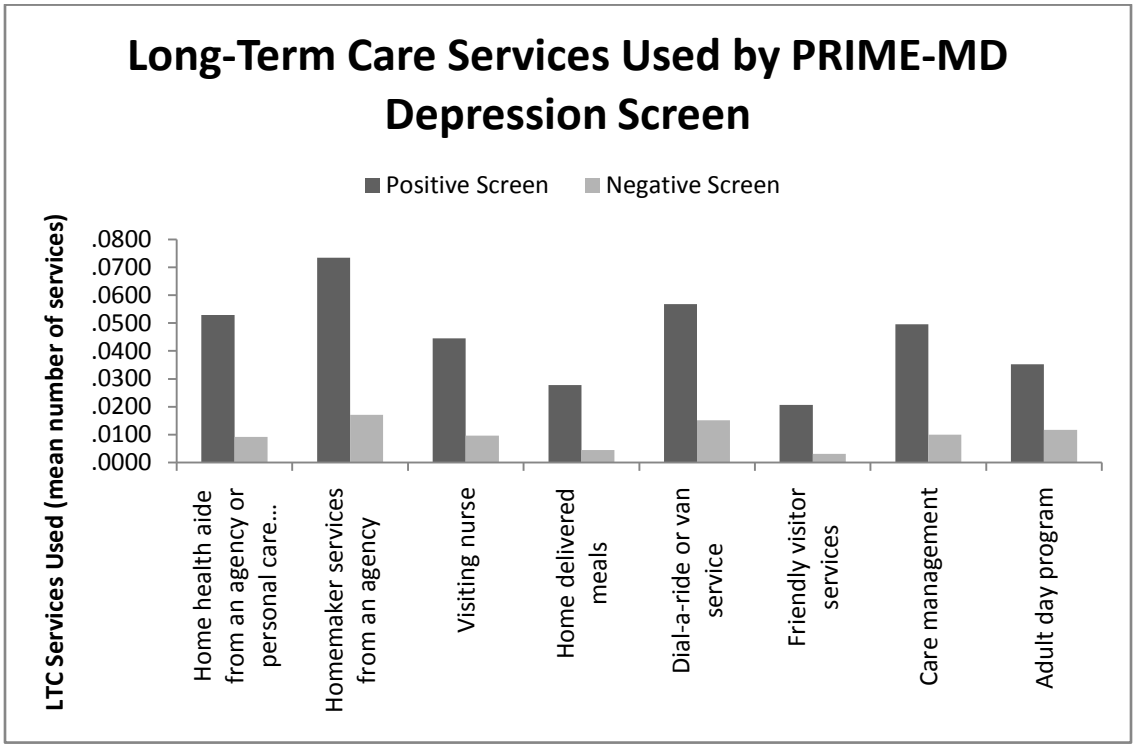



**Table 4. Satisfaction with Long-Term Care Services (N = 307)**

| | Positive Depression | | Negative Depression | | |
|---|---|---|---|---|---|
| *Variable* | *n* | *%* | *n* | *%* | *Statistical Test* |
| **Very well** | 62 | 50.4 | 137 | 74.5 | |
| **Somewhat well** | 52 | 42.3 | 44 | 23.9 | |
| **Not very well** | 9 | 7.3 | 3 | 1.6 | $\chi^2$=20.627, p<.0001 |

*II. Regression Results*

Individuals who screened positive for depression were more likely to have increased functional needs. Specifically, screening positive for depression is associated with increased need for help with ADLs compared to individuals with a negative depression screen (Table 5). Furthermore, screening positive for depression is associated with increased need for help with IADLs compared to individuals with a negative depression screen (Table 6). These findings were both statistically significant ($p<.0001$) and independent of age, sex, ethnicity, marital status, income, employment status, and disability (i.e., physical disability, intellectual disability, blindness, or deafness).

Additionally, individuals who screened positive for depression reported more unmet need for (Table 7) and use of (Table 8) paid long-term care services (e.g., home health aides, homemaker services, visiting nurse, home delivered meals, etc.). These findings for unmet long-term care need and use were statistically significant ($p<.0001$) and independent of age, gender, ethnicity, income, employment status, and disability.

**Table 5. Regression Model: ADL Functional Needs**

| *Independent Variables* | *β* | *Standard Error* | *Standardized β* | *p Value* |
|---|---|---|---|---|
| Positive Depression | .418 | .062 | .116 | <.0001 |
| Age | .008 | .003 | .065 | .002 |
| Gender | -.033 | .053 | -.011 | .528 |
| Ethnicity | -.179 | .089 | -.033 | .045 |
| Marital Status | <.0001 | .060 | <.0001 | .997 |
| Employment | -.061 | .059 | -1.042 | .297 |
| Education | -.022 | .039 | -.010 | .570 |
| Income | .005 | .026 | .004 | .863 |
| Disability | .877 | .066 | .237 | <.0001 |

**Table 6. Regression Model: IADL Functional Needs**

| *Independent Variables* | *β* | *Standard Error* | *Standardized β* | *p Value* |
|---|---|---|---|---|
| Positive Depression | 1.102 | 0.115 | 0.149 | <.0001 |
| Age | 0.039 | 0.005 | 0.149 | <.0001 |
| Gender | -0.039 | 0.098 | -0.006 | 0.688 |
| Ethnicity | -0.601 | 0.165 | -0.055 | <.0001 |
| Marital Status | <.0001 | 0.111 | <.0001 | .993 |
| Employment | -0.179 | 0.110 | -0.029 | 0.102 |
| Education | -0.218 | 0.072 | -0.050 | 0.003 |
| Income | -0.032 | 0.049 | -0.012 | 0.507 |
| Disability | 2.709 | 0.122 | 0.357 | <.0001 |

**Table 7. Regression Model: Unmet Need for Long-Term Care Services**

| *Independent Variables* | *β* | *Standard Error* | *Standardized β* | *p Value* |
|---|---|---|---|---|
| Positive Depression | .189 | .044 | .075 | <.0001 |
| Age | .002 | .002 | .021 | .319 |
| Gender | .047 | .038 | .022 | .217 |
| Ethnicity | -.284 | .064 | -.076 | <.0001 |
| Marital Status | -.142 | .043 | -.063 | .001 |
| Employment | -.048 | .042 | -.023 | .254 |
| Education | -.038 | .028 | -.026 | .171 |
| Income | -.043 | .019 | -.048 | .023 |
| Disability | .439 | .047 | .169 | <.0001 |

**Table 8. Regression Model: Long-Term Care Services Used**

| *Independent Variables* | *β* | *Standard Error* | *Standardized β* | *p Value* |
|---|---|---|---|---|
| Positive Depression | .168 | .027 | .107 | <.0001 |
| Age | .006 | .001 | .101 | <.0001 |
| Gender | -.006 | .023 | -.004 | .805 |
| Ethnicity | -.295 | .039 | -.127 | <.0001 |
| Marital Status | -.118 | .026 | -.084 | <.0001 |
| Employment | -.057 | .026 | -.043 | .027 |
| Education | -.023 | .017 | -.024 | .182 |
| Income | -.027 | .011 | -.048 | <.019 |
| Disability | .213 | .028 | .132 | <.0001 |

## Discussion

Many studies in the literature have focused on the effects of depression, particularly in the geriatric population, on general health care use. Few studies have focused on the impact of depression on long-term care use. This study provides evidence for the association of a positive depression screen, and possibly depression itself, with increased long-term care needs and utilization. The association between depression, functional impairment, and long-term care outcomes occurred independent of age, sex, ethnicity, marital status, education, income, and disability. Additionally, an association was found between screening positive for depression and decreased satisfaction with long-term care services.

The first hypothesis was supported by this study. Individuals who screened positive for depression had higher functional and unmet long-term care service needs independent of various demographic factors and disabilities. Potential reasons explaining such a finding are likely multifactorial. The characteristics of depression (e.g., anhedonia, lack of interest and energy), the association of depression with multiple medical and psychiatric comorbidities, and association with functional impairment itself are possible contributors to this observed relationship. Other factors potentially contributing to this association, but not included in the model due to data limitations, include the presence of comorbid medical and non-depression psychiatric illness. Additionally, it is important to note that, due to the nature of a cross-sectional study, the reverse of the described relationship between depression, function, and long-term care needs may explain the findings of the analysis. In other words, functional impairment and long-term care unmet needs may be a contributor to depression.

The second hypothesis, that a positive depression screen is associated with long-term care utilization, was supported. Possible explanations for this observed association include the characteristics of depression (e.g., anhedonia, lack of interest and energy), association of depression with medical and psychiatric comorbidities, and association of depression with functional impairment. Additional factors potentially contributing to the observed association include the presence of comorbid medical and non-depression illness. Such factors were not included in the analysis due to data limitations. Further, the findings of this analysis may be explained by the impact of high long-term service utilization, indicating increased impairment and dependence, on depression. Differentiation between the directionality of such a relationship cannot be distinguished due to the cross-sectional design of this study.

The third hypothesis, that a positive depression screen is associated with dissatisfaction with long-term care services, was supported. This observation may be explained by the features of depression such as anhedonia and perceived helplessness. Additionally, the other characteristics of depression (e.g., lack of interest, lack of energy) may be contributors to this finding. Notably, dissatisfaction with long-term care services (i.e., poorly met needs) may contribute to depression. Due to the study design, the direction of the observed relationship between depression and satisfaction cannot be determined.

*Limitations of the Study*

Due to the method by which depression was assessed (i.e., screening questionnaire), a relationship between actual depressive disorders (e.g., MDD) and long-

term care outcomes cannot be made. Further, due to the cross-sectional design of this study, a causal relationship cannot be ascertained regarding a positive depression screen, depression, and long-term care outcomes. The method of data collection (i.e., self-report of symptoms) presents additional limitations due to the frequent minimization of psychiatric symptoms by the elderly.[28] Due to data limitations, this study was unable to control for comorbid medical illnesses (e.g., cardiovascular disease, diabetes) and non-depressive mental illness (e.g., schizophrenia, bipolar disorder). The presence of either comorbidity may influence both the experience of depression and long-term care outcomes. Although a question in the survey does specifically mention schizophrenia and bipolar illness, the data were not included in the analysis due to the broad nature of the question and possible inclusion of depressive disorders as a disabling mental illness.

**Conclusion**

The findings of this study have implications for long-term care planning, particularly with the older adult population in the state of Connecticut. Screening for depression with a brief and focused questionnaire in the older adult and baby boomer populations may help identify individuals at risk of high long-term care service utilization. The identification of such individuals will provide a target population for diagnostic and therapeutic intervention. Appropriate diagnosis and treatment potentially increases the likelihood of reducing depressive symptoms, somatic complaints, comorbid illness, and functional disability. Ultimately, this would help the depressed population lead a higher quality of life and potentially alleviate the burden on the state's health and long-term care resources.

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## Appendix

## Connecticut Long-term Care Needs Assessment General Survey (Selected Portions)

### Health

11. During the past month, have you often been bothered by feeling down, depressed, or hopeless?
☐ No ☐ Yes

12. During the past month, have you often been bothered by little interest or pleasure in doing things?
☐ No ☐ Yes

18. Do you need help from another person for any of the following activities because of a disability or health problem? Check one box to show how much help you need with each activity: no help, a little help, a lot of help, or you cannot do the activity at all.

| | No help | A little help | A lot of help | Cannot do it at all |
|---|---|---|---|---|
| Preparing meals | ☐ | ☐ | ☐ | ☐ |
| Shopping for groceries | ☐ | ☐ | ☐ | ☐ |

| | | | | |
|---|---|---|---|---|
| Doing routine household chores | ☐ | ☐ | ☐ | ☐ |
| Managing money, including keeping track of bills | ☐ | ☐ | ☐ | ☐ |
| Doing laundry | ☐ | ☐ | ☐ | ☐ |
| Taking medications correctly | ☐ | ☐ | ☐ | ☐ |
| Getting to places out of walking distance | ☐ | ☐ | ☐ | ☐ |
| Using the telephone | ☐ | ☐ | ☐ | ☐ |
| Taking a bath or shower | ☐ | ☐ | ☐ | ☐ |
| Getting dressed | ☐ | ☐ | ☐ | ☐ |
| Getting in and out of a bed or chair | ☐ | ☐ | ☐ | ☐ |
| Using the toilet | ☐ | ☐ | ☐ | ☐ |
| Eating | ☐ | ☐ | ☐ | ☐ |
| Maintaining control of your bowel/bladder function | ☐ | ☐ | ☐ | ☐ |
| Getting around inside the house | ☐ | ☐ | ☐ | ☐ |
| Other _____ | ☐ | ☐ | ☐ | ☐ |

20. A disability is defined as a physical or mental impairment that substantially limits one or more major life activities, such as walking, self-care, thinking, or working. Please check No or Yes for each one to indicate if you have any of the following disabilities.

| | No | Yes |
|---|---|---|
| Physical disability or chronic illness disability that makes it difficult for you to walk, reach, lift, or carry | ☐ | ☐ |
| Intellectual or cognitive disability, such as mental retardation, Alzheimer's disease, or other severe thinking impairment | ☐ | ☐ |
| Mental illness or psychiatric disability, such as schizophrenia or bipolar disorder | ☐ | ☐ |
| Deafness or other severe hearing impairment | ☐ | ☐ |
| Blindness or legal blindness | ☐ | ☐ |

## Employment and Transportation

23. Are you currently employed, volunteering, or going to school? Check all that apply.

☐ Work full time
☐ Work part time
☐ Retired
☐ Homemaker
☐ Volunteer
☐ Attend school full or part time
☐ Unemployed

## Community Long Term Care Services

29. Long-term care services can be used when people need ongoing assistance because of age-related problems, serious injury, disabilities, or other difficulties. The following is a list of paid long-term care services which can help people live in the community. Please tell us if **you use or need** any of these services for yourself. Check one box for each service.

| | Not using now and Do not need | Not using now but Do need | Using now and receiving Enough | Using now but Need more |
|---|---|---|---|---|
| Home health aide from an agency or personal care assistant (for bathing, dressing, daily living needs, etc.) | ☐ | ☐ | ☐ | ☐ |
| Homemaker services from an agency (for laundry, shopping, cleaning, etc.) | ☐ | ☐ | ☐ | ☐ |
| Visiting nurse (to change bandages, give injections, etc.) | ☐ | ☐ | ☐ | ☐ |
| Home delivered meals (Meals-On-Wheels, etc.) | ☐ | ☐ | ☐ | ☐ |
| Dial-a-ride or van service (transportation for shopping, medical appointments, etc.) | ☐ | ☐ | ☐ | ☐ |
| Friendly visitor services (social visits from volunteers) | ☐ | ☐ | ☐ | ☐ |
| Care management (assessment, coordination, and monitoring of services by a social worker, nurse, etc.) | ☐ | ☐ | ☐ | ☐ |
| Adult day program (activities and health | ☐ | ☐ | ☐ | ☐ |

| | | | | |
|---|---|---|---|---|
| services provided at care centers) | | | | |
| Handyman services (home maintenance, minor repairs) | ☐ | ☐ | ☐ | ☐ |
| Lawn or snow services (lawn care, snow removal) | ☐ | ☐ | ☐ | ☐ |

33. Overall, how well do the long-term care services you receive meet your needs?

- ☐ I do not use any services
- ☐ Very well
- ☐ Somewhat well
- ☐ Not very well → Please describe your experiences:

_____

**General Information**

46. What is your age? _____

47. What is your gender? ☐ Male ☐ Female

48. What is your marital status?

- ☐ Married ☐ Separated ☐ Never married
- ☐ Widowed ☐ Divorced ☐ Living together as though married

50. Which category best describes your race? Check only one.

- ☐ White or Caucasian
- ☐ Black, African-American, or Caribbean Black
- ☐ Asian, including Asian Indian, Chinese, Filipino, Korean, or other Asian
- ☐ American Indian or Alaska Native
- ☐ Other _____

52. What is the highest grade or year you finished in school?

- ☐ 8th grade or less
- ☐ Some high school
- ☐ High school diploma or GED
- ☐ Technical school/community college
- ☐ Some college
- ☐ Two-year college degree
- ☐ Four-year college degree
- ☐ Post graduate degree (masters/doctorate)

**Financial**

53. What category best describes your total monthly household income from all sources before taxes? Include income such as wages, salaries, Social Security, retirement benefits, veteran's benefits, public assistance, investment income, or any other income.

- ☐ Less than $500 each month
- ☐ $500 - $999
- ☐ $1,000 - $1,999
- ☐ $2,000 - $2,999
- ☐ $3,000 - $3,999
- ☐ $4,000 - $4,999
- ☐ $5,000 - $6,999
- ☐ $7,000 - $8,999
- ☐ $9,000 - $12,499
- ☐ $12,500 or more each month