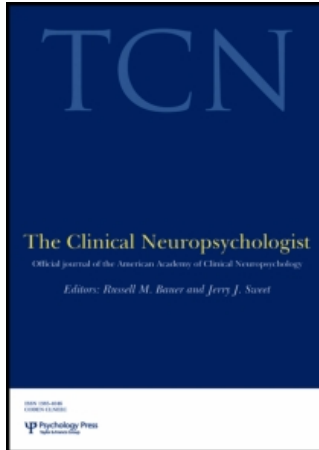


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ASSESSMENT OF DEPRESSION IN THREE MEDICALLY ILL, ELDERLY POPULATIONS: ALZHEIMER'S DISEASE, PARKINSON'S DISEASE, AND STROKE

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Prevalence rates of depression in medically ill elderly people are strikingly high. In particular, the prevalences of depression at any given time in Alzheimer's, Parkinson's, and stroke are as high as 87%, 75%, and 79%, respectively. Proper detection and management of depression in primary care is imperative. The present review examines the risk factors, peculiarities, and etiologies of depression in these populations. We suggest that certain features of depression be considered in assessing depression in these populations and provide guidelines for distinguishing depression from medical, psychosocial, and physical complaints common in elderly people. Additionally, we explore the use of self-report instruments of depression and provide guidelines regarding the specific measures and cutoffs most appropriate for use with these populations. To this end, we hope that readers acquire a greater appreciation for the experience of depression of those suffering from these neurological disorders to aid in their assessment.

Keywords: Depression; Assessment; Self-report instruments; Alzheimer's disease; Parkinson's disease; Stroke.

INTRODUCTION

Depression is a significant hurdle in regard to proper assessment and treatment in primary care. Assessment of depression in medically ill elders in particular has been complicated by several factors, including: (1) overlap of physical complaints of disease and depression indistinguishable to the patient and providers; (2) lack of training in mental health care to recognize which symptoms are more related to medical disorders than depression; (3) limited knowledge by medical care providers regarding what is depression versus what is "typical" in the aging process; (4) unwillingness or lack of socialization of elderly people with mental health care; and finally (5) use of assessment tools that, for the most part, have been validated on a younger, healthy population. Given that it is expected that 20% of the general population will be comprised of senior citizens by the year 2020 and currently individuals 65 years of age or older constitute 13% of the population (Molinari, 1999), it is imperative that more attention be given to this population

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and adequate assessment and treatment of depression in primary care. It is estimated that 11% to 13% of community-dwelling elders suffer from a mental disorder (Beutler et al., 1987; Evans, 1995). Furthermore, many medical illnesses in elderly people are accompanied by a psychiatric disorder. It is estimated that 60–70% of the population of elderly persons with dementia suffer from depression and/or anxiety (Walker, 2004). Moreover, depression in primary care is frequently undiagnosed in upwards of 50% of cases (Arnau, Meagher, Norris, & Bramson, 2001). Given the comorbidity and poor recognition of depression in primary care, it is suspected that depression may go unrecognized in medically ill elderly people. In fact, Evans (1995) suggested that over 20% of individuals over the age of 65 in medical wards are depressed, yet liaison referrals are only 2–5%. Furthermore, the time and cost for such consults renders the use of self-report instruments a viable option in primary care yet the measures are seldom validated on elderly populations, much less on medically ill elders. Finally, assessing depression in the medically ill, in general, is difficult given the overlap of somatic complaints, side effects of medications, biological substrates of the disease, and reactionary hypotheses to illness. Without a clearer understanding of depressive symptoms in medically ill elderly people and more adequate assessment tools, it is highly probable that depression in elders will be overlooked. As such, there is a call to arms for healthcare providers to fully understand and appreciate the complexities surrounding diagnosis of depression in medically ill elderly people and proper delineation of depression from medical illness. Lastly, there is a dire need for proper assessment tools that make practitioners as competent in the assessment of depression in elderly populations as they are with their younger counterparts.

The aim of this paper is to understand the difficulties and accomplishments that healthcare providers have in detecting depression in elderly people, in particular with individuals suffering from Alzheimer's, Parkinson's, and stroke. First is a review of the etiology, prevalence, unique features, and impact of depression in these disorders. Following this will be a review of what has been undertaken thus far to increase our ability to accurately assess depression in such populations. Finally, recommendations will be provided to assist practitioners in better assessing depressive symptoms in these three populations, accompanied with suggested self-report instruments and specific cutoffs. However, prior to such a specific review, a brief review regarding the hurdles in differential diagnosis, neuroanatomical findings, and neuropsychological implications of late-life depression, in general are provided.

LATE-LIFE DEPRESSION: HURDLES IN DIFFERENTIAL DIAGNOSIS

Depressive disorders in the general population have been broadly defined into three categories: major depression, minor depression, and dysthymia. According to current diagnostic criteria, to meet major depression criteria one must meet at least one of the two major criteria (depressed mood or anhedonia) and five of the nine specific symptoms of depression. Minor depression on the other hand, requires at least one major criterion symptom and a minimum of one and maximum of four of

the specific symptoms, whereas dysthymia is defined as depressed mood lasting 2 years or more with no more than 2 months of remission.

Assessing depression in elderly people is complicated by having to utilize such discrete categories. For instance, in determining the existence of dysthymia and course of major or minor depressive episodes in elderly people, particular attention must also be given to the onset of depression in order to determine whether or not the depression can be considered late-onset depression (age > 60 at first depressive episode). Distinguishing early-onset versus late-onset depression is important in conceptualizing and treating depression in elderly people. Further differentiating whether the depression has been longstanding (through either patient's or informants' report), its co-occurrence with medical illnesses and diagnoses, adjustment to late-life situations, and potential biological etiologies of depression associated with old age (e.g., age-related brain atrophy), renders an even more convoluted picture. However, what is more complicated is the finding that many elderly individuals suffer from what has been termed "subsyndromal" depression in which they fail to meet discrete criteria for a depressive disorder, but are indeed depressed. In fact, VanItallie (2005) suggested that although 5.7% of elders over the age of 65 may meet criteria for major depression or dysthymia, nearly three times as many (14.3%) suffer from subsyndromal depression. Moreover, between 15% and 23% of elders report depressive symptomatology that does not meet criteria for major depression (Elderkin-Thompson et al., 2003). Reports indicate that as the incidence of major depression decreases with age, non-major clinical depression increases and does so steeply over age 80 (VanItallie, 2005). It is also speculated that subsyndromal depression may precipitate a major depressive episode and is associated with functional impairment, greater severity of medical illness, and may result in relapses of major depression (Chopra et al., 2005; VanItallie, 2005). As such, subsyndromal depression is important, just as are the major diagnoses of depression in elderly people.

The definition of a "syndrome" is the presence of symptoms that appear to co-exist, in the absence of a definitive disorder or disease. Lavretsky and Kumar (2002) define subsyndromal depression in elderly people as the presence of depressed mood or loss of interest with two or more concurrent depressive symptoms existing for at least a period of a month (see Lavretsky & Kumar, 2002, for full review). Given the high incidence of subsyndromal depression in elderly people, this review hopes to shed light on the clusters of symptoms more commonly found in Alzheimer's, Parkinson's, and stroke patients, in hopes of developing a better appreciation for the symptoms most indicative of depression in these populations that may serve as markers for the presence of subsyndromal depression. Reliance on "five or more" or "no more than four" symptoms and time-limited criteria may not be best suited for assessment of depression in elderly people. Proper delineation of "cardinal" symptoms of depression in medically ill people may be the first line of defense in proper assessment of depression in elderly people, regardless of the "number" of the symptoms present. Given this, such a "dimensional" or "cluster analysis" approach in the assessment of depression in elderly people is recommended by these authors given the difficulty in using the more traditional categorical approach of major depression diagnoses.

NEUROANATOMICAL AND NEUROPSYCHOLOGICAL FINDINGS IN LATE-LIFE DEPRESSION

Atrophy of brain regions crucial to mood regulation is common in elderly people. In particular, it has been shown that there is a proclivity for frontal white matter changes in old age (Bae et al., 2006). However, differences between depressed and non-depressed elderly people have shed light on significant neuroanatomical differences. Namely, when compared to non-depressed elderly people, depressed elderly people are found to have lower frontal volumes and greater whole-brain high-intensity lesions (Kumar, Bilker, Jin, & Udupa, 2000). MacFall et al. (2006) found that not only are frontal lobe lesion volumes greater in depressed elderly people, but there is also a trend for total and right parietal regions. Previous findings have also implicated frontal and parietal lesions, which extended into the occipital and temporal lobes in older individuals with greater levels of clinical depression, later onset of depression, and medical comorbidity (Artero et al., 2004).

Late onset depression, in general, has been shown to be related to subcortical gray matter lesions as well as white matter lesions (Taylor et al., 2005). The findings that these lesions tend to increase with age, are more severe at onset of depression, are associated with medical comorbidity (particularly vascular) and, on autopsy, appear to have an ischemic etiology, led to the vascular depression hypothesis (MacFall et al., 2006; Taylor et al., 2005). The vascular depression hypothesis suggests that white matter lesions (particularly within the frontal regions) are a result of cerebrovascular incidents. It is also posited that gray matter lesions may result in impaired functioning of the subcortical regions involved in mood regulation, while white matter lesions may also disrupt integral pathways of mood regulation of the cortical and subcortical regions (MacFall et al., 2006; Taylor et al., 2005). In fact, Bae et al. (2006), using diffusion tensor imaging, found lower fractional anisotropy values in the white matter of the superior and middle frontal gyri accompanied with lower values in the anterior cingulate cortex in late-life depressed participants compared to controls. The authors concluded that changes in white matter among depressed elderly people may result in the disconnection of cortical and subcortical regions, which may be associated with late-life depression. Similarly, Hannestad et al. (2006) showed that white matter lesion volume is negatively associated with the left caudate volume in depressed elderly people, and suggested that such lesions may disrupt the frontostriatal circuits.

Neuropsychological findings pertaining to depression in elderly people mirror some of the neuroanatomical findings. It is well established that depression, in general, can lead to deficits in memory, verbal and visual learning, working memory, psychomotor speed, and executive functioning (Austin, Mitchell, & Goodwin, 2001). Depression in elderly patients has been found to lead to deficits in executive functioning, nonverbal and verbal fluency, nonverbal memory, psychomotor processing, verbal memory, learning, and reading comprehension (see Beats, 1996; Elderkin-Thompson et al., 2003). Such a broad variety of deficits are also commonly seen in Alzheimer's, Parkinson's, and stroke patients. Delineation of the cognitive deficits associated with these disorders and those

associated with depression, so-called “pseudodementia,” renders another significant hurdle in the overall assessment of medically ill elderly people. The presence of depression may easily mask the deficits seen in these disorders. Fortunately there are some observations that have been thought to aid in differentiating pseudodementia from dementia. In particular, depressive patients are found to perform worse on more “effortful” tasks compared to “automatic” tasks (Elderkin–Thompson et al., 2003). Namely, greater deficits are typically seen on explicit memory tasks as opposed to implicit tasks. Additionally, depressive patients may have relatively spared recognition despite impaired recall, whereas cognitively impaired patients may have comparably impaired recall without improved recognition (Austin et al., 2001). Overall, motivational factors are thought to play a significant role in the poor performance amongst depressed patients. However, these observations may not be easily applied to the oldest of the old. For instance, the observation that depressed patients may express a significant amount of distress about their cognitive functioning and offer “I don’t know” answers is not as common in depressed elderly people as it is in their younger counterparts (Alexopoulos, Meyers, Young, Mattis, & Kakuma, 1993). Given the difficulty in differentiating depressive syndromes and pseudodementia from dementia, it is imperative to properly assess depression in these patients when conducting a thorough neuropsychological assessment. In many instances, successful treatment of the depression is necessary in order to determine the deficits related to the medical condition. Hence, proper detection and understanding of depression in these populations takes precedence.

DEPRESSION IN ALZHEIMER’S DISEASE

The estimated prevalence of Alzheimer’s disease (AD) in 1998 was 2.3 million in the United States and several million worldwide, with an annual incidence of 360,000. At that time it was thought that the prevalence would quadruple in the next 50 years (Brookmeyer, Gray, & Kawas, 1998). Today, AD is the most common cause of dementia, accounting for between 30% and 70% of sufferers (Graham, 1997; Stevens et al., 2002). Alzheimer’s disease is accompanied with a high risk for depression. It is speculated that upwards of 50% of AD patients suffer from depression at some point in time throughout the course of the disease, with most investigations reporting a range somewhere between 20% and 30% (Lee & Lyketsos, 2003). However, rates for major depression (MD) have been shown to be slightly lower, ranging from 5% to 23%, while 8% to 34% of AD patients suffer from dysthymia (Regan, Katina, Walker, & Livingston, 2005). Finally, point prevalence rates of minor depression in AD have been found to be between 20% and 30% (Lyketsos & Olin, 2002). Most troubling, though, is that prevalence rates for depressive symptomatology have ranged anywhere from 17% to 87% (Lyketsos et al., 1997). Such wide range of reports may suggest that minor and syndromal depression also contribute to the prevalence of depression in AD. Better delineation of these depressive syndromes may lead to more accurate prevalence rates.

The etiology of depression in AD has received a lot of attention. There is some dispute regarding causality. Some have proposed that late-life depression tends to

precede AD (Alexopoulos et al., 1993; Devanand et al., 1996) while others see depression in AD as a symptom of the disease. Another dispute is whether or not it is late-life depression, per se, or depression throughout life that makes one susceptible to AD. Speck et al. (1995) showed that depressive symptoms occurring more than 10 years before onset of AD were a possible risk factor. Van Reekum et al. (2005) compared individuals with late and early onset of depression to decipher who was more likely to develop AD. They found that the risk for developing AD was not different between late- and early-onset depression. Although van Reekum et al. report not having enough power with their sample it appeared that, if they had, those with late-onset depression might have been more likely than those with early-life depression to develop AD. However, elders who were depressed and showed cognitive impairment were at a risk of developing AD. Other risk factors for depression in AD include female gender, younger age of onset, family history of mood disorder in first-degree relatives, and history of depression (Lyketsos & Olin, 2002). In fact, Butt and Strauss (2001) showed that AD patients with either a personal history of depression or a family history of depression or suicide were three to four more times likely to experience depression than those without. Some investigators have suggested that this may be due to a genetic vulnerability to depression that is similar to the pathophysiology of AD. In fact depression and Alzheimer's share many neuropathological processes, suggesting there may be a significant biological etiology for depression in AD. There are several replications of postmortem studies showing an association between depression and loss of noradrenergic cells in the locus coeruleus, a region commonly deteriorated in AD (Lyketsos & Olin, 2002). It has also been shown that depression is associated with the loss of dorsal raphe serotonergic nuclei in AD (Forstl, Burns, & Luthert, 1992), although more recently this finding has not been supported (Hendricksen, Thomas, Ferrier, Ince, & O'Brien, 2004). Most recently, attention has been given to the role of the serotonin transporter gene, 5-HTTLPR and its association with depression and other disturbances in AD. In fact, polymorphism of the short variant of this gene was found to be associated with behavioral disturbances in AD, namely psychosis (Borroni et al., 2006). Such findings support a direct genetic component.

Depression in AD may be reactive in nature. Evidence for the reactive hypothesis is the existence of greater depression in mild to moderate dementia and decreased prevalence of depression in severe dementia. Forsell, Jorm, Fratiglioni, Grut, and Winblad (1993) showed that depression worsens as dementia progresses from mild cognitive impairment to early/moderate dementia, but is less common in severe dementia. A possible explanation for the lack of depressive symptomatology in severely progressed AD is the lack of awareness that may cause patients to be indifferent to their situation. The findings of Forsell et al., that one's awareness of the disease is associated with depression, runs counter to other claims that depression in AD is not "reactive" but rather a neuropathologic feature of the disease. If depression were solely biologically determined, awareness of the disease would make little difference, while progression of the disease would lead to an increase in depression. Finally, Migliorelli et al. (1995) suggest the possibility of understanding

depressive symptoms along a spectrum for determining if depression in AD has a reactive or biological etiology. These investigators contended that those with dysthymia had more awareness of their intellectual deficits than those with and without MD. It was theorized that dysthymia in AD may be more due to a reaction of illness, while MD in AD may have more of a biological etiology.

Regardless of this etiological conundrum, properly assessing depression in AD is difficult. A significant hurdle for detecting depression in AD is the high prevalence of apathy that upwards of 92% of AD patients report experiencing. Apathy in AD has been defined as diminished initiation, lack of interest, poor persistence, indifference, low social engagement, lack of insight, and blunted emotional response (Landes, Sperry, Strauss, & Geldmacher, 2001). This overlap may render detection of depression in AD difficult given that some of the cardinal symptoms of depression, such as loss of interest, psychomotor retardation, fatigue, and hypersomnia, are also common in apathy (Marin, 1990; Marin, Firinciogullari, & Biedrzycki, 1993). In fact, Lee and Lyketsos (2003) reported that their earlier Cache County study found 27.3% of AD patients suffered from apathy, with 40% of them also being depressed. Conversely, 56.4% of the depressed sample was apathetic. These data are consistent with findings that, although the prevalence of apathy in AD ranges from 25% to 50%, 50% of those suffering from apathy do not suffer from concomitant depression (Starkstein, Jorge, Mizrahi, & Robinson, 2006). In Starkstein et al's study, they found that 23% of their non-depressed sample suffered from apathy, while nearly half of their depressed samples (major and minor depression) were apathetic. Given such comorbidity it is probable that apathy may be misconstrued as depression or vice versa. In fact, some have reported that individuals with AD who are thought to be depressed suffer more from motivational symptoms and delusions, while displaying less guilt, suicidal thoughts, and low self-esteem (Rosenberg et al., 2005). However, these latter cognitive and evaluative symptoms of depression may actually be more indicative of depression. In fact, Landes et al. (2001) suggest that sadness, guilt, suicidal ideation, self-criticism, pessimism, and hopelessness may distinguish depression from apathy in AD patients. Other factors that may help differentiate apathy from depression in AD are the findings that apathy in AD is more common in more severe AD (from 14% in very mild AD to 61% in severe AD) and is thought to be due to functional limitations as well as discrete neuropathological changes (Starkstein et al., 2006). Starkstein et al. (2006) showed that although apathy and depression frequently coexist, those who developed depression over time were not necessarily more apathetic than those who did not, suggesting that apathy is not necessarily synonymous with depression in AD. Moreover, it was found that patients who developed apathy over time suffered from greater cognitive and functional decline, suggesting a more aggressive course of AD, which may be more responsible for the presence of apathy. Finally, consideration should be given to the fact that psychomotor slowing, emotional lability, crying spells, insomnia, weight changes, inability to express affective state, and pessimism occur in both depressed and non-depressed AD patients (McGuire & Rabins, 1994).

DEPRESSION IN PARKINSON'S DISEASE

Approximately 1.5 million individuals suffer from Parkinson's disease (PD) with an annual incidence of 50,000 (Weintraub, 2004). Although PD has a peak age of onset between 55 and 66, cases of earlier onset are also found. Melancholy was an initial description of the disease reported by James Parkinson in 1817 (Parkinson, 1817). Depression has in some cases been thought to predate the disease or be the first symptom. It has also been shown that a prodromal syndrome of depression occurred up to 4–8 years prior to diagnosis (Edwards et al., 2002). Incident estimates of depression in PD range from 4% to 75% (McDonald, Richard, & DeLong, 2003). Slaughter, Slaughter, Nichols, Holmes, and Martens (2001) reviewed 45 studies examining the lifetime prevalence of depression in PD dating back to 1922, up to and including the 1990s. They found that since 1922, the range of depression in PD has varied widely anywhere from 7% to 70%. Overall, they found the prevalence of MD to be 25% with a prevalence of 42% for all depressive disorders, and suggested that one in three PD patients will experience some sort of depression over the course of their disease. It has been speculated that this wide range is due to use of various sampling methods and inaccurate assessment tools. For instance, the incidence of depression in PD has been found to be 40% to 50% in research centers compared to less than 10% in community settings, while scripted interviews and use of diagnostic criteria have generated lower prevalence rates (McDonald et al., 2003).

Three theories exist regarding the development of depression in PD. McDonald et al. and Weintraub present two possible etiologies: psychological and biological. These theories were based on the observations that depression seemed the greatest at the beginning of the disease and in the late stage, with individuals in the middle seemingly unaffected (Weintraub, 2004). A typical interpretation of these data has been that a psychological or reactionary process occurs initially, while biological factors may lead to depression later on. The psychological theory is further supported by evidence that there are reports of depression at the time of initial diagnosis and that people with an early onset (<55) have been shown to have increased rates of depression, suggesting that is a reaction to being diagnosed with a chronic, progressive disease in which they are aware of their prognosis. However, a biological explanation for depression in earlier onset PD is also possible given the neuropathological differences between early and late onset PD.

The biological theory posits that depression is a result of the neurodegeneration seen in Parkinson's that mirrors a similar process in depression. In particular, the degeneration of the ventral tegmental area (VTA), hypothalamus, dorsal raphe, and locus coeruleus are found in both PD and depression. McDonald et al. (2003) reported on postmortem studies showing that depressed PD patients had smaller subcortical nuclei, which is similar to findings in non-PD depression. Further, the degeneration of the VTA and substantia nigra that project to the striatum, mesocortical, and mesolimbic areas can lead to a depletion of dopamine, serotonin, and norepinephrine, key players in mood regulation. Decreases in serotonin in the dorsal raphe nucleus and dopamine in the VTA are found postmortem in PD patients with a history of depression. Finally, depression has

been found to be more common in akinetic rigid-type PD than those suffering predominantly from tremor (Starkstein et al., 1988a) and in those with right-side motor symptoms suggesting a potential link to the area or type of degeneration and mood symptoms.

The third theory proposed by McDonald et al. posits that depression can be a result of medications taken to manage the symptoms of PD. Individuals treated with the most common dopaminergic treatment, levodopa, for long periods of time have been shown to go through “off” periods in which the effectiveness of the drug is not as great and may present with transient dysphoria or euphoria. Dopamine agonists have also been linked to delirium, agitation, restlessness, and other psychological symptoms in PD.

Beyond early age of onset and akinetic-type PD, risk factors for depression in PD include longer disease duration, a family history of PD, more severe symptomatology, higher doses of levodopa, and dementia (Leentjens, Lousberg, & Verhey, 2002).

Assessing depression in PD is complicated by several factors. First and foremost, emotional lability and abrupt mood changes associated with PD could easily be misconstrued as depression. Patients with Parkinson’s have been described as having panic and pathological fearfulness at some times and uncontrollable, sentimental crying at other times when not depressed (Edwards et al., 2002). Further, there appear to be periods of emotional distress that accompany exacerbations of PD that are not considered to reflect depression. Lastly, the overall picture of PD patients may lead one to assume they are depressed. Parkinson’s patients have been described as melancholic, while the personality of PD patients has been described as unemotional, less talkative, inflexible, and stoic (Slaughter et al., 2001). This presentation was apparent in Charcot’s descriptions of the personality of Parkinson’s patients as “industrious, introverted, inflexible, and morally rigid” (Slaughter et al., 2001, p. 190). Suggestions have been made that the most reliable indicators of depression in PD are dysphoria, pessimism, irritability, sadness, and suicidal ideation (Cummings, 1992). Further, insomnia, weight loss, psychomotor retardation, and loss of energy are all common in PD, while sleep disturbance, fatigue, psychomotor slowing, difficulty concentrating, and sexual dysfunction are common in advanced stages of PD and should be considered prior to giving a diagnosis of depression. Withdrawal and social isolation may also be present as some patients may have difficulty getting around with their dyskinesia or feel uncomfortable with their appearance—not because they are depressed (McDonald et al., 2003). Similarly, apathy is also frequently present in PD, with some considering apathy a core symptom of PD, in the absence of depression (Kirsch–Darrow, Fernandez, Marsiske, Okun, & Bowers, 2006), and noting a strong association of apathy with cognitive impairment (Dujardin, et al., 2007), similar to the presence of apathy in AD. Finally, Mercshdorf et al. (2003) compared depressed PD patients to controls with MD. They found that depressed PD patients reported similar rates of depressed mood, anhedonia, anxiety, loss of energy and drive, hopelessness, feelings of guilt and worthlessness, and suicidal thoughts as depressed controls. However, depressed PD patients reported more irritability and inner restlessness, while depressed controls reported more affective flattening, delusions, and suicide attempts.

POST-STROKE DEPRESSION

Stroke is common, with approximately 600,000 new cases being reported each year and 4.5 million stroke survivors in the United States (Whyte & Mulsant, 2002). Post-stroke depression (PSD) point prevalence rates vary anywhere from 6% to 79% (Provinciali & Coccia, 2002; Whyte & Mulsant, 2002). In a more recent review, Robinson (2003) found point prevalence rates ranging from 10% to 40% for major depressive disorder and between 8% and 44% for minor depression. Perhaps the most important issue in examining the prevalence rates of PSD is the time lapsed since the incident. A number of investigators have found that depression after a stroke varies in course anywhere from several days to upwards of 2–3 years. Whyte and Mulsant's meta-analysis found that prevalence of depression at initial diagnosis of a stroke was between 6–27% and about 9–34% at 6 months post-stroke at which it peaks. Additionally, it has been found that 30% of patients who are not depressed initially, developed depression 6 months post-stroke. However, there is a decline to about 50% of initial rate at 1 year post-stroke, although the prevalence remains slightly high (5% to 16%). It is common for PSD to remit after 1–2 years (Provinciali & Coccia, 2002; Whyte & Mulsant, 2002) although the prevalence is still reported to be high at 2 years post-stroke, where depression rates range between 19% and 21% (Whyte & Mulsant, 2002). Given that this was found in a meta-analysis using cross-sectional studies, the data cannot reveal the course of depression for individuals over time. Longitudinal studies of post-stroke depression would provide a better indication of these fluctuations in prevalence.

Certain factors seem predictive of whether or not depression will remit over time. One prognostic feature is the appearance of depression within the first few months of diagnosis. It has been found that half who are depressed at 3 months post-stroke are still likely to be depressed 1 year later, while those who are depressed within days after stroke are more likely to show remittance. This latter depression may be seen as reactionary, which remits through adjustment to the diagnosis. Second, severity of disability has been found to be one of the strongest predictors of PSD, with severity of disability at 3 months being even more predictive than lesion location. Finally, common risk factors for PSD include female gender, major life events prior to stroke, past psychiatric history, premorbid neurotic personality, and social isolation (Whyte & Mulsant, 2002).

An interesting etiological hypothesis of PSD is the idea that some investigators view the original cerebrovascular risk factors for stroke to be the same that may predispose one to depression. Whyte, Mulsant, Vanderbuilt, Dodge, and Ganguli (2004) examined whether certain cerebrovascular factors (hypertension, diabetes mellitus, atherosclerotic heart disease, and smoking) and disability mediated the relationship between stroke and depression. Although such cerebrovascular factors are proven to play a role in depression in clinical populations, they were not found to play a role in this sample. Although these factors seem to suggest a psychosocial etiology, others have shown a biological basis of depression in stroke.

Support for a biological etiology is the association of certain ischemic lesions found to be associated with depression in stroke. In particular, lesions in the left anterior and left basal ganglia as well as frontal lobe lesions have been found to be associated with depression (Robinson, Kubos, Starr, & Rao, 1984;

Starkstein, Robinson, Berthier, Parikh, & Price, 1988b) while lesions in the right orbital frontal, basal ganglia, or thalamic regions are related to the euphoria or mania occasionally seen post-stroke (Whyte & Mulsant, 2002). Although a biological substrate may be responsible for these findings, others have also shown that non-fluent aphasic patients have a high prevalence of depression, and attribute it to the patient's awareness of their impairment which may explain higher levels of depression in those with left lesions. However, studies have also shown that severe comprehension difficulties are associated with the left posterior region not the left anterior region, which is more commonly linked with PSD (Provinciali & Coccia, 2002). The evidence that cognitive impairment and aphasia are risk factors for depression is not as well supported as other evidence. Further, the evidence that individuals who suffer "silent" infarcts or individuals with anosognosia have been shown to be depressed (Whyte & Mulsant, 2002) provides further support of a biological etiology. Provinciali and Coccia (2002) suggest that depression in stroke can be both psychological and biological. They suggest that the presentation of early PSD consists of anxiety, loss of libido, and feelings of guilt which may be more biological, while sleep disturbances and social isolation that is found at 1–2-year follow-up may be more psychological. Similarly, Whyte and Mulsant (2002) suggest that factors such as lesion location are stronger in the first 6 months, but that psychosocial factors such as isolation are more prominent at 1 year post-stroke. Regardless, they contend that the first year is crucial, as depression in stroke does tend to remit within a year and patients who do not remit are at greater risk for developing chronic depression.

PSD is characterized by greater psychomotor retardation compared to depressed individuals without vascular disease (Alexopoulos et al., 1997), more social withdrawal or affective flattening than AD patients (Mast, 2004), isolation, and apathy (Provinciali & Coccia, 2002). Alexopoulos et al. (1997) also found that depressed patients with vascular disease reported less agitation, guilt, and insight than depressed individuals without vascular disease. Similarly, Mast (2004) showed that compared to geriatric depression in other medical illnesses, stroke patients were more likely to exhibit social withdrawal and were less likely to endorse agitation while there were no differences in depressed mood, energy, or positive affect. Social withdrawal/isolation seems to be one of the most consistent factors in PSD and has been speculated to be one of the greatest predictors for more longstanding depression. Further, compared to non-depressed stroke patients, patients with minor depression endorsed more depressed mood, diminished interest, fatigue, insomnia, and psychomotor retardation. Interestingly, those diagnosed with MD endorsed even more diminished interest, concentration difficulties, psychomotor retardation, weight/appetite decrease, and suicidal ideation than the minor depression group while not endorsing more fatigue or insomnia (Spalletta, Ripa, & Caltagirone, 2005). Furthermore, non-depressed stroke patients still endorsed insomnia (24%), fatigue or loss of energy (35%), and concentration difficulties (35%). This may suggest that fatigue and insomnia may not be the best indicators of distinguishing minor and major depression in PSD, while concentration difficulties may be apparent in depressed and non-depressed stroke patients. Finally, upwards of 50% of stroke patients have been reported to be apathetic (Hama et al., 2007; Okada, Kobayashi, Yamagata, Takahashi, & Yamaguchi, 1997) and its presence

may or may not coexist with depression. Similar to the presence of apathy in AD and PD, the presence of apathy post-stroke has been found to be associated with cognitive impairment, older age, functional impairment (see Brodaty et al., 2005; Starkstein, Fedoroff, Price, Leiguarda, & Robinson, 1993), and specific neuropathology. Namely, involvement of the right dorsolateral frontal and left frontotemporal regions (Okada et al., 1997), as well as the right fronto-subcortical circuit (Brodaty et al., 2005) have been implicated, suggesting a link between apathy and frontal dysfunction. Hama et al. (2007) more recently found anatomical differences between apathetic and affective presentations following stroke. Depressive or affective presentation was associated with damage to the left frontal lobe, while bilateral basal ganglia damage was associated with a more apathetic presentation. Such findings further suggest that apathy may or may not coexist with depression following a stroke, and the importance of differentiating depression from apathy following a stroke.

WHY THE VARIABILITY OF PREVALENCE RATES OF DEPRESSION IN THE THREE CONDITIONS?

Throughout this review of the literature of depression in these three populations—AD, PD, and stroke—there exist many methodological concerns regarding these accumulated prevalence rates. Most of the investigations across literatures employ varying samples, various time periods over the course of the disease, different measures and diagnostic criteria, and varying use of informants. For example, Spalletta et al. (2005) caution that the methodological limitations in the post-stroke depression literature include the use of different interviews and scales and their validity with stroke patients, the different approaches to diagnostic criteria, questionable validity of the *Diagnostic Statistical Manual of Mental Disorders* (DSM) (American Psychiatric Association, 1994) categorical diagnosis for major and minor depression, the overlap of neurovegetative and cognitive symptoms that may be due to brain damage, and the questionable use of cutoff scores on questionnaires. Similar reports were found for Alzheimer's and Parkinson's research. The breadth of these concerns is too great to include comprehensively in the present review, but we will later examine the use of varying self-report instruments and how improvements can be made in this domain.

IMPACT OF DEPRESSION IN THESE THREE POPULATIONS

Despite varying prevalence rates and ambiguity surrounding methodological flaws, Ranga et al. (2002) suggest it is reasonable to assume that approximately half of the patients with these neurological disorders experience significant depressive symptoms at any given time, while current MD in AD ranges from 5% to 15%, 15% to 20% in PD, and 20% to 25% in stroke patients with another 25% of patients with each disorder suffering from minor depression. Depressed elderly medical patients have been found to be less likely to be compliant with medications than non-depressed medically ill elders (Carney, Freedland, Eisen, Rich, & Jaffe, 1995). Further, suicide is twice as high in late-life elders than in the general public (Alexopoulos et al., 2002) and there are other detriments in quality of life for elders

suffering from depression. It has been shown that depression in Alzheimer's brings an increase in suicide, poorer quality of life, greater disability in activities of daily living, and an increase in mortality when accompanied by cognitive impairment or dementia (Lyketso & Olin, 2002). Similarly, Parkinson's patients with depression have commonly been shown to have suicide plans when their prognosis is known. Depression in Parkinson's has also been shown to be the primary factor impeding overall quality of life (McDonald et al., 2003). Lastly, PSD is associated with excess disability, poor rehabilitation outcomes, mortality, morbidity, and suicidal thoughts and plans (Whyte & Mulsant, 2002). Given the impact that depression has on patients with these disorders, proper assessment seems vital.

This paper provides the following guidelines to assist practitioners in assessing depression in these populations. These guidelines are provided as a tentative review of the literature and should only be used as an initial template, not as definitive criteria (see Table 1). These guidelines can be useful when utilizing the best estimate approach in assessing depression in the medically ill, which is recommended by these authors. In using such an approach, all symptoms on depression measures are included in assessment. It is important to take a holistic view of the full constellation of symptoms reported to delineate depression from the disease. For example, if a patient with AD reports symptoms of insomnia, apathy, and psychomotor slowing to a great extent, and only endorses a minimal amount of hopelessness, one may use one's best clinical judgment in deciding that the reported symptoms are more related to their disease and not depression. On the contrary, if a patient reports insomnia, psychomotor slowing, and crying spells accompanied with sadness, guilt, and hopelessness, erring on the side of caution would suggest that the insomnia, crying, and slowing be considered more related to concomitant depression and should be treated as such. By examining the full presentation of the patient with the knowledge of which symptoms are commonly found in the disease, the risk factors for depression, and which symptoms are more indicative of depression, practitioners should feel more confident in utilizing the best estimate approach and may be more capable of properly addressing the symptoms while having a familiarity with possible etiologies.

Awareness of which symptoms are more reflective of depression and which are more related to the disease is the first step in better assessing depression in these populations. However, such an approach does require closer examination of subjective reports typically found by conducting a clinical interview, which may not always be feasible. Again, self-report instruments are common in primary care given their ease and efficiency at screening for depression. However, caution needs to be exercised as to how one utilizes such instruments with the medically ill, elder populations. We turn now to a review of the efforts made to assure that we are "getting it right" when employing common self-report instruments to assess for depression in Alzheimer's, Parkinson's, and stroke.

STRIVING FOR A VALID INTERVIEW OR SELF-REPORT QUESTIONNAIRE

Self-report depression questionnaires and interviews, such as the Beck Depression Inventory (BDI), the Montgomery Asberg Depression Rating Scale (MADRS), the Center for Epidemiological Studies – Depression Scale (CES-D),

Table 1 Symptoms, prevalence, risk factors, and comorbidity of depressive symptoms in Alzheimer's, Parkinson's, and stroke

Condition	Prevalence rates	Risk factors for depression	Comorbid symptoms	Indicators of depression
Alzheimer's	Major 5–23% Minor 20–30% Dysthymia 8–34% Depression greater at mild-moderate dementia	Younger onset Family history of depression Female gender Past depression	Psychomotor slowing Emotional lability Crying spells Insomnia Weight change Apathy Poor emotional expression Pessimism	Guilt Pessimism Hopelessness Suicidal ideation Self-criticism Low self-esteem Sadness
Parkinson's	Major 25% Minor, major, & dysthymia 42% Depression greatest at beginning and late stages	Younger onset Medications Akinetic rigid type Disease duration Family history of PD Severe symptoms Dementia	Psychomotor slowing Emotional lability Crying spells Insomnia Weight loss Loss of energy Abrupt mood changes Sleep disturbance* Fatigue* Concentration difficulty* Sexual dysfunction* Social withdrawal [†]	Guilt Pessimism Hopelessness Suicidal ideation Sadness Irritability Anxiety Anhedonia Inner restlessness Worthlessness
Stroke	Major 10–40% Minor 8–44% Initial 6–27% 6 months 9–34% 1 year 5–16% 2 years 19–21%	Major life events prior to stroke Past depression Female gender Premorbid neurotic personality Isolation* Left-side lesions Aphasia Disability	Fatigue Insomnia Concentration difficulty	Psychomotor slowing Social Withdrawal Affective flattening Apathy Isolation Depressed mood Diminished interest Suicidal ideation Fatigue* Insomnia*

Comorbid symptoms = symptoms common to the condition.

*Found later in the disease.

†Symptom may be related to appearance and dyskinesias.

‡May not distinguish minor and major depression.

and the Hamilton Depression Rating Scale (HDRS), may not be the most accurate tools at our disposal when assessing elderly people, much less those with medical illness. Some of these measures rely heavily on somatic items and few included elderly people in their normative data. More specific measures have been designed for elderly populations. Such measures as the Geriatric Depression Scale (GDS), the Cornell Scale for Depression in Dementia (CSDD), and the Evans Liverpool Depression Rating Scale (ELDRS) are thought to capture depression in elderly people with more precision, having been designed specifically for an elderly population.

Precision of self-report questionnaires are commonly examined through Receiver Operating Characteristics (ROC) procedures. ROC curves plot the sensitivity (ability to detect) and specificity (ability to rule out noise) of all cutoffs of the measure (Vida, Des Rosiers, Carrier, & Gauthier, 1994). ROC procedures also provide information regarding the predictive values of the measure, or more precisely the number of false positives and false negatives that would result from particular cutoffs. For screening purposes, in which one wants to detect if an individual exhibits any of the attributes under question (e.g., depression), sensitivity is more important in a measure. However, when it is suspected that an individual has the attribute and a diagnosis is to be made, specificity is more important (Streiner, 2003). Under severe consequences, such as suicide, screening measures may employ greater sensitivity, but when trying to determine or confirm a diagnosis, a measure should contain good specificity. For the purposes of detecting depression in medically ill people, the distinction should be on what is acceptable for screening and what is advisable for diagnosis. It is suggested by some that a sensitivity greater than 80% and specificity greater than 60% is good for diagnosis, while a sensitivity of 90% is acceptable for screening (Lincoln, Nicholl, & Flannagan, 2003). However, others suggest that both high sensitivity and high specificity are warranted when differentiating depressed and non-depressed individuals (Weintraub, Oehlberg, Katz, & Stern, 2006). Several investigators have taken this approach in determining which measures are presumably useful in Alzheimer's, Parkinson's and stroke, and what would be the modified cutoffs, if needed. Others have examined other psychometric properties, such as factor structure of the scales, to determine their reliability and validity with these populations.

COMMON SELF-REPORT DEPRESSION MEASURES

Beck Depression Inventory (BDI)

The BDI has been criticized for being dependent on somatic items, but praised for its ability to give a severity rating of depression. Its validity for use with these three neurological populations and elderly people in general has been mixed. Gallagher, Nies, and Thompson (1982) contended that the BDI was adequate for use with a community sample of elders and for screening purposes among a depressed patient group. However, their inclusion criteria included major depressive disorder, which may not have included the gamut of depressive disorders found in elderly people. Wagle, Ho, Wagle, and Berrios (2000) compared the items of the

BDI of 129 AD patients to 52 depressed AD patients, and contended that it was not a good screening tool in AD. Despite showing that the depressed group scored significantly higher on both cognitive and somatic items of the BDI, with cognitive items being better at distinguishing the two groups and the inclusion of somatic items not confounding, the best sensitivity and specificity obtained were only 61% and 80%, respectively, with a cutoff of 12. They recommended a cutoff of 16, which gave the best "likelihood" that the individual was depressed. The likelihood ratio of a positive test was 4.71 while the sensitivity was only 36% with a specificity of 92%. Wagle et al. caution that the BDI may be assessing more severe depression, which is again, not common in AD.

However, others have shown the BDI to be adequate in other neurological populations. Levin, Llabre, and Weiner (1988) found the BDI to be valid and reliable in PD even when endorsement of somatic items was taken into account. Their findings were based on replicating the factorial structure of the BDI between controls and PD patients. However, they found that the PD patients reported more depression than their healthy counterparts. Comparisons with depressed controls may have given this study more credence in examining the use of the BDI in depressed PD patients. Tamaklo, Schubert, Mentari, Lee, and Taylor (1992) examined the BDI among 22 stroke patients in relation to the MADRS and DSM-III-R criteria of depression. Using the original cutoff of the BDI (=12) they found that the BDI correlated with the MADRS ($r = .646$, $p < .001$), of which severity ratings were highly correlated with their DSM-III-R diagnoses ($r = .996$, $p < .001$). They suggested that the BDI was an accurate assessment tool for depression in stroke. Several limitations existed in this study. For one, their small sample is notable. Furthermore, the patients were interviewed 2–3 weeks post-stroke and several of them had concomitant medical problems (hypertension, diabetes, heart disease, and prior stroke). Given that 8 subjects from the initial 30 recruited dropped out, it is unclear as to which patients with such disorders were in the actual sample.

Aben, Verhey, Lousberg, Lodder, and Honig (2002) tested a sample of 202 stroke patients and demonstrated that the BDI could be used to screen for depression in stroke, but concluded that it should not be used to diagnose depression as it had a high misdiagnosis rate of 40%. However, they suggested a cutoff of 10 generated a sensitivity of 80% and specificity of 61.4%, and that its ability to distinguish depressed from not depressed was better in men. Similarly, Lincoln et al. (2003) found a higher cutoff on the BDI-II of 15/16 was optimal, with a sensitivity of 91% and specificity of 56%, suggesting that the BDI-II is sensitive but not specific to post-stroke depression and is advisable for use only for screening.

Overall, these findings suggest that the BDI may not be the most adequate tool available for assessing depression in these three populations. The BDI may be adequate for PD patients in light of factorial structure and somatic complaints not inflating reports, but little is known in regard to adequate cutoffs. However, for AD patients it seems that it may not be the best screening device, but could be used for diagnosis if utilizing a higher cutoff of 16. Similarly, a cutoff of 15/16 appears adequate for screening depression in stroke patients, while a cutoff of 10 can be used cautiously for a diagnosis.

Montgomery Asberg Depression Rating Scale (MADRS) and Center for Epidemiological Studies Depression scale (CES-D)

The MADRS has been examined for use with Parkinson's patients and stroke patients, while the CES-D has been questioned for its use with stroke patients. Leentjens et al. (2000), using DSM-IV criteria derived by the Clinical Assessment in Neuropsychiatry (SCAN), found that a cutoff of 14/15 on the MADRS was the best for screening purposes (sensitivity = 88%, specificity = 89%) while a cutoff of 17/18 (sensitivity = 63%; specificity = 94%) was best for diagnosis in PD. Given the low sensitivity at this cutoff, they did suggest that the MADRS was not as predictive as the HDRS, but could be used. Tamaklo et al. (1992) found that the MADRS was concurrent with DSM-III-R diagnoses of depression. Using the cutoffs on the MADRS for varying degrees of depression, they found that the MADRS score related to DSM-III-R diagnoses of depression. Those who reported no depression on the MADRS were also found not to be depressed according to the DSM. Similarly, 70% of the mildly depressed were picked up under adjustment disorder with depressed mood. Both mild and MD were picked up by the MADRS 50% of the time. Tamaklo et al. recommended that the MADRS was a good screening device for depression in medically ill people. Having a 30–50% miss rate seems less than adequate. The CES-D, which has been recommended for use with elderly people (Haringsma, Engels, Beekman, & Spinhoven, 2004) has shown variable preferences for cutoffs, ranging from 16 to 27, but with an agreement of 20 for use with elders. Haringsma et al. (2004) found that among self-referred stroke patients a cutoff of 22 captured clinically relevant depression (sensitivity = 84%, specificity = 60%) while a higher cutoff of 25 was more appropriate for major depressive disorder (sensitivity = 85%, specificity = 64%).

CLINICAL INTERVIEW QUESTIONNAIRES

Hamilton Depression Rating Scale (HDRS)

The HDRS has been promoted for its use in medical populations as it assesses severity of depression without somatic comorbidity. When examining its use with Alzheimer's, Parkinson's, and stroke patients, Naarding, Leentjens, van Kooten, & Verhey (2002) found varying optimal cutoffs. Caution should be advised, though, that the values for each group were found using varying DSM-IV criteria. Given the compilation of three groups, varying sources were used for DSM-IV criteria; a hurdle mentioned earlier. DSM-IV diagnoses were determined by a checklist of the Hamilton Rating Scale of Depression (HAM-D) for Alzheimer's, the SCID for Parkinson's patients, and the Schedule for Affective Disorders and Schizophrenia (SADS) for stroke victims. Despite this, a cutoff of 9/10 for AD patients obtained a sensitivity of 86% and specificity of 84%, while a cutoff of 13/14 generated a PPV of 76% and specificity of 96%. In an earlier study by Vida et al. (1994) a cutoff of 7 was found to have a sensitivity of 90% and specificity of 63% in a much smaller sample size of AD patients. In Parkinson's patients, who reported the least depression, a cutoff of 12/13 was adequate, with a sensitivity of 80% and 92% specificity. This specificity was raised to 99% with a PPV of 93% when the cutoff was raised to 15/16. This replicates their earlier study that showed an optimal cutoff

of 16/17 (sensitivity = 75%; specificity = 98%) for diagnosis and 11/12 (sensitivity = 94%, specificity = 75%) for screening in PD patients (Leentjens et al., 2000). Most recently, Weintraub et al. (2006) found similar cutoffs of 9/10 (sensitivity = 88%, specificity = 78%) for screening for depression in PD, while a cutoff of 15/16 (sensitivity = 44%, specificity = 98%) was recommended for diagnosis, despite a low sensitivity. Finally, the stroke patients who reported the most depression needed a lowering of the cutoff to 5/6 to gain a sensitivity of 100% and specificity of 93%. Raising this seemingly low cutoff to 10/11 performed better, leaving a perfect specificity and PPV of 100%. The authors suggested that these higher cutoffs for all populations be employed if used diagnostically. In another vein, Aben et al. (2002) found that the optimal cutoff of the HDRS was 12 (sensitivity = 78.1%; specificity = 74.6%) for screening for depression in stroke patients and a cutoff of 17 for diagnosis (sensitivity = 62.5%; specificity = 91.7%). Consideration should be given that these 202 individuals in Aben et al.'s study were tested at 1 month post-stroke versus Naarding et al.'s (2002) sample of only 44, all of whom were neurology ward inpatients with 52% classified as demented, something that may have had a profound effect on these findings. Reports of Naarding et al.'s sample also suggested that they had been tested between 3 and 9 months post-stroke, which may have also confounded the findings as depression is found to vary significantly during that period. The HDRS has seemingly disparate findings in these three samples. In PD, a stable finding is that a cutoff of 11 or 12 can be used diagnostically and for screening, while a cutoff of 15 to 17 is ideal for diagnosis. Again, the use of the HDRS in AD and stroke patients seems to need more consideration. In AD a cutoff of 7 may be utilized for screening, with a cutoff of 13/14 being adequate for diagnosis. Most discerning are the findings for stroke patients. Taking in to consideration Naarding's findings of a cutoff of 5 or 6 for screening and their suggestion that a cutoff of 10 or 11 performed almost perfectly, while Aben suggested a cutoff of 12 for screening and preference of 17 used for diagnosis that was slightly less than stellar, it would appear that a cutoff of 10 or 11 at this time may hold the most "screening and diagnostic" value, with a cutoff of 17 being more adequate for diagnosis.

SELF-REPORT DEPRESSION MEASURES DESIGNED SPECIFICALLY FOR ELDERLY PEOPLE

The Geriatric Depression Scale (GDS)

The GDS was developed for use with the elderly population, which has its advantages, but has not received as much attention or empirical validation in neurological samples. The full GDS consists of 30 binary "yes or no" questions, while the shorter version consists of half the items (GDS-15). The GDS-30 was normalized with individuals over the age of 55 and validated among a community sample using RDC criteria. It was found to have a sensitivity of 84% and specificity of 95% with a cutoff of 11, while a cutoff of 14 yielded a sensitivity of 80% and 100% specificity. When examined in nursing home patients, a cutoff of 14 had only a sensitivity of 47% and 75% specificity. This sensitivity was increased to 75% when those with cognitive impairment were eliminated (Koenig, Meador, Cohen, & Blazer, 1988). Needless to

say, these latter findings brought into question the utility of this measure in medically ill elderly people. Koenig et al. (1988) examined the GDS-30 among 128 men over the age of 70 who were admitted to medical and neurological units of a VA hospital and found that a cutoff of 11 resulted in a sensitivity of 92% and specificity of 89%. When raised to 14, sensitivity was 86% with 93% specificity, suggesting that it was valid in medically ill elders with an optimal cutoff of 11. It should be noted that their sample consisted of only men and their prevalence of depression was 12%. This low prevalence may be due, in part, to their best estimate approach in which they downgraded symptoms by 50% in their diagnostic criteria if they felt it was more attributable to disease. Most recently, a thorough review of the GDS found that a cutoff of 10 or 11 was common practice when using the GDS-30, while a cutoff of 14 was typical in nursing home and primary care settings. A cutoff of 5 or 6 was most frequently used with the GDS-15. Overall findings indicated that the GDS-30 had an average sensitivity of 75% and specificity of 77% while the GDS-15 obtained an average sensitivity of 81% and a specificity of 75% (Wancata, Alexandrowicz, Marquart, Weiss, & Friedrich, 2006).

The Cornell Scale of Depression in Dementia (CSDD)

The CSDD is an instrument that gathers information through an interview with the patient and caregiver/staff. Items were derived from phenomenological research of depression in patients with and without dementia and information from geriatric psychiatrists and experts (Alexopoulos, Abrams, Young, & Shamoian, 1988). An advantage of the CSDD is that it is initially administered to the patient's caregiver and a preliminary score is given for each item. The clinician then interviews/examines the patient. If there is a discrepancy, the clinician interviews the caregiver again to clarify such discrepancies and then bases the score on clinical judgment. When initially formulated, the CSDD was found to be an accurate report of depression across the range of depressive diagnoses and its use was encouraged, as it was better than the HDRS at distinguishing mild depression and was valid for those with mild and severe dementia. Suggested cutoffs scores are 8 for mild depression and 12 for MD. Vida et al. (1994) found a cutoff of 7 ideal for the CSDD in Alzheimer's patients with a sensitivity of 90% and 75% specificity.

The Evans Liverpool Depression Rating Scale (ELDRS)

The ELDRS was designed with medically ill elderly people in mind (Evans, 1993). It is designed to be given by nurses/care staff to inpatients whom they presumably know well. Originally validated with individuals over the age of 65 admitted to a general medical ward, it was found to have good internal consistency (Cronbach alpha=0.81) and a suggested cutoff of 5 (sensitivity=88%, specificity=94%) to 6 (sensitivity=96%, specificity=88%). Caution should be advised that the sample size was not reported in this study, although it seems to have been somewhere around 100. This questionnaire, uncommon in use, has reportedly been validated in hospitals and nursing homes against the HDRS, MADRS, and clinical psychiatric interviews. It showed a sensitivity of 91% and specificity of 85% when compared to a psychiatric interview (Evans, 1993). The questionnaire

Table 2 Recommended cutoffs of self-report depression measures

Measure Group	Screening cutoff (S, SP)	Diagnostic cutoff (S, SP)
BDI		
Alzheimer's	Not established	16 (0.36, 0.92)
Parkinson's	Not established	Not established
Stroke	15/16 (0.91, 0.56)	10 (0.80, 0.61)*
HDRS		
Alzheimer's	7 (0.90, 0.63)	13/14 (0.76, 0.96)
Parkinson's	11/12 (0.94, 0.75)	15/16 (0.70, 0.99)
Stroke	10/11(0.73, 10.0)	17 (620.5, 910.7)
MADRS		
Alzheimer's	Not established	Not established
Parkinson's	14/15 (0.88, 0.89)	17/18 (0.63, 0.94)
Stroke	Not established	Not established
CES-D		
Alzheimer's	Not established	Not established
Parkinson's	Not established	Not established
Stroke	Not established	25 (0.85, 0.64)*
CSDD		
Alzheimer's	7 (0.90, 0.75)	Not established
Parkinson's	Not established	Not established
Stroke	Not established	Not established
GDS		
Medical & Neurological	11 (0.92, 0.89)	14 (0.86, 0.93)

BDI=Beck Depression Inventory; HDRS=Hamilton Depression Rating Scale; MADRS=Montgomery-Asberg Depression Rating Scale; CES-D=Center for Epidemiological Studies Depression Scale; CSDD=Cornell Scale for Depression in Dementia; GDS=Geriatric Depression Scale; S=Sensitivity; SP=Specificity.

*=Cautiously used.

assesses many of the cardinal symptoms of depression and takes a best estimate approach using follow-up questions to some of the more somatic and motivational aspects. Evans (1993) highlights this need for further distinction from the patient quite eloquently. Rather than asking "Do you have enough energy?", it asks "Do you have enough energy to do the things that you want to do?" Similarly, when asking about satisfaction, it asks "Do you get satisfaction or enjoyment from your life as it was before you came to the hospital?" When assessing sleep disturbances it is asked of the relatives or nursing staff, and is qualified with how the person slept before coming to the hospital as many do not sleep well in a hospital regardless of depression. Finally, to assess for social isolation, it asks if the person complains of loneliness, has stopped going out, or does not mix with others on the ward or join in conversation.

Given the aforementioned review, the recommended cutoffs for each of the measures reviewed within are presented in Table 2.

These are tentative guidelines based on the findings reviewed. For those that were still questionable or not reviewed, "not established" was indicated. For most of the "not established" notations this was due to there not being sufficient research

to establish guidelines. Further research is warranted in those instances. It appears that some of the more standard self-report measures, the BDI, MADRS, and CES-D, can be used in assessing depression in these three populations. However, caution should be employed in using the BDI, which is in common use. From this review it is suggested that higher cutoffs of the BDI be employed. The HDRS appears to be most sensitive to depression in these populations and may be due to its application in the form of a mini-structured interview.

It is the present authors' recommendation that all patients suffering from AD and PD or who are post-stroke be screened for depression by neuropsychologists and/or physicians using one of the aforementioned measures. Utilization of a lower cutoff for all measures is suggested, with the exception of the BDI when administered to stroke patients. Upon screening, practitioners should review positive reports, and determine the cluster and severity of symptoms and whether they are representative of the symptoms of depression for that particular disorder. Administration of another measure utilizing a diagnostic cutoff may be warranted. Further follow-up interviewing will also allow practitioners to assess the onset of the depression, relative risk factors, and the contribution that physical and medical complaints make to their reports. Such information should be used in conjunction with informant reports to determine a diagnosis, including the possibility of subsyndromal depression. Administration of self-report instruments assessing apathy and sleep disturbance may also aid in differential diagnosis and provide valuable information, particularly in light of the high presence of these complaints in the absence of depression. In the instances in which such procedures cannot be conducted (e.g., brief assessment in neurology clinics), it is recommended that screening cutoffs be used when there is a risk in misdiagnosis (e.g., suicide risk in newly diagnosed PD patients) or suspected depression (presence of sadness, feelings of guilt, pessimism, hopelessness, worthlessness, self-criticism, and suicidal ideation among AD and PD or withdrawal/isolation, apathy, diminished mood, loss of interest, psychomotor slowing, affective flattening, and suicidal ideation in stroke patients). Diagnostic cutoffs should be used in routine initial and follow-up assessments of elderly patients suffering from these three disorders in which false negatives are less costly and greater accuracy for treatment decisions is sought.

In sum, there is a wealth of opportunity to properly assess and treat depression in patients with stroke, Alzheimer's, and Parkinson's disease. Knowledge of the features of depression, in particular, aids in our conceptualization as to how to best treat such patients. For instance, behavioral prescriptions may ward off depression in stroke patients in whom isolation, social withdrawal, and loss of interest are prominent symptoms of depression. Similarly, cognitive behavioral therapies may be adequate at addressing negative feelings and cognitive distortions frequently found among depressed AD and PD patients. Interpersonal approaches have also proven to be effective in allowing patients to grieve their loss of function and health, and establish a new identity for themselves. Such therapies, in conjunction with psychopharmacological intervention, should be considered the best line of defense. Given the impact that depression can have on the overall well-being, medical health, and care of these individuals, it is incumbent upon practitioners to build their competence in the assessment and treatment of a growing population of patients in need of quality care. It is hoped that this review sheds light on how we may best

conceptualize and assess depression in medically ill elderly people. Future research can continue to examine the utility of self-report instruments with these populations, in hopes that any further modifications or recommendations are made that can promote improved validity. Similarly, continued phenomenological research of depression in these disorders is necessary in order to increase our understanding of the peculiarities of depression in conditions that are complicated by both age and medical illness.

REFERENCES

- Aben, I., Verhey, F., Lousberg, R., Lodder, J., & Honig, A. (2002). Validity of the Beck Depression Inventory, Hospital Anxiety and Depression Scale, SCL-90, and Hamilton Depression Rating Scale as screening instruments for depression in stroke patients. *Psychosomatics, 43*(5), 386–393.
- Alexopoulos, G. S., Abrams, R. C., Young, R. C., & Shamoian, C. A. (1988). Cornell scale for depression in dementia. *Biological Psychiatry, 23*, 271–284.
- Alexopoulos, G. S., Borson, S., Cuthbert, B. N., Devanand, D. P., Mulsant, B. H., Olin, J. T., et al. (2002). Assessment of late life depression. *Biological Psychiatry, 52*, 164–174.
- Alexopoulos, G. S., Meyers, B. S., Young, R. C., Kakuma, T., Silbersweig, D., & Charlson, M. (1997). Clinically defined vascular depression. *The American Journal of Psychiatry, 154*(4), 562–565.
- Alexopoulos, G. S., Meyers, B. S., Young, R. C., Mattis, S., & Kakuma, T. (1993). The course of geriatric depression with “reversible dementia”: A controlled study. *American Journal of Psychiatry, 150*, 1693–1699.
- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th edn.). Washington, DC: American Psychiatric Association.
- Arnau, R. C., Meagher, M. W., Norris, M. P., & Bramson, R. (2001). Psychometric evaluation of the Beck Depression Inventory-II with primary care medical patients. *Health Psychology, 20*(2), 112–119.
- Artero, S., Tiemeier, H., Prins, N. D., Sabatier, R., Breteler, M. M. B., & Ritchie, K. (2004). Neuroanatomical localisation and clinical correlates of white matter lesions in the elderly. *Journal of Neurology, Neurosurgery, & Psychiatry, 75*, 1304–1308.
- Austin, M., Mitchell, P., & Goodwin, G. (2001). Cognitive deficits in depression. *British Journal of Psychiatry, 178*, 200–206.
- Bae, J., MacFall, J., Ranga, K., Krishnan, R., Payne, M., Steffens, D., et al. (2006). Dorsolateral prefrontal cortex and anterior cingulate cortex with white matter alterations in late life depression. *Biological Psychiatry, 60*, 1365–1363.
- Beats, B. (1996). The biological origin of depression in later life. *International Journal of Geriatric Psychiatry, 11*, 349–354.
- Beutler, L. E., Scogin, F., Kirkish, P., Schretlen, D., Corbishley, A., Hamblin, D., et al. (1987). Group cognitive therapy and alprazolam in the treatment of depression in older adults. *Journal of Consulting and Clinical Psychology, 55*(4), 550–556.
- Borroni, B., Grassi, M., Agosti, C., Archetti, S., Costanzi, C., Cornali, C., et al. (2006). Cumulative effect of COMT and 5-HTTLPR polymorphisms and their interaction with disease severity and comorbidities on the risk of psychosis in Alzheimer disease. *American Journal of Geriatric Psychiatry, 14*(4), 343–351.
- Brodsky, H., Sachdev, P. S., Withall, A., Altendorf, A., Valenzuela, M. J., & Lorentz, L. (2005). Frequency and clinical, neuropsychological and neuroimaging correlates of

- apathy following stroke: The Sydney stroke study. *Psychological Medicine*, 35, 1707–1716.
- Brookmeyer, R., Gray, S., & Kawas, C. (1998). Projections of Alzheimer's disease in the united states and the public health impact of delaying disease onset. *American Journal of Public Health*, 88, 1337–1342.
- Butt, Z. A., & Strauss, M. E. (2001). Relationship of family and personal history to the occurrence of depression in persons with Alzheimer's disease. *The American Journal of Geriatric Psychiatry*, 9(3), 249–254.
- Carney, R. M., Freedland, K. E., Eisen, S. A., Rich, M. W., & Jaffe, A. S. (1995). Major depression and medication adherence in elderly patients with coronary artery disease. *Health Psychology*, 14(1), 88–90.
- Chopra, M., Zubritsky, C., Knott, K., Have, T., Hadley, T., Coyne, J., et al. (2005). Importance of subsyndromal depression in elderly patients. *The American Journal of Geriatric Psychiatry*, 13, 596–606.
- Cummings, J. L. (1992). Depression and Parkinson's disease: A review. *American Journal of Psychiatry*, 149, 443–454.
- Devanand, D. P., Sano, M., Tang, M. X., Taylor, S., Gurland, B. J., Wilder, D., et al. (1996). Depressed mood and the incidence of Alzheimer's disease in the elderly living in the community. *Archives of General Psychiatry*, 53, 175–182.
- Dujardin, K., Sockeel, P., Devos, D., Delliaux, M., Krystkowiak, P., Destee, A., et al. (2007). Characteristics of apathy in Parkinson's disease. *Movement Disorders*, 22, 778–784.
- Edwards, E., Kitt, C., Oliver, E., Finkelstein, J., Wagster, M., & McDonald, W. M. (2002). Depression and Parkinson's disease: A new look at an old problem. *Depression and Anxiety*, 16, 39–48.
- Elderkin-Thompson, V., Kumar, A., Bilker, W., Dunkin, J., Mintz, J., Moberg, P., et al. (2003). Neuropsychological deficits among patients with late-onset minor and major depression. *Archives of Clinical Neuropsychology*, 18, 529–549.
- Evans, M. (1995). Detection and management of depression in the elderly physically ill patient. *Human Psychopharmacology*, 10, S235–S241.
- Evans, M. E. (1993). Development and validation of a brief screening tool for depression in the elderly physically ill. *International Clinical Psychopharmacology*, 8, 329–331.
- Forsell, Y., Jorm, A. F., Fratiglioni, L., Grut, M., & Winblad, B. (1993). Application of DSM-III-R criteria for major depressive episode to elderly subjects with or without dementia. *American Journal of Psychiatry*, 150, 1199–1202.
- Forstl, H., Burns, A., & Luthert, P. (1992). Clinical and neuropathological correlates of depression in Alzheimer's disease. *Psychological Medicine*, 22, 877–884.
- Gallagher, D., Nies, G., & Thompson, L. W. (1982). Reliability of the Beck Depression Inventory with older adults. *Journal of Consulting and Clinical Psychology*, 50(1), 152–153.
- Graham, N. (1997). Alzheimer's disease international. *International Journal of Geriatric Psychiatry*, 12, 691–692.
- Hama, S., Yamashita, H., Shigenobu, M., Watanabe, A., Kurisu, K., Yamawaki, S., et al. (2007). Post-stroke affective or apathetic depression and lesion location: Left frontal lobe and bilateral basal ganglia. *European Archives of Psychiatry and Clinical Neurosciences*, 257, 149–152.
- Hannestad, J., Taylor, W., McQuoid, D., Payne, M., Ranga, K., Krishnan, R., et al. (2006). White matter lesion volumes and caudate volumes in late-life depression. *International Journal of Geriatric Psychiatry*, 21, 1193–1198.

- Haringsma, R., Engels, G. I., Beekman, T. F., & Spinhoven, Ph. (2004). The criterion validity of the Center for Epidemiological Studies Depression Scale (CES-D) in a sample of self-referred elders with depressive symptomatology. *International Journal of Geriatric Psychiatry, 19*, 558–563.
- Hendricksen, M., Thomas, A. J., Ferrier, I. N., Ince, P., & O'Brien, J. T. (2004). Neuropathological study of the dorsal raphe nuclei in late-life depression and Alzheimer's disease with and without depression. *The American Journal of Psychiatry, 161*(6), 1096–1102.
- Kirsch-Darrow, L., Fernandez, H. H., Marsiske, M., Okun, M. S., & Bowers, D. (2006). Dissociating apathy and depression in Parkinson's disease. *Neurology, 67*, 33–38.
- Koenig, H. G., Meador, K. G., Cohen, H. J., & Blazer, D. G. (1988). Self-rated depression scales and screening for major depression in the older hospitalized patient with medical illness. *Journal of the American Geriatric Society, 36*, 699–706.
- Kumar, A., Bilker, W., Jin, Z., & Udupa, J. (2000). Atrophy and high intensity lesions: complementary neurobiological mechanisms in late-life depression. *Neuropsychopharmacology, 22*, 264–274.
- Landes, A. M., Sperry, S. D., Strauss, M. E., & Geldmacher, D. S. (2001). Apathy in Alzheimer's disease. *Journal of the American Geriatric Society, 49*, 1700–1707.
- Lavretsky, H., & Kumar, A. (2002). Clinically significant non-major depression: Old concepts, new insights. *The American Journal of Geriatric Psychiatry, 10*, 239–255.
- Lee, H. B., & Lyketsos, C. G. (2003). Depression in Alzheimer's disease: Heterogeneity and related issues. *Biological Psychiatry, 54*, 353–362.
- Leentjens, A. F. G., Lousberg, R., & Verhey, F. R. J. (2002). Markers for depression in Parkinson's disease. *Acta Psychiatrica Scandinavica, 106*, 196–201.
- Leentjens, A. F. G., Verhey, F. R. J., Lousberg, R., Spitsbergen, H., & Wilmsink, F. W. (2000). The validity of the Hamilton and Montgomery-Asberg Depression Rating Scales as screening and diagnostic tools for depression in Parkinson's disease. *International Journal of Geriatric Psychiatry, 15*, 644–649.
- Levin, B. E., Llabre, M. M., & Weiner, W. J. (1988). Parkinson's disease and depression: Psychometric properties of the beck depression inventory. *Journal of Neurology, Neurosurgery, and Psychiatry, 51*, 1401–1404.
- Lincoln, N. B., Nicholl, C. R., & Flannagan, T. (2003). The validity of questionnaire measures for assessing depression after stroke. *Clinical Rehabilitation, 17*, 840–846.
- Lyketsos, C. G., & Olin, J. (2002). Depression in Alzheimer's disease: Overview and treatment. *Biological Psychiatry, 52*, 243–252.
- Lyketsos, M. H. S., Steele, C., Baker, L., Galik, E., Kopunek, S., Steinberg, M., et al. (1997). Major and minor depression in Alzheimer's disease: Prevalence and impact. *The Journal of Neuropsychiatry and Clinical Neurosciences, 9*, 556–561.
- MacFall, J., Taylor, W., Rex, D., Pieper, S., Payne, M., McQuoid, D., et al. (2006). Lobar distribution of lesion volumes in late-life depression: The biomedical informatics research network. *Neuropsychopharmacology, 31*, 1500–1507.
- Marin, R. S. (1990). Differential diagnosis and classification of apathy. *American Journal of Psychiatry, 147*, 22–30.
- Marin, R. S., Firinciogullari, S., & Biedrzycki, R. C. (1993). The sources of convergence between measures of apathy and depression. *Journal of Affective Disorders, 28*, 117–124.
- Mast, B. T. (2004). Cerebrovascular disease and late-life depression. *American Journal of Geriatric Psychiatry, 12*(3), 315–322.
- McDonald, W. M., Richard, I. H., & DeLong, M. R. (2003). Prevalence, etiology, and treatment of depression in Parkinson's disease. *Biological Psychiatry, 54*, 363–375.

- McGuire, M. H., & Rabins, P. V. (1994). Mood disorders. In C. E. Coffey & J. L. Cummings (Eds.), *Textbook of geriatric neuropsychiatry* (pp. 246–260). Washington, DC: American Psychiatric Press.
- Merschdorf, U., Berg, D., Csoti, I., Fornadi, F., Merz, B., Naumann, M., et al. (2003). Psychopathological symptoms of depression in Parkinson's disease compared to major depression. *Psychopathology*, *36*, 221–225.
- Migliorelli, R., Tesoma, A., Sabe, L., Petracchi, M., Leiguarda, R., & Starkstein, S. E. (1995). Prevalence and correlates of dysthymia and major depression among patients with Alzheimer's disease. *American Journal of Psychiatry*, *152*(1), 37–44.
- Molinari, V. (1999). Using reminiscence and life review as natural therapeutic strategies in group therapy. In M. Duffy (Ed.), *Handbook of counseling and psychotherapy with older adults* (pp. 154–165). New York: John Wiley & Sons: Inc.
- Naarding, P., Leentjens, A. F. G., van Kooten, F., & Verhey, F. R. J. (2002). Disease-specific properties of the Hamilton rating scale for depression in patients with stroke, Alzheimer's dementia, and Parkinson's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences*, *14*, 329–334.
- Okada, K., Kobayashi, S., Yamagata, S., Takahashi, K., & Yamaguchi, S. (1997). Poststroke apathy and regional cerebral blood flow. *Stroke*, *28*, 2437–2441.
- Parkinson, J. (1817). *An essay of the shaking palsy*. London: Neely & Jones.
- Provinciali, L., & Coccia, M. (2002). Post-stroke and vascular depression: A critical review. *Neurological Science*, *22*, 417–428.
- Ranga, K., Krishnan, R., Delong, M., Kraemer, H., Carney, Spiegel, D., et al. (2002). Comorbidity of depression with other medical disease in the elderly. *Biological Psychiatry*, *52*, 559–588.
- Regan, C., Katina, C., Walker, Z., & Livingston, G. (2005). Relationship of exercise and other risk factors to depression of Alzheimer's disease: The LASER-AD study. *International Journal of Geriatric Psychiatry*, *20*, 261–268.
- Robinson, R., Kubos, K., Starr, L., & Rao, K. (1984). Mood disorders in stroke patients: Importance of location of lesion. *Brain*, *107*, 81–93.
- Robinson, R. G. (2003). Poststroke depression: Prevalence, diagnosis, treatment, and disease progression. *Biological Psychiatry*, *54*, 376–387.
- Rosenberg, P. B., Chiadi, O. U., Katz, I. R., Porteinsson, A. P., Mintzer, J. E., Schneider, L. S., et al. (2005). Clinical application of operationalized criteria for depression in Alzheimer's disease. *International Journal of Geriatric Psychiatry*, *20*, 119–127.
- Slaughter, J. R., Slaughter, K. A., Nichols, D., Holmes, S. E., & Martens, M. P. (2001). Prevalence, etiology, and treatment of depression in Parkinson's disease. *Journal of Neuropsychiatry and Clinical Neuroscience*, *13*(2), 187–196.
- Spalletta, G., Ripa, A., & Caltagirone, C. (2005). Symptom profile of DSM-IV major and minor depressive disorders on first-ever stroke patients. *The American Journal of Geriatric Psychiatry*, *13*(2), 108–115.
- Speck, C. E., Kukull, W. A., Brenner, D. E., Bowen, J. D., McComick, W. C., Teri, L., et al. (1995). History of depression as a risk factor for Alzheimer's disease. *Epidemiology*, *6*, 366–369.
- Starkstein, S. E., Fedoroff, J. P., Price, T. R., Leiguarda, R., & Robinson, R. G. (1993). Apathy following cerebrovascular lesions. *Stroke*, *24*, 1625–1630.
- Starkstein, S. E., Jorge, R., Mizrahi, R., & Robinson, R. G. (2006). A prospective longitudinal study of apathy in Alzheimer's disease. *Journal of Neurology, Neurosurgery, & Psychiatry*, *77*, 8–11.
- Starkstein, S. E., Petracca, G., Chemerinski, E., Teson, A., Sabe, L., Merello, M., et al. (1988). Depression in classic versus akinetic-rigid Parkinson's disease. *Movement Disorders*, *13*, 29–33.

- Starkstein, S. E., Robinson, R. G., Berthier, M. L., Parikh, R., & Price, T. R. (1988). Differential mood changes following basal ganglia versus thalamic lesions. *Archives of Neurology*, *45*, 725–730.
- Stevens, T., Livingston, G., Kitchen, G., Manela, M., Walker, Z., & Katona, C. (2002). Islington study of dementia subtypes in the community. *British Journal of Psychiatry*, *180*, 270–276.
- Streiner, D. (2003). Diagnosing tests: Using and misusing diagnostic and screening tests. *Journal of Personality Assessment*, *81*, 209–219.
- Tamaklo, W., Schubert, D., Mentari, A., Lee, S., & Taylor, C. (1992). Assessing depression in the medical patient using the MADRS, a sensitive screening scale. *Integrative Psychiatry*, *8*, 264–270.
- Taylor, W., MacFall, J., Payne, M., McQuoid, Steffens, D., Provenzale, et al. (2005). Greater MRI lesion volumes in elderly depressed subjects than in control subjects. *Psychiatry Research: Neuroimaging*, *139*, 1–7.
- Van Itallie, T. (2005). Subsyndromal depression in the elderly: Underdiagnosed and untreated. *Metabolism Clinical and Experimental*, *54*, 39–44.
- Van Reekum, R., Binns, M., Clarke, D., Chayer, C., Conn, D., Herrmann, N., et al. (2005). Is late-life depression a predictor of Alzheimer's disease? Results from a historical cohort study. *International Journal of Geriatric Psychiatry*, *20*, 80–82.
- Vida, S., Des Rosiers, P., Carrier, L., & Gauthier, S. (1994). Depression in Alzheimer's disease: Receiver operating characteristic analysis of the Cornell Scale for Depression in dementia and the Hamilton Depression Scale. *Journal of Geriatric Psychiatry and Neurology*, *7*, 159–162.
- Wagle, A. C., Ho, W., Wagle, S. A., & Berrios, G. E. (2000). Psychometric behaviour of BDI in Alzheimer's patients with depression. *International Journal of Geriatric Psychiatry*, *15*, 63–69.
- Walker, D. A. (2004). Cognitive behavioural therapy for depression in a person with Alzheimer's dementia. *Behavioral and Cognitive Psychotherapy*, *32*, 495–500.
- Wancata, J., Alexandrowicz, R., Marquart, B., Weiss, M., & Friedrich, F. (2006). The criterion validity of the geriatric depression scale: A systematic review. *Acta Psychiatrica Scandinavica*, *114*, 398–410.
- Weintraub, D. (2004). Diagnosing and treating depression in patients with Parkinson's disease. *Psychiatry Annals*, *34*(4), 299–304.
- Weintraub, D., Oehlberg, K. A., Katz, I. R., & Stern, M. B. (2006). Test characteristics of the 15-item Geriatric Depression Scale and Hamilton Depression Rating Scale in Parkinson's disease. *The American Journal of Geriatric Psychiatry*, *14*, 169–175.
- Whyte, E. M., & Mulsant, B. H. (2002). Post stroke depression: Epidemiology, pathophysiology, and biological treatment. *Biological Psychiatry*, *52*, 253–264.
- Whyte, E. N., Mulsant, B. H., Vanderbuilt, J., Dodge, H. H., & Ganguli, M. (2004). Depression after stroke: A prospective epidemiological study. *Journal of the American Geriatric Society*, *52*, 774–778.