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MEMORY COMPLAINTS, MEMORY RECALL, AND DEPRESSION

By

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ABSTRACT

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This study investigated the relationship between depressive symptoms, memory complaints, and memory recall. Participants (N = 208) for this study were community dwelling elderly (Mean age = 70) who were offered a free assessment of their mood and memory. Level of depressive symptoms was assessed with the Hamilton Depression Rating Scale, the Beck Depression Inventory, and the Geriatric Depression Scale. Due to the differences in score ranges among the depression measures, the participant's test scores were converted to z-scores and summed to produce a composite depression index. In addition, three advanced-level clinicians identified test items on the three depression inventories that assessed the nine DSM-IV symptoms of depression. These groupings (i.e., factors) of test items were then assessed for validity and reliability with a confirmatory factor analysis. Only test items exhibiting factor loadings above .40 were retained. The score for memory complaints was based on the occurrence of perceived memory difficulties across eight general situations. Verbal recall was assessed with the Selective Reminding Test while cognitive status was assessed with the Mini Mental State Examination. Results indicated that a factor composed of test items that assessed

concentration difficulties/indecisiveness had a correlation of .70 ($p<.0002$) with memory complaints. Also, the number of words encoded into and retrieved from long-term memory were significantly related ($r = -.20$, $p<.0019$) to the composite depression index. Furthermore, a significant relationship was observed between memory complaints and random recall from long-term memory ($r = .16$, $p<.05$) in a subset of our sample who were identified as nondepressed. In addition, a correlation of .37 ($p<.0002$) was exhibited between memory complaints and syndromal depression in replication of earlier studies. Implications, as well as, limitations of these findings were discussed.

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INTRODUCTION

Our memories are the result of a linear series of events. Initially, information from the external environment stimulates our sensory organs which encodes this information and transfers it to the cerebral cortex. Here the information is further encoded into short-term memory which is a type of time-limited processing store. Next, this information can be further encoded based on certain characteristics (e.g., importance, personal relevance) and consolidated into a permanent memory store (i.e., long-term memory). This information can then be retrieved spontaneously or under the aid of cues where it is experienced consciously once again (Petersen & Weingarter, 1991). This series of events, however, is often interrupted with advancing age and can lead to the development of various memory deficits. These deficits can be differentiated into input and output problems. Input problems deal with difficulties in the processing and storing of information while output problems deal with difficulties associated with the retrieval of information from long-term memory.

Investigations into the nuances of memory deficits that are associated with various pathological conditions such as dementia, head injuries, and amnesia have led to the discovery of different types of long-term memory. Of these types, explicit memory, working memory, episodic memory, semantic memory, and prospective memory have been associated with age-related declines (Craik, 1991). Explicit memory refers to the

conscious recollection of recent events. An example would be when an individual recalls a list of words from a laboratory exercise that was just completed. Working memory describes tasks in which subjects must hold information in mind and also carry out some calculation or decision making process based on that information. Episodic memory refers to the "where" and "when" of events and episodes in a person's life. For example, episodic memory would be used by someone to recall what they had for breakfast this morning. Semantic memory deals with general knowledge about the world. It would likely be used to recall who flew the first airplane. Prospective memory refers to situations in which the person must remember to carry out some task in the future.

Long-term memory has also been differentiated by the type of sensory process that led to the initial encoding. Based on this categorization, a different type of memory can result from each of our sensory modalities (i.e., visual memory, tactile memory, olfactory memory, auditory memory, and memory for different tastes). Memory has also been classified into verbal and visual components. In this case, the two should be viewed as the poles of a continuum since many spatial diagrams can be encoded both verbally and spatially by an observer. However, regardless of the type of long-term memory or the sensory apparatus that led to its encoding, memory impairment can have a devastating impact on the individual, family, and society (e.g., health care system) due to the essential role that it plays in learning and functioning in day-to-day life. Presently, memory problems are considered to be one of the primary reasons for family referrals of the elderly. Furthermore, they appear to primarily result from an underlying dementia and/or depression (Heath, Grant, Kamps, & Margolin, 1991). In order to ascertain the size of the

relationship between memory recall difficulties, memory complaints, dementia, and depression, while avoiding the inherent biases in summarizing the results in a narrative format (Smith, Glass, & Miller, 1980), a series of meta-analyses were conducted (Hunter & Schmidt, 1990). These analyses were limited to studies involving the elderly (i.e., >55 years of age) to allow direct comparisons with the sample found in the present study and due to the possibility that the relationship between memory impairment and depressive symptomatology is moderated by age (Lichtenberg, Manning, & Turkheimer, 1992). These analyses were also limited to those studies assessing explicit memory recall using tasks such as word lists and prose recall since they are analogous to many everyday situations (e.g., shopping list, to-do list, newspaper and magazine articles) that the elderly encounter.

Dementia and Explicit Memory Recall

Presently, upwards of four million people are thought to suffer from Alzheimer's disease in our country with projections suggesting that this figure will double or triple within the next century if a cure is not discovered (National Institute on Aging, 1990). As staggering as these numbers are, they only represent about one-half of all dementias that exist within our borders (Lezak, 1983). One of the most commonly used set of criteria for the diagnosis of dementia is the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV; American Psychiatric Association, 1994). The DSM-IV considers impaired learning and memory to be essential features of this condition. Furthermore, at least one of the following disturbances must also be present: (a) impaired executive functioning (i.e., disturbances in planning, organization, sequencing, or abstract thinking), (b) agnosia

(i.e., inability to recognize or identify items despite normal sensory function), (c) apraxia (i.e., impaired ability to carry out motor activities despite normal motor function), or (d) aphasia (i.e., a language disturbance). In addition, the associated memory impairments and cortical disturbances must significantly interfere with the individual's work or social activities and there should be evidence of a specific organic factor that is related to these impairments and disturbances. However, in the absence of such evidence, an organic factor may still be hypothesized if the problems cannot be explained by nonorganic disorders. If these criteria are met, the dementia is further classified by the presence of (a) delirium, (b) delusions, (c) depressed mood, or (d) uncomplicated (i.e., if a - c are not present). In previous DSM versions that were used across some of the following studies for diagnoses, dementia was also rated as mild (e.g., presence of work and social impairment but the individual can still live independently), moderate (e.g., some supervision in living is necessary), or severe (e.g., continual supervision is required; individual is mostly incoherent or mute). For the diagnosis of Alzheimer's disease (i.e., primary degenerative dementia of the Alzheimer type), the criteria for dementia must be met in addition to (a) an insidious onset characterized by a general deteriorating course and (b) the exclusion of all other causes of dementia by history, physical exam, and laboratory analysis.

A literature search identified 17 studies that assessed demented individuals on an explicit memory task (Breen, Larson, Reifler, Vitaliano, & Lawrence, 1984; Feehan, Knight, & Partridge, 1991; Flicker, Ferris, & Reisberg, 1993; Gibson, 1981; Hart, Kwentus, Taylor, & Hamer, 1987; Hart, Kwentus, Taylor, & Harkins, 1987; King, Caine,

Conwell, & Cox, 1991; Larrabee, Largen, & Levin, 1985; Lines et al., 1991; Masur, Fuld, Blau, Crystal, & Aronson, 1990; Niederehe & Yoder, 1989; Poitrenaud, Moy, Girousse, Wolmark, & Piette, 1989; Robinson-Wheelen & Storandt, 1992; Rubin, Kinscherf, Grant, & Storandt, 1991; Speedie, Rabins, Pearlson, & Moberg, 1990; Storandt, Botwinick, & Danziger, 1987; Weingartner, Grafman, Boutelle, Kaye, & Martin, 1983;). The criteria used for ascertaining the existence of dementia among these studies varied widely. Two of the studies did not mention the diagnostic criteria that their samples were based on, while the remaining studies based their diagnoses on one or more of the following measures: the Diagnostic and Statistical Manual of Mental Disorders-Third Edition (DSM-III; American Psychiatric Association, 1980), its revision (DSM-III-R; American Psychiatric Association, 1987), the Research and Diagnostic Criteria (RDC; Spitzer, Endicott, & Robins, 1978), combined ratings from a neurologist, psychiatrist, and neuropsychologist, the Diagnostic Interview Schedule (Robins, Helzer, Croughin, & Ratcliffe, 1981), a structured interview, the Dementia Scale (Blessed, Tomlinson, & Roth, 1968), the Short Portable Mental Status Questionnaire (Pfeiffer, 1975), the Face-Hand Test (Fink, Green, & Bender, 1952), the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975), the National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA; McKhann et al., 1984), the Clinical Dementia Rating Scale (Hughes, Berg, Danzinger, Coben, & Martin, 1982), or Reisberg's Global Deterioration Scale (Reisberg, Ferris, de Leon, & Crook, 1982). The severity of the dementia among these studies also varied from "very mild" cases to "advanced." Twelve

of the 17 studies only assessed patients with Alzheimer's disease, while the remainder included patients suffering from other forms of dementia. Age and education, and, in some cases, gender and socioeconomic status were controlled for. In each of the studies, the mean difference in total recall scores was determined by comparing the demented group against a healthy control group. The memory measures that these recall scores were based on consisted of a number of different word list tasks (e.g., Selective Reminding Test) and prose recall tasks (e.g., Logical Memory).

For each of these studies, "r," the point-biserial correlation was computed (Hunter & Schmidt, 1990; pp. 272-273). The point biserial correlation describes the amount of relationship that exists between the group (i.e., demented versus control) and the level of explicit memory. From the 17 studies obtained through the literature search, 24 effect sizes were calculated. The larger number of effect sizes were the result of some studies including multiple memory measures or multiple groups of subjects that varied in the severity of dementia (See Appendix B, Table 3). These point biserial correlations ranged from $r = -.11$ to $r = -1.00$ and had a weighted average of $r = -.75$. The weighted average point biserial correlation gives the average effect size obtained across the studies while taking into account the differences in sample size. This negative correlation implies that the demented subjects had poorer total recall scores on the measures of explicit memory than normal.

Two studies also examined the consistency of memory recall among demented samples (Larrabee et al., 1985; Masur et al., 1990). Consistency of recall was measured with the Buschke Selective Reminding Test (SRT; Buschke, 1973). The SRT has been

used extensively to assess the effects of marijuana, anesthesia, benzodiazepines, nerve growth factor, and Physostigmine on memory (Miller, Cornett, & McFarland, 1978; Morgan, Furman, & Dikmen, 1981; Thal & Fuld, 1983; Thal, Fuld, Masur, & Sharpless, 1983; Block & Berchou, 1984; Pomara et al., 1985; Stern, Sano, & Mayeux, 1987; Pomara, Deptula, Medel, Block, & Greenblatt, 1989; Thal, Masur, Blau, Fuld, & Klauber, 1989; Olson et al., 1992). It has also been used to examine developmental differences in memory, as well as, memory deficits in Age-Associated Memory Impairment, Huntington's disease, Alzheimer's disease, alcoholism, depression, and dementia (Buschke, 1974; Fuld, 1976; Caine, Ebert, & Weingarter, 1977; Hart, Kwentus, Taylor, & Hamer, 1987; Larrabee & Crook, 1989). Although the SRT is one of several, multiple trial, free recall tasks, it is different from other word list tasks (e.g., Rey Auditory-Verbal Learning Task) in that it discriminates between retrieval from short-term memory and long-term memory. In addition, it quantifies several subcomponents associated with long-term memory. This discrimination is possible due to the unique way in which the memory test is conducted. During the first trial, all 12 words are presented to the subject while in subsequent trials, only those words not recalled on the previous trial are mentioned. Once a word is recalled on two consecutive trials, it is assumed to have entered long-term memory (i.e., LTM). Prior to this, it is assumed to have been retrieved from short-term memory (i.e., STM). Here lies the SRT's uniqueness. Other word list tasks repeat the entire list of words during each trial. Unfortunately, this does not allow the researcher to differentiate words that are being recalled from short-term memory from those that are being retrieved from long-term memory.

Another feature of the SRT is that it differentiates between random and consistent retrieval from long-term memory. Consistent long term retrieval (i.e., CLTR) refers to words retrieved from long-term memory on that trial and all following trials while all other word retrievals from long-term memory are considered random long term retrieval (i.e., RLTR). Through an analysis of word retrieval from long-term memory in both children and adults (Buschke, 1974; Fuld & Buschke, 1976), Buschke demonstrated that random and consistent retrieval represent two qualitatively different stages of verbal learning. The ability to differentiate word recall into these subcomponents can lead to the recognition of differences between subjects that may have initially appeared similar based on a total recall score. For example, suppose two subjects took a six-trial, 12-word SRT and each obtained a total recall score of 30 (i.e., SUM). This means that both subjects recalled a total of 30 words across the six trials. This total, however, is a combination of words that were recalled from short-term memory and those retrieved both randomly and consistently from long-term memory. With this gross measure of recall, it appears that both subjects remembered the word list to the same extent. However, despite the same total recall score, dramatic differences may still exist in how the words are recalled (See Appendix B, Table 17).

As table 17 demonstrates, an evaluation of subject #1's trials reveals that the subject recalled 18 of the 30 words from short-term memory and 12 words randomly from long-term memory. This subject did not recall any words on a consistent basis from long-term memory and appears to primarily rely on short-term memory. An evaluation of subject #2, however, reveals that the subject recalled 7 of the 30 words from short-term

memory, 10 words randomly from long-term memory, and 13 words consistently from long-term memory. Although recalling 13 words consistently sounds incorrect since there were only 12 words on the SRT, this is because the words that are consistently recalled during each trial are summed over the six trials. This method of summing across trials also holds for SUM, LTM, and RLTR. Based on these scores, one of the main differences that is evident between these two subjects is that subject #2 has learned a greater portion of the word list. Learning here is defined as facts that can be consistently recalled from long term memory.

From the three studies that tested consistent recall among those with dementia, four effect sizes were calculated. These ranged from $\underline{r} = -.54$ to $\underline{r} = -.78$ and had a weighted average of $\underline{r} = -.56$ (See Appendix B, Table 4). This negative correlation signifies that as dementia increased in severity, the consistency of recall decreased. This value is substantially smaller than the correlation of -.75 obtained based on total recall scores. However, since a total recall score is only partially a result of continuous recall from long-term memory, the most likely explanation is that the difference between these two correlations is due to the role that deficits in short-term memory and random retrieval from long-term memory play in dementia.

Two studies were also found that examined subjects who were diagnosed with both depression and dementia (Breen et al., 1984; Rubin et al., 1991). In each of these, assessment was limited to total recall scores based on Logical Memory, a prose recall task (See Appendix B, Table 5). The effect sizes that were calculated from the authors' analyses ranged from $\underline{r} = -.74$ to $\underline{r} = -.95$ with a weighted average of $\underline{r} = -.92$ that takes

into account the differences in sample size between the studies. This correlation means that as dementia and depression increase in severity, there is a corresponding decrease in total recall scores. Apparently, the relationship between poorer memory performance and coexisting dementia and depression is stronger than what is observed when the participants are only afflicted with one of these diagnoses. However, without an analysis of which components of memory were associated with these deficits, it cannot be determined if this larger correlation is because dementia and depression cause different memory deficits that are additive in nature or if they merely amplify memory difficulties that are common to both. Also, since the weighted correlation is only based on two studies ($\underline{N} = 21$), it may be higher than the actual population value due to chance. In summary, there appears to be a strong negative relationship between explicit memory performance and dementia ($\underline{R} = 56\%$) that appears to be largely due to deficits in consistent long-term memory retrieval ($\underline{R} = 31\%$) In addition, when subjects are diagnosed with both dementia and depression, the relationship with poorer recall becomes even stronger. Furthermore, since the amount or proportion of words that are entered into long-term memory and those words randomly recalled from long-term memory appear to have not been assessed in other dementia-related studies, we still lack an understanding of what contributions they play to dementia's overall memory deficits.

Depression and Explicit Memory Recall

The rate of major depression in the United States and Europe appears to range from 10% to 25% among females and 5% to 12% among males depending on the study and the specific criteria that are used (American Psychiatric Association, 1994). The

DSM-IV criteria for this nosological category requires the presence of a major depressive episode in the absence of a manic or hypomanic episode. A major depressive episode, in turn, is characterized by the presence of at least five of the following symptoms (i.e., a - i) during the same two-week period which occur over most of the day and nearly every day: (a) depressed mood, (b) significantly attenuated interest or pleasure in all, or most of one's activities, (c) significant weight loss/gain or fluctuations in appetite, (d) insomnia/ hypersomnia, (e) observable psychomotor agitation/retardation, (f) fatigue/loss of energy, (g) perceived worthlessness or inappropriate guilt, (h) decreased concentration, thinking ability, or indecisiveness, and/or (i) a suicide attempt or plan, recurrent suicidal ideation or thoughts of death. In addition, (j) there should not be an indication of an organic factor associated with the depressive disturbance, (k) bereavement and schizoaffective disorder should be ruled out, (l) delusions and hallucinations should not have been present for two weeks or longer without the presence of prominent depressive symptoms, (m) the depressive disturbance should not be superimposed on Schizophrenia, Schizophreniform Disorder, Delusional Disorder, or Psychotic Disorder Not Otherwise Specified, and (n) there is no history of a manic, mixed, or hypomanic episode. If the above conditions are met, the depressive episode is then rated as (a) mild (e.g., minimal symptoms required for diagnosis), (b) moderate (e.g., symptoms or level of impairment between mild and severe), (c) severe without psychotic features (e.g., several symptoms in excess of those required for diagnosis and marked impairment with the individual's occupational and social realms), (d) severe with psychotic features (e.g., delusions or hallucinations), (e) in partial remission, (f) in full remission, or (g) unspecified.

In addition to the nosological category described above, depression can also be categorized as a syndrome. Syndromal depression indicates a group of symptoms (e.g., depressed mood, diminished interest in activities, significant weight loss or gain) that may be primary to a diagnosis of Major Depression (i.e., a nosological category) or be secondary to another psychopathological disorder (e.g., Schizophrenia). A search of the literature for studies that examined the relationship between explicit memory and depression (i.e., either as a nosological category or syndrome) among the elderly resulted in 18 studies (Danion, Willard-Schroeder, Zimmerman, Grange, Schlienger, & Singer, 1991; Feehan, Knight, & Partridge, 1991; Gannon, 1994; Gibson, 1981; Hart, Kwentus, Taylor, & Hamer, 1987; Hart, Kwentus, Taylor, & Harkins, 1987; King, Caine, Conwell, & Cox, 1991; Lachman, Steinberg, & Trotter, 1987; Lichtenberg, Manning, & Turkheimer, 1992; Mormont, 1984; Niederehe & Yoder, 1989; O'Hara, Hinrichs, Wallace, Lemke, & Kohout, 1986; Poitrenaud, Moy, Girousse, Wolmark, & Piette, 1989; Popkin, Gallagher, Thompson, & Moore, 1982; Rubin, Kinscherf, Grant, & Storandt, 1991; Speedie, Rabins, Pearlson, & Moberg, 1990; West, Boatwright, & Schleser, 1984; Zarit, 1982). Studies were not limited to those that assessed individuals with a nosological categorization of depression since there are indications that explicit memory deficits are associated with the severity of syndromal depression irrespective of the presence of major depression (Johnson & Magaro, 1987). From these studies, 25 effect sizes were calculated. The additional effect sizes were due to the inclusion of multiple groups or multiples measures of depression and memory recall within some of the studies. These studies were of two main types. The first type consisted of 12 studies that assessed

depressed elderly inpatients and/or outpatients. Diagnosis was based on a psychiatrist's rating, the DSM-III, DSM-III-R, or the RDC. Each of these studies determined the mean difference in explicit memory total recall scores when compared with healthy controls. In most cases, age and education were controlled for. The second type was composed of seven studies that examined the relationship between total recall scores and the scores obtained from depression inventories (e.g., Geriatric Depression Scale). In this second group, however, the elderly participants were not formally assessed for the presence or absence of depression. Memory measures across both groups of studies were total recall scores based on either word lists (e.g., Miller's word list) or paragraph recall (e.g., Logical Memory). The resulting effect sizes of the relationship between depression and memory recall ranged from $\underline{r} = .13$ to $\underline{r} = -.90$ with a weighted average of $\underline{r} = -.30$ (See Appendix B, Table 6). This negative correlation signifies that as depression increased, total recall scores on the explicit memory task decreased. These depressed total recall scores, in turn, are the result of a decrease in word retrieval from short- and/or long-term memory. However, since there did not appear to be any studies that examined the relationship between long-term memory or its subcomponents (i.e., random and consistent retrieval) and depression, the question of what leads to the lower total recall scores in depression is presently unknown. One possibility for this relationship may be that poorer concentration among those depressed leads to poorer encoding which, in turn, allows less words to enter long-term memory. Also, motivational deficits that can be associated with depression may lead to depressed consistency of recall.

In a slightly different vein, Speedie, Rabins, Pearlson, and Moberg's (1990) assessed depressed subjects who were also suffering from pseudodementia. Here pseudodementia was defined as depression-induced dementia. In other words, the patients experienced the symptoms of dementia while being severely depressed but as their depression lessened, the dementia was also relieved. The participants in this study were assessed on the Rey Auditory-Verbal Learning Test (Rey, 1964) and compared to a group of healthy controls (See Appendix B, Table 7). From their results, an effect size of $\underline{r}$ = -.47 was calculated. This indicates that depression and pseudodementia were associated with poorer recall scores. The authors also reported that their patients with pseudodementia obtained better recall scores than those with irreversible dementia. This could suggest that the memory deficits are due to a different mechanism and/or are not impaired to the same extent.

Memory Complaints

Overall, it appears that a substantial portion of the elderly perceive that their memory becomes problematic with age. Lowenthal (1967) observed that self-reports of declining memory among individuals residing in the San Francisco Bay area increased from 31% for those 60 to 64 years of age to 65% for those over 75 years of age ($\underline{N}$ = 984). Data based on the Eastern Baltimore Mental Health Survey, which was part of the National Institute of Health's 1981 Epidemiologic Catchment Area Program, indicated that the prevalence of memory complaints reached 43% for those 65 to 70 years of age. For individuals that were 75 to 84 years of age, this figure increased to 51% while 88% of those above the age of 84 had memory complaints ($\underline{N}$ = 810; Bassett & Folstein, 1993).

In a more recent and larger study (N = 10,611) by Cutler and Grams (1988) that utilized data from the 1984 National Health Interview Survey, complaints of frequent forgetting were assessed. However, while this only represents one type of memory complaint, the rates were still at 15% for those 55 years of age or older and 23% for those 65 or older.

Memory Complaint Questionnaires

This self-awareness of memory ability or disability is considered one of the components of metamemory (Flavell, 1977). Initial research in this area involved assessing individuals for the presence of memory complaints through brief interviews or questionnaires that either asked if the subject had memory problems or that gauged the extent of any memory difficulties (e.g., frequency of problems). Hermann (1982) pointed out that the benefits of such an approach include not having to assess an individual over a long period of time and detecting memory problems that observation would not pick up (e.g., if memory strategies were used). Since these initial measures, numerous memory complaint questionnaires have been developed that differ in both content and format. Differences in content include inquiring about the (a) frequency of forgetting, (b) clarity of memories, (c) quality of memories, (d) degree of change in memory over time, (e) methods of using their memory, and (f) affective stance towards their memories. Even within these content areas, further subdivisions are common. For instance, the frequency of memory difficulties has been estimated based on (a) a certain unit of time, (b) relative to the number of opportunities to use their memory in specific situations, and (c) relative to other individuals (Hermann, 1982).

Memory complaint questionnaires can also differ in the level of detail that is obtained. "How often do you forget to take your medicine?" is an example of low detail while "How often when you are on vacation do you forget to take your medicine?" is an example of high detail. Some questionnaires may even assess only specific memory situations. For example, the Inventory of Learning Processes (Schmeck, Ribich, & Ramanaiah, 1977), only focuses on situations in a college setting. Format differences within these questionnaires can range from open-ended questions typical of interviews to multiple choice answers.

One of the more recent examples of self-appraisal, is the Memory Functioning Questionnaire (Gilewski, Zelinski, & Schaie, 1990). This measure is composed of 64 items that are weighted on a seven-point Likert scale. They result in scores for (a) the frequency of forgetting, (b) the seriousness of forgetting, (c) retrospective functioning, and (d) mnemonics usage. The score for frequency of forgetting is based on the subject's perception of their forgetfulness in 28 situations, as well as, five ratings of their general memory performance. Seriousness of forgetting rates the "seriousness" of their forgetting in 18 different situations. Retrospective functioning is based on comparisons of one's current memory with five earlier time periods in the subject's life while mnemonics usage rates how frequently the subject uses eight different mnemonics.

Memory Complaints and Depression

Within the elderly population, a variety of these memory complaint questionnaires have been used to detail how various parameters of memory complaints (e.g., frequency, severity) are affected by emotional and organic conditions such as depression and

dementia. Fourteen studies were found that examined the relationship between memory complaints and depression among the elderly (Chandler & Gerndt, 1988; Derouesne et al., 1989; Feehan, Knight, & Partridge, 1991; Grut et al. 1993; Kahn, Zarit, Hilbert, & Niederehe, 1975; Niederehe & Yoder, 1989; O'Boyle, Amadeo, & Self, 1990; O'Connor, Pollitt, Roth, Brook, & Reiss, 1990; O'Hara, Hinrichs, Wallace, Lemke, & Kohout, 1986; Popkin, Gallagher, Thompson, & Moore, 1982; Tun, Perlmutter, Russo, & Nathan, 1987; West, Boatwright, & Schleser, 1984; Zarit, 1982; Zelinski, Anthony-Bergstone, & Gilewski, 1990;). These could be further subdivided into two categories. The first category assessed elderly who were depressed inpatients or outpatients. Diagnosis was based on the DSM-III, DSM-III-R, or the RDC. These studies either assessed the relationship between memory complaints and scores on a depression inventory (e.g., Beck Depression Inventory) or determined the mean difference in memory complaints when compared with healthy controls. The second group of studies examined the relationship between memory complaints and scores on a depression inventory among elderly participants who were not formally assessed for the presence or absence of depression. Again, both types of studies were included due to the possibility that memory complaints are associated with syndromal depression rather than the nosological category of depression. From these studies, 19 effect sizes of the relationship between depression and memory complaints were calculated. These correlations ranged from $\underline{r} = .18$ to $\underline{r} = .70$ with a weighted average of $\underline{r} = .34$ (See Appendix B, Table 8). This positive correlation indicates that depression is associated with a higher prevalence of memory complaints. Furthermore, since a heightened level of memory complaints has been associated with

greater levels of somatic complaints (Hanninen et al., 1994), it may be that the relationship between depression and memory complaints is primarily due to the somatic components of depression (e.g., insomnia, psychomotor agitation). Alternatively, it may be that a diminished ability to concentrate, another DSM-IV symptom of depression, leads to a decreased number of words entering long-term memory (i.e., LTS).

Memory Complaints and Dementia

The relationship between memory complaints and dementia was examined by Kahn, Zarit, Hilbert, and Niederehe (1975), Niederehe and Yoder (1989), McGlone et al. (1990), O'Connor, Pollitt, Roth, Brook, and Reiss (1990), Feehan, Knight, and Partridge (1991), and Grut et al. (1993). All participants within these studies were diagnosed with dementia based on the criteria of the DSM-III, DSM-III-R, Cambridge Mental Disorders of the Elderly Examination (CAMDEX; Roth et al. 1986), or from the combined test results of the Mental Status Questionnaire (Pfeiffer, 1975) and the Face-Hand Test (Kahn, Goldfarb, Pollack, & Peck, 1960). These samples of elderly were inpatients and outpatients, as well as, community-dwelling elderly who responded to local newspaper and radio announcements. While Grut et al. (1993) calculated the correlation between the subjects scores on the Mini Mental State Examination (i.e., a test of cognitive impairment) with the presence of memory complaints, the remainder of the studies examined group differences in memory complaints between samples of impaired and healthy controls. From these 6 studies, 14 effect sizes were calculated. This sizable difference between study number and effect size number was mainly due to Kahn et al. (1975) in which eight effect sizes were calculated. The effect sizes across these studies ranged from $\underline{r} = -.44$ to

$\underline{r}$ = .49 and had a weighted average of $\underline{r}$ = .23 (See Appendix B, Table 9). The weighted average indicates that demented individuals had a greater number of memory complaints. However, the wide range of correlations, which encompasses equally strong negative and positive values, suggests that other factors are affecting this relationship. One such factor appears to be the severity of dementia. Grut et al. (1993) reported that the frequency of memory complaints were the least among those subjects with Mini Mental State Examination scores of 26 to 30 (i.e., non-demented) and 0 to 5 (i.e., severe dementia). It appears that once an individual has severe dementia, they are no longer aware of their memory deficits. Grut et al. (1993) also found that between these two extremes, memory complaints were found to increase as MMSE scores decreased (i.e., participants became more demented). This observation seems to also be in line with the findings of O'Connor et al. (1990). Here, the correlation between memory complaints and dementia increased from $\underline{r}$ = .32 for those with mild dementia to $\underline{r}$ = .46 for those with moderate dementia.

Only one study (O'Boyle, Amadeo, & Self, 1990) was found that examined the relationship between depression, pseudodementia, and memory complaints (See Appendix B, Table 10). The patients for this study were selected from an analysis of 83 admissions to a geropsychiatric unit who had received a DSM-III diagnosis of depression. Of these patients, 11 had initial Mini-Mental State Examination scores of 23 or below indicating the presence of dementia. However, following treatment, their scores on the Mini-Mental State Examination were 24 or better indicating a lack of cognitive impairment. In these 11 pseudodemented subjects, scores on a cognitive complaints inventory completed at admission were compared with their scores on the Beck Depression Inventory also taken

during admission to the unit. A strong relationship (r = .81) was found that was more than twice the size of average weighted correlation found in studies comparing memory complaints and depression.

Memory Complaints and Actual Memory Recall

Overall, studies examining the relationship between memory complaints and depression, dementia, and pseudodementia have described relationships of varying strength. However, this does not imply that actual memory problems exist. A number of studies have reported discrepancies between memory complaints and actual memory performance involving subjects who were depressed, demented, or healthy. Within these studies, objective memory performance was based on total recall scores from tests of paragraph recall (e.g., Babcock Story Recall), word recall (e.g., Buschke Selective Reminding Test), or memory test batteries (e.g., Cambridge Mental Disorders of the Elderly Examination). Two of these studies investigated the relationship between memory complaints and objective memory performance among demented samples (Kahn et al. 1975; O'Connor et al. 1990). The effect sizes that were calculated from their findings ranged from r = .06 to r = .29, with a weighted average of r = .22 (See Appendix B, Table 11). This positive correlation indicates only a small association of greater complaints and greater objective memory impairment. Since the correlations are markedly higher in O'Connor et al. (1990), in which participants had mild to moderate dementia, it may be that Kahn et al. (1975) assessed subjects with more severe levels of dementia. It would seem plausible that persons with advanced dementia would be unable to perceive the extent of their actual memory deficits and hence would have a lower correlation between

complaints and actual performance. These two studies also examined the relationship between memory complaints and objective memory performance in participants who were diagnosed depressed (See Appendix B, Table 12). Here the range of effect sizes was $\underline{r}$ = -.01 to $\underline{r}$ = .01 with a weighted average of $\underline{r}$ = .00. This suggests that no relationship was found between memory ability and complaints among depressed individuals. Based on Beck's cognitive theory of depression (Beck, 1967), one potential explanation is that views of the self were so negatively distorted among those with depression that they did not reflect accurate representations of reality. Based on the DSM-IV criteria for depression, this explanation would suggest that feelings of worthlessness and inappropriate guilt may be more related to heightened memory complaints than the other depressive criteria (e.g., significant weight loss or gain).

The relationship between memory complaints and performance has also been examined using healthy elderly samples (Zarit, 1982; Sunderland, Watts, Baddeley, & Harris, 1986; O'Connor, Pollitt, Roth, Brook, & Reiss, 1990; Zelinski, Anthony-Bergstone, & Gilewski, 1990; Taylor, Miller, & Tinklenberg, 1992, Gannon, 1994). In this population, the 11 effect sizes that were calculated were found to range from $\underline{r}$ = .05 to $\underline{r}$ = .40 with a weighted average of $\underline{r}$ = .20 (See Appendix B, Table 14). This low, positive correlation signifies that as memory complaints increased, actual memory ability showed only a slight tendency to become poorer. A few studies also examined mixed groups of elderly (See Appendix B, Tables 15 & 16). O'Hara, Hinrichs, Wallace, Lemke, and Kohout (1986) combined depressed and healthy elderly together and reported a correlation of .10 between memory complaints and performance while in combined groups

of demented, depressed, and healthy elderly, similar relationships (r_{avg} = .11) have been observed (Derouesne et al. 1989; Niederehe & Yoder, 1989). These studies that combined different populations appear to have illustrated the importance of subject differences. It seems that when elderly who are demented, depressed, or healthy are combined, any relationship that may exist between memory complaints and objective performance is no longer evident.

Although the low correlations between memory performance and perception calls into question the utility of memory questionnaires, numerous reasons have been advanced to explain these low correlations as well as the sizable interstudy differences. It has been suggested that (a) the elderly may have a poorer ability to predict their actual memory performance (Cavanaugh & Perlmutter, 1982), (b) some subjects may be inaccurate because of early dementia and/or depression (Wells, 1980; Zarit, 1982; Zelinski et al., 1990), (c) certain questionnaires may suffer from psychometric limitations, (d) it may be a function of different types of memory performance that were assessed, (e) it may be due to differences in health status of the subjects, (f) depression was not controlled for (Erickson, Poon, & Walsh-Sweeney, 1980; Hermann, 1982; Zelinski et al., 1990), (g) by including only healthy subjects, the range of scores is restricted (Hultsch, Hertzog, & Dixon, 1987), (h) they are due to unassessed differences in the subjects' attributions and locus of control (Lachman, Steinberg, & Trotter, 1987), (i) studies using less than a 7-point Likert scale may not differentiate memory complaints sufficiently enough (Zarit, 1982), (j) it may be a result of individual differences in quantifying the degree of memory complaints on a Likert scale (Taylor, Miller, & Tinklenberg, 1992), (k) studies are not taking into account

contributing lifestyle and effort factors (Sunderland, Watts, Baddeley, & Harris, 1986), (l) the memory questionnaires may not have been extensive enough (Niederehe & Yoder, 1989), (m) grouping all demented patients together may confound the results (Grut et al, 1993), (n) individuals may hold inaccurate beliefs about their memory ability (Hermann, Grubs, Sigmundi, & Grueneich, 1986), and (o) memory tests may not be sensitive to everyday memory problems.

In spite of this wide variety of explanations, it appears that most of the studies in this area have emphasized only two of the above explanations. The first is that memory questionnaires are not extensive enough. This is based on the increasing number of studies that are employing questionnaires with additional numbers of test items and content areas (Hermann, 1982). The other explanation is that individuals may hold inaccurate beliefs about their memory ability. This is based on the observation that a number of the newer questionnaires are completed by someone other than the individual with the memory complaints. In these instances, a spouse or relative who can observe the participant on a daily basis provides the necessary information (e.g., Sunderland et al. 1986). However, both of these explanations attempt to deal with supposed deficits in the memory questionnaires. The author is unaware of any study that has addressed the explanation that the low correlations between memory complaints and memory recall performance may be the result of the method in which memory is measured (i.e., total recall scores). For example, it would seem possible that the randomness or consistency of recall may more directly reflect an individual's perception of forgetfulness than a gross measure of recall such as total recall.

Summary

A number of findings were gleaned from this series of meta-analyses. First, deficits in total recall are related to dementia and depression to varying degrees, $\underline{r}$ = -.75 and $\underline{r}$ = -.30, respectively. Unfortunately, this measure does not describe to what extent these deficits are due to problems with short-term memory and long-term memory. Only a couple of studies limited to demented individuals have attempted to differentiate total recall deficits into those that are due to impaired entry into long-term memory or the result of changes in random or consistent retrieval from long-term memory (Larrabee et al., 1985; Masur et al., 1990). Such information would appear to be essential in order to successfully critique the direct and side effects of different drug treatments that are being developed for dementia and depression. Second, the relationship between memory complaints and memory recall performance (i.e., total recall scores) is dismal irregardless of the population being examined (estimated mean $\underline{r}$s of .22 for dementia, .00 for depression, and $\underline{r}$ = -.20 for healthy elderly). Efforts at strengthening this relationship appear to have been primarily limited to increasing the content and length of memory questionnaires. The author is unaware of any studies that have attempted to determine if the relationship would be stronger by comparing memory complaints, as measured by the initial measures that assessed merely the presence and/or frequency of memory complaints, with the subcomponents of long-term memory (i.e., LTS, CLTR, RLTR). Since the presence of subjective memory complaints is required for such conditions as age-associated memory impairment (AAMI; Crook, Bartus, Ferris, Whitehouse, Cohen, &

Gershon, 1986), it would seem vital to examine the extent of all potential relationships between memory complaints and objective memory performance.

Third, there does appear to be a positive relationship between depression and memory complaints (i.e., $\underline{r} = .34$) and a negative relationship between depression and poorer explicit memory recall (i.e., $\underline{r} = -.30$). However, the author is unaware of attempts to determine if these relationships are due to some of the specific criteria of depression (e.g., feelings of worthlessness, somatic criteria). Fourth, with the exception of Gannon (1994), the studies in these meta-analyses have not reported correcting for attenuation due to measurement error in their calculations. This will result in lower correlations than actually exist in their respective populations. Fifth, the scoring method used in the SRT to determine consistent recall may lead to an inaccurate representation of the role of consistent retrieval in different conditions (e.g., dementia). Since this has not been mentioned previously, I will describe this in greater detail.

It may be recalled that through analyses of word retrieval from long-term memory in both children and adults (Buschke, 1974; Fuld & Buschke, 1976), the SRT was able to differentiate two qualitatively different stages of verbal learning, random and consistent retrieval. Buschke (1974) hypothesized that this was the result of retrieval reflecting the adequacy of storage. One benefit of this finding was that verbal learning could be investigated through stages of learning (i.e., random versus consistent retrieval) rather than attempting to make a distinction between storage and retrieval. The difficulty with distinguishing between storage and retrieval is due to their intertwining relationship. While retrieval is required to demonstrate that the storage of information took place,

effective retrieval requires adequate storage (Fuld & Buschke, 1976). In other words, if a subject cannot retrieve some piece of information from long-term memory, is it due to storage difficulties, retrieval difficulties, or both?. With Buschke's approach, it is far simpler. The better the storage (i.e., encoding), the better the retrieval. The poorer the storage, the poorer the retrieval.

One difficulty with studies that have assessed consistent long term recall (i.e., CLTR), is that the criteria for determining which words are consistently recalled often varies. In Buschke's original paper on the SRT (1973), a word only had to be recalled across a minimum of the last two trials (i.e., Trial 5 & 6) in order to be considered consistently recalled. However, other studies have used scoring criteria that required that the word be recalled across at least the last three trials (Masur et al., 1989) or even a larger number of trials (Fuld & Buschke, 1976) to be considered consistently recalled. This can lead to different findings across studies. A second difficulty is that Buschke's scoring convention appears to assume that if a word was consistently recalled across trials 5 and 6, it would also be recalled on any additional trials (e.g., trial 7). However, the author is unaware of any study on which this claim can be based. Recalling a word across two consecutive trials should demonstrate the same degree of consistency in retrieval irregardless of which two trials the word was recalled on (e.g., trial 1 & 2 or trial 5 & 6). Using Buschke's scoring criteria misrepresents the role that consistent and, consequently, random retrieval are playing in the subjects that are being assessed To demonstrate this, I will use the original definition of consistent recall which requires that a word from long-term memory be retrieved during at least the last two trials (See Appendix C). This

Appendix shows all possible combinations of how a word could be recalled across six trials and whether it is considered retrieved from: short-term memory (i.e., STM) and/or long-term memory (i.e, LTS) and retrieved randomly (i.e., RLTR), and/or consistently (i.e., CLTR) from long-term memory. The problem with the definition of consistent recall becomes evident when one examines the different possible events that can occur during word recall. Some words may be recalled much more consistently across the six trials but are considered derived from random retrieval (i.e., RLTR) since they were not recalled during the 5th and 6th trials.

For example, in the subsection describing all possible events for words that are recalled four times, it seems that event 1 and event 2 are much more indicative of consistent retrieval than event 15, however, event 1 and 2 are scored 4 for random retrieval and 0 for consistent retrieval. Event 15 on the other hand, gets a score of 2 for consistent retrieval. This results in an inaccurate measure of the consistency of retrieval from long-term memory. A potential solution could be to use another measure of retrieval consistency, referred to as consistent retrieval (i.e., CR; Masur et al., 1989). This represents the total number of events across a word list task in which words are recalled on two consecutive trials from long-term memory. The higher the number, the greater the consistency of recall. To calculate random retrieval (i.e., RR), words that have been recalled from long-term memory that are not recalled on two consecutive trials could be summed. This would also solve the problem of the dichotomous separation of random and consistent retrieval that results from Buschke's scoring convention. If, as Buschke

(1973) states, retrieval reflects the adequacy of storage, then retrieval would be better viewed along a continuum.

Hypotheses

Based on the findings described in this summary, the following six hypotheses were examined.

#1. It was hypothesized that the somatic components of syndromal depression were related to memory complaints. Based on this hypothesis, a factor composed of test-items from the depression inventories that assessed the DSM-IV somatic criteria of depression (i.e., significant weight loss/gain, insomnia/ hypersomnia, psychomotor agitation/ retardation, fatigue) should exhibit a stronger positive relationship with the frequency of memory complaints then a "cognitive" factor based on test-items that assessed the remaining DSM-IV depression criteria (i.e., depressed mood, diminished interest, feelings of worthlessness, diminished ability to concentrate, recurrent thoughts of death).

#2. It is hypothesized that feelings of worthlessness and inappropriate guilt, one of the DSM-IV symptoms of depression, is what relates depression scores to the number of memory complaints. Based on this hypothesis, a factor composed of test-items from the depression inventories that assessed this characteristic of depression should manifest a stronger relationship with memory complaints then factors based on the test-items that assessed the other DSM-IV characteristics of depression.

#3. It is hypothesized that a diminished ability to concentrate or heightened indecisiveness, another of the DSM-IV symptoms of depression, is what relates depression scores to the frequency of memory complaints. Consequently, a factor based on test items

from the depression inventories that assessed this characteristic of depression should display a stronger relationship with memory complaints then factors based on test-items that assessed the other DSM-IV characteristics of depression.

#4. It is hypothesized that the depressed elderly will have a lower mean number of words that enter long-term memory (i.e., LTS) and a lower mean number of words that are consistently recalled from long-term memory (i.e., CR) then will be found in the non-depressed elderly. In addition, it is expected that a negative relationship will exist between the presence of depressive symptoms (i.e., DEP factor) and these two measures of memory. This means that as the depression score from the three depression measures increases in severity, there will be a corresponding decrease in words entered into long-term memory (i.e., LTS) and words consistently recalled from long-term memory (i.e., CR).

#5. It is also hypothesized that as memory complaints increase, there will be a corresponding decrease in the words consistently recalled on the SRT (i.e., CR) and an increase in the words randomly recalled (i.e., RR). It is also hypothesized that these correlations will be greater than the correlation between memory complaints and total recall scores (i.e., SUM).

#6. It is hypothesized that a positive relationship exists between memory complaints and syndromal depression. Consequently, it is expected that memory complaints will increase in frequency as depressive symptoms increase (i.e., DEP factor). This hypothesis serves as a replication of previous studies that have examined this topic.

METHOD

Participants

The participants (N = 208) were community-dwelling elderly recruited through newspaper and radio ads, circulars, and presentations at local senior citizen centers. Each participant was offered a free assessment of their mood and memory. Nondepressed elderly were considered those with an absence of syndromal depression and an unimpaired cognitive status (n = 131). Depressed elderly were considered those with syndromal depression and an unimpaired cognitive status (n = 77). The absence of syndromal depression was considered a score of less than 10 on the Beck Depression Inventory (i.e., BDI;)and less than 11 on the Geriatric Depression Scale (i.e., GDS;) and Hamilton Depression Scale (i.e., HAM;). The presence of syndromal depression was considered a score equal to or greater than 10 on the BDI or equal to or greater than 11 on the GDS or HAM. An unimpaired cognitive status (i.e., >23 on the MMSE; Mini-Mental State Examination) was required of all participants due to the influence that dementia and pseudodementia can have on memory recall and potentially on memory complaints. These cut-off scores were based on previously reported scoring guidelines for the BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), GDS (Yesavage et al., 1983; Alden, Austin, & Sturgeon, 1989), HAM (Yesavage et al., 1983; Marks-Cash, 1992), and MMSE (Tombaugh & McIntyre, 1992).

Test Instruments for Severity of Depression

Since multiple measures of depression can more fully capture any depressive symptomatology being experienced by the participants (Kendall, Hollon, Beck, Hammen,

& Ingram, 1987), three instruments were chosen. The first instrument was an observer-rating scale, the HAM (Hamilton, 1960). The remaining two, the BDI (Beck et al., 1961) and the GDS (Yesavage et al., 1983), were self-report measures. Together, these three measures more fully address the DSM-IV criteria for depression and criteria characteristic of depression in the elderly population (Weiss, Nagel, & Aronson, 1986).

Hamilton Rating Scale for Depression

The HAM used for this study was a 23-item version of the original 17-item scale. Since all of the test items in the original 17-item version are contained in the 23-item scale and no psychometric information was available for the 23-item version, the following psychometric information represents the findings from the original 17-item test. Although the HAM was originally designed to measure the severity of depression in individuals already diagnosed depressed, since its inception it has been extensively used to assess depressive symptoms in other populations as well (Hedlund & Vieweg, 1979). Test-retest reliability coefficients for the HAM ranged from .61 (Mean interval = 15 days; Lyons, Strain, Hammer, Ackerman, & Fulop, 1989) to .70 (3 week interval; Maier, 1990) while Cronbach's (1951) alpha was .76 (Rehm & O'Hara, 1985). Sensitivity to change, which is a scale's ability to detect changes (e.g., in depressive symptoms) in individuals across time, was .65 (3 week interval) for the HAM (Maier, 1990). Correlations of the HAM and psychiatrist's ratings of global severity of depressed patients ranged from a mean of .88 (range = .84 to .90) for three studies reviewed by Hedlund and Vieweg (1979) to .67 (Maier, 1990).

Stukenberg, Dura, and Kiecolt-Glaser (1990) observed that the area under the ROC (i.e., Receiver Operating Characteristics) curve, which represents the probability of a measure correctly categorizing subjects (e.g., depressed versus nondepressed), was .85. In a sample of psychiatric inpatients (Lichtenberg, Steiner, Marcopulos, & Tabscott, 1992), the HAM's sensitivity and specificity was 9% and 92%, respectively. These indices were determined by comparing those subjects who fell above and below a cut-off criterion. Sensitivity is the proportion of individuals correctly diagnosed depressed (i.e., proportion of true positives) while specificity is the proportion of individuals correctly diagnosed affectively healthy (i.e., proportion of true negatives; Masur et al. 1989). The authors mentioned that the low sensitivity of 9% is at odds with the high correlations of HAM ratings and DSM-III-R diagnoses reported in the literature and suggested that it may have been due to their study's large number of demented subjects. This may have been the case since in the only other study that has apparently examined these criteria, a sensitivity of 86% and a specificity of 80% was obtained with a cut-off score of 11 (Brink, Yesavage, Lum, Heeresema, Adey, & Rose, 1982).

Concurrent validity for the HAM was determined based on its correlation with other measures of depression. The HAM had an average correlation of .77 (range = .73 to .80) with the BDI across two studies that examined nonpsychiatric samples (Beck, Steer, & Garbin, 1988). This correlation with the BDI was lower, however, in a sample of mixed psychiatric and medical inpatients ($\underline{r}$ = .52; Fitzgibbon, Cella, & Sweeney, 1988) and across seven studies assessing psychiatric inpatients ($\underline{r_{avg}}$ = .58; range = .31 to .82; Hedlund & Vieweg, 1979). The HAM also had a correlation of .60 with the Brief

Symptom Inventory Depression scale (Derogatis & Spencer, 1982) in a sample of community-dwelling elderly (Stukenberg, Dura, & Kiecolt-Glaser, 1990). In a review of seven factor analyses, Hedlund and Vieweg (1979) concluded that the first of two factors generally evident across the studies appeared to measure the severity of depressive symptoms. However, in a more recent study, O'Brien and Glaudin (1988) observed four factors that they labeled somatic complaints, anorexia, sleep disturbance, and agitation/retardation. The 23-item version of the HAM that will be used for the present study has a scoring range of 0 to 75. Zero denotes a lack of depressive symptoms while 75 suggests severe depression.

Beck Depression Inventory

The BDI is a 21-item, multiple-choice inventory that rates the intensity of depressive symptoms, especially those of a somatic nature. Based on a psychometric review of the BDI (Beck, Steer, and Garbin, 1988), Cronbach's (1951) alpha had a mean of .81 (range = .73 to .92) based on 15 samples of nonpsychiatric subjects while test-retest reliability coefficients had a mean of .74 (7 days to 4 month interval; range = .60 to .90) based on 5 samples of nonpsychiatric subjects. Correlations of the BDI and clinical ratings of depression for three samples of nonpsychiatric patients, had a mean of .60 (range = .55 to .73). The concurrent validity of the BDI, when correlated with the GDS, was .85 with medical outpatients (Norris, Gallagher, Wilson, & Winograd, 1987). The value with the HAM across two nonpsychiatric samples, however, was slightly lower (r_{avg} = .77, range = .73 to .80; Beck et al., 1988). In a review by Beck et al. (1988), the authors concluded that the more recent factor studies suggest one depressive factor which measures

depressive severity. Scores on the BDI can range from 0, which indicates that depressive statements were not endorsed, to a maximum value of 36 which indicates severe depression.

Geriatric Depression Scale

The GDS is composed of 30 yes-no questions that primarily examine mood and psychological symptoms. Test-retest reliability coefficients of .98 (Mean interval = 15 days; Lyons, Strain, Hammer, Ackerman, & Fulop, 1989) and .85 (1 month interval; Parmalee, Lawton, & Katz, 1989) have been reported. The mean value for Cronbach's (1951) alpha was .91 based on studies by Yesavage et al. (r = .94; 1983), Parmalee et al. (r = .91; 1989), and Salamero and Marcos (r = .87, 1992). A study by Harper, Kotik-Harper, and Kirby (1990) yielded a sensitivity of 85% for the GDS in a sample of depressed elderly, while in a study by Koenig, Meador, Cohen, and Blazer (1988), a sensitivity of 92% and a specificity of 89% were obtained. Concurrent validities of .62 and .81 were obtained when the GDS was correlated with the HAM at two different assessment periods with medical inpatients (Lyons, Strain, Hammer, Ackerman, & Fulop, 1989). This value was slightly higher (r = .83) when medical outpatients were assessed (Norris, Gallagher, Wilson, & Winograd, 1987). Correlations were also slightly higher between the GDS and BDI (r = .85; Norris et al., 1987). Two factor analyses of the GDS found six (Parmalee et al., 1989) and nine-factor (Salamero & Marcos, 1992) solutions although both studies mentioned that the GDS was unidimensional (i.e., general depression factor) based on Cattell's (1966) scree criterion. Scores on the GDS can range

from a score of 0, which indicates that no depressive statements were endorsed, to a maximum value of 30 which indicates severe depression.

Test Instrument for Explicit Memory

The Selective Reminding Test (SRT, Buschke, 1973), served as the word list task (Appendix D). Words were presented orally at a rate of one word every two seconds. Test-retest reliability has been found to range from .73 (6 month interval; Ruff, Quayhagen, & Light, 1988) to .89 (2 hour interval; Masur et al., 1989). In a study by Masur et al. (1989), the SRT displayed a sensitivity and specificity in the detection of patients with mild Alzheimer's disease of 86 and 99%, respectively. However, in a second study (Masur et al., 1990) with patients diagnosed with dementia based on DSM-III-R criteria, the SRT obtained a sensitivity of 47% and a specificity of 86%. Total recall scores (i.e., SUM) were based on the sum of words recalled across 6 trials and could range from 0 to a maximum value of 72. The higher the number, the more words were recalled by the participant across the trials. Retrieval consistency (i.e., CR) represented the total number of events across a word list task in which words were recalled on two consecutive trials from long-term memory. The higher the number, the greater the consistency of recall. Random retrieval (i.e., RR) was based on the number of words recalled from long-term memory that were not recalled on two consecutive trials. For CR and RR, the higher the number, the greater the consistency or randomness of recall, respectively.

Test Instrument for Memory Complaints

To provide a measure of subjective memory complaints, participants were asked to identify the areas in which they were having memory problems. This could be problems with remembering (a) names, (b) faces, (c) the date, month, or year, (d) appointments, (e) where objects were placed, (f) what they went into a room to do/get, (g) taking their medication, or (h) other problem areas not mentioned. The test-retest reliability coefficient for this questionnaire was .66 (time interval 3 months). These coefficients were based on 51 control subjects who were assessed on this instrument as part of a larger study. This measure could range from 0, indicating a lack of memory problems, to a maximum value of 8 problem areas.

Test Instrument for Mental Status

The MMSE (Folstein, Folstein, & McHugh, 1975) is a 30-item form that assessed the presence of cognitive impairment (i.e., mental status). This screening test provided a brief measure of orientation, registration, attention and calculation, recall, and language. Based on a review of the MMSE by Tombaugh and McIntyre (1992), the mean coefficient alpha across five studies was .72 (range = .54 to .96) while the mean stability coefficient across 25 samples was .82 (time interval 1 day to 2 months; range = .80 to .97). The sensitivity of the MMSE across 27 samples that examined demented subjects had a mean value of .79 (range = .20 to 1.00) while the specificity across 21 samples had a mean value of .83 (range = .46 to 1.00). Construct validity, based on 14 studies between the MMSE and other cognitive status measures, ranged from .70 to .90. Scores could range from a

low of 0, indicating severe impairment, to a maximum value of 30, indicating an unimpaired mental status.

Procedure

Subjects were assessed on the three depression scales, the Selective Reminding Test, the memory complaints questionnaire, and the MMSE. Testing was done by clinicians enrolled in a doctoral level clinical psychology program all of whom had prior training and practice in assessment. Seven to 10 hours of additional training were given to each of the clinicians in administering and scoring the tests. During their training phase, each clinician observed an assessment by another clinician with at least 1 year experience and was then observed by the same clinician during their first testing session. Furthermore, all tests were re-scored by the author to ensure accuracy. Also, in order to reduce subjectivity in selecting the variables to compose each of the factors examined in this study (Ford, MacCallum, & Tait, 1986), three advanced-level clinicians individually provided a summary of test items from the three depression inventories that assessed each of the nine DSM-IV criteria for depression. Only test items identified by all three clinicians for each factor were retained for subsequent analyses.

RESULTS

The first hypothesis examined the relationship between memory complaints and the somatic and cognitive components of syndromal depression. Three advanced-level clinicians identified 16 test items from the HAM, BDI, and GDS that assessed somatic characteristics of depression and 48 test items that assessed cognitive aspects of depression. The somatic test items were considered those that focused on weight or

appetite fluctuations, sleep problems, psychomotor disturbances, or feelings of fatigue. The cognitive test items were those that identified a depressed mood, attenuated interests or pleasures, feelings of worthlessness/guilt, concentration difficulties/indecisiveness, or thoughts of death/suicide. Construct validity of these two factors was then empirically tested with a confirmatory factor analysis (CFA; Hunter & Cohen, 1969). Initially, the CFA was examined for the presence of any test items which had negative loadings on their respective factor. It was assumed that test items exhibiting a negative factor loading were measuring something different from either the somatic or cognitive depression construct being assessed by the other test items. Although none of the test items had negative factor loadings, several test items exhibited minimal factor loadings. In order to exclude these peripheral test items and retain those that appeared central in defining the two constructs, only test items with factor loadings of .40 or greater were retained (Cohen & Cohen, 1983; Ford et al., 1986). This resulted in 10 variables for the somatic factor and 32 variables for the cognitive depression factor. Reliability of these revised factors was then assessed using Cronbach's (1951) alpha. The resulting internal consistency was .76 for the somatic factor and .93 for the cognitive factor. In summary, it appears that the two revised factors had adequate validity and reliability with which to test this hypothesis.

Next, the relationship between these factors and the number of memory complaints was determined and expressed as Pearson product moment correlations. In addition, these correlations were corrected for attenuation to take into account the effects of measurement error (Hunter, 1990; Hunter, 1993a). It was hypothesized that the somatic factor would have a larger positive correlation with memory complaints than the cognitive

factor. However, both correlations while significant ($p<.05$), were essentially the same (somatic $r = .36$; cognitive $r = .32$, $df = 207$) and this hypothesis was rejected. A listing of the 95% confidence intervals (Hunter, 1993b) for these and subsequent analyses can be found in Table 18.

The analyses for the second and third hypotheses were combined since both involved examining the relationship between memory complaints and factors representing the nine DSM-IV symptoms of depression. The advanced level clinicians identified test items in the HAM, BDI, and GDS that assessed depressed mood (17 test items), attenuated interests or pleasures (11 test items); weight or appetite fluctuations (4 test items), sleep problems (4 test items), psychomotor disturbances (3 test items), fatigue (5 test items), feelings of worthlessness/ guilt (10 test items), concentration difficulties/indecisiveness (7 test items), and thoughts of death/suicide (3 test items). Construct validity of these nine depression constructs was then assessed with a CFA. The initial CFA did not indicate any negative factor loadings for each of the factor's respective test items, however, some test items displayed minimal-sized factor loadings (i.e., <.40) and were removed. This resulted in 13 test items for depressed mood, 10 test items for attenuated interests or pleasures, 4 test items for weight/appetite fluctuations, 4 test items for sleep problems, 5 test items for fatigue, 8 test items for feelings of worthlessness/guilt, 5 test items for concentration difficulties/indecisiveness, and 2 test items for thoughts of death/suicide. The factor assessing psychomotor disturbances was removed entirely due to factor loadings that ranged from .17 to .35. Reliability of the revised constructs was

Table 1

Depression Factors: Consistency/Correlations with Memory Complaints

N = 208	Coeff. Alpha	r	p
Depressed mood	.88	.25	.0002
Interests/pleasure	.79	.42	.0002
Weight/appetite	.58	.03	n.s.
Sleep problems	.71	.42	.0002
Fatigue	.73	.34	.0002
Worthlessness/guilt	.82	.21	.0012
Concentration/indec.	.67	.70	.0002
Death/suicide	.82	.18	.0045

then assessed and can be found in Table 1. In summary, it appears that there is adequate validity and reliability with which to test these hypotheses.

Next, the relationship between these depression factors and the frequency of memory complaints was determined and expressed as correlations that had been corrected for attenuation (Table 1). The second hypothesis examined the possibility that the frequency of memory complaints would exhibit the strongest relationship with the feelings of worthlessness/guilt factor while the third hypothesis suggested that this relationship would occur with the concentration difficulties/indecisiveness factor. Analyses indicated that the second hypothesis should be rejected while the third hypothesis should be accepted. The construct of diminished concentration and indecisiveness displayed the strongest relationship with memory complaints ($r = .70$, $p<.0002$, $df = 207$) and was also significantly larger ($p<.005$) than the other correlations. This correlation means that an increase in perceived concentration difficulties and indecisiveness was associated with a greater number of perceived memory problems.

The fourth hypothesis expected that the depressed elderly would have a lower mean number of words that entered (i.e., LTS) long-term memory and were consistently recalled (i.e., CR) from long-term memory when compared with the nondepressed group. Results indicated that the depressed participants exhibited this pattern (Table 2). It was also hypothesized that a significant negative relationship would exist between the amount of depressive symptoms (i.e., DEP) and these two measures of memory. Since the amount of depressive symptoms was based on the total score across three different depression measures with different scoring ranges, the participant's depression scores were first

transformed into z-scores and summed to produce a composite depression index (i.e., DEP). For this index, a larger score signified a greater degree of syndromal depression. Analyses of these relationships also proved to be significant (LTS & DEP $r = -.20$, $p<.0019$, $df = 207$; CR & DEP $r = -.20$, $p<.0019$, $df = 207$). Consequently, the fourth hypothesis was accepted.

Table 2

Recall in Depressed versus Nondepressed Elderly

	Depressed		Nondepressed	
	$n = 77$		$n = 131$	
	LTS	CR	LTS	CR
M	21.6	12.9	25.4	15.6
SD	17.0	12.0	16.8	11.9

The fifth hypothesis examined the possibility that as memory complaints increased, there would be a corresponding decrease in the words consistently recalled (i.e., CR) and an increase in the words randomly recalled (i.e., RR) from long term memory. It was also hypothesized that these relationships would be larger than the one between memory complaints and total recall scores (i.e., SUM). However since the meta-analyses indicated

that the presence of syndromal depression might affect this relationship, these analyses were carried out separately for the depressed and nondepressed groups. Results indicated that while the correlations were somewhat different for those with (CR r = -.02; RR r = .07; SUM r = .06, df = 76) and without (CR r = .04; RR r = .16; SUM r = .09, df = 130) syndromal depression, only RR was significantly associated with memory complaints ($p<.05$) in the nondepressed group. This correlation implies that as memory complaints increased, there was an increase in random recall from long-term memory. Also, correlations for RR and SUM were not significantly different. Hence, the fifth hypothesis was only partially accepted. The final hypothesis suggested that there would be a positive relationship between memory complaints and syndromal depression. A correlation analysis that had been corrected for attenuation yielded a correlation of .37 ($p<.0002$) when this relationship was examined. Consequently, this hypothesis was accepted.

DISCUSSION

The observation that the frequency of memory complaints was significantly related to the severity of syndromal depression replicated previous studies that have examined this relationship. However, the examination of the DSM-IV symptoms underlying syndromal depression has also led to an understanding of the symptom primarily responsible for this relationship within our sample. By far the strongest relationship was exhibited between the number of memory complaints and the degree of perceived concentration difficulties and/or indecisiveness. Here, concentration refers to an effortful and heightened state of attention in which only relevant stimuli are left in conscious awareness (Russell, 1975). Consequently, concentration refers to a certain combination of the three subcomponents

that encompass the construct of attention (i.e., alertness, capacity, and selection). Alertness is considered one's level of general preparedness to act upon a stimulus. This stimulus could be within one's self (i.e., internal) or within one's environment (i.e., external). Alertness can fluctuate along a continuum over the course of a day. One pole on the continuum would reflect nonresponsiveness (e.g., comatose state) while the opposite end would describe a maximal degree of awareness and response speed to a stimulus. Capacity deals with the degree of conscious effort that is used in attending to a task. Attentional capacity has been shown to be finite and susceptible to diurnal variation. Although, we have a limited attentional capacity, this can be circumvented to a certain extent by increasing the amount of information that is processed automatically. Many automatic processes can occur concurrently and only minimally affect the overall supply of attentional capacity. Automatic processes refer to behaviors that have been practiced extensively over a period of time, that are performed habitually, and do not require conscious attention (e.g., tying your shoes). Selection refers to the specific allocation of attentional resources for single or multiple stimuli and can be directed internally and/or externally (Nissen, 1986).

Intuitively, this relationship between memory complaints and disturbances in concentration/indecisiveness makes sense. If one does not possess a certain level of concentration, information in the environment will not be sufficiently attended to. This will result in minimal information being obtained and encoded from our sensory organs into memory (Nissen, 1986). For instance, recall of information from the Selective Reminding Test would be influenced by the amount of concentration that was allocated or

available during the test. If one does not have sufficient levels of attention (i.e., concentration), recall of test words will be poor.

Indecisiveness, which is grouped by the DSM-IV along with concentration disturbances, could be considered an effect of concentration difficulties. Indecisiveness refers to an inability to make a decision. One reason for indecision may be that there are insufficient attentional resources to generate the level of concentration required for a particular problem. Without sufficient resources, one would be limited in the extent that viable alternatives could be examined, compared, and selected. This could result in a person who vacillates between choices or hesitates to choose.

This description of concentration could be used to demonstrate how each of the DSM-IV symptoms of depression could potentially exhibit a strong, although indirect, relationship with memory complaints due to their effects on a person's attentional resources. For example, Hanninen et al. (1994) concluded that memory complaints were associated with somatic complaints. It may be that those who have somatic ailments predominately focus their attention/concentration internally on their physical state rather than externally on their environment. Also, their physical condition may leave them fatigued. Consequently, lower levels of concentration and attention may be available to encode external environmental stimuli. Such a hypothesis of attention has also been proposed by Nideffer (1986) within the field of sports psychology. Nideffer contends that if one has too broad a focus on internal stimuli (e.g., focusing on your own actions/tactics) then less resources are available to focus broadly on external stimuli (e.g., the opposing team). This could result in losing a sports match despite being in better shape or having

superior game strategies than the opposing team. If Hanninen et al. (1994) had participants who had more of a internal focus due to their somatic difficulties, less attentional capacity would be available to be focused externally. If this results in poor levels of concentration, then as Nissen (1986) pointed out, poorer encoding and recall of external information will result. Unfortunately, neither Hanninen et al. (1994) nor the present study included measures of attention and concentration to test this explanation.

This line of logic could also be used to explain how worthlessness could be associated with memory complaints. Beck (1967) theorized that depression is characterized by a negative view of the self, world, and future and that these views become perpetuated and amplified leading to a "downward spiral of depression." As a person becomes more depressed, thoughts of worthlessness (i.e., the self) may be focused on to a greater extent. This would result in greater attentional resources being allocated for a narrow, internal focus. Consequently, there should be a corresponding decrease in the ability to concentrate on and recall external stimuli.

Another interesting finding was that even with a total of 74 test items from the three depression inventories, only 2 test items loaded adequately on the factor that assessed thoughts of death/suicide and only 5 test items on the factors that measured sleep problems and fatigue. In addition, the factor of psychomotor disturbances was removed due to a lack of variables with a sufficient factor loading. Part of this is undoubtedly a result of the focus on cognitive aspects of depression in the Geriatric Depression Scale. Yesavage et al. (1983) points out that this measure was formulated in an attempt to decrease the rate of false positive in those mildly depressed elderly who are screened for

depression. It appears that due to the higher base rates of somatic symptoms among the elderly, they are often incorrectly considered depressed or considered more depressed then is actually the case. However, Yesavage et al. (1983) also states that somatic symptoms are clearly a part of major depression disorders. It would seem advisable then to have a depression inventory that would adequately assess the presence of all the DSM-IV symptoms of depression and then take age into account when determining the presence or severity of syndromal depression. Without such test items to adequately assess these constructs, false negatives will occur (i.e., depressed individuals who are not considered depressed).

It was also mentioned that only two test items loaded on the death/suicide factor. Particularly since these test items did not have perfect reliability, it would seem advisable for more test items to be donated to assessing this construct. While Yesavage et al. (1983) contends that thoughts of death and suicide may mean something different to the elderly than for those who are younger, the identification of the existence of such thoughts is important since one of the most serious expressions of depression is suicide. Also, given the likelihood that most people are only exposed to self-report instruments for assessing depression (e.g., talk shows, magazines, National Depression Screening Day) rather than a clinical interview, more comprehensive inventories appear to be needed. For instance, in October of each year, a National Depression Screening Day is conducted. At sites all over the country (e.g., schools, shopping malls), mass assessments are performed with a self-report measure of depression. A useful purpose of such a screening would be

to identify those who are potentially likely to commit suicide. However, with our current measures many of these people may not be identified and helped.

Another of the hypotheses examined the notion that depressed elderly would have a greater difficulty encoding and consistently retrieving words from long-term memory. Although this hypothesis was confirmed, the significant correlation was only -.20. One possibility for this small relationship is that this sample may have had enough automatic processes at their disposal to attenuate some of the effects of their depression on their long-term memory abilities. Another possibility is that our sample of elderly were only mildly depressed (BDI $\underline{M}$ = 13; GDS $\underline{M}$ = 13; HAM $\underline{M}$ = 10). If encoding and retrieval processes are impacted by the severity of syndromal depression, it may be that greater levels of syndromal depression are required to demonstrate a larger relationship. Furthermore, if the relationship between depression and memory recall is mediated through insufficient concentration resources, it may be that concentration levels were only mildly compromised in our sample. However, it should also be kept in mind that a correlational relationship does not imply causality.

It was also observed that memory complaints were significantly related to random word recall but not total recall within the nondepressed group. Since other studies that have examined this relationship have only measured total recall, this may be the reason for the low correlations that have been previously cited in the literature. Also, since the relationship was only significant in the nondepressed group, it may be that syndromal depression adversely impacts the metamemory abilities of the elderly. This could then provide an explanation for the lack of relationship between memory performance and

memory complaints observed in those suffering from depression. Another related question concerns why this relationship was not stronger. One reason may be that only a laboratory measure of verbal recall (i.e., SRT) was used in the present study. Here a laboratory measure indicates an assortment of words that are not related to each other and often have a low frequency of use in the general population. An alternative to a laboratory measure of verbal recall is an everyday measure. An everyday measure of memory would be tests that use words that have some commonality between them such as words that would be found on a shopping list. Recall of a short story would be another example of an everyday memory measure. It may be that memory complaints are more related to how participants feel about their everyday memory. This was the concept behind the creation of the Rivermead Behavioral Memory Test (Wilson, Cockburn, Baddeley, & Hiorns, 1989) which measures an assortment of memory variables couched in everyday situations. Another reason for this small relationship may be that memory complaints in this study were based on the occurrence of memory problems in several general areas. It may be that memory complaints are primarily associated with random recall within specific subdivisions of memory. For instance, memory complaints for remembering faces or where you put things may primarily correlate with random recall scores on spatial memory tasks. Remembering whether you took your medication may relate more to your level of attentional ability at the time. A further possibility has to due with restriction of range for the memory complaint variable ($\underline{M} = 2$, $\underline{SD} = 2$). Possibly there was insufficient breadth to the memory questionnaire to adequately resolve the relationships that were there.

Suggestions for Future Research

Ideally, future research should consider seven components when designing studies that examine the relationship between memory complaints, depression, and memory recall. The first component is sample composition. In addition to including depressed and nondepressed elderly, participants should demonstrate a broader range of symptom severity (i.e., mild to severe). The sample should also include those who meet, and fail to meet, the DSM-IV criteria for major depression. The inclusion of symptom severity and depression diagnosis could help elucidate which variables are involved in this interrelationship. Secondly, although recognizing the limitations of our current attentional/concentration measures (Schmidt, Trueblood, Merwin, & Durham, 1994), instruments based on cognitive models of attention should be included in future designs. Such measures could provide the link that is needed between theory and clinical practice. It may also be beneficial for these instruments to employ stimuli having verbal characteristics as opposed to those using numerals or symbols. Using stimuli similar to those contained in the memory tests may allow a more accurate measure of the attention and concentration resources available for verbal recall. For instance, if subjects have more extensive experience in attending to verbal stimuli, more automatic attentional processes may be able to be employed then would exist for attending to numerical stimuli.

Third, memory tests should assess both verbal and spatial memory. If memory complaints are specific to a certain type of memory deficit, limiting memory measures to verbal recall may mask the existence of potential relationships. Since verbal and spatial memory represent two major subdivisions of memory, these should provide an adequate

assessment of any such relationships. It may be that problems with remembering faces may only relate to spatial measures of memory while difficulties in remembering names may be confined to disturbances with verbal memory. The fourth component deals with the type of memory recall stimuli used. If memory complaints primarily relate to memory difficulties encountered outside a laboratory, objective memory performances that more closely mirror everyday memory situations may be required to reveal such a relationship. The inclusion of memory tests to assess verbal memory with either "laboratory" or "everyday" characteristics should help determine if this is true. Consequently, the assessment of verbal memory should include tests that assess recall of words, sentences, and paragraphs. In addition, these should be separately presented as visual or oral stimuli. This could help determine if the sensory modalities are differentially susceptible to certain memory difficulties. Also, the inclusion of both visual and oral modalities takes into account the two primary mechanisms by which information is obtained from the environment. For example, a visual presentation of stimuli would mirror information obtained by reading a newspaper or shopping list while an oral presentation would mimic information that could be obtained through a radio or television program. Spatial memory should be assessed by a laboratory measure that is primarily free of verbal encoding, such as the Complex Figure Test (Osterrieth, 1944). This restricts memory processes to those of a spatial nature rather than allowing the simultaneous encorporation of verbal memory processes. For everyday measures, spatial memory tests could be used that assess recall of faces or directions on a map.

Fifth, a memory complaints inventory should be used that allows the adequate discrimination of the type, frequency, quality, and degree of memory difficulties. It may be that if the memory questionnaire is too general or only examines the frequency of memory problems, potential interrelationships with memory recall and depression may be masked. Sixth, if this data could be collected over multiple time periods, causal relationships between the variables could be tested. Seventh, if such a study is formulated that includes these components, a correlational analysis would probably be advisable. This would allow a determination of any relationships, as well as, causal processes without losing significant amounts of power through the grouping of individuals by condition as is required with such statistics as an ANOVA.

APPENDIX A

APPENDIX A

Characteristics of the Meta-Analyses

Medline and Psychlit were searched for relevant articles published between 1979 and 1994 that dealt with depression or memory complaints and between 1983 and 1994 for articles that dealt with dementia. Relevancy was based on the following criteria: (a) the sample needed to include elderly subjects (i.e., 55 years of age or older), (b) subjects had to be assessed for dementia, depression, depressive symptomatology, or memory complaints (c) the article had to be published in English, and (d) explicit memory had to be assessed by either a word list or prose task. Relevant studies cited in the articles obtained through Medline and Psychlit were also acquired. For each of the studies obtained, the point biserial correlation (r) was calculated and used as a measure of treatment effect (Hunter & Schmidt, 1990). This correlation describes the degree of relationship that exists between the group (e.g., demented or control) and the level of explicit memory ability (e.g., total recall score). The overall results of the r statistic was expressed as a weighted average and weighted standard deviation. These measures were used to take into account the variation in sample size across the studies.

APPENDIX B

APPENDIX B

List of Tables

Table 3

Long-Term Memory and Dementia

Author(s)	Demented			Control				
	n	M	SD	n	M	SD	N	r
1. Gibson (1981)								
	20	16.20	5.65	20	34.70	6.63	40	-.84
Dementia Measure:	Not mentioned							
Memory Measure:	10-item Miller's word list, total recall score; 7 lists,1 trial each							
Dementia Sample:	Inpatient/Outpatient elderly diagnosed with dementia							
2. Weingartner, Grafman, Boutelle, Kaye, & Martin (1983)								
	8	4.00	.20	8	7.30	.60	16	-.97
Dementia Measure:	Not mentioned							
Memory Measure:	12-item Buschke Selective Reminding Test, total recall score, 5 trials							
Dementia Sample:	Elderly patients diagnosed with dementia, Alzheimer's type							
3. Breen, Larson, Reifler, Vitaliano, & Lawrence (1984)								
							21	-.11
Dementia Measure:	DSM-III diagnosis; Mini Mental State Exam; Dementia Rating Scale							
Memory Measure:	Logical Memory Form I							
Dementia Sample:	Community dwelling elderly diagnosed with dementia, Alzheimer's type							

Table 3 (cont'd)

4. Larrabee, Largen, & Levin (1985)

#1	16	2.81	2.18	25	7.56	3.14	41	-.67
#2	22	45.95	13.88	25	101.44	18.09	47	-.87

Dementia Measure: Research Diagnostic Criteria diagnosis; Blessed Dementia Scale

Memory Measure: Logical Memory Form I (#1); Selective Reminding Test, total recall score, number of items and trials not mentioned (#2)

Dementia Sample: Elderly patients diagnosed with dementia, Alzheimer's type

5. Hart, Kwentus, Taylor, & Hamer (1987)

	15	43.7	9.3	16	83.6	12.4	31	-.88

Dementia Measure: Neurologist, Psychiatrist, and Neuropsychologist rating; Clinical Dementia Rating Scale; Global Deterioration Scale

Memory Measure: 12-item Selective Reminding Test, total recall score, 10 trials

Dementia Sample: Outpatient elderly diagnosed with mild dementia, Alzheimer's type

6. Hart, Kwentus, Taylor, & Harkins (1987)

	14	8.10	1.10	16	17.70	1.40	30	-.97

Dementia Measure: Diagnostic Interview Schedule; Clinical Dementia Rating Scale; Global Deterioration Scale

Memory Measure: Logical Memory Form I

Dementia Sample: Inpatient elderly diagnosed with dementia, Alzheimer's type

7. Storandt, Botwinick, & Danziger (1987)

	22	2.30	2.10	39	9.10	2.10	61	-.86

Dementia Measures: Structured Interview; Dementia Scale; Short Portable Mental Status Questionnaire; Face-Hand Test; Clinical Dementia Rating Scale

Memory Measure: Logical Memory Form I

Dementia Sample: Community dwelling elderly diagnosed with mild dementia, Alzheimer's type

8. Niederehe & Yoder (1989)

#1	10	7.15	8.83	22	18.43	6.67	32	-.65
#2	10	6.75	6.79	22	18.55	4.86	32	-.77

Dementia Measure: Mental Status Questionnaire; Face-Hand Test

Memory Measure: 40-item word list, total recall score, 1 trial (#1); paragraph recall (#2)

Dementia Sample: Outpatient/Community dwelling elderly diagnosed with dementia

Table 3 (cont'd)

9. Poitrenaud, Moy, Girousse, Wolmark, & Piette (1989)

#1	26	14.42	4.12	33	19.03	4.31	59	-.49
#2	17	9.47	3.97	33	19.03	4.31	50	-.78

Dementia Measure: DSM-III diagnosis; Mini Mental State Examination
Memory Measure: McCarthy's shopping list task, total recall score, 1 trial
Dementia Sample: Inpatient elderly diagnosed with mild (1#) or moderate-severe (#2) dementia, Alzheimer's type

10. Masur, Fuld, Blau, Crystal, & Aronson (1990)

	36	31.10	11.10	386	40.10	10.80	422	-.59

Dementia Measure: DSM-III-R diagnosis; Blessed Mental Status Test
Memory Measure: 12-item Selective Reminding Test, total recall score, 6 trials
Dementia Sample: Community dwelling elderly diagnosed with dementia

11. Speedie, Rabins, Pearlson, & Moberg (1990)

	22	3.47	2.13	17	6.23	1.3	39	-.40

Dementia Measure: Mini Mental State Examination
Memory Measure: 10-item Rey Auditory Verbal Learning Test, total recall score, number of trials varied
Dementia Sample: Inpatient elderly diagnosed with dementia

12. Feehan, Knight, & Partridge (1991)

	10	3.00	1.86	10	6.30	2.38	20	-.63

Dementia Measure: DSM-III diagnosis; Hachinski Ischemic Scale, Mini Mental State Examination
Memory Measure: Logical Memory Form I
Dementia Sample: Inpatient elderly diagnosed with dementia, Alzheimer's type

13. King, Caine, Conwell, & Cox (1991)

	20	3.60	2.10	23	7.50	1.40	43	-.75

Dementia Measure: National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA); Mini Mental State Examination
Memory Measure: Caine's 10-item word list, total recall score, 1 trial
Dementia Sample: Outpatient elderly diagnosed with dementia, Alzheimer's type

Table 3 (cont'd)

14. Lines, et al. (1991)

	8	4.40	1.30	8	8.10	.70	16	-.98

Dementia Measure: NINCDS-ADRDA; Clinical Dementia Rating Scale; Mini Mental State Examination
Memory Measure: 10-item Paivio's word list total recall score, 1 trial
Dementia Sample: Community dwelling elderly diagnosed with mild dementia, Alzheimer's type

15. Rubin, Kinscherf, Grant, & Storandt (1991)

#1	41	4.70	2.10	83	9.00	2.50	124	-.69
#2	66	1.70	1.80	83	9.00	2.50	149	-.86

Dementia Measure: Clinical Dementia Rating Scale; Blessed Dementia Rating Scale; Mental Status Questionnaire
Memory Measure: Logical Memory Form I
Dementia Sample: Elderly diagnosed with very mild (#1) or moderate (#2) dementia, Alzheimer's type

16. Robinson-Wheelen, & Storandt (1992)

	51			64			115	-.62

Dementia Measure: Clinical Dementia Rating Scale
Memory Measure: Logical Memory Form 1
Dementia Sample: Community dwelling elderly diagnosed with very mild dementia

17. Flicker, Ferris, & Reisberg (1993)

#1a	47	3.20	.30	50	8.80	.50	97	-.99
#2a	39	1.20	.20	50	8.80	.50	89	-1.00
#1b	47	18.10	1.20	50	38.30	1.30	97	-.99
#2b	39	6.50	1.00	50	38.30	1.30	89	-1.00

Dementia Measure: Reisberg's Global Deterioration Scale
Memory Measure: Guild paragraph recall (a); 10-item McCarthy's shopping list, total recall score, 5 trials (b)
Dementia Sample: Elderly patients diagnosed with early (n = 47; #1) or advanced (n = 39; #2) dementia, Alzheimer's type

Summary:

Weighted M:	-.75
Weighted SD:	.03

Table 4

Consistent Long-Term Memory and Dementia

Author(s)	Demented			Control				
	n	M	SD	n	M	SD	N	r
1. Larrabee, Largen, & Levin (1985)								
	22	2.41	4.56	25	63.00	33.58	47	-.78
Dementia Measure:	Research Diagnostic Criteria diagnosis; Blessed Dementia Scale							
Memory Measure:	Selective Reminding Test, consistent long term retrieval score, number of items and trials not mentioned							
Dementia Sample:	Elderly patients diagnosed with dementia, Alzheimer's type							
2. Masur, Fuld, Blau, Crystal, & Aronson (1990)								
#1	36	10.70	9.00	386	18.60	10.80	422	-.56
#2	36	7.00	7.70	386	15.30	11.90	422	-.54
Dementia Measure:	DSM-III-R diagnosis; Blessed Mental Status Test							
Memory Measure:	12-item Selective Reminding Test, consistent retrieval (#1); consistent long term retrieval (#2) scores, 6 trials							
Dementia Sample:	Community dwelling elderly diagnosed with dementia							
Summary:								
						Weighted M:		-.56
						Weighted SD:		.00

Table 5

Long-Term Memory and Dementia/Depression

Author(s)	Demented/Depressed			Control				
	n	M	SD	n	M	SD	N	r
1. Breen, Larson, Reifler, Vitaliano, & Lawrence (1984)								
							14	-.74
Dementia Measure:	DSM-III diagnosis; Mini Mental State Exam; Dementia Rating Scale							
Depression Measure:	DSM-III diagnosis							
Memory Measure:	Logical Memory Form I							
Dementia/Dep Sample:	Community dwelling elderly diagnosed with dementia, Alzheimer's type and major depressive disorder							
2. Rubin, Kinscherf, Grant, & Storandt (1991)								
	7	1.40	1.60	83	9.00	2.50	90	-.95
Dementia Measure:	Clinical Dementia Rating Scale; Blessed Dementia Rating Scale; Mental Status Questionnaire							
Depression Measure:	DSM-III diagnosis, Beck Depression Scale; Geriatric Depression Scale							
Memory Measure:	Logical Memory Form I							
Dementia/Dep Sample:	Community dwelling elderly diagnosed with dementia, Alzheimer's type and major depressive disorder							
Summary:								
						Weighted M:		-.92
						Weighted SD:		.01

Table 6

Long-Term Memory and Depression

Author(s)	Depressed			Control				
	n	M	SD	n	M	SD	N	r
1. Gibson (1981)								
	20	25.65	6.16	20	34.70	6.63	40	-.59
Depression Measure:	Psychiatrist rating							
Memory Measure:	10-item Miller's word list, total recall score, 7 lists, 1 trial each							
Depressed Sample:	Inpatient/Outpatient elderly diagnosed depressed							
2. Popkin, Gallagher, Thompson, & Moore (1982)								
	18	17.56	8.66	23	16.87	8.19	41	.04
Depression Measures:	RDC diagnosis; Beck Depression Inventory; Zung Depression Scale							
Memory Measure:	Paragraph recall							
Depressed Sample:	Outpatient elderly diagnosed depressed							
3. Zarit (1982)								
#1a							79	-.33
#2a							79	-.21
#1b							79	-.31
#2b							79	-.23
Depression Measures:	Zung Depression Scale (a); Brief Symptom Inventory (b)							
Memory Measures:	15-item word list, total recall score, 1 trial (#1); 15-item shopping list total recall score, 1 trial (#2)							
Depressed Sample:	Community dwelling elderly not assessed for depression diagnosis							
4. Mormont (1984)								
							101	-.24
Depression Measure:	von Zerssen's Befindlichkeit Skala							
Memory Measure:	15-item Rey's Auditory-Verbal Learning Test, total recall score for trial 5							
Depressed Sample:	Community dwelling elderly not assessed for depression diagnosis							

Table 6 (cont'd)

5. West, Boatwright, & Schleser (1984)

#1							67	.12
#2							67	.13

Depression Measure: Beck Depression Inventory
Memory Measure: 16-item Craik's word list, total recall score, 1 trial (#1); 16-item shopping list, total recall score, 1 trial (#2)
Depressed Sample: Community dwelling elderly not assessed for depression diagnosis

6. O'Hara, Hinrichs, Wallace, Lemke, & Kohout (1986)

#1	22	5.00	2.09	25	6.08	1.85	47	-.27
#2	23	5.57	2.78	25	6.08	1.85	48	-.11

Depression Measures: RDC diagnosis; Schedule for Affective Disorders and Schizophrenia diagnosis (SADS-L); Center for Epidemiological Studies Depression Scale (CES-D)
Memory Measure: 20-item word list, total recall score, 1 trial
Depressed Sample: Community dwelling elderly; diagnosed depressed (#1), elevated depressive symptoms, not meeting criteria for depression (#2)

7. Hart, Kwentus, Taylor, & Hamer (1987)

	14	70.70	16.50	16	83.60	12.40	30	-.42

Depression Measures: DSM-III diagnosis; Hamilton Depression Rating Scale
Memory Measure: 12-item Selective Reminding Test, total recall score, 10 trials
Depressed Sample: Outpatient elderly diagnosed depressed

8. Hart, Kwentus, Taylor, & Harkins (1987)

	10	12.20	1.50	14	17.70	1.40	24	-.90

Depression Measures: DSM-III diagnosis; Hamilton Depression Rating Scale
Memory Measure: Logical Memory Form I
Depressed Sample: Inpatient elderly diagnosed depressed

9. Lachman, Steinberg, & Trotter (1987)

							47	-.15

Depression Measure: Zung Depression Scale
Memory Measures: 10-item shopping list and 10-item gift list, averaged total recall score, 1 trial
Depressed Sample: Community dwelling elderly not assessed for depression diagnosis

Table 6 (cont'd)

10. Niederehe & Yoder (1989)

#1	24	16.69	5.08	22	18.43	6.67	46	-.15
#2	24	15.17	4.86	22	18.55	4.86	46	-.34

Depression Measures: RDC diagnosis; SADS-L; Hamilton Depression Rating Scale
Memory Measures: 40-item word list, total recall score, 1 trial (#1); paragraph recall (#2)
Depressed Sample: Outpatient and community dwelling elderly diagnosed depressed

11. Poitrenaud, Moy, Girousse, Wolmark, & Piette (1989)

	24	14.29	3.67	33	19.03	4.31	57	-.52

Depression Measures: DSM-III diagnosis; Montgomery and Asberg Depression Rating Scale; Geriatric Depression Scale
Memory Measure: 20-item McCarthy's shopping list task, total recall score, 1 trial
Depressed Sample: Inpatient elderly diagnosed depressed

12. Speedie, Rabins, Pearlson, & Moberg (1990)

	21	6.00	1.30	17	6.23	1.30	38	-.09

Depression Measure: DSM-III diagnosis; Hamilton Depression Rating Scale
Memory Measure: 10-item Rey Auditory-Verbal Learning Test, total recall score, number of trials varied
Depressed Sample: Inpatient elderly diagnosed depressed

13. Danion, Willard-Schroeder, Zimmerman, Grange, Schlienger, & Singer (1991)

#1	18	6.40	3.70	18	8.90	2.90	36	-.36
#2	18	1.30	2.00	18	4.50	4.50	36	-.43

Depression Measure: DSM-III diagnosis; Hamilton Depression Rating Scale
Memory Measure: Logical Memory Form 1 (#1); 30-item word list, total recall score, 1 trial (#2)
Depressed Sample: Inpatient elderly diagnosed depressed

14. Feehan, Knight, & Partridge (1991)

	10	5.50	2.43	20	7.20	2.46	30	-.34

Depression Measures: DSM-III diagnosis; Geriatric Depression Scale
Memory Measure: Logical Memory Form I
Depressed Sample: Outpatient elderly diagnosed depressed

Table 6 (cont'd)

15. King, Caine, Conwell, & Cox (1991)

23	6.40	1.50	23	7.50	1.40	46	-.36

Depression Measures: DSM-III-R diagnosis; Hamilton Depression Rating Scale
Memory Measure: 10-item Caine's word list, total recall score, 1 trial
Depressed Sample: Inpatient elderly diagnosed depressed

16. Rubin, Kinscherf, Grant, & Storandt (1991)

8	5.90	2.20	83	9.00	2.50	91	-.75

Depression Measures: DSM-III diagnosis, Beck Depression Inventory, Geriatric Depression Scale
Memory Measure: Logical Memory Form I
Depressed Sample: Elderly diagnosed depressed

17. Lichtenberg, Manning, & Turkheimer (1992)

16	7.30	3.50	19	11.50	2.20	35	-.71

Depression Measure: Geriatric Depression Scale
Memory Measure: Logical Memory Form I
Depressed Sample: Community dwelling elderly not assessed for depression diagnosis

18. Gannon (1994)

						45	-.35

Depression Measures: Hamilton Depression Rating Scale; Beck Depression Inventory; Geriatric Depression Scale
Memory Measures: Summed z-score of 12-item Selective Reminding Test, total recall score, 6 trials and Logical Memory Form I averaged over 3 assessment periods
Depressed Sample: Community dwelling elderly not assessed for depression diagnosis

Summary:

Weighted M:	-.30
Weighted SD:	.06

Table 7

Long-Term Memory and Depression/Pseudodementia

Author(s)	Depressed/Pseudodem.			Control				
	n	M	SD	n	M	SD	N	r
1. Speedie, Rabins, Pearlson, & Moberg (1990)								
	18	4.29	2.28	17	6.23	1.30	35	-.47

Dementia Measure: Mini Mental State Examination

Depression Measure: DSM-III diagnosis; Hamilton Depression Rating Scale

Memory Measure: 10-item Rey Auditory Verbal Learning Test, total recall score, number of trials varied

Dementia/Dep Sample: Inpatient elderly diagnosed with major depression and dementia that was alleviated over treatment (i.e., pseudodementia)

Table 8

Memory Complaints and Depression

Author(s)	Depressed			Control				
	n	M	SD	n	M	SD	N	r
1. Kahn, Zarit, Hilbert, Niederehe (1975)								
							105	.33
Complaint Measure:	Severity of memory problems							
Depression Measure:	Hamilton Depression Rating Scale							
Depressed Sample:	Inpatient/Outpatient elderly with mild to moderate depression							
2. Popkin, Gallagher, Thompson, & Moore (1982)								
#1	18	4.28	1.27	23	5.01	1.20	41	.29
#2	18	4.02	.99	23	4.69	1.19	41	.30
#3	18	4.24	1.06	23	4.77	.90	41	.27
Complaint Measure:	Metamemory Questionnaire: Severity Subscale (#1), Effort Subscale (#2), Frequency Subscale (#3)							
Depression Measure:	RDC diagnosis; Beck Depression Inventory; Zung Depression Scale							
Depressed Sample:	Outpatient elderly diagnosed depressed							
3. Zarit (1982)								
#1							79	.22
#2							79	.25
Complaint Measure:	Total memory problems							
Depression Measure:	Zung Depression Scale (#1); Brief Symptom Inventory (#2)							
Depressed Sample:	Community dwelling elderly not assessed for depression diagnosis							
4. West, Boatwright, & Schleser (1984)								
							67	.25
Complaint Measure:	Number of memory problems							
Depression Measure:	Beck Depression Inventory							
Depressed Sample:	Community dwelling elderly not assessed for depression diagnosis							

Table 8 (cont'd)

5. O'Hara, Hinrichs, Wallace, Lemke, & Kohout (1986)

#1						77	.34
#2						77	.32
#3						77	.20

Complaint Measure: Memory compared to others their age (#1); Memory compared to when young adult (#2); Frequency of memory problems (#3)
Depression Measure: RDC diagnosis; SADS-L; CES-D
Depressed Sample: Community dwelling elderly diagnosed depressed (n = 26), elevated depressive symptoms not meeting criteria for depression (n = 25), and healthy controls (n = 26).

6. Tun, Perlmutter, Russo, & Nathan (1987)

						144	.49

Complaint Measure: Short Inventory of Memory Experiences
Depression Measure: Zung Depression Scale
Depressed Sample: Community dwelling elderly not assessed for depression diagnosis

7. Chandler & Gerndt (1988)

						31	.42

Complaint Measure: Severity of memory complaint
Depression Measure: DSM-III diagnosis
Depressed Sample: Inpatient elderly diagnosed depressed

8. Derouesne, Alperovitch, Arvay, Migeon, Moulin, Vollant, Rapin, & LePoncin (1989)

						367	.33

Complaint Measure: Severity of memory complaint
Depression Measure: Zung Depression Scale
Depressed Sample: Community dwelling elderly not assessed for depression diagnosis

9. Niederehe & Yoder (1989)

24	27.38	8.31	22	24.77	5.73	46	.18

Complaint Measure: Metamemory Questionnaire: Concerns Subscale
Depression Measures: RDC diagnosis; SADS-L; Hamilton Depression Rating Scale
Depressed Sample: Outpatient/Community dwelling elderly diagnosed depressed

10. O'Boyle, Amadeo, & Self (1990)

						22	.61

Complaint Measure: Cognitive Complaints Inventory
Depression Measure: DSM-III diagnosis; Beck Depression Inventory
Depressed Sample: Inpatient elderly diagnosed depressed

Table 8 (cont'd)

11. O'Connor, Pollitt, Roth, Brook, & Reiss (1990)

	36	3.40	2.10	213	1.30	1.40	249	.70

Complaint Measure: Number of memory complaints
Depression Measure: DSM-III-R diagnosis
Depressed Sample: Outpatient elderly diagnosed depressed

12. Zelinski, Gilewski, & Anthony-Bergstone (1990)

198 .28

Complaint Measure: Memory Functioning Questionnaire: Frequency of Forgetting
Depression Measure: Zung Depression Scale
Sample: Community dwelling elderly not assessed for depression diagnosis

13. Feehan, Knight, & Partridge (1991)

	10	47.40	11.39	20	33.30	11.50	30	.56

Complaint Measure: Cognitive Failures Questionnaire
Depression Measure: DSM-III diagnosis; Geriatric Depression Scale
Depressed Sample: Community dwelling elderly diagnosed depressed

14. Grut, Jorm, Fratiglioni, Forsell, Viitanen, & Winblad (1993)

436 .22

Complaint Measure: Presence of memory complaints
Depression Measure: Comprehensive Psychopathological Rating Scale
Sample: Community dwelling elderly not assessed for depression diagnosis

Summary:

Weighted M:	.34
Weighted SD:	.02

Table 9

Memory Complaints and Dementia

Author(s)	Demented			Control				
	n	M	SD	n	M	SD	N	r
1. Kahn, Zarit, Hilbert, & Niederehe (1975)								
#1A							66	.07
#1B							66	-.08
#1C							66	.19
#1D							66	.03
#2A							66	-.20
#2B							66	-.32
#2C							66	.03
#2D							66	-.15
Complaint Measure:	Severity of memory problems: recent personal (A), recent general (B), remote personal (C), remote general (D)							
Dementia Measures:	Face-Hand Test (#1); Mental Status Questionnaire (#2)							
Dementia Sample:	Inpatient/Outpatient elderly diagnosed with altered brain function based on the Face-Hands (n = 38) and the Mental Status Questionnaire (n = 28)							
2. Niederehe & Yoder (1989)								
	10	30.09	9.17	22	24.77	5.73	32	.40
Complaint Measure:	Metamemory Questionnaire: Concerns Subscale							
Dementia Measures:	Mental Status Questionnaire; Face-Hand Test							
Dementia Sample:	Outpatient/Community dwelling elderly diagnosed with dementia							
3. McGlone, Gupta, Humphrey, Oppenheimer, Mirsen, & Evans (1990)								
	29	7.40	3.60	35	11.80	4.30	64	.49
Complaint Measure:	Memory Observation Questionnaire-SA							
Dementia Measures:	DSM-III diagnosis; NINCDS-ADRDA							
Dementia Sample:	Elderly patients diagnosed with dementia, Alzheimer's type							

Table 9 (cont'd)

4. O'Connor, Pollitt, Roth, Brook, & Reiss (1990)

#1	80	2.20	1.70	213	1.30	1.40	293	.32
#2	55	2.60	2.10	213	1.30	1.40	268	.46

Complaint Measure: Number of memory complaints
Dementia Measure: CAMDEX diagnosis
Dementia Sample: Outpatient elderly diagnosed with mild (#1) or moderate dementia (#2).

5. Feehan, Knight, & Partridge (1991)

	10	20.00	9.29	10	29.30	10.34	20	-.44

Complaint Measure: Cognitive Failures Questionnaire
Dementia Measures: DSM-III diagnosis; Hachinski Ischemic Scale; Mini Mental State Examination
Dementia Sample: Inpatient elderly diagnosed with dementia, Alzheimer's type

6. Grut, Jorm, Fratiglioni, Forsell, Viitanen, & Winblad (1993)

							178	-.30

Complaint Measure: Presence of memory complaints
Dementia Measures: DSM-III-R diagnosis, Clinical Dementia Rating Scale, Mini Mental State Examination
Dementia Sample: Community dwelling elderly diagnosed with dementia

Summary:

Weighted M:	.17
Weighted SD:	.09

Table 10

Memory Complaints and Depression/Pseudodementia

Author(s)	Depressed/Pseudodem.			Control				
	n	M	SD	n	M	SD	N	r
1. O'Boyle, Amadeo, & Self (1990)								
							11	.81
Complaint Measure:	Cognitive Complaints Inventory							
Dementia Measure:	Mini Mental State Examination							
Depression Measure:	DSM-III diagnosis; Beck Depression Inventory							
Sample:	Inpatient elderly diagnosed with major depression and also displaying reversible dementia							

Table 11

Complaints versus Performance: Demented Samples

Author(s)		N	r
1. Kahn, Zarit, Hilbert, & Niederehe (1975)			
		48	.06
Complaint Measure:	Severity of memory problems		
Memory Measure:	Babcock Story Recall		
Dementia Measure:	Face-Hand Test; Mental Status Questionnaire		
Sample:	Inpatient/Outpatient elderly diagnosed with altered brain function		
2. O'Connor, Pollitt, Roth, Brook, & Reiss (1990)			
#1		80	.29
#2		55	.27
Complaint Measure:	Number of memory complaints		
Memory Measure:	Cambridge Mental Disorders of the Elderly Examination (CAMDEX), sum of 7 verbal and visual memory tests		
Dementia Measure:	CAMDEX diagnosis		
Sample:	Elderly medical patients diagnosed with mild or moderate dementia		
Summary:			
	Weighted M:		.22
	Weighted SD:		.01

Table 12

Complaints versus Performance: Depressed Samples

Author(s)		N	r
1. Kahn, Zarit, Hilbert, & Niederehe (1975)		105	-.01
Complaint Measure:	Severity of memory problems		
Memory Measure:	Babcock Story Recall		
Depression Measure:	Adjective Mood Checklist; Hamilton Depression Rating Scale		
Sample:	Inpatient/Outpatient elderly with mild to moderate depression		
2. O'Connor, Pollitt, Roth, Brook, & Reiss (1990)		36	.01
Complaint Measure:	Number of memory complaints		
Memory Measure:	Cambridge Mental Disorders of the Elderly Examination (CAMDEX)		
Depression Measure:	DSM-III-R diagnosis		
Sample:	Elderly medical patients diagnosed depressed		
Summary:			
	Weighted M:		.00
	Weighted SD:		.00

Table 13

Complaints versus Performance: Healthy Elderly Samples

Author(s)		N	r
1. Zarit (1982)			
#1		79	.40
#2		79	.31
Complaint Measure:	Total memory problems		
Memory Measure:	15-item word list, total recall score, 1 trial (#1); 15-item shopping list, total recall score, 1 trial (#2)		
Sample:	Community dwelling elderly not assessed for any diagnoses		
2. Sunderland, Watts, Baddeley, & Harris (1986)			
#1		60	.26
#2		60	.37
Complaint Measure:	Frequency of memory problems from Sunderland's Memory Questionnaire (#1); Sunderland's Memory Questionnaire (#2)		
Memory Measure:	Paragraph recall		
Sample:	Community dwelling elderly not assessed for any diagnoses		
3. O'Connor, Pollitt, Roth, Brook, & Reiss (1990)			
		213	.05
Complaint Measure:	Number of memory complaints		
Memory Measure:	Cambridge Mental Disorders of the Elderly Examination (CAMDEX)		
Dementia Measure:	CAMDEX		
Depression Measure:	DSM-III-R		
Sample:	Elderly medical patients not meeting dementia or depression diagnosis		

Table 13 (cont'd)

4. Zelinski, Gilewski, & Anthony-Bergstone (1990)

#1		198	.13
#2		198	.23
Complaint Measure:	Memory Functioning Questionnaire: Frequency of Forgetting		
Memory Measure:	Paragraph recall (#1); 20-item word list, total recall score, 1 trial		
Sample:	Community dwelling elderly not assessed for any diagnoses		

5. Taylor, Miller, & Tinklenberg (1992)

#1		43	.10
#2		43	.25
#3		43	.17
Complaint Measure:	Memory Functioning Questionnaire		
Memory Measure:	12-item Selective Reminding Test, total recall score for trial 1 (#1), trial 2 (#2), and trial 3 (#3)		
Dementia Measure:	Mini Mental State Examination		
Depression Measure:	Hamilton Depression Rating Scale		
Sample:	Community dwelling elderly not meeting dementia or depression diagnosis.		

6. Gannon (1994)

		45	.21
Complaint Measure:	Summed z-score of presence and frequency of memory complaints		
Memory Measure:	Summed z-score of 12-item Selective Reminding Test, total recall score, 6 trials and Logical Memory Form I averaged over 3 assessment periods		
Sample:	Community dwelling elderly not assessed for any diagnoses		

Summary:

Weighted M:	.20
Weighted SD:	.01

Table 14

Complaints versus Performance: Depressed and Healthy Elderly Samples

Author(s)	N	r
1. O'Hara, Hinrichs, Wallace, Lemke, & Kohout (1986)		
#1	77	.21
#2	77	.03
#3	77	.07
Complaint Measure:	Memory compared to others their age (#1); Memory compared to when young adult (#2); Frequency of memory problems (#3)	
Memory Measure:	20-item word list, total recall score, 1 trial	
Depression Measure:	RDC diagnosis; SADS-L; CES-D	
Sample:	Community dwelling elderly diagnosed depressed (n = 26), elevated depressive symptoms not meeting criteria for depression (n = 25), and healthy controls (n = 26).	
Summary:		
Weighted M:		.10
Weighted SD:		.01

Table 15

Complaints versus Performance: Demented, Depressed, and Healthy Elderly Samples

Author(s)		N	r
1. Derouesne, Alperovitch, Arvay, Migeon, Moulin, Vollant, Rapin, & Le Poncin (1989)		367	.08
Complaint Measure:	Severity of memory complaints		
Memory Measure:	Global Memory Score of 8 verbal and visual tests		
Dementia Measure:	Below 2 SD on Profil de rendement; Visual Retention Test		
Depression Measure:	Zung Depression Scale; Zung Anxiety Scale; Well Being Questionnaire		
Sample:	Community dwelling elderly diagnosed with organic brain dysfunction (n = 23), psychoaffective brain dysfunction (n = 63), healthy controls (n = 269), and organic/ psychoaffective brain dysfunction (n = 12)		
2. Niederehe & Yoder (1989)			
#1		54	.22
#2		54	-.20
Complaint Measure:	Metamemory Questionnaire: Concerns Subscale		
Memory Measure:	40-item word list, total recall score, 1 trial (#1); paragraph recall (#2)		
Dementia Measure:	Mental Status Questionnaire; Face-Hand Test		
Depression Measure:	RDC diagnosis; SADS-L; Hamilton Depression Rating Scale		
Sample:	Outpatient/Community dwelling elderly diagnosed demented (n = 10), depressed (n = 24), or healthy controls (n = 22)		
Summary:			
	Weighted M:		-.11
	Weighted SD:		.00

Table 16

Differentiation of Short- and Long-Term Memory

	Subject 1						Subject 2					
	Trial						Trial					
	1	2	3	4	5	6	1	2	3	4	5	6
Word												
1	x		x		x		x				x	x
2		x	x						x			
3	x		x			x	x	x			x	x
4			x	x						x	x	
5		x		x		x		x			x	x
6		x	x							x		
7	x			x		x	x		x		x	x
8			x	x				x	x			
9	x			x		x	x				x	x
10		x	x						x	x		
11		x		x		x				x	x	x
12			x	x				x	x			
SUM:			30					30				
STM:			18					07				
LTM			27					34				
RLTR:			12					10				
CLTR:			00					13				

Table 17

Hypotheses 95% Confidence Intervals

	Worst Case	Best Case
Hypothesis #1:		
Memory complaints and somatic depression	.22	.50
Memory complaints and cogntive depression	.19	.44
Hypothesis #2 & 3:		
Memory complaints and depressed mood	.11	.39
Memory complaints and diminished interests	.29	.56
Memory complaints and weight/appetite changes	-.14	.21
Memory complaints and sleep problems	.27	.56
Memory complaints and fatigue	.20	.49
Memory complaints and worthlessness/guilt	.06	.35
Memory complaints and decreased concen./indec.	.58	.82
Memory complaints and death/suicide	.04	.33
Hypothesis 4:		
DEP and LTS	-.35	-.06
DEP and CR	-.33	-.07
Hypothesis 5:		
Memory complaints and CR	-.16	.11
Memory complaints and RLTR	-.03	.28
Memory complaints and total recall	-.10	.18
Hypothesis 6:		
Memory complaints and DEP	.23	.51

APPENDIX C

APPENDIX C

Rule of Combinations

This rule states that the number of possible choices of "r" objects from a group of "N" distinct objects is denoted by (N/r). Given that the Selective Reminding Test (i.e., SRT) contains six trials, each word can be recalled from zero to six times. The number of possible choices for zero through 6 successful recall attempts is given immediately below with their breakdown across trials.

If a word is recalled all six times across six trials, the number of possible combinations is given by 6x5x4x3x2x1/6x5x4x3x2x1. This equals one possible combination (i.e., event).

	Trial										
	1	2	3	4	5	6	SUM	STM	LTM	CLTR	RLTR
Event 1	x	x	x	x	x	x	6	0	6	6	0

If a word is recalled five times across six trials, the number of possible combinations is given by 6x5x4x3x2/5x4x3x2x1. This equals six possible events.

	Trial										
	1	2	3	4	5	6	SUM	STM	LTM	CLTR	RLTR
Event 1	x	x	x	x	x		5	0	6	0	5
Event 2	x	x	x	x		x	5	0	6	0	5
Event 3	x	x	x		x	x	5	0	6	2	3
Event 4	x	x		x	x	x	5	0	6	3	2
Event 5	x		x	x	x	x	5	1	4	4	0
Event 6		x	x	x	x	x	5	0	5	5	0

If a word is recalled four times across six trials, the number of possible combinations is given by 6x5x4x3/4x3x2x1. This equals 15 possible events.

	Trial										
	1	2	3	4	5	6	SUM	STM	LTM	CLTR	RLTR
Event 1	x	x	x	x			4	0	6	0	4
Event 2		x	x	x	x		4	0	5	0	4
Event 3			x	x	x	x	4	0	4	4	0
Event 4	x	x	x		x		4	0	6	0	4
Event 5	x	x	x			x	4	0	6	0	4
Event 6		x	x	x		x	4	0	5	0	4
Event 7	x		x	x	x		4	1	4	0	3
Event 8	x			x	x	x	4	1	3	3	0
Event 9		x		x	x	x	4	1	3	3	0
Event 10	x	x		x	x		4	0	6	0	4
Event 11	x	x			x	x	4	0	6	2	2
Event 12		x	x		x	x	4	0	5	2	2
Event 13	x	x		x		x	4	0	6	0	4
Event 14	x		x	x		x	4	1	4	0	3
Event 15	x		x		x	x	4	2	2	2	0

If a word is recalled three times across six trials, the number of possible combinations is given by 6x5x4/3x2x1. This equals 20 possible events.

	Trial										
	1	2	3	4	5	6	SUM	STM	LTM	CLTR	RLTR
Event 1	x	x	x				3	0	6	0	3
Event 2		x	x	x			3	0	5	0	3
Event 3			x	x	x		3	0	4	0	3
Event 4				x	x	x	3	0	3	3	0
Event 5	x	x		x			3	0	6	0	3
Event 6	x	x			x		3	0	6	0	3
Event 7	x	x				x	3	0	6	0	3
Event 8		x	x		x		3	0	5	0	3
Event 9		x	x			x	3	0	5	0	3
Event 10			x	x		x	3	0	4	0	3
Event 11	x		x	x			3	1	4	0	2
Event 12	x		x		x		3	3	0	0	0
Event 13	x		x			x	3	3	0	0	0
Event 14	x			x		x	3	3	0	0	0
Event 15	x			x	x		3	1	3	0	2
Event 16		x		x	x		3	1	3	0	2
Event 17	x				x	x	3	1	2	2	0
Event 18		x			x	x	3	1	2	2	0
Event 19			x		x	x	3	1	2	2	0
Event 20		x		x		x	3	3	0	0	0

If a word is recalled two times across six trials, the number of possible combinations is given by 6x5/2x1. This equals 15 possible events.

	Trial										
	1	2	3	4	5	6	SUM	STM	LTM	CLTR	RLTR
Event 1	x	x					2	0	6	0	2
Event 2	x		x				2	2	0	0	0
Event 3	x			x			2	2	0	0	0
Event 4	x				x		2	2	0	0	0
Event 5	x					x	2	2	0	0	0
Event 6		x	x				2	0	5	0	2
Event 7		x		x			2	2	0	0	0
Event 8		x			x		2	2	0	0	0
Event 9		x				x	2	2	0	0	0
Event 10			x	x			2	0	4	0	2
Event 11			x		x		2	2	0	0	0
Event 12			x			x	2	2	0	0	0
Event 13				x	x		2	0	3	0	2
Event 14				x		x	2	2	0	0	0
Event 15					x	x	2	0	2	2	0

If a word is recalled one time across six trials, the number of possible combinations is given by 6/1. This equals six possible events.

	Trial										
	1	2	3	4	5	6	SUM	STM	LTM	CLTR	RLTR
Event 1	x						1	1	0	0	0
Event 2		x					1	1	0	0	0
Event 3			x				1	1	0	0	0
Event 4				x			1	1	0	0	0
Event 5					x		1	1	0	0	0
Event 6						x	1	1	0	0	0

If a word is recalled zero times across six trials, the number of possible combinations is given by 0/0. This equals one possible event.

	Trial										
	1	2	3	4	5	6	SUM	STM	LTM	CLTR	RLTR
Event 1							0	0	0	0	0

APPENDIX D

APPENDIX D

SRT Word List

Shine	Grass
Disagree	Moon
Fat	Prepare
Wealthy	Prize
Drunk	Duck
Pin	Leaf

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