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Outcomes of Subsyndromal Depression in Older Primary Care Patients

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Abstract

Objectives—Most older persons in primary care suffering clinically significant depressive symptoms do not meet criteria for major or minor depression. We tested the hypothesis that patients with subsyndromal depression (SSD) would have poorer psychiatric, medical, and functional outcomes at follow-up than non-depressed patients, but not as poor as those with minor or major depression. We also explored the relative outcomes of three definitions of SSD to determine their relative prognostic value.

Design—Prospective observational cohort study.

Setting—Primary care practices in Monroe County, NY.

Participants—481 primary care patients age ≥65 years who completed research assessments at intake and at least one year of follow-up evaluation.

Measurements—Depression diagnoses and three definitions of SSD were determined by the Structured Clinical Interview for DSM-IV and the 24-item Hamilton Depression Rating Scale. Other validated measures assessed anxiety, cognition, medical burden, and functional status.

Results—Patients with SSD had poorer 1-year lagged outcomes than non-depressed subjects in terms of psychiatric symptoms and functional status, often not significantly different than major or minor depression. Two of the SSD definitions identified subjects with poorer psychiatric and functional outcomes than the third SSD definition.

Conclusions—Clinicians should be vigilant in caring for patients with SSD, monitoring for persistent or worsening depressive symptoms including suicidality, anxiety, cognitive impairment, and functional decline. Researchers may use particular SSD definitions to identify individuals at higher risk of poor outcomes, to better understand the relationships of SSD to functional disability and to test innovative preventive and therapeutic interventions.

Keywords

depression; geriatrics; primary care

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Objective

Depression in later life is a major public health concern (1). Major depression has a point prevalence of 5-10% in older primary care patients (1-4), with considerable comorbidity, impact on functional status (5), and risk for suicide (6). Because older depressed patients rarely present to mental health specialists but most do receive primary care, primary care settings are crucial venues for case identification and initiation of needed treatments (7).

Major depression, however, is only part of the picture in primary care patients with depressive symptoms, as less severe depressive conditions have even greater cumulative associated morbidity (8). Minor depression has been operationally defined by criteria in the appendix to DSM-IV that require the patient to have only 2-4 symptoms rather than the five or more of major depression. Compared to major depression, minor depression has a similar point prevalence (~5%) and nearly as great an impact on functional status (2).

Yet an even larger number of older persons suffer clinically significant depressive symptoms that do not meet criteria for major or minor depressive disorders, with a point prevalence of at least 10% (9,10). Collectively such so-called subsyndromal depressions (SSD) have substantial symptomatic and functional impairment, part of a continuum with major depression (11). Our group found that three different definitions of SSD were each associated cross-sectionally with greater symptoms and functional impairment compared with non-depressed subjects, at times approaching the severities found in minor and major depression (12). However, while there is evidence that subsyndromal symptoms pose an elevated risk for first-onset or recurrence of major depression (13,14), to our knowledge no longitudinal studies have compared the relative predictive utility of these alternative definitions of SSD. Identification of the SSD definition that best predicts outcome would allow clinicians to target preventive interventions for those at highest risk (15), recognizing that SSD outcomes are not universally poor (16,17).

Given this context, we conducted an observational follow-up study of a well-characterized cohort of older primary care patients. We hypothesized that patients with SSD would have poorer psychopathological, medical, and functional outcomes at follow-up than non-depressed patients, but not as poor as those with minor or major depression. We also sought to explore the relative outcomes of three definitions of SSD to determine their relative prognostic value.

Methods

Procedures and Subjects

The methods of this study have been described previously (18). Briefly, we attempted to enroll all patients age 65 years or older who presented for care at primary care offices on select days. Sites for enrollment included internal medicine and family medicine private practices and hospital-based clinic settings. Patients gave written consent to participate in the study, using procedures approved by the University of Rochester Research Subjects Review Board (RSRB). Consenting subjects underwent in-person intake interviews by a trained rater in their homes or UR research offices. These interviews were completed with 745 (50.1%) out of 1487 patients approached, a completion rate consistent with previous work using intensive, rigorous assessment methodologies in primary care settings (5); based on available data, enrolled subjects did not significantly differ from non-enrolled patients in age, gender, or 15-item Geriatric Depression Scale score (19). Similar in-person follow-up interviews with all study measures were completed annually for up to four years during the study period (2001-2006), as study intakes were staggered across the first four years of the study; the Ns for each annual follow-up year are shown in Table 1.

Measures

Subjects underwent evaluations including the Structured Clinical Interview for DSM-IV (SCID), a validated and widely used method for establishing psychiatric diagnoses in research contexts (20), and the 24-item version of the Hamilton Rating Scale for Depression (Ham-D), assessing depressive symptom severity (21). The SCID and the Ham-D were completed based on the interview and primary care chart review, with the follow-up interviews also informed by an interim telephone interview six months after the previous in-person assessment. Inter-rater reliability was high, e.g., an intraclass correlation coefficient of 0.93 for the Ham-D (based on six raters and five subjects), and Kappa coefficients for the diagnoses of major and minor depression ranging from 0.66 to 0.86 ($p = 0.0003$, based on six raters and three subjects).

Depression diagnoses based on SCID criteria were assigned at a consensus conference of study investigators and raters. The first two groups were defined as Major Depression – meeting full criteria for current major depressive disorder, and Minor Depression – meeting full criteria for current minor depressive disorder (and not meeting criteria for major depression), as defined in the DSM-IV appendix. All remaining patients were subdivided into SSD or nondepressed groups according to three definitions of SSD, as per prior cross-sectional work in this cohort (12). Note that each definition of SSD altered the compositions of both the SSD and nondepressed groups. It should be noted that the one subject meeting SCID criteria for a primary diagnosis of dysthymic disorder was grouped with the appropriate SSD depression diagnosis group. Recent bereavement was not an exclusion criterion for SSD, but also was uncommon in this cohort. Some subjects with SSD might be diagnosed by clinicians as having an adjustment disorder, but we did not attempt to ascertain this diagnosis; the DSM-IV criteria for adjustment disorder are intentionally vague and flexible, making the category practical for use by clinicians (22) but poorly operationalized for research purposes.

SSD-A

The SSD-A group consisted of patients who scored greater than 10 on the Ham-D. The cutoff of 10 was chosen because of its use in defining remission in clinical trials involving older patients.

SSD-B

Patients with any two depressive symptoms at the SCID threshold level were placed in the SSD-B group. This method was used by Judd and colleagues (23) to describe SSDs in the course of diagnosable depressive disorders in younger and mixed-age adults.

SSD-C

Patients were included in this group if they had two symptoms of depression at either SCID threshold or subthreshold levels, with at least one symptom being depressed mood or decreased interests/pleasure.

Depression diagnosis group was used as a time-varying predictor variable, with yearly outcomes including both one-year lagged depression diagnosis group and one-year lagged Ham-D score. Other outcome domains included one-year lagged suicidal ideation (using the single item from the Ham-D) and anxiety (assessed both by the Ham-D psychic anxiety item and the Snaith Clinical Anxiety Scale [CAS] (24)). These outcome domains were chosen based on their clinical relevance and attention paid in prior longitudinal studies (25,26)

Other outcomes of interest included the following. Medical illness burden was measured by the Cumulative Illness Rating Scale (CIRS) (27), a validated measure of the severity of pathology in each organ system, completed by a physician-investigator (JML). Overall functional status was assessed by the Instrumental Activities of Daily Living (IADL) and

Physical Self-Maintenance Scales (PSMS) (28); the former assesses higher-order activities such as shopping and cooking, while the latter measures more basic self-care tasks such as feeding and grooming. Psychiatric functioning was rated on the Global Assessment of Functioning (GAF) from DSM-IV, while impairments in functioning due to physical disorders were rated on the Karnofsky Performance Status Scale (KPSS) (29). Cognitive assessments included the Mini-Mental State Exam (MMSE) (30), assessing overall cognitive status, and selected components of executive functioning using the initiation-perseveration subscale of the Mattis Dementia Rating Scale (Mattis-IP) (31) and Trail Making Tests A and B (32), the latter examining both separate scores and the difference between Trails B and Trails A time ("Δ Trails"), which may be a more specific indicator of set shifting abilities.

Analyses

We examined 1-year lagged outcomes, providing more accurate findings by averaging the predictive power of the independent variables across multiple 1-year follow-up periods. Analyses of 1-year lagged associations were based on generalized estimating equations using the GENMOD procedure in SAS (SAS Institute, Cary, NC, v9.1). We chose this approach over generalized linear mixed-effects model to increase robustness in inference, since the latter requires distributional models that may not fit the data in this study. For each outcome measure, analyses examined whether SSD predicted worse outcomes compared to the non-depressed group. Analyses were repeated for each of the three definitions of SSD to see whether the different definitions predicted unique outcomes. Analyses covaried demographics (age, gender, education) and baseline values of the outcome variable in each regression model.

Results

Of the 745 subjects initially enrolled, 472 were female (63.3%); 684 were white (91.8%), 44 African American (5.9%), and 17 from other racial or ethnic groups (2.3%). Of the whole group, 41 (5.5%) had major depression, 52 (6.9%) minor depression, and 146 (19.6%) had SSD-A. Using the alternative SSD definitions, 113 (15.2%) had SSD-B and 206 (27.7%) had SSD-C. Overall, 280 (37.6%) met criteria for at least one SSD diagnosis, leaving 372 (49.9%) who were non-depressed by all SSD definitions. Other descriptive data are presented in Table 1. Attrition during follow-up was relatively low; 630 (84.6%) remained in the study at the time the study closed in 2006, 38 (5.1%) had died, and 77 (10.3%) had withdrawn or been lost to follow-up. Compared with subjects remaining in the study, patients who withdrew did not differ at intake in age, gender, education, depression diagnosis, Ham-D score, or CIRS score.

Table 2 presents results from the series of regression analyses predicting 1-year lagged outcomes for each of the clinical variables of interest, with depression diagnoses as time-varying predictor variables. The table shows the overall regression for each depression diagnosis scheme (i.e., using SSD-A, SSD-B, and SSD-C, respectively), along with descriptors of rank order for Major Depression, Minor Depression, SSD, and Non-depressed subgroups (based on pair-wise comparisons not presented in the table). For example, the first table cell shows that depression diagnosis (using SSD-A) significantly predicted 1-year lagged depression diagnosis with a p-value < 0.0001; Major Depression predicted a higher likelihood of being depressed at follow-up than did the Minor Depression and SSD-A subgroups, each of which were not significantly different than the other at predicting 1-year lagged depression diagnosis but were significantly more likely to be depressed at 1-year than the Non-depressed subgroup. While each SSD definition differed from the Non-depressed subgroup in predicting many of the clinical outcome variables, interestingly, baseline SSD-A did not significantly predict 1-year lagged Ham-D score, despite SSD-A being defined by a Ham-D score cut-off.

Table 3 shows analyses of paired comparisons between each of the three SSD definitions. The SSD-A and SSD-B definitions identified patients with poorer outcomes than SSD-C, including

greater psychiatric symptoms (depressive, anxiety, and cognitive) and lower functional status. The outcomes of SSD-A and SSD-B did not differ from each other except for greater total Ham-D score and Ham-D psychic anxiety in the SSD-A group. (See Figure, Supplemental Digital Content 1, which shows 1-year lagged predicted scores for Ham-D, MMSE, IADL, and PSMS for each SSD group in the paired comparisons, http://links.lww.com/AJGP/A3.)

Conclusions

Our findings confirmed a key aspect of our hypothesis: Patients with SSD had poorer outcomes than non-depressed subjects in terms of psychiatric symptoms and functional status. In many cases the SSD outcomes were not significantly different from the outcomes of minor and even major depression, e.g., with regard to one-year lagged overall depressive symptom severity, suicidal ideation, psychic anxiety, cognition, and medical burden. These results build on prior work regarding the clinical significance of SSD by demonstrating that poorer outcomes include symptoms of anxiety, suicidal ideation, and cognitive functioning, as well as overall depressive symptom severity and functional status. Also, our work is the first to our knowledge to explore differences in outcome of three definitions of SSD. Specifically, SSD-A and SSD-B identified subjects with poorer psychiatric and functional outcomes than SSD-C.

Of interest, SSD was associated with poorer outcomes in the basic self-care tasks assessed by the PSMS, but not the IADL's higher-order activities that clinical experience suggests might be the earlier and more prominent ‘casualties’ of depressive disorders. It is not clear how to understand this finding. One might wonder whether SSD captured symptoms of medical illnesses rather than depression per se, but SSD was not associated with outcomes of medical burden (CIRS) or physical disability (KPSS). Future work should examine the association of SSD with more specific functional outcomes, assessed by multiple methods including performance-based measures (33), to better understand the complex relationships among SSD, medical illnesses, and functional status.

Prior work in this cohort demonstrated varying weekly depressive symptom trajectories for patients with symptom severity at study intake in the SSD to minor depression range: some such patients improved, some worsened, and some remained at the same symptom level over 2-year follow-up (16). The weekly trajectory methodology used in the prior analyses corresponded most closely to the SSD-C definition in the present analyses. However, the outcomes of the SSD-A and SSD-B groups in this study also were heterogeneous. While future research might usefully examine fluctuations in phenomenology over time, it would seem unlikely that broad SSD group definitions will usefully distinguish different outcome trajectories.

The findings regarding cognition merit comment, in light of prior work in this cohort demonstrated that major and minor depression were associated with poorer outcome in Trails B and Δ Trails time (albeit not in the other cognitive measures) (34). In this study, SSD-A in particular was worse than non-depressed and generally similar to major and minor depression in regard to several cognitive outcomes. SSD-A also appeared to predict poorer outcomes in other outcome domains as compared to SSD-C and, to a lesser extent, SSD-B. Thus the SSD-A definition identified a subgroup with an overall worse prognosis, rather than a specific association with cognitive decline.

Our study limitations must be acknowledged. The sample was predominantly white and relatively ‘young-old;’ findings may not generalize to other populations. While the use of 1-year lagged analyses improved power and accuracy, the findings might differ over longer periods of follow-up. And our explorations of the relative outcomes of three SSD definitions were limited by the use of overlapping subjects drawn from the same study population.

Still, our data strongly suggest that clinicians should be vigilant in caring for patients with depressive symptoms that fail to meet diagnostic criteria for major or minor depression, monitoring for persistent or worsening depressive symptoms including suicidality, anxiety, cognitive impairment, and functional decline. Researchers studying SSD can identify at-risk subjects using any of the three SSD definitions employed here, albeit recognizing that some definitions may capture patients with poorer outcomes than others. In addition to observational studies, research must test innovative interventions, whether framed as treatments for SSD or as preventive interventions to reduce the development of major and minor depression, suicidality, or functional disability over time. Such approaches likely will need to include psychosocial as well as pharmacological components (35), and ultimately will prove crucial to reducing the public health burden of depression in later life (36).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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References

1. Charney DS, Reynolds CF III, Lewis L, et al. Depression and Bipolar Support Alliance consensus statement on the unmet needs in diagnosis and treatment of mood disorders in late life. Arch Gen Psychiatry 2003;60:664–672. [PubMed: 12860770]
2. Lyness JM, Caine ED, King DA, et al. Psychiatric disorders in older primary care patients. J Gen Intern Med 1999;14:249–254. [PubMed: 10203638]
3. Borson S, Barnes RA, Kukull WA, et al. Symptomatic depression in elderly medical outpatients. I. Prevalence, demography, and health service utilization. J Am Geriatr Soc 1986;34:341–347. [PubMed: 3958408]
4. Weyerer S, Eifflaender-Gorfer S, Kohler L, et al. Prevalence and risk factors for depression in non-demented primary care attenders aged 75 years and older. J Affect Disord 2008;111:153–163. [PubMed: 18372049]
5. Schulberg HC, Mulsant B, Schulz R, et al. Characteristics and course of major depression in older primary care patients. Int J Psychiatry Med 1998;28:421–436. [PubMed: 10207741]
6. Conwell, Y. Suicide, in Late-Life Depression. Roose, SP.; Sackeim, HA., editors. Oxford: Oxford University Press; 2004. p. 95-106.
7. Gallo JJ, Coyne JC. The challenge of depression in late life: bridging science and service in primary care. JAMA 2000;284:1570–1572. [PubMed: 11000654]
8. Lavretsky H, Kumar A. Clinically significant non-major depression: old concepts, new insights. Am J Geriatr Psychiatry 2002;10:239–255. [PubMed: 11994211]
9. Chopra MP, Zubritsky C, Knott K, et al. Importance of subsyndromal symptoms of depression in elderly patients. Am J Geriatr Psychiatry 2005;13:597–606. [PubMed: 16009736]
10. Lyness JM, King DA, Cox C, et al. The importance of subsyndromal depression in older primary care patients: prevalence and associated functional disability. J Am Geriatr Soc 1999;47:647–652. [PubMed: 10366161]

11. Kessler RC, Zhao S, Blazer DG, et al. Prevalence, correlates, and course of minor depression and major depression in the national comorbidity survey. J Affect Disord 1997;45:19–30. [PubMed: 9268772]
12. Lyness JM, Kim J, Tang W, et al. The clinical significance of subsyndromal depression in older primary care patients. Am J Geriatr Psychiatry 2007;15:214–223. [PubMed: 17213374]
13. Lyness JM, Heo M, Datto CJ, et al. Outcomes of minor and subsyndromal depression among elderly patients in primary care settings. Ann Intern Med 2006;144:496–504. [PubMed: 16585663]
14. Lyness JM, Chapman BP, McGriff J, et al. One-year outcomes of minor and subsyndromal depression in older primary care patients. Int Psychogeriatr 2009;21:60–68. [PubMed: 18786280]
15. Schoevers RA, Smit F, Deeg DJ, et al. Prevention of late-life depression in primary care: do we know where to begin? Am J Psychiatry 2006;163:1611–1621. [PubMed: 16946188]
16. Cui X, Lyness JM, Tang W, et al. Outcomes and predictors of late-life depression trajectories in older primary care patients. Am J Geriatr Psychiatry 2008;16:406–415. [PubMed: 18448851]
17. Andreescu C, Chang CC, Mulsant BH, et al. Twelve-year depressive symptom trajectories and their predictors in a community sample of older adults. Int Psychogeriatr 2008;20:221–236. [PubMed: 18234145]
18. Seaburn D, Lyness JM, Eberly S, et al. Depression, perceived family criticism, and functional status among older, primary-care patients. Am J Geriatr Psychiatry 2005;13:766. [PubMed: 16166405]
19. Sheikh JI, Yesavage JA. Geriatric Depression Scale (GDS): recent evidence and development of a shorter version. Clin Gerontol 1986;5:165–173.
20. Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview For Axis I DSM-IV Disorders. Biometrics Research Department, New York State Psychiatric Institute; 1994.
21. Williams JBW. A structured interview guide for the Hamilton depression rating scale. Arch Gen Psychiatry 1988;45:742–747. [PubMed: 3395203]
22. Strain, JJ.; Wolf, D.; Newcom, J., et al. Adjustment disorder, in DSM-IV Sourcebook. Widiger, TA.; Frances, AJ.; Pincus, HA., et al., editors. Vol. 2. Washington, D.C.: American Psychiatric Press; 1996.
23. Judd LL, Akiskal HS, Paulus MP. The role and clinical significance of subsyndromal depressive symptoms (SSD) in unipolar major depressive disorder. J Affect Disord 1997;45:5–17. [PubMed: 9268771]
24. Snaith RP, Baugh SJ, Clayden AD, et al. The Clinical Anxiety Scale: A scale derived from the Hamilton Anxiety Scale. Br J Psychiatry 1982;141:518–523. [PubMed: 7150890]
25. Dombrovski AY, Mulsant BH, Houck PR, et al. Residual symptoms and recurrence during maintenance treatment of late-life depression. J Affect Disord 2007;103:77–82. [PubMed: 17321595]
26. Bruce ML, Ten Have TR, Reynolds CF III, et al. Reducing suicidal ideation and depressive symptoms in depressed older primary care patients: a randomized controlled trial. JAMA 2004;291:1081–1091. [PubMed: 14996777]
27. Linn BS, Linn MW, Gurel L. Cumulative illness rating scale. J Am Geriatr Soc 1968;16:622–626. [PubMed: 5646906]
28. Lawton MP, Brody EM. Assessment of older people. Self-maintaining and instrumental activities of daily living. Gerontologist 1969;9:179–186. [PubMed: 5349366]
29. Karnofsky, DA.; Burchenal, JH. The clinical evaluation of chemotherapeutic agents in cancer, in Evaluation of Chemotherapeutic Agents. MacLeod, CM., editor. New York, Columbia: 1949.
30. Folstein MF, Folstein SE, McHugh PR. “Mini-mental state”. A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 1975;12:189–198. [PubMed: 1202204]
31. Mattis, S. Dementia Rating Scale. Odessa, FL: Psychological Assessment Resources; 1989.
32. Reitan, RM.; Davison, LA. Clinical Neuropsychology: Current Status And Applications. New York: John Wiley & Sons; 1974.
33. Bruce ML. Depression and disability in late life: directions for future research. Am J Geriatr Psychiatry 2001;9:102–112. [PubMed: 11316615]
34. Cui X, Lyness JM, Tu X, et al. Does depression precede or follow executive dysfunction? Outcomes in older primary care patients. Am J Psychiatry 2007;164:1221–1228. [PubMed: 17671285]

35. Pinquart M, Duberstein PR, Lyness JM. Treatments for later-life depressive conditions: a meta-analytic comparison of pharmacotherapy and psychotherapy. Am J Psychiatry 2006;163:1493–1501. [PubMed: 16946172]

36. Smits F, Smits N, Schoevers R, et al. An epidemiological approach to depression prevention in old age. Am J Geriatr Psychiatry 2008;16:444–453. [PubMed: 18515688]

Table 1

Descriptive Data

	N at intake	Intake Mean (SD) Range	N at 1 year Mean (SD) Range	N at 2 years Mean (SD) Range	N at 3 years Mean (SD) Range	N at 4 years Mean (SD) Range
Age	745	75.1 (6.86) 65 – 97				
Education (years)	744	14.1 (4.10) 0 – 17				
Hamilton Depression Rating Scale (total)	745	8.83 (6.13) 0 – 35	481 9.23 (6.31) 0 – 33	394 8.68 (5.76) 0 – 31	308 8.73 (6.14) 0 – 29	67 9.67 (5.61) 1 – 25
Ham-D psychic anxiety item	745	0.102 (0.415) 0 – 3	481 0.0993 (0.374) 0 – 2	395 0.709 (0.302) 0 – 2	310 0.742 (0.297) 0 – 2	67 0.0299 (0.171) 0 – 1
Ham-D suicidal ideation item	745	0.526 (0.853) 0 – 4	481 0.497 (0.788) 0 – 4	394 0.426 (0.714) 0 – 4	310 0.461 (0.726) 0 – 3	67 0.433 (0.763) 0 – 3
Snaith anxiety scale	738	1.71 (2.18) 0 – 14	481 1.64 (2.17) 0 – 17	393 1.38 (193) 0 – 14	309 1.54 (2.10) 0 – 14	64 1.89 (2.20) 0 – 8
Mini-Mental State Exam	731	27.6 (2.53) 11 – 30	472 27.6 (2.54) 7 – 30	391 27.6 (2.69) 9 – 30	305 27.5 (3.32) 2 – 30	64 27.6 (2.69) 14 – 30
Trails A (seconds)	702	56.7 (28.1) 13 – 263	449 55.5 (29.1) 17 – 280	374 54.4 (28.2) 20 – 247	288 51.4 (25.4) 16 – 220	59 54.0 (28.9) 23 – 148
Trails B (seconds)	634	121 (56.9) 27 – 300	396 118 (51.7) 28 – 286	336 112 (49.9) 11 – 285	257 113 (47.4) 40 – 277	48 115 (58.0) 28 – 293
ΔTrails (seconds)	634	68.3 (46.5) -23 – 246	396 68.5 (43.3) -35 – 204	336 61.8 (41.0) -54 – 201	256 64.9 (39.1) 3 – 200	48 70.3 (54.6) -7 – 245
Mattis Dementia Rating – Initiation-Perseveration	714	35.0 (3.60) 10 – 37	469 34.6 (4.20) 5 – 37	373 35.0 (413) 5 – 37	290 35.1 (3.51) 13 – 37	56 34.5 (4.25) 20 – 37
Cumulative Illness Rating Scale	747	7.56 (3.05) 1 – 19	471 8.76 (3.18) 2 – 21	395 9.50 (3.15) 2 – 22	312 10.0 (3.31) 2 – 21	67 11.5 (3.03) 5 – 21
Instrumental Activities of Daily Living	744	2.10 (4.07) 0 – 22	469 2.49 (4.46) 0 – 23	374 2.61 (4.63) 0 – 24	309 2.63 (4.61) 0 – 24	67 3.46 (5.47) 0 – 21
Physical Self-Maintenance Scale	742	1.67 (2.34)	466	382	309	66

	N at intake	Intake Mean (SD) Range	N at 1 year Mean (SD) Range	N at 2 years Mean (SD) Range	N at 3 years Mean (SD) Range	N at 4 years Mean (SD) Range
		0 – 20	2.07 (2.62) 0 – 17	2.00 (264) 0 – 22	2.01 (2.54) 0 – 15	2.77 (2.77) 0 – 11
Mattis Dementia Rating – Initiation-Perseveration	714	35.0 (3.60) 10 – 37	469 34.6 (4.20) 5 – 37	373 35.0 (413) 5 – 37	290 35.1 (3.51) 13 – 37	56 34.5 (4.25) 20 – 37
Karnofsky Performance Status Score	748	78.1 (13.31) 25 – 95	482 75.8 (13.98) 19 – 94	397 75.8 (14.04) 18 – 91	313 75.8 (13.70) 31 – 91	67 72.0 (15.22) 37 – 89

N.B. – For the Mini-Mental State Exam and the Karnofsky Performance Status Score, lower scores denote poorer functioning. For all other measures, higher scores denote greater severity or impairment.

Table 2

Predicting 1-year Lagged Outcomes By Depression Diagnosis Groups (df = 3 for each analysis)

1-Year Lagged Outcome	Baseline Depression Diagnosis Using SSD-A	Baseline Depression Diagnosis Using SSD-B	Baseline Depression Diagnosis Using SSD-C
Depression Diagnosis	**χ^2=123.36, p<0.0001 Maj>Min=SSD>Non B: -3.55/-2.46/-2.11**	**χ^2=94.17, p<0.0001 Maj>Min=SSD>Non B: -3.56/-2.17/-2.10**	**χ^2=176.03, p<0.0001 Maj>Min>SSD>Non B: -4.12/-3.06/-2.14**
Hamilton Depression Rating Scale (total)	χ^2=3.36, p=0.3398 Maj=Min=SSD=Non B: .72/.62/.64	**χ^2=8.51, p=0.0366 Maj=Min>Maj=SSD>Maj=Non** B: 1.13/-.36/1.54	**χ^2=10.57, p=0.0143 Maj=Min=SSD>Non B: 1.05/.34/.99**
Ham-D psychic anxiety item	**χ^2=27.81, p<0.0001 Maj=Min=SSD>Non B: .61/.27/.29**	**χ^2=11.64, p=0.0087 Maj=Min>SSD=Min>Non=Min** B: .50/.19/.12	**χ^2=27.10, p<0.0001 Maj=Min>Min=SSD>Non B: .57/.26/.19**
Ham-D suicidal ideation item	**χ^2=16.12, p=0.0011 Maj=Min=SSD>Non** B: .16/.04/.15	χ^2=4.31, p=0.2298 Maj=Min=SSD=Non B: .11/.02/.07	**χ^2=14.17, p=0.0027 Maj=Min=SSD>Non B: .14/.04/.09**
Snaith Anxiety scale	**χ^2=25.13, p<0.0001 Maj=SSD>Min>SSD>Non B: 1.47/.20/.83**	**χ^2=11.27, p=0.0103 Maj=SSD>Min=SSD>Non=Min B: 1.21/.05/.48**	**χ^2=24.85, p<0.0001 Maj=SSD>Min=SSD>Non=Min B: 1.37/.20..58**
Mini-Mental State Exam	χ^2=5.81, p=0.1213 Maj=Min=SSD=Non B: .53/.28/.26	**χ^2=10.34, p=0.0159 Maj=Min=SSD>Non B: -.55/-.30/-.46**	χ^2=2.63, p=0.4518 Maj=Min=SSD=Non B: -.49/-.25/-.07
Trails A	**χ^2=11.29, p=0.0102 Maj=Min=SSD>Non=Min** B: 9.43/3.58/4.16	**χ^2=7.99, p=0.0462 Maj=Min=SSD>Non=SSD=Min** B: 9.06/3.22/3.13	**χ^2=10.10, p=0.0177 Maj=Min=SSD>Non=Min B: 9.63/3.80/2.91**
Trails B	**χ^2=14.19, p=0.0027 Maj=Min=SSD>Non=Min=Maj B: 16.8/10.1/12.5**	χ^2=4.24, p=0.2366 Maj=Min=SSD=Non B: 14.4/7.93/4.19	**χ^2=12.27, p=0.0065 Maj=Min=SSD>Non=Min=Maj B: 17.00/10.40/8.37**
ΔTrails	**χ^2=10.84, p=0.0126 Maj=Min=SSD>Non B: 13.40/8.65/9.54**	χ^2=4.21, p=0.2394 Maj=Min=SSD=Non B: 11.90/7.25/4.36	χ^2=6.49, p=0.0902 Maj=Min=SSD=Non B: 13.20/-.17/-.04
Mattis Dementia Rating – Initiation-Perseveration	**χ^2=10.05, p=0.0181 Maj=Min=SSD>Non=Min B: -1.11/-.26/-.48**	χ^2=5.48, p=0.1399 Maj=Min>Min=SSD=Non B: -1.00/-.16/-.02	χ^2=5.42, p=0.1434 Maj=Min>Min=SSD=Non B: -1.01/-.17/-.04
Cumulative Illness Rating Scale	**χ^2=19.17, p=0.0003 Maj=Min=SSD>Non=Maj B: .37/.40/.40**	**χ^2=9.43, p=0.0241 Maj=Min=SSD>Non=Maj=Min** B: .30/.35/.25	χ^2=6.44, p=0.0921 Maj=Min=SSD=Non B: .32/.37/.16
Instrumental Activities of Daily Living	χ^2=2.97, p=0.3961 Maj=Min=SSD=Non B: .88/.30/.02	χ^2=4.13, p=0.2481 Maj=Min=SSD=Non B: .93/.33/.19	χ^2=2.85, p=0.4161 Maj=Min=SSD=Non B: .88/.30/.004
Physical Self-Maintenance Scale	**χ^2=11.33, p=0.0101 Maj=SSD>Min=Non>SSD>Non B: .95/.15/.25**	**χ^2=14.03, p=0.0029 Maj=SSD>Min=Non>SSD>Non** B: 1.00/.11/.50	χ^2=6.88, p=0.0759 Maj>Min=SSD=Non B: .89/-.19/.05
Karnofsky Performance Status Score	χ^2=6.40, p=0.0936 Maj =Min =SSD >Non=SSD=Min B: -3.15/-1.32/-.68	**χ^2=9.20, p=0.0267 Maj=Min=SSD>Non=Min** B: -3.29/-1.43/-1.38	χ^2=6.18, p=0.1033 Maj=Min=SSD>Non=SSD=Min B: -3.19/-1.38/-.55

N.B. – test statistics are for each overall comparison. Beta estimates list betas for Maj/Min/SSD, with Non-depressed as the reference group. Results of paired comparisons are denoted as in these examples:

Maj>Min=SSD>Non : Major depression associated with a significantly higher outcome variable score than minor depression, SSD, and non-depressed. Minor depression and SSD not significantly different from each other, but each associated with significantly higher outcome variable score than non-depressed.

Maj=Min=SSD>Non=SSD=Min: Major depression not significantly different from minor depression and from SSD, but associated with significantly higher outcome variable score than non-depressed. Non-depressed, SSD, and minor depression not significantly different from each other.

Table 3

Comparison of SSD subgroups as Predictors of 1-Year Lagged Outcomes (df = 1)

1-Year Lagged Outcome	SSD-A versus SSD-B	SSD-A versus SSD-C	SSD-B versus SSD-C
Depression Diagnosis	-.16, χ^2=3.25, p=0.07	**-.38, χ^2=21.45, p<0.0001, A>C**	**.21, χ^2=7.10, p=0.0077, B>C**
Hamilton Depression Rating Scale (total)	**-5.33, χ^2=127.91, p<0.0001, A>B**	**-6.64, χ^2=211.10, p<0.0001, A>C**	**-7.26, χ^2=290.23, p<0.0001, B>C**
Ham-D psychic anxiety item	**-.60, χ^2=11.03, p=0.0009, A>B**	**-.36, χ^2=8.48, p=0.0036, A>C**	**-.67, χ^2=34.92, p<0.0001, B>C**
Ham-D suicidal ideation item	-.09, χ^2=1.95, p=0.1624	-.06, χ^2=2.07, p=0.1498	**-.08, χ^2=3.95, p=0.0468, B>C**
Snaith Anxiety scale	-.70, χ^2=3.03, p=0.0816	**-1.36, χ^2=20.01, p<0.0001, A>C**	**-1.17, χ^2=18.60, p<0.0001, B>C**
Mini-Mental State Exam	.70, χ^2=1.40, p=0.2368	**1.08, χ^2=4.56, p=0.0327, A<C**	**1.10, χ^2=6.72, p=0.0095, B<C**
Trails A	6.07, χ^2=1.00, p=0.3166	-2.06, χ^2=0.16, p=0.6851	-6.05, χ^2=1.54, p=0.2151
Trails B	3.07, χ^2=0.06, p<0.8037	-4.88, χ^2=0.25, p=0.6173	-6.29, χ^2=2.44, p=0.1183
ΔTrails	7.56, χ^2=0.62, p=0.4327	1.49, χ^2=0.01, p=0.9520	-4.77, χ^2=0.35, p=0.5551
Mattis Dementia Rating – Initiation-Perseveration	.49, χ^2=0.32, p=0.5725	**1.72, χ^2=6.28, p=0.0122, A<C**	1.05, χ^2=2.88, p=0.0896
Cumulative Illness Rating Scale	.70, χ^2=1.66, p=0.1973	-.50, χ^2=1.15, p=0.2840	-.74, χ^2=2.71, p=0.0994
Instrumental Activities of Daily Living	-.24, χ^2=0.06, p=0.8136	**-2.93, χ^2=13.74, p=0.0002, A>C**	**-2.03, χ^2=8.78, p=0.003, B>C**
Physical Self-Maintenance Scale	-.80, χ^2=2.05, p=0.1525	**-1.34, χ^2=7.96, p=0.0048, A>C**	**-1.54, χ^2=13.86, p=0.0002, B>C**
Karnofsky Performance Status Score	-2.73, χ^2=0.89, p=0.3468	**5.41, χ^2=6.02, p=0.0141, A<C**	**6.68, χ^2=9.96, p=0.0017, B<C**

N.B. – Values shown as parameter estimate, χ^2, p value. Directions of group comparisons are denoted as in these examples:
A>B: SSD-A associated with higher outcome variable score than SSD-B
B<C: SSD-B associated with lower outcome variable score than SSD-C