

Assessment Tool	Behavioral Domains <sup>1</sup>	Who Administers and How	Number of Items	Response Categories	Estimated Time to Administer	Setting and Target Population	Reliability and Validity
<b>Part I: General Behavior Scales</b>							
1. Alzheimer's Disease Assessment Scale Non-Cognitive	Tremors Pacing Motor restlessness Tearfulness Depression Delusions Hallucinations Appetite Concentration Uncooperativeness	Interview with caregiver and patient	10 items	Based on past week  Rated 0 = not present to 5 = severe  Range 0-50 Higher scores indicate greater behavioral issues	Not specified	AD patients in community and nursing homes	$\alpha = .83$  Test-retest reliability: $r = .977$  Significant Correlations with NOSGER Patients Mood subscale ( $r = .69$ ) social behavior ( $r = .69$ ) and disturbing behavior ( $r = .51$ ). $p < .05$

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2. Multi-Dimensional Observation Scale for Elderly Subjects (MOSES)	Self-care behavior Disoriented behavior Depressed/Anxious mood Irritable behavior Withdrawn behavior	Nursing staff with daily contact of person being assessed	40 items (5 groups, 8 items each)	Based on past week  Rated either 1-4 or 1-5 scale with different response sets for each item  Range 40-180 Higher scores indicate greater behavioral issues	Not specified	Older adults in psychiatric facilities, nursing homes, homes for the aged, and continuing care hospitals	<p>Inter-rater reliability: Self-care (r=.97) Disorientation (r=.84) Depression (r=.58) Irritability (r=.72) Withdrawn (r=.75)</p> <p>Internal Consistency: Self-care (α=.82) Disorientation (α=.87) Depression (α=.80) Irritability (α=.79) Withdrawn (α=.78)</p> <p>Convergent validity: Correlation with Physical and Mental Impairment of functioning Evaluation subscales significant at p&lt;.001 Self-care (r=.91) Disorientation (r=.81) Depression (r=.65) Irritability (r=.77) Withdrawn (r=.78)</p> <p>Depression correlated with Zung Depression Status Inventory (r=.49, p&lt;.005) Self-care correlated with Robertson Short Mental Status Questionnaire (r=.53, p&lt;.001) Disorientation with Robertson Short Mental Status Questionnaire (r=.77, p&lt;.001) +H5</p>

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3. Nurses' Observation Scale for Geriatric Patients (NOSGER)	Memory IADLs ADLs Mood Social behavior Disturbing behavior	Nurse/ care-giver observation. Observer contact with person at least 2x/week for min. 2 hours on each occasion.	30 items (6 groups, 5 items each)	Based on observations in the past 2 weeks  Rated 1=no disturbance to 5=maximum disturbance  Range 30-150 Higher scores = greater behavioral issues	Not specified	Older adults at home or in an institution (healthy, mild dementia and advanced dementia)	Inter-rater: Memory (r=.85) IADL (r=.89) ADL (r=.88) Mood (r=.76) Social behavior (r=.68) Disturbing behavior (r=.70) (p<.001 for all subscales) Retest reliability Memory (r=.91) IADL (r=.92) ADL (r=.88) Mood (r=.85) Social behavior (r=.87) Disturbing behavior (r=.84) (p<.001 for all subscales)  Concurrent Validity: Memory compared measures of cognition (digit span forward and backward, trail-making) (r=.43-.70, p<.001) IADL compared with ADL and PLUT (r=.60-.68, p<.001) ADL: compared with IADL and PLUT3 (r=.73-.80, p<.001) Social behavior compared with PLUT (r=.74, p<.001). Not done for mood or disturbing behavior
4. The Neuro-behavioral Rating Scale (NRS)	Cognition Agitation/ Disinhibition Behavioral Retardation Anxiety/Depression Verbal output disturbance Psychosis	Structured interview with patient by trained researcher or psychologist/ psychiatrist	27 items	Rating period not stated  Scored 0=not present to 6=extremely severe Range 0-162 Higher scores indicate greater behavioral issues	45 minutes	Patients with head trauma, HIV infection and dementia	Inter-rater reliability: r=.93, p<.001

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5. The Nursing Home Behavior Problem Scale (NHBPS)	Uncooperative or aggressive Irrational or restless Sleep problems Annoying Inappropriate Dangerous	Observation by nurses and nursing assistants	29 items	Based on past 3 days Rated 0=never to 4=always Range 0-116 Higher scores indicate greater behavioral issues	3-5 minutes per resident	Nursing home residents	Inter-rater reliability: r=.75-.83 Construct Validity: Correlation with NOSIE r=-.747 Correlation with CMAI r=.911
6. Behavioral Pathology in Alzheimer's Disease (BEHAVE-AD)	Delusions Hallucinations Activity disturbances Aggressiveness Diurnal rhythm disturbances Affective disturbance Anxiety/phobia	Informant interview	26 items (7 groups plus 1 global assessment of the overall magnitude of the symptoms)	Based on past 2 weeks Rated 0 = not present to 3 (each category 3 is different) Range 0-75 (only first 25 items totaled) Higher scores indicate greater behavioral issues	20 minutes	AD patients; outpatient and nursing home residents	Interclass correlation coefficient r = .96 (p<.01) "Construct validity supported by the differences between the nature and course of behavioral symptoms of AD and those of the cognitive and functional symptoms"

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7. Neuro-psychiatric Inventory (NPI) Also available are the NPI-C and the NPI-Q	Delusions Hallucinations Dysporhia Anxiety Agitation Euphoria Apathy Irritability Disinhibition Aberrant motor behavior Nighttime behavior disturbances Changes in appetite and eating behaviors (the last 2 were additions to the original) Caregiver distress	Caregiver familiar with person with behaviors	12 items each rated by frequency, severity, and caregiver distress *number of items depends on version used	Based on past month  Yes/No to behavior present Frequency rated 1 = occasionally, less than once per week to 4 = very frequently, once or more per day or continuously  Severity rated 1 = mild, produces little stress in subject to 3 = marked, a major source of behavioral abnormality  Caregiver distress rated 0 = not distressing to 5 = extreme distress  Total score for each domains calculated by multiplying frequency by severity Add domain totals for total NPI score Higher scores indicate greater behavioral issues	10 minutes but depends on number of behaviors present	Dementia patients, no specific setting stated	Content validity: a Delphi panel to review the behaviors of apathy, irritability, disinhibition, and euphoria as there was no "gold standard"  Concurrent validity: scores on relevant scales were compared to the BEHAVE-AD and HAM-D. All correlations reached the .05 level of significance and all but one reached the .01 level of significance.  Reliability: between rater reliability varied from 93.6 to 100% Test-retest reliability was .79 (p<.01) for frequency and .86 (p<.01) for severity at 3 weeks.

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8. Revised Memory and Behavior Problem Checklist (RMBPC)	Memory-related problems Depression problems Disruptive problems Caregiver Reaction	Caregiver report	24 items each rated by frequency and caregiver distress	Based on past week  Behaviors rated on frequency: 0 = never occurs to 4 = occurs daily or more often  Range 0-96; Higher score = greater frequency of behavioral issues Caregiver reaction rated by degree behavior is upsetting/bothersome 0 = not at all to 4 = extremely  Range 0-96 Higher scores indicate greater distress	15-20 minutes	Dementia patients in outpatient clinic	Patient behavior frequency Overall reliability: .84  Caregiver Reaction Overall reliability: .90 Validity confirmed through a comparison of scores with well-established indices of depression, cognitive impairment and caregiver burden All were correlated at a .05 level of significance and all but one at the .01 level of significance.
9. Computer Assisted Behavioral Observation Systems (CABOS)	Disruptive vocalization (but could potentially be applied to other behaviors)	Direct observation	12 hours of observation per patient ( 4 three-hour blocks)	Location Activity in Environment Sound in Environment Social Environment Physical Restraint	12 hours per patient	Nursing home residents with probable dementia	Kappa reliabilities for interobserver reliability ranged from 1.0 (location-hairdresser) to .67 (activity-transfer)
10. Clinical Dementia Rating Scale (CDR)	Memory Orientation Judgment and Problem Solving Community Affairs Home and hobbies Personal Care	Semi - structured interviews of caregiver and person with AD	6 Domains	Rating based on trained interviewers judgment based on semi-structured interview of caregiver and person with AD and Each domain rated 0 = none to 3 = severe	40 minutes	AD patients in the community	Overall agreement of investigators is 83%.  Criterion validity for both global and individual scores.  Neuropathological Validity in detecting the presence or absence dementia.

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11. Behavioral Syndromes Scale for Dementia (BSSD)	Disinhibition (including agitation, aggression, and wandering) Catastrophic reactions Apathy-indifference Sundowning Denial	Family caregiver	24 items (5 domains and global scores)	Based on past week  Rated 0 = no information to 6 = extreme Denial rated (0-4)  Global rating for each domain  Higher scores = greater behavioral issues	20-30 minutes	Probable AD in outpatient setting	Interclass correlation coefficients for the 5 domains:  Catastrophic reactions: .64-.85 Disinhibition: .83-.90 Apathy-indifference: .65-.85 Sundowning .53-.95 Denial: .40-.84  Internal Consistency of ratings, Cronbach's alpha: Catastrophic reactions: .69-.78 Disinhibition: .73-.82 Apathy-indifference: .82-.83 Sundowning: .70-.76 Divergent Validity was demonstrated by weak to moderate correlations between domains.  Criterion validity was demonstrated in several ways including an association with mMMSE score.
12. Dementia Signs and Symptoms Scale (DSS)	Anxiety Mania Depression Restlessness Social disruptiveness Aggressiveness Delusions Hallucinations	Semi-structured interview with person with dementia and informant, examiner also rates based on interviews and clinical judgment	43 items (8 subscales)	Rating based on occurrence and severity in past month  Rated 0=absent to 3=daily  Higher scores indicate greater behavioral issues	30 minutes	AD patients in clinical settings	Internal consistency ranged from .37 for hallucinations to .82 for behaviors. Average internal consistency was .60. Interrater reliability was .92-.99. Pearson correlations ranged from +.49 with the depression scale to +.94 with the mania scale.

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13. CERAD Behavior Rating Scale for Dementia (BRSD)	Depressive features Psychotic features Defective self-regulation Irritability/agitation Vegetative features Apathy Aggression Affective Ability	Informant interview	Original 51 items (48 quantitative and 3 open-ended)  Revised 46-item (3 quantitative items dropped and 3 open-ended items consolidated into one question)  17 items shortened version	Based on past month 5 items (diurnal patterns of confusion and changes in interest, appetite, weight and sexual drive) scored as present or absent.  Other items rated 0 = has not occurred since illness began to 4 = present 16 days or more in the past month, more than half the days in the month  Higher scores indicate greater behavioral issues  Scoring available for "has occurred since illness began but not in past month"	20-30 minutes	Dementia patients in various settings	Interrater reliability ranged from 91.3% to 100%. Item kappas ranged from .77 to 1.00.
14. Key Behavior Change Inventory (KBCI)	Inattention Impulsivity Unawareness of problems Apathy Interpersonal difficulties Communication problems Somatic difficulties Emotional adjustment	Informant interview	64 items (8 subscales, 8 items each)	Rating period not stated  4-point scale (false not true to very true)  Half of items are worded positively, half negatively  Range of scores not available Greater score equals greater impairment	Not specified.	traumatic Brain Injury and AD in clinics	$\alpha = .82-.91$  Content validity: external item review by panel of experts  Construct validity: significant group differences between controls and those with TBI ( $F(16,178) = 9.15, p < .001$ ).



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15. Dementia Behavior Disturbance Scale (DBD)	Passivity Agitation Eating disturbances Aggressiveness Diurnal rhythm disturbances Sexual misdemeanor	Informant interview	28 items	Based on prior week  Rated 0 = never to 4 = all the time Range 0-112 Higher scores = more disturbance	15 minutes	Dementia patients living in the community	Internal consistency $\alpha = .83-.84$  Test-retest: $r = .71$  Construct validity: correlation with Greene's Behavior and Mood Disturbance Scale $r = .73$

### Table 1. Notes

<sup>1</sup> The Behavioral Domain column lists area using the labeling of behaviors as reported within the cited article.

$\alpha$  = Cronbach's alpha

ABID = Agitated Behavior in Dementia Scale

ABS = Aggressive Behavior Scale

ADL = Activities of Daily Living

AES - C = Apathy Evaluation Scale - Clinician

AES - I = Apathy Evaluation Scale - Informant

AES - S = Apathy Evaluation Scale - Self

AES = Apathy Evaluation Scale

AI = Activity Inventory

AWS = Algae Wandering Scale

V2 = version 2

BAI = Beck Anxiety Inventory

BARS = Brief Agitation Rating Scale

BDI = Beck Depression Inventory

BEHAVE-AD = Behavioral Pathology in Alzheimer's Disease

BRSD = CERAD Behavior Rating Scale for Dementia

BSSD = Behavioral Syndromes Scale for Dementia

CABOS = Computer Assisted Behavioral Observation Systems

CCL - A = Cognition Checklist for Anxiety

CCL - D = Cognition Checklist for Depression

CDR = Clinical Dementia Rating Scale

CES-D = Center for Epidemiologic Studies Depression Scale

CMAI = Cohen Mansfield Agitation Inventory

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<p> CMAI = Cohen-Mansfield Agitation Inventory  CSDD = Cornell Scale for Depression in Dementia  DAIR = Dementia Apathy Interview and Rating Scale  DASS = Depression Anxiety Stress Scale  DBD = Dementia Behavior Disturbance Scale  DBRS = Disruptive Behavior Rating Scales  DMAS = The Dementia Mood Assessment Scale  DSM-IV = Diagnostic and Statistical Manual of Mental Disorders IV  DSS = Dementia Signs and Symptoms Scale  ESS = Epworth Sleepiness Scale  FrSBe = Frontal System Behavioral Scale  GAI = Geriatric Anxiety Inventory  GDS = Geriatric Depression Scale  HADS = Hospital Anxiety and Depression Scale  HAM-A = Hamilton Rating Scale for Anxiety  HAM-D = Hamilton Rating Scale for Depression  HD = Huntington's Disease  IADL = Instrumental Activities of Daily Living  IAS = Irritability Apathy Scale  KBCI = Key Behavior Change Inventory  LARS = Lille Apathy Rating Scale  MCI = Mild Cognitive Impairment  MDS = Minimum Data Set  mMMSE = Modified Mini-Mental Status Exam  MOAS = Modified Overt Aggression Scale  NHBPS = The Nursing Home Behavior Problem Scale  NOISE = Nurse Oriented Scale for Inpatient Evaluation  NOSGER = Nurses' Observation Scale for Geriatric Patients  NPI = Neuropsychiatric Inventory  NPI-C = Neuropsychiatric Inventory - Clinician  NPI-Q = Neuropsychiatric Inventory - Questionnaire  NRS = The Neuro-behavioral Rating Scale  OAS = Overt Aggression Scale  OASS = Overt Agitation Severity Scale  PANSS = Positive and Negative Symptom Scale </p>							

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<p>PAS = Pittsburgh Agitation Scale            PD = Parkinson's Disease            PHQ-9 = Patient Health Questionnaire - 9            PLUT = Plutchik Scale            PSQI = Pittsburgh Sleep Quality Index            RAGE = Rating Scale for Aggressive Behavior in the Elderly            RAID = Rating Anxiety in Dementia            RAS = Ryden Aggression Scale            RMBPC = Revised Memory and Behavior Problem Checklist            SANS = Scale for the Assessment of Negative Symptoms            SDI = The Sleep Disorders Inventory            SF - 20 = 20-item Short Form Survey            TBI = Traumatic Brain Injury</p> <p>Brief Psychiatric Rating Scale not included since generally used to assess psychosis in patients with schizophrenia.</p> <p>Scale for the Assessment of Negative Symptoms (SANS) and Positive and Negative Symptom Scale (PANSS) are not included since primarily used in patients with schizophrenia.</p> <p>Unified Parkinson's Disease rating scale not included as it is a single item for apathy that does not have any reliability measure.</p> <p>Hamilton Depression Rating Scale not included because it was first published in 1960 and is no longer considered the gold standard. While it has adequate internal reliability, many of the items do not contribute to depression severity, response options are not optimal, and the retest reliability is poor. Content validity has also been found to be poor (Bagby, Ryder, Schuller &amp; Marshall, 2004).</p> <p>The Mini Nutritional Assessment was not included because it does not address behavior. The Nutritional Risk Index and DETERMINE Your Nutritional Health Checklist were not included because they do not address behavior and because validity has not been established.</p> <p>GDS was not included as at least two studies have found it not to be as reliable and valid in a dementia population as in the general geriatric population (Burke, 1989; Korner, 2006).</p> <p>CES-D was not included as there was no evidence of reliability and validity in a dementia population.</p> <p>State/Trait anxiety scale: originally published prior to 1980.</p>							

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<p>Geriatric Evaluation by Relative's Rating Instrument (GERRI) Schwartz, G. (1983). Development and validation of the Geriatric Evaluation by Relative's Rating Instrument (GERRI). Psychological Reports. 53: 479-88-not included because there is no subscale for neuropsychiatric symptoms.</p> <p>Clinical Assessment of Psychopathology among Elderly Residents (CAPER): Reichenfeld (1992) not included because it does not address specific behaviors of dementia-it is for diagnosis of psychotic disorders. It is also based on psychiatrist interview.</p>							