# Dementia Singapore



# MEASURES FOR BEHAVIOUR CHANGES

## TOOLS FOR DEMENTIA PRACTICE & RESEARCH

# Measures for Behaviour Changes

Dementia is often accompanied by behaviour changes that affect both persons living with dementia and the individuals around them. Clinicians and researchers often aim to improve the management of these behaviour changes because they are associated with adverse effects on daily living, increased risk of long-term hospitalisation, premature institutionalisation, higher use of healthcare facilities and medication, and higher financial costs. These adverse effects lower the quality of life for both persons living with dementia and their carers, and heightens caregiver stress.[1,2] To avoid these negative effects and improve or maintain the well-being of those living with dementia and the people around them, it is important for behaviour changes to be accurately measured, described, and addressed.

Dr Vanessa Mok, a consultant at the Department of Psychological Medicine in Changi General Hospital, has summarised and classified types of behaviour changes into the following categories:

- Disturbances of emotional experience;
- Delusions of abnormal thought content;
- Perceptual disturbance;
- Disturbance in motor function; and
- Disturbance in circadian rhythm.[2]

To evaluate the effects of both non-pharmacological and pharmacological interventions on behaviour changes, reliable and valid measures of behaviour changes are essential in research and clinical practices. To date, there may be a total of more than a hundred different tools available to measure different kinds of behaviour changes.[3,4] There are both global instruments and symptom-specific instruments: global instruments can be administered either in full to measure several behaviour changes, or as separate subscales that focus on specific behaviours; symptom-specific instruments focus and provide a more comprehensive assessment of a specific behaviour change.[3,5] This wide variety of instruments allows practitioners many tools to measure behaviour changes. On the other hand, however, this large number of instruments can also made selection difficult for practitioners and researchers.[4]

In the following list of systematic reviews, researchers have reviewed instruments (both global and symptom-specific tools) measuring different behaviour changes. These reviews summarise the nature and purpose of each tool, evaluate and discuss their strengths and gaps, and report their psychometric properties. For more information on the findings of these systematic reviews, please refer to this list of references:

- Bentvelzen, A., Aerts, L., Seeher, K., Wesson, J., & Brodaty, H. (2017). A comprehensive review of the quality and feasibility of dementia assessment measures: The dementia outcomes measurement suite. *Journal of the American Medical Directors Association, 18*(10), 826-837. doi: 10.1016/j.jamda.2017.01.006.

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- Sheehan, B. (2012). Assessment scales in dementia. *Therapeutic Advances in Neurological Disorders, 5*(6), 349-358. https://doi.org/10.1177/1756285612455733.
- van der Linde, R. M., Stephan, B. C. M., Dening, T., & Brayne, C. (2014). Instruments to measure behavioural and psychological symptoms of dementia. *International Journal of Methods in Psychiatric Research, 23*(1), 69-98. doi: 10.1002/mpr.1414.

## Tools Used in the Singapore Context

Despite the many existing instruments assessing behaviour changes, there is no one tool that has been regarded as the "gold standard", or as an all-encompassing tool for the assessment of behaviour changes. Practitioners and researchers are encouraged to consider some useful key factors when deciding on an instrument to measure behaviour changes: what the behaviours of interest are, the quality of the tools, the amount of detail about the behaviour that needs to be measured, and other practical issues that affect the implementation of the scale, like time constraints.[3]

The table below lists some global measures of behaviour changes that have been either frequently used and reviewed and recommended in the MOH's Clinical Practice Guidelines for Dementia (i.e., BEHAVE-AD, NPI, and CMAI),[6] or used in the local Singapore setting. The CBS is recommended for use in nursing homes, while the NPI-Q is used in the Dementia Singapore's Dementia Day Centres, and the RMBPC by Dementia Singapore's Home Support Team (a home-based intervention programme).

| Tool | What It Measures | No. of Items | Psychometric Properties | Permission to Use |
|---|---|---|---|---|
| Behavioural Pathology in Alzheimer's Disease Rating Scale[7] (BEHAVE-AD) | Measures the presence of 25 specific symptoms, and how troubling they are; these symptoms are classified into the following seven domains:[4,6] <br> 1. Paranoid and delusional ideation <br> 2. Hallucinations <br> 3. Activity disturbance <br> 4. Aggressiveness <br> 5. Diurnal rhythm disturbances <br> 6. Affective disturbances | 25 | **Reliability:** <br> ● Multiple studies reported high interrater reliability:[8] <br> ○ A study reported high percent agreement on the entire scale at 90%. Percent agreement for the 25 items ranged from 76% to 100%.[8] <br> ○ Another study compared different types of interrater reliability, and reported high rater agreement | Cite the developers to use the scale. No other permissions are required. <br><br> No formal training is required, but the tool should be used by a care professional with some clinical background.[4,6] |

| Tool | What It Measures | No. of Items | Psychometric Properties | Permission to Use |
|------|------------------|--------------|-------------------------|-------------------|
| | 7.  Anxieties and phobias | | intraclass correlation coefficients (ICCs) for the total BEHAVE-AD scores, that ranged from .89 to .98.[8]<br><br>   o  Finally, a study reported the ICCs for total BEHAVE-AD scores were .96 for the rater consistency coefficient and .95 for the rater agreement coefficient.[8]<br><br>**Validity:**<br>●  This tool has construct validity. Studies have shown that the occurrences of the symptoms assessed by the BEHAVE-AD are often independent from the cognitive and functional progression of Alzheimer's disease.[8]<br>●  This tool also has criterion validity. Studies have reflected the responsiveness of BEHAVE-AD total scores and symptomatic categorical scores to pharmacological and non-pharmacological interventions – participants showed a drop in BEHAVE-AD total and symptomatic categorical scores from baseline to post-interventions.[8] | |

| Tool | What It Measures | No. of Items | Psychometric Properties | Permission to Use |
|---|---|---|---|---|
| Neuropsychiatric Inventory[9, 10] (NPI) | • A caregiver- or informant-based structured interview<br>• Can be completed within approximately 20 minutes<br>• Measures the frequency and severity of symptoms/ behaviours that are classified into the following 12 domains: [4, 6, 10]<br>  1. Delusions<br>  2. Hallucinations<br>  3. Agitation<br>  4. Depression<br>  5. Anxiety<br>  6. Euphoria<br>  7. Apathy<br>  8. Disinhibition<br>  9. Irritability<br>  10. Aberrant behaviours<br>  11. Night-time behaviours<br>  12. Appetite change | 5-8 items per domain | **Reliability:**<br>• Studies reported acceptable to good internal consistency for the tool, its subscales, and each item, with Cronbach's α ranging from .67 to .89;[4]<br>• High test-retest reliability, where the overall correlations remained at least at .79 for frequency and severity of symptoms within three weeks of the first test and three weeks later.[4]<br>• Interrater reliability: Between-rater reliability varied between 71% and 100% for the different items, and from 80% to 100% for the total score.[4]<br><br>**Validity:**<br>• A panel of experts in geriatric psychiatry rated the tool and its items with high content validity;[4]<br>• Presence of convergent validity: subscales of NPI significantly correlated well with BEHAVE-AD, Hamilton Depression Rating Scale, Clinical Dementia Rating Scale, and Brief Psychiatric Rating Scale.[4] | Using the NPI or NPI-Q in investigational studies sponsored in whole or part by for-profit entities is prohibited without express written consent. Otherwise, cite the developers to use the scale.<br><br>A training pack is available to assist interviewers (usually a care professional with some clinical background) to record informants' responses (usually a caregiver of a person living with dementia).[4] |

| Tool | What It Measures | No. of Items | Psychometric Properties | Permission to Use |
|---|---|---|---|---|
| Neuropsychiatric Inventory-Questionnaire[11] (NPI-Q)<br><br>Click here to access the NPI-Q. | ● Adapted from the NPI, a brief version of the NPI;<br>● A caregiver-based questionnaire (minimises interview effort); and<br>● Can be completed within in five to 10 minutes.<br><br>Measures the severity of the same 12 symptoms/behaviours as the NPI and the level of caregiver distress experienced. | 12 | The original study has established acceptable psychometric properties of the tool: [10]<br><br>**Reliability:**<br>● Good test-retest reliability:<br>  o Significant positive correlation between the total NPI-Q scores for **severity of symptoms** on two administrations, $r = .80$.<br>  o Significant positive correlation between the total scores for **caregiver distress** on two administrations, $r = .94$<br><br>**Validity:**<br>● Has convergent validity:<br>  o Significant strong, positive interscale correlations between the NPI-Q and the NPI total scores for both the **severity of symptoms** ($r = .91$) and **level of caregiver distress** ($r = .92$). | Using the NPI or the NPI-Q in investigational studies sponsored in whole or part by for-profit entities is prohibited without express written consent. Otherwise, cite the developers to use the scale. |

| Tool | What It Measures | No. of Items | Psychometric Properties | Permission to Use |
|---|---|---|---|---|
| Cohen-Mansfield Agitation Inventory[12] (CMAI) | Measures the frequency of 29 specific agitated behaviours classified into the following four domains:[13]<br>1. Physically aggressive behaviours;<br>2. Physically non-aggressive behaviours;<br>3. Verbally aggressive behaviours; and<br>4. Verbally non-aggressive behaviours. | 29 | **Reliability:**<br>● Good to excellent internal consistency, with Cronbach's α ranging from .86 to .91;[14]<br>● Good test–retest reliability over a 1-month period, with $r$ = .74 to .92;[15] and<br>● High inter-rater reliability over time, with $r$ = >.90 on three occasions.[16]<br><br>**Validity:**<br>● Strong correlations between the CMAI and other measures of behaviour changes – BEHAVE-AD and Behavioral Syndromes Scale for Dementia (BSSD), but the CMAI has been shown to be more sensitive to change.[14] | Cite the developers to use the scale. No other permissions are required.<br><br>A caregiver of a person living with dementia may use the tool, but some form of training is required. [6] |

| Tool | What It Measures | No. of Items | Psychometric Properties | Permission to Use |
|---|---|---|---|---|
| Challenging Behaviour Scale[17] | ● Measures first the incidence, then the frequency and severity of a list of 25 behaviours;<br>● Tool also provides a computed score to identify 'challenging residents';<br>● Can be used by both trained and untrained formal caregivers; and<br>● Particularly useful in the residential setting.[17] | 25 | The original paper has conducted multiple studies to establish acceptable psychometric properties of the tool:[17]<br><br>**Reliability:**<br>● Good internal consistency across the four ratings, where their Cronbach's α are as follow:<br>　o Incidence rating: .85<br>　o Frequency rating: .82<br>　o Severity rating: .87<br>　o Challenging rating: .85<br>● Good test-retest reliability<br><br>**Validity:**<br>Adequate validity<br>● Has criterion validity – Significant moderate correlations for each of the four ratings against the presence of dementia:<br>　o Incidence rating, $r$ = .45<br>　o Frequency rating, $r$ = .46<br>　o Severity rating, $r$ = .36<br>　o Challenging rating, $r$ = .35<br>● Has concurrent validity:<br>　o Significant weak to moderate correlations between the total CBS frequency score and the Clifton Assessment Procedures for the Elderly (CAPE-BRS) social | Cite the developers to use the scale. No other permissions are required. |

| | | | disturbance ($r$ = .69) and apathy ($r$ = .36) subscales. |
|---|---|---|---|
| | | | • Has predictive validity: |
| | | |     ○ Significant moderate correlations between the CBS challenging ratings and time-sampled direct observations of challenging behaviours at home, with $r$ ranging from .41 to .61. |

| Tool | What It Measures | No. of Items | Psychometric Properties | Permission to Use |
|---|---|---|---|---|
| Revised Memory and Behaviour Problems Checklist[18] (RMBPC)<br><br>Click here to access the RMBPC. | Measures the frequency of 24 behavior problems and caregivers' reactions towards these behaviors, which can be classified into the following three subscales: [18]<br>1. Memory-related problems<br>2. Depression<br>3. Disruptive behaviours | 24 | The original study has established the tool's psychometric properties and recommended it as reliable and valid for measuring behaviour changes observed in persons living with dementia: [18]<br><br>**Reliability:**<br>● Good internal consistency for overall scale, with Cronbach's α = .84 for the behaviour problems and .90 for level of perceived burden.<br>● Acceptable to good internal consistency for each subscale, with Cronbach's α ranging from .67 to .89.<br><br>**Validity:**<br>Validity of the **Frequency** items:<br>● Has concurrent validity:<br>　○ Significant positive correlation between depression subscale and the Hamilton Rating Scale for Depression (HRSD), with $r$ = .44.<br>● Has discriminant validity:<br>　○ Significant negative correlation between depression subscale and the Mini Mental State Examination (MMSE), with $r$ = -.48.<br><br>Validity of the **Reaction** items: | Cite the developers to use the scale. No other permissions are required. |

| | | | ● Presence of construct validity, significant correlations between all three subscales and:<br>   o  Center for Epidemiological Studies – Depression Scale (measuring caregiver depression), with $r$ ranging from .26 to .31.<br>   o  Caregiver Stress Scale (measuring caregiver burden), with $r$ ranging from .32 to .42. | |
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