

## **Measures for Behaviour Changes**

As mentioned in the topic <u>Responding to Behavioural Changes</u>, dementia is often accompanied by behaviour changes that affect both persons living with dementia and the individuals around them. Clinicians and researchers often look into treating these behaviour changes or improving the management. This is 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.<sup>1,2</sup> These detrimental effects lower the quality of life for both persons living with dementia and their carers, which also heightens caregiver stress.<sup>1,2</sup> Dr Vanessa Mok, a consultant at the Department of Psychological Medicine in Changi General Hospital, has summarised and classified the different types of behaviour changes into the following:

- Disturbances of emotional experience;
- Delusions of abnormal thought content;
- Perceptual disturbance;
- Disturbance in motor function; and
- Disturbance in circadian rhythm.<sup>2</sup>

To evaluate the effects of non-pharmacological and pharmacological interventions, 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 the various behaviour changes.<sup>3,4</sup> There are global instruments that can be administered either in full to measure several behaviour changes, or separated as subscales that focus on specific behaviours. There are also symptom-specific instruments, which focus and provide a more comprehensive assessment of a behaviour change.<sup>3,5</sup> However, the huge number of existing instruments measuring behaviour changes has also made selection difficult for practitioners and researchers.<sup>4</sup>

In the following list of systematic reviews, researchers have reviewed numerous instruments (both global and symptom-specific tools) measuring the different behaviour changes, where they summarized the nature and purpose of each tool, evaluated and discussed the strengths and gaps of the tools, and reported their psychometric properties. Refer to the references below to read on further about the findings of these systematic reviews:

- 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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- 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 numerous existing instruments assessing behaviour changes, there is no perfect tool that has been regarded as the "gold standard". Rather, practitioners and researchers are recommended to consider several factors when deciding on an instrument to measure behaviour changes, such as the behaviours of interest, the quality of the tools, the amount of details about the behaviour that needs to be captured, and issues like time constraints.<sup>3</sup>

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),<sup>6</sup> or used in the local Singapore setting. The CBS is recommended to use in nursing homes, while the NPI-Q is used in the Dementia Day Centres of Dementia Singapore and the RMBPC by Dementia Singapore's Home-Based Intervention programme.

Tool	What It Measures	No. of Items	Psychometric Properties	Permission to Use
Behavioural	Measures the presence of 25 specific	25	Reliability:	Cite the developers to use the
Pathology in	symptoms, and how troubling they		<ul> <li>Multiple studies reported high</li> </ul>	scale. No other permissions are
Alzheimer's Disease	are; these symptoms are classified		interrater reliability: <sup>8</sup>	required.
Rating Scale <sup>7</sup>	into the following 7 domains: <sup>4,6</sup>		<ul> <li>A study reported high percent</li> </ul>	
(BEHAVE-AD)	1. Paranoid and delusional ideation		agreement for the entire scale,	No formal training is required,
	2. Hallucinations		90%. Percent agreement for the 25	but tool should be used by a
	3. Activity disturbance		items also ranged from 76 to	care professional with some
	4. Aggressiveness		100%.8	clinical background. <sup>4,6</sup>
	5. Diurnal rhythm disturbances		<ul> <li>Another study compared different</li> </ul>	
	6. Affective disturbances		types of interrater reliability, and	
	7. Anxieties and phobias		reported high rater agreement	
			intraclass correlation coefficients	
			(ICCs) for the total BEHAVE-AD	
			scores, that ranged from .89	
			to .98. <sup>8</sup>	
			$\circ$ Finally, a study reported the ICCs	
			for total BEHAVE-AD scores	



ΤοοΙ	What It Measures	No. of Items	Psychometric Properties	Permission to Use
Tool	What It Measures	No. of Items	Psychometric Properties         were .96 for the rater consistency         coefficient and .95 for the rater         agreement coefficient. <sup>8</sup> Validity:         • Tool has construct validity. Multiple         studies have reported that the         occurrences of the symptoms assessed	Permission to Use
			<ul> <li>by the BEHAVE-AD are often independent from the cognitive and functional progression of Alzheimer's disease.<sup>8</sup></li> <li>Tool also has criterion validity, because multiple 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.<sup>8</sup></li> </ul>	



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



Tool	What It Measures	No. of Items	Psychometric Properties	Permission to Use
Tool         Neuropsychiatric         Inventory-         Questionnaire <sup>10</sup> (NPI-Q)         Click here         to access         the NPI-Q.	<ul> <li>What It Measures</li> <li>Adapted from the NPI, a brief version of the NPI</li> <li>A caregiver-based questionnaire (minimises interview effort)</li> <li>Can be completed in 5 to 10 minutes</li> <li>Measures the severity of the same 12</li> </ul>	No. of Items	Psychometric Properties         The original study has established         acceptable psychometric properties of the         tool: 10         Reliability:         • Good test-retest reliability:         • Significant positive correlation	Permission to Use 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.
	symptoms/behaviours as the NPI and the level of caregiver distress experienced		<ul> <li>between the total NPI-Q scores for severity of symptoms on two administrations, r = .80.</li> <li>Significant positive correlation between the total scores for caregiver distress on two administrations, r = .94</li> </ul>	
			<ul> <li>Validity:</li> <li>Has convergent validity: <ul> <li>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).</li> </ul> </li> </ul>	



Tool	What It Measures	No. of Items	Psychometric Properties	Permission to Use
Cohen-Mansfield Agitation Inventory <sup>11</sup> (CMAI)	<ul> <li>Measures the frequency of 29 specific agitated behaviours classified into the following 4 domains:<sup>12</sup></li> <li>Physically aggressive behaviours</li> <li>Physically non-aggressive behaviours</li> <li>Verbally aggressive behaviours</li> <li>Verbally non-aggressive behaviours</li> </ul>	29	<ul> <li>Reliability:</li> <li>Good to excellent internal consistency, with Cronbach's α ranging from .86 to .91;<sup>13</sup></li> <li>Good test-retest reliability over a 1-month period, with r = .74 to .92;<sup>14</sup> and</li> <li>High inter-rater reliability over time, with r = &gt;.90 on 3 occasions.<sup>15</sup></li> </ul>	Cite the developers to use the scale. No other permissions are required. A caregiver of a person living with dementia may use the tool, but some form of training is required to use the tool. <sup>6</sup>
			<ul> <li>Validity:</li> <li>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.<sup>13</sup></li> </ul>	



Tool	What It Measures	No. of Items	Psychometric Properties	Permission to Use
Challenging	• Measures first the incidence, then	25	The original paper has conducted multiple	Cite the developers to use the
Behaviour Scale <sup>16</sup>	the frequency and severity of a		studies to establish acceptable	scale. No other permissions are
	list of 25 behaviours;		psychometric properties of the tool: <sup>16</sup>	required.
	• Tool also provides a computed			
	score to identify 'challenging		Reliability:	
	residents';		• Good internal consistency across the 4	
	• Can be used by both trained and		ratings, where their Cronbach's $\alpha$ are as	
	untrained formal caregivers; and		follow:	
	<ul> <li>Particularly useful in the</li> </ul>		<ul> <li>Incidence rating: .85</li> </ul>	
	residential setting. <sup>16</sup>		<ul> <li>Frequency rating: .82</li> </ul>	
			<ul> <li>Severity rating: .87</li> </ul>	
			<ul> <li>Challenging rating: .85</li> </ul>	
			<ul> <li>Good test-retest reliability</li> </ul>	
			Validity:	
			Adequate validity	
			• Has criterion validity – Significant	
			moderate correlations for each of the 4	
			ratings against the presence of	
			dementia:	
			<ul> <li>Incidence rating, r = .45</li> </ul>	
			• Frequency rating, r = .46	
			• Severity rating, $r = .36$	
			• Challenging rating, $r = .35$	
			Has concurrent validity	
			<ul> <li>Significant weak to moderate</li> </ul>	
			correlations between the total CBS	
			frequency score and the Clifton	
			Assessment Procedures for the	
			Elderly (CAPE-BRS) social	



disturbance ( $r$ = .69) and apathy ( $r$
= .36) subscales.
Has predictive validity
<ul> <li>Significant moderate correlations</li> </ul>
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	Measures the frequency of 24	24	The original study has established the tool's	Cite the developers to use the
Behavior Problems	behavior problems and caregivers'		psychometric properties and recommended	scale. No other permissions are
Checklist <sup>17</sup> (RMBPC)	reactions towards these behaviors,		it as reliable and valid for measuring	required.
	which can be classified into the		behaviour changes observed in persons	
Click <u>here</u> to access	following 3 subscales: 17		living with dementia: 17	
the RMBPC.	1. Memory-related problems			
	2. Depression		Reliability:	
	3. Disruptive behaviours		<ul> <li>Good internal consistency for overall</li> </ul>	
			scale, with Cronbach's $\alpha$ = .84 for the	
			behaviour problems and .90 for level of	
			perceived burden.	
			Acceptable to good internal consistency	
			for each subscale, with Cronbach's $\alpha$	
			ranging from .67 to .89.	
			Validity:	
			Validity of the <b>Frequency</b> items:	
			<ul> <li>Has concurrent validity:</li> </ul>	
			<ul> <li>Significant positive correlation</li> </ul>	
			between depression subscale and	
			the Hamilton Rating Scale for	
			Depression (HRSD), with $r = .44$ .	
			• Has discriminant validity:	
			<ul> <li>Significant negative correlation</li> </ul>	
			between depression subscale and	
			the Mini Mental State Examination	
			(MMSE), with <i>r</i> =48.	
			Validity of the <b>Reaction</b> items:	



Presence of construct validity,
significant correlations between all 3
subscales and:
<ul> <li>Center for Epidemiological Studies</li> </ul>
– Depression Scale (measuring
caregiver depression), with r
ranging from .26 to .31.
<ul> <li>Caregiver Stress Scale (measuring</li> </ul>
caregiver burden), with <i>r</i> ranging
from .32 to .42.



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