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# Assessing mental capacity for everyday decision-making in the Chinese older population

## Key Messages

1. The abilities to make everyday decisions may be reliably measured in the local elderly population.
2. The Chinese version of the Assessment of Capacity for Everyday Decision-Making is a reliable tool to assess these abilities.
3. Significant proportion of participants with mild dementia was mentally incapable in making decisions on everyday tasks. Global cognitive functioning appeared to be an important prerequisite for intact mental capacity.

## Introduction

With population ageing, the prevalence of cognitive impairments in older people is expected to increase. Clinicians are often requested to assess a person's fitness for independent community living. Clinical assessment by psychiatrists and psychologists is a standard approach to assess one's mental capacity, but it can be unreliable.<sup>1</sup> A multidimensional structured assessment may enhance the reliability. The MacArthur Competence Assessment Tools for Treatment (MacCAT-T) and for Clinical Research (MacCAT-CR) were recommended as standard instruments for measuring mental capacity. Based on the framework of both instruments, a new instrument to measure everyday decision-making capacity—the Assessment of Capacity for Everyday Decision-Making (ACED)—has been developed.<sup>2</sup> The ACED is the first semi-structured interview for assessing everyday decision-making in western older populations with cognitive impairments.

This study aimed to: (1) develop a culturally appropriate ACED for Chinese older persons in Hong Kong; (2) identify profiles of performance in mental capacity in older persons with different degree of cognitive impairment; (3) evaluate the association between mental capacity for judgement of functional abilities with actual performance in everyday tasks; and (4) determine the cognitive pre-requisites for competent decision making in everyday tasks.

## Methods

This study was approved by relevant institutional ethical review boards and conducted from November 2009 to October 2010. Participants were recruited from social centres for elders in Hong Kong. Three groups of subjects were recruited: those with intact cognitive function, those with amnesic mild cognitive impairment (MCI),<sup>3</sup> and those with mild dementia (MD) as rated by the Clinical Dementia Rating of 1.<sup>4</sup> Those with moderate to severe dementia or poor ability to communicate were excluded.

The ACED focused on three areas of activities of daily livings (medication management, meal management, and money management) and measured four decision-making abilities (understanding, appreciation, reasoning, and expressing a choice). The ACED questionnaire was translated into Chinese and back-translated using a standard procedure. Two focus groups were held to evaluate the appropriateness of the instrument, and two modifications were made. First, the option "someone could double-check how you spend your money" was changed to "someone you trust would plan the spending of your money for you." Second, the option "someone else could manage your money completely" was changed to "someone you trust would manage your money completely." The changes were made because these financial issues appeared to be sensitive in the local context. Each participant was interviewed with the ACED for decision-making capacity on everyday activities. The recorded interviews of 100 subjects were assessed independently by a geriatric psychiatrist and an occupational therapist for inter-rater reliability. All participants were independently assessed by a psychiatrist with respect to their capacity in making decisions about their medication, meal, and money managements. The participants were rated as 'fully incapable', 'incapable', 'capable', or 'fully capable'. The ACED ability scores

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were compared with the corresponding clinician ratings for estimation of concurrent validity.

To compare the decision-making abilities across different capacity domains, participants were also interviewed with the Chinese version of the MacCAT-T. The recorded interviews were also rated independently by a geriatric psychiatrist.

Cognitive assessment was made using the Cantonese version of the Mini-Mental State Examination (MMSE),<sup>5</sup> the Alzheimer's Disease Assessment Scale – Cognitive subscale (ADAS-cog), the 10-minute delayed recall, the category verbal fluency test (CVFT), and digit and visual spans. Functional assessment was made using the Disability Assessment for Dementia (DAD).

In a western study, the correlation of the three major dimensions measured by ACED with MMSE scores ranged from 0.48 to 0.60.<sup>4</sup> It was estimated that a sample size of 53 in each group could attain a power of 80% (alpha value=0.05). Based on the Chinese MacCAT-T, 97% of cognitive normal subjects, 73% of subjects with MCI, and 46% of subjects with MD were competent to make decision on medical treatment. The estimated number of subjects required for each group was estimated to be at least 60 to achieve a power of 81%. For psychometric properties of the ACED in Chinese elderly, inter-rater reliability was

assessed by the intra-class correlation coefficients. The internal consistency of each dimension of the ACED was examined. The summary scores of the MacCAT-T were used for evaluation of construct validity. The correlation between each decision-making ability in MacCAT-T and ACED was calculated. Correlations with clinician ratings were used for concurrent validity. One-way ANOVA was used to evaluate differences in ACED ability scores between different subject groups (normal cognition, MCI, and MD). Correlations between decision-making abilities, cognitive and functional performance were evaluated.

## Results

A total of 291 participants were recruited. Participants in the MD group were significantly older and less educated (Table 1). Of all participants, 291, 288, and 287 finished the ACED for medication management, meal management, and money management, respectively (Table 2).

The intra-class correlation coefficients for medication, meal and money managements ranged from 0.84 to 0.94 for understanding, 0.83 to 0.88 for appreciation, 0.89 to 0.94 for reasoning, and 0.55 to 0.71 for expressing a choice. The Cronbach's alpha coefficients for medication, meal and money managements ranged from 0.75 to 0.79 for understanding, 0.53 to 0.64 for appreciation, and 0.74 to 0.77 for reasoning.

**Table 1. Demographics of the participants (n=291)**

Characteristics	Cognitively intact (n=97)	Mild cognitive impairment (n=99)	Mild dementia (n=95)	One-way ANOVA	
				F	P value
Mean±SD age (years)	74.2±6.5	78.15±6.9	82.27±6.6	35	<0.001
Mean±SD education (years)	4.3±3.7	3.17±3.51	1.62±3.24	14.19	<0.001
No. of male/female	10/87	28/71	14/81	11.73	0.003
Mean±SD Mini-Mental State Examination score	26.6±2.4	25.3±2.5	19.5±2.7	208.29	<0.001
Mean±SD Alzheimer's Disease Assessment Scale – Cognitive subscale total score	10.2±3.2	14.5±3.7	25.8±6.1	308.14	<0.001
Mean±SD 10-minute delayed recall score	6.3±1.1	2.6±1.5	0.9±1.6	367.73	<0.001

**Table 2. Assessment of Capacity for Everyday Decision-Making (ACED) scores of the participants**

ACED ability	Mean±SD score			One-way ANOVA	
	Cognitively intact	Mild cognitive impairment	Mild dementia	F	P value
Medication management	n=97	n=99	n=95		
Understanding	7.00±1.68	5.84±2.13	4.22±1.96	49.92	<0.001
Appreciation	7.33±1.18	6.81±1.48	5.69±1.79	29.76	<0.001
Reasoning	8.87±1.48	8.46±1.76	6.96±2.88	25.27	<0.001
Expressing a choice	1.99±0.10	1.97±0.17	1.84±0.49	6.67	0.001
Meal management	n=97	n=98	n=94		
Understanding	7.88±1.64	6.96±1.85	5.21±2.40	44.61	<0.001
Appreciation	7.61±0.82	7.18±1.10	6.24±1.67	30.44	<0.001
Reasoning	9.43±1.34	8.85±1.74	7.49±2.50	25.92	<0.001
Expressing a choice	1.97±0.23	1.95±0.26	1.89±0.40	1.56	0.211
Money management	n=97	n=97	n=94		
Understanding	7.05±1.62	6.31±1.72	4.34±2.12	55.75	<0.001
Appreciation	7.33±1.21	6.66±1.57	5.51±2.00	30.61	<0.001
Reasoning	8.87±1.72	7.92±2.22	6.21±2.66	34.79	<0.001
Expressing a choice	1.99±0.10	1.96±0.23	1.85±0.49	5.45	0.005

With regard to concurrent validity for medication management, clinician ratings correlated significantly with the ability score for understanding ( $r_s=0.42$ ,  $P<0.001$ ), appreciation ( $r_s=0.38$ ,  $P<0.001$ ), reasoning ( $r_s=0.39$ ,  $P<0.001$ ) and expressing a choice ( $r_s=0.23$ ,  $P<0.001$ ). For meal management, the clinician ratings correlated significantly with the ability score for understanding ( $r_s=0.44$ ,  $P<0.001$ ), appreciation ( $r_s=0.35$ ,  $P<0.001$ ), reasoning ( $r_s=0.39$ ,  $P<0.001$ ) and expressing a choice ( $r_s=0.15$ ,  $P=0.01$ ). For money management, the clinician ratings correlated significantly with the ability score for understanding ( $r_s=0.45$ ,  $P<0.001$ ), appreciation ( $r_s=0.39$ ,  $P<0.001$ ), reasoning ( $r_s=0.49$ ,  $P<0.001$ ) and expressing a choice ( $r_s=0.22$ ,  $P<0.01$ ).

With regard to construct validity for medication management, the area under the curve (AUC) was 0.76 (95% confidence interval [CI], 0.69-0.84) for understanding, 0.74 (95% CI, 0.66-0.83) for appreciation and 0.78 (95% CI, 0.71-0.85) for reasoning. For meal management, the AUC was 0.78 (95% CI, 0.70-0.86) for understanding, 0.72 (95% CI, 0.63-0.81) for appreciation and 0.77 (95% CI, 0.70-0.84) for reasoning. The highest point estimate for the AUC was for money management, which was 0.81 (95% CI, 0.75-0.87) for reasoning, 0.79 (95% CI, 0.72-0.86) for understanding and 0.75 (95% CI, 0.67-0.82) for appreciation (Table 3).

With regard to clinician ratings for medication management, 97.9% of the cognitively intact group, 96% in the MCI group, and 57.9% in the MD group were mentally capable. The last two groups differed significantly ( $\chi^2=40.06$ ,  $P<0.001$ ). For meal management, 97.9% of the cognitively intact group, 93.9% in the MCI group, and 56.8% in the MD group were mentally capable. The last two groups differed significantly ( $\chi^2=36.34$ ,  $P<0.001$ ). For money management, 95.9% of the cognitively intact

group, 93.9% in the MCI group, and 50.5% in the MD group were mentally capable. The last two groups differed significantly ( $\chi^2=46.02$ ,  $P<0.001$ ).

Predictive power of each ACED ability score was evaluated using linear regression analyses. The ability score was entered as a dependent variable, with the corresponding summary score in the MacCAT-T, age, years of education, CDAD, MMSE, CVFT, backward digital span, and backward visual span entered as independent variables. Across all participants, the relationship among these measures accounted for 27.5% (appreciation) to 41% (understanding) of the variance of the ACED scores on medication management, 29.1% (appreciation) to 47% (understanding) on meal management, and 36.3% (appreciation) to 52% (understanding) on money management.

## Discussion

The Chinese version of ACED demonstrated satisfactory inter-rater reliability in the ability scores, which correlated significantly with their corresponding measure in the MacCAT-T. This supported the construct validity of ACED. The concurrent validity of the ACED was also supported by significant correlations between clinician ratings and the ability scores. The values of AUCs of ACED abilities were comparable with capacity-measuring instruments for other decisions.

The proportion of participants with mental incapacity in the MD group was significantly higher. This highlights the fact that MD can have a profound effect on decisional capacity. This also supports the need to develop proper tools for mental capacity assessment in MD subjects. Each ability score of the ACED correlated with cognitive and functional measures. The MMSE score was a significant factor for mental capacity.

**Table 3. MacArthur Competence Assessment Tools for Treatment (MacCAT-T) summary scores and the Assessment of Capacity for Everyday Decision-Making (ACED) scores**

ACED ability	MacCAT-T (Spearman's rho)			
	Understanding	Appreciation	Reasoning	Expressing a choice
Medication management (n=291)				
Understanding	0.60 <sup>†</sup>	0.41 <sup>†</sup>	0.49 <sup>†</sup>	0.30 <sup>†</sup>
Appreciation	0.44 <sup>†</sup>	0.39 <sup>†</sup>	0.47 <sup>†</sup>	0.24 <sup>†</sup>
Reasoning	0.36 <sup>†</sup>	0.36 <sup>†</sup>	0.49 <sup>†</sup>	0.17 <sup>†</sup>
Expressing a choice	0.19 <sup>†</sup>	0.19 <sup>†</sup>	0.24 <sup>†</sup>	0.03
Meal management (n=288)				
Understanding	0.53 <sup>†</sup>	0.45 <sup>†</sup>	0.51 <sup>†</sup>	0.25 <sup>†</sup>
Appreciation	0.45 <sup>†</sup>	0.42 <sup>†</sup>	0.43 <sup>†</sup>	0.21 <sup>†</sup>
Reasoning	0.36 <sup>†</sup>	0.32 <sup>†</sup>	0.40 <sup>†</sup>	0.12 <sup>*</sup>
Expressing a choice	0.17 <sup>†</sup>	0.11	0.17 <sup>†</sup>	0.03
Money management (n=287)				
Understanding	0.54 <sup>†</sup>	0.46 <sup>†</sup>	0.53 <sup>†</sup>	0.28 <sup>†</sup>
Appreciation	0.52 <sup>†</sup>	0.46 <sup>†</sup>	0.47 <sup>†</sup>	0.25 <sup>†</sup>
Reasoning	0.49 <sup>†</sup>	0.43 <sup>†</sup>	0.53 <sup>†</sup>	0.22 <sup>†</sup>
Expressing a choice	0.24 <sup>†</sup>	0.20 <sup>†</sup>	0.12	-0.09

\*  $P<0.05$

†  $P<0.01$

The findings of this study should be interpreted in the context of its limitations. The group differences in education and age among the subjects may affect interpretation of the findings. The low proportion of males and low education level of our participants may affect generalisability of the findings. The study was also limited by the range of tests studied.

Most of our participants could complete the ACED interview for one decision within 10 minutes. Although clinical assessment is considered the gold standard, the ACED may serve as a useful adjunct and reference.

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