

## Translating and Applying the Dynamic Loewenstein Occupational Therapy Cognitive Assessment (DLOTCA) for Adults with Intellectual Disabilities in Hong Kong

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### Abstract

**Background and Purpose:** The Chinese Dynamic Loewenstein Occupational Therapy Cognitive Assessment (DLOTCA-CV) was designed to evaluate cognitive skills and visual perception in adults. This study aimed to translate and adapt the DLOTCA-CV for individuals with intellectual disabilities (ID) in Hong Kong, while ensuring cultural and linguistic appropriateness.

**Methods:** A team of seven experienced occupational therapists (OTs) was involved in the translation, adopting an idiomatic approach to preserve the natural meaning. The process included the stages of parallel translations, review and moderation meetings. This pilot version was then tested on a convenience sample of seven service users to evaluate comprehensibility and feasibility.

**Results:** The sample comprised individuals aged 21-40 (43%) and 41-60 (43%), with varying degrees of ID. One participant withdrew, while the remaining six completed the assessment in over 120 minutes, exceeding the expected 45 to 90 minutes. Feedback indicated that certain items posed challenges for individuals with poor upper limb function, contributing to fatigue and anxiety. To enhance the feasibility of the assessment, it is recommended to incorporate more breaks or allow multiple sessions for completion. Additionally, user-friendly instructions should be developed to facilitate understanding and engagement with the assessment. Specific revisions in translation were also suggested, particularly for terms related to cognitive functions.

**Conclusion:** The process of translating and adapting the DLOTCA-CV has created a version that is culturally and linguistically suitable for adults with ID in Hong Kong. This adapted version demonstrates the feasibility for implementation in Hong Kong, providing a valuable tool for OTs to better understand and address the cognitive and perceptual needs of adults with ID.

**Keywords:** DLOTCA, Intellectual Disabilities, Occupational Therapy, Cognitive Assessment, Hong Kong

### Prevalence of Adults with Intellectual Disabilities in Hong Kong

In Hong Kong, approximately 1% of the population has intellectual disabilities (ID), which is approximately

77,000 individuals (Census and Statistics Department, 2021). ID is a condition marked by deficits in both intellectual and adaptive functioning, with onset during the developmental period. The global prevalence rate of ID is approximately 10.37 per 1,000 population (Maulik

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et al., 2011), which is to the rates reported in Hong Kong (Census and Statistics Department, 2021).

ID in individuals could vary from mild to profound, which hinders their ability to acquire, process, and adapt to information (American Psychiatric Association [APA], 2013). Common comorbid conditions of ID include conditions such as Autism Spectrum Disorder, Attention Deficit Hyperactivity Disorder, epilepsy, and psychiatric illnesses (Srouf & Shevell, 2013). Development of health service and social care have enabled more adults with ID to function well in society (Education Bureau, 2020).

## Cognitive Function of People with Intellectual Disabilities

Intellectual disabilities encompass a spectrum of impairments, including significant limitations in intellectual functioning and adaptive behaviour (American Association on Intellectual and Developmental Disabilities [AAIDD], 2010). Individuals with ID often require specialized educational services and support to develop daily living skills (Bouck, 2012). The severity of ID varies, influencing independence and community participation, which can lead to social isolation (Emerson, 2011).

Individuals with ID commonly experience cognitive and perceptual dysfunctions, such as deficits in working memory, executive functioning, attention, and sensory processing (Alloway et al., 2010; Danielsson et al., 2010; Lanfranchi et al., 2010; Stojanovic et al., 2006). These impairments significantly affect daily functioning and quality of life.

Assessing cognitive functions is crucial to identify deficits, inform personalized interventions, and set realistic goals. Comprehensive assessments help leverage individual strengths and address areas of difficulty, enhancing independence and quality of life for those with ID (Alloway et al., 2010; Danielsson et al., 2010). Planning an intervention will be made easier and assessment accuracy will be improved with a localized, culturally appropriate version. The current study aimed to determine if translating and using the Dynamic Loewenstein Occupational Therapy Cognitive Assessment (DLOTCA) is feasible.

## Literature Review

### *Dementia in Adults with Intellectual Disability*

With increased life expectancy, individuals with ID are more vulnerable to age-associated disorders, including dementia. By age 40, adults with ID are more likely to develop dementia, with cognitive decline occurring faster compared to the general population (Burt et al., 2005; De Vreese et al., 2014). The prevalence of dementia among ID cases is as high as 4% in those below age 40 and 40% in those aged 60 or older, with 51-56 as the average age of onset (Adams & Oliver, 2010; McCarron et al., 2017; Nelson et al., 1995). Adults with ID have a raised risk of Alzheimer's dementia (Strydom et al., 2007) when compared with the population. Recent studies suggest that individuals with IDs may also develop dementia and mild neurocognitive disorder at an earlier age and at a higher rate than the general population (Takenoshita et al., 2020). Monitoring the progression of age-related symptoms is crucial for people with ID (McCarron et al., 2013; Wiseman et al., 2015).

### *Selection of Functional Assessments for Adults with Intellectual Disability*

Cognitive and perceptual assessments included scales, questionnaires, inventories, batteries, and tests that were used for screening and documenting people with cognitive impairment (Paiva et al., 2020; Rosli et al., 2015). Occupational therapists utilize these neuropsychological tests to assess clients' cognition, provide scores for longitudinal comparison, and inform cognitive training and treatment monitoring.

While there are many validated cognitive assessment instruments available in Hong Kong, such as the Hong Kong version of the Montreal Cognitive Assessment (Wong et al., 2009, 2018; Yeung et al., 2014), the Cantonese versions of the Addenbrooke's Cognitive Examination (Wong et al., 2013), and the Birmingham Cognitive Screen (Chan et al., 2013), research on the cognitive functions of individuals with ID is limited. When identifying suitable cognitive assessments for adults with ID, several key selection criteria were considered.

First, assessments with good psychometric properties should be included. A validation study should be conducted, with acceptable reliability and validity being reported. Secondly, the mode of assessment should be performance-based, with minimal verbal/ speech requirements. This is crucial as adults with ID may face difficulties in responding to verbal questions. A performance-based assessment could also serve as a tool for detecting cognitive

changes and documenting potential cognitive impairment progression. Longitudinal cognitive assessment for people with ID is crucial for early detection of significant cognitive decline, enabling early intervention before substantial brain damage occurs (Tse et al., 2018). Thirdly, as individuals with ID experienced diverse cognitive and perceptual dysfunctions, an assessment with comprehensive investigation of cognitive domains should be considered. Assessing performance across different cognitive domains is essential for detecting and evaluating the cognitive abilities of adults with ID. Lastly, the use of “dynamic assessment procedure” should also be included in one of the selection criteria when identifying cognitive assessment for adults with ID. The dynamic assessment procedure, which aims to modify cognitive functioning and observe changes in learning and problem-solving, has proven effective in assessing cognitive improvement in individuals with ID after a short intervention (Lifshitz et al., 2005).

### ***Review of Cognitive and Perceptual Assessment in Hong Kong***

Based on the above-mentioned selection criteria, we reviewed the commonly used assessments in Hong Kong if they are suitable for assessing adults with ID. The Hong Kong version of the Montreal Cognitive Assessment (MoCA-HK) was a performance-based assessment, with minimal verbal requirement and good psychometric properties (Wong et al., 2009, 2018; Yeung et al., 2014). Comprehensive cognitive domains were also assessed by MoCA-HK, but the instrument did not use the dynamic assessment procedure. On the other hand, the Cantonese versions of Addenbrooke’s Cognitive Examination (Wong et al., 2013) and the Birmingham Cognitive Screen (Chan et al., 2013) were some other commonly used instruments. However, they were also not primarily designed for people with ID.

While research on the cognitive functions of individuals with ID was limited, the Chinese version of the Dementia Screening Questionnaire for Individuals with Intellectual Disabilities (DSQIID-CV) was the only validated tool for the ID population. However, it is an observer-rated instrument for screening dementia in the ID population (Li et al., 2015). The DSQIID-CV is not a performance-based assessment, limiting its use for longitudinal cognitive monitoring in comprehensive cognitive domains.

Diagnosing cognitive deterioration, such as

dementia, in individuals with ID is challenging, as their baseline cognition is already below average (Deb et al., 2007; Zeilinger et al., 2013). Determining whether performance is significantly below an individual’s previous abilities is difficult due to unknown premorbid functioning levels (Holland, 2000; Nagdee, 2011). When applying existing tools to the ID population, floor effects and the absence of cut-off thresholds may result in under-diagnosis of dementia (Chaplin et al., 2010; Perry et al., 2010; Tse et al., 2018).

### ***The Lowenstein Occupational Therapy Cognitive Assessment (LOTCA)***

The Lowenstein Occupational Therapy Cognitive Assessment (LOTCA) and its updated version, the Dynamic Lowenstein Occupational Therapy Cognitive Assessment (DLOTCA), were selected for development in the present study. The LOTCA, originally developed in 1989 to assess the cognitive functions of patients with brain injury, has been validated and applied in various countries and populations, including individuals with ID in Taiwan (Jang et al., 2009) and stroke patients in Hong Kong (Leung, 2003). The LOTCA was a performance-based assessment with minimal verbal/ speech requirements, with aims to assess comprehensive cognitive domains. The LOTCA met most of the selection criteria for the identification of suitable assessment for the adults with ID. The DLOTCA, as an updated version of LOTCA, could provide further insights into the cognitive functions of adults with ID as the dynamic assessment procedure was used, indicating that the instrument met all the stated selection criteria. The DLOTCA assessment battery consists of seven cognitive domains with 28 subtests. In addition to the LOTCA, the dynamic assessment procedure was used throughout the battery (except subtests on orientation and awareness), with 4 to 5-step mediation options based on the Toggia (1994). The dynamic procedures enable assessors to document the levels of mediation required for ID cases to complete the subtests, which could provide insights and guidance for planning of prompting strategies in the later training process.

Similarly to the LOTCA, good psychometric properties were also reported for the DLOTCA. Its psychometric properties were evaluated based on research involving two groups: stroke patients and a control group (Katz et al., 2012). Concerning reliability, the inter-rater reliability ranged from 0.90 to 0.98 ( $r(n)=10$ ). Moderately high internal

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consistency reliability was indicated by alpha coefficients of 0.81 for “perception” and 0.74 for “thinking operations”. For the areas of “perception”, “praxis”, and “verbal mathematical questions”,  $\alpha$  coefficients of 0.67, 0.65, and 0.60 were found, respectively. The subtest on shape identification was removed from the final version due to difficulties in naming by participants with lower educational levels. With respect to construct validity, the Mann-Whitney U tests were used to compare the performances before mediation between the two groups. The DLOTCA effectively distinguished between the healthy control and stroke groups, with healthy subjects performing better than the stroke group on most subtests (orientation, visual perception, spatial perception, and praxis at  $p < 0.05$ ) before mediation. Furthermore, the stroke group required significantly more time ( $p < 0.01$ ) to complete the subtests on visuomotor construction and thinking operations compared to the control group.

The DLOTCA was the only instrument that met all the selection criteria for identifying suitable assessments for individuals with ID, so it was selected for translating and applying to adults with ID in the present study.

## *Significance of the study*

Cognitive and perceptual dysfunctions significantly impact daily functioning and quality of life for individuals with ID. Assessing cognitive functions in this population is crucial for planning training and monitoring treatment outcomes. Early detection of potential cognitive decline can facilitate intervention for mild cognitive impairment or dementia.

Despite the availability of assessment tools in Hong Kong, research and local assessments focused on the cognitive functions of people with ID are limited. The DLOTCA meet the criteria mentioned by Lifshitz et al. (2005) for evaluating cognitive functions in adults with ID, with the DLOTCA’s mediation systems being particularly valuable. It has proven effective in assessing cognitive improvement in individuals with ID after a short intervention (Lifshitz et al., 2005).

While a Chinese LOTCA exists, the absence of a Chinese DLOTCA highlights the importance of this work. The present study aims to translate the DLOTCA into Chinese for people with ID, as a localized version will enhance assessment accuracy and facilitate intervention planning.

## **Methodology**

### *Research Design*

This research aimed to translate and apply the DLOTCA-CV for assessing adults with ID in Hong Kong. Six occupational therapists (OTs) were divided into two teams to independently draft translations of the entire DLOTCA. Within each team, different OTs were assigned sections to translate independently. Each translated section was then discussed and refined within the team until a consensus team version was reached. Next, an independent review moderator facilitated a joint discussion between the two teams. The two draft translations were compared and discussed until all discrepancies in translation were resolved. Finally, a senior occupational therapist acted as an adjudicator, resolving any remaining discrepancies and determining the final pilot version. The assessment tool was then tested in Chinese through a small-scale study to verify the translation.

### **Translation Process of the Chinese Dynamic Loewenstein Occupational Therapy Cognitive Assessment (DLOTCA-CV)**

#### *Procedure*

##### Stage I

Before the translation and cultural adaptation process began, the researchers emailed Yifat Schwartz, Head of the Occupational Therapy Department at Loewenstein Medical Rehabilitation Centre, and obtained permission for the translation and validation of the DLOTCA.

##### Stage II

After receiving permission, a panel of six occupational therapists conducted the forward translation from English to Chinese. The team used the Translation, Review, Adjudication, Pretest, and Documentation (TRAPD) approach (Harkness, 2011) to guide the translation process (see Figure 1)

##### Stage III

According to the Survey Research Centre (2016) guidelines, six occupational therapists were randomly divided into two teams to independently create draft translations of the entire assessment tool (DLOTCA). Before starting, the teams agreed to use idiomatic rather than literal translation methods (Larson, 1984). Within each team, therapists were assigned different

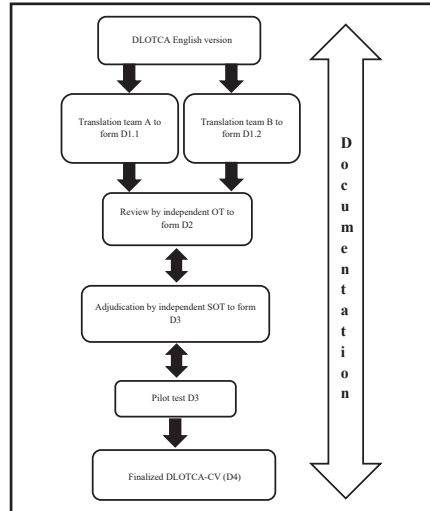


Figure 1: TRAPD team translation model (Harkness, 2011)

parts of the assessment to translate independently. The translations were then combined into team versions (D1.1 and D1.2) through discussion to ensure conceptual equivalence with the English version.

#### Stage IV

An independent review moderator, also an occupational therapist, facilitated a joint discussion between the two translation teams. The two translation drafts were compared, assessing semantic accuracy, cultural relevance, fluency, and comprehensibility. The reconciled version (D2) was synthesized from the initial drafts (D1.1 and D1.2).

#### Stage V

A senior occupational therapist acted as adjudicator to make final decision, understanding the research design and subject matter but not involved in the actual translation process. The adjudicator, along with the review moderator, resolved any discrepancies and decided on the pilot version (D3), which was ready for pretesting.

#### Stage VI

The pre-final version of the translated assessment was tested on a small sample to refine the translation. A convenience sample of individuals with ID was recruited from service centres of The Mental Health Association of Hong Kong. Verbal consent was obtained from each participant or their caregiver before participating in the study. They were informed

of the research objective and their right to withdraw from the study at any time without providing a reason. All information related to participants remained confidential and was identifiable only by codes known to the researcher.

#### **Participants**

##### ***Inclusion criteria:***

- a. Individuals with borderline, mild, moderate, or severe ID as an adult.
- b. Aged 20 to 70 years old.
- c. Receiving residential or day care services from The Mental Health Association of Hong Kong, including Day Activity Centre (DAC), Hostel for Moderately Mentally Handicapped Persons (HMMH), Hostel for Severely Mentally Handicapped Persons (HSMH), and Care and Attention Home for Severely Disabled Persons (C&A Home).

##### ***Exclusion criteria:***

- a. Hearing impairment
- b. Lack active control of bilateral upper limbs

#### Stage VII

The review moderator and adjudicator addressed all feedback from the pilot study. The final version of the DLOTCA-CV (D4) was produced when no

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further modifications were needed. Comprehensive documentation of translations, edits, and commentary ensures transparency and supports future work.

## Results

### *Translation of the DLOTCA-CV*

During the parallel translation of the DLOTCA-CV, versions D1.1 and D1.2 were produced. A word-for-word translation from English to Chinese proved difficult to read and did not convey the original text's meaning, especially for colloquialisms and idiomatic expressions. Therefore, an idiomatic translation approach was adopted to ensure the natural transfer of meaning in the target language.

An independent review moderator conducted a review meeting with the two translation teams to discuss the accuracy and fluency of the translations. Any discrepancies were resolved, leading to the creation of a reconciled version (D2).

The adjudicator further reviewed the D2 version, resulting in the pre-final version (D3). Table 1 summarizes the finalized version of technical terms used in the assessment.

The DLOTCA-CV incorporated colloquialisms and idiomatic expressions, particularly in the examiner's instructions. Below are adaptations aimed at aligning with Hong Kong culture (see Table 2).

**Table 1.**  
**The translation of technical term**

English Version	Team A	Team B	Final version after moderation
Subtest	子測驗	分測驗	子測驗
Orientation	定向	導向	導向
Awareness	意識	覺察	覺察
Visual Perception	視覺感知	視覺知覺	視覺感知
Spatial Perception	空間感知	空間知覺	空間感知
Praxis	動作計畫	動作運用	動作運用
Visuomotor Construction	視覺動作建造	視覺動作建構	視覺動作建構
Thinking Operations	思考操作	思考操作	思考運轉
Mediation	提示	協助	介入
Examiner	治療師	評估員	評估員
Client	參加者	個案	個案
Object Identification	物品識別	物體識別	物品辨認
Figure Ground	圖與底	圖形重疊	主題背景
Object Constancy	物品恆定性	物品一致性	物品一致性
Directions on Client's body	自身的方向	自己身體的方向	自己身體的方向
Spatial Relations between Client and Objects in Near Space	自身與附近物品的空間關係	自己與鄰近空間物品的空間關係	自己與附近物品的空間關係
Spatial Relationships in a Picture	圖片中的空間關係	照片環境中的空間關係	圖片中的空間關係
Motor Imitation	動作模仿	動作模仿	動作模仿
Utilization of Objects	物品使用	物品使用	物品的使用
Symbolic Actions	象徵性動作	象徵性動作	象徵性動作
Copy Geometric Forms	抄畫幾何圖形	繪畫幾何圖形	臨摹幾何圖形
Reproduction of a Two-Dimensional Model	拼出二維空間圖板	複製二度空間模型	拼出二維圖板
Pegboard Construction	孔板建造	孔板建構	孔板建構
Colored Block Design	彩色積木模型	彩色積木設計	彩色積木模型
Plain Block Design	原色積木模型	原色積木設計	原色積木模型
Reproduction of a puzzle	拼圖	拼圖	拼圖
Drawing a clock	繪畫鐘面	繪畫鐘面	繪畫鐘面
Categorization	分類	分類	分類
ROC Unstructured	無結構	無結構分類	無結構
Pictorial Sequence	圖片順序排列	圖片順序排列	圖片順序排列
Geometric Sequence	幾何形狀順序排列	幾何順序排列	幾何順序排列
Verbal Mathematical Questions	口頭數學問題	口頭數學問題	口頭數學問題
ROC Structured	結構	結構	結構

**Pilot test of DLOTCA-CV**

The D3 version was pilot tested on a convenience sample of seven service users with ID (four females and three males) for comprehensibility. Most of them fell within the age ranges of 21-40 (43%) and 41-60 (43%). Regarding the classification of ID, 43% were classified as mild, 29% as moderate, and both borderline and severe grades accounted for 14% each (see Table 3).

One service user withdrew from the assessment.

The others completed the assessment in over 120 minutes, exceeding the expected completion time of 45 to 90 minutes as suggested by the manual. Most of them (57%) finished the questionnaire within 2.5 hours (see Table 4).

**Feedback from researchers and service users after the pilot test**

During the pilot test, researchers observed the performance and behaviour of service users to

**Table 2.**  
**Cantonese translation commented by review moderator and adjudicator**

English Version	Cantonese Version
Pay attention, don't hurry	留心啲，唔使心急
Where is the	邊度
Try and correct it	做返啱佢
Some questions	一啲問題
I'll will ask you	我一陣會問你
Now	宜家
What	咩 / 乜嘢
Think	再諗下
How to dial	點樣撥電話
Use all the ....	用晒所有 .....
Tell me	話比我知
David, Dan, Sharon, Joan, Liz	小明、小華、小美、小欣、小怡

**Table 3.**  
**Characteristics of pilot test's service users**

Characteristics	Frequency (N=7)	Percent (%)
Sex		
Male	3	43
Female	4	57
Age		
Below 20	0	0
21-40	3	43
41-60	3	43
Over 61	1	14
Mentally handicapped		
Borderline	1	14
Mild	3	43
Moderate	2	29
Severe	1	14

**Table 4.**  
**Summary of completion time of assessment**

Duration of Assessment	Frequency (N=7)	Percent (%)
Under 2 Hours	0	0
2 to 2.5 Hours	4	57
Over 2.5 Hours	2	29
Cannot Complete	1	14

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evaluate which parts they encountered significant difficulties with. They also noted which aspects of the test were confusing and unclear for the users.

The English version of the DLOTCA was designed to assess basic cognitive skills and visual perception in adults with neurological deficits during hospitalization. However, some items did not fit well for the service users. The test duration was perceived as too long, which led to fatigue. In particular, the latter part of the assessment involved more abstract tasks, which was challenging for the participants. It is highly recommended that the entire assessment be completed over several sessions to address this issue. Additionally, complex mediation regimens and repeated testing caused anxiety and a sense of failure among participants. Certain items were unsuitable for individuals with poor upper limb function, even if their cognitive function was adequate.

Specific Chinese translation suggestions were

made for terms related to the “Thinking Operations” domain. For item 21: “each subtest” should be translated as “每項子測驗”, “cards” as “圖卡”, and “spreads cards” as “展示圖卡”. For item 22: “pieces” should be translated as “膠片” and “criterion” as “準則”. It was also recommended that a column be added to record the time used before and after mediation in the scoring sheet for subtest 12.

The review moderator and adjudicator agreed on some modifications, especially regarding translation issues on testing items and instructions to better fit Hong Kong service users with ID (see Table 5).

On subtest 5 to 28, researcher recorded the service user’s performance scores for each question (static score before mediation). The higher the score, the better the performance. The researcher must mediate if the service user did not achieve a perfect

**Table 5.**  
**Modifications on testing items and instructions after pilot test**

Items	English Version	Cantonese Version
1: Question 2	What community (city/town) are you in right now?	你宜家係邊區?
1: Question 4	Where were you before you came into this room?	你入嚟評估之前响邊?
2: Question 4	How long is it since you came to the hospital?	你來咗 (單位名稱) 幾耐?
3: Question 1	Why are you in the hospital? What happened to you?	知唔知點解你會嚟 (單位名稱) ?
4a: Question 1	How is your thinking and your memory? Have you noticed a change in your thinking or your memory lately?	你呢排專唔專心? 你覺得自己記性點樣呀? 同最近有無分別?

score. The service user was required to repeat the subtest to achieve the highest possible score. DLOTCA mediation principles was based on Toglia (1994) and included the following levels of intervention:

- Level I: General Intervention
- Level II: General Feedback
- Level III: Specific Feedback
- Level IV: Partial Intervention
- Level V: Copying or Subtracting Amount

Researchers provide mediation at each level to the service user. The researcher needed to record the service user’s performance scores again (static score after mediation) for each question, to achieve the highest

score for that subtest. If the service user still could not achieve a perfect score after Level V mediation, the score achieved was recorded as the performance score (static score after mediation). When comparing the static scores before and after mediation, 13 out of 24 subtests showed significant improvement. Due to the limited sample size in the pilot test, the Wilcoxon signed-rank test, a non-parametric rank test, was applied in the present study (see Table 6).

### Discussion

This pilot study found that applying the DLOTCA-CV for adults with ID is feasible. Local practitioners in Hong Kong often translate overseas



**Table 6.**  
**Comparisons of static score before and after mediation**

Questions		Static Score			Wilcoxon Signed Rank Test
		Mean	SD	Median	P-value
Object Identification (N =7)	Before mediation	1.7	1.11	1	.031*
	After mediation	3.9	.38	4	
Figure Ground (N =7)	Before mediation	2.0	.82	2	.034*
	After mediation	3.4	.53	3	
Object Constancy (N =7)	Before mediation	1.9	.69	2	.048*
	After mediation	3.1	.90	3	
Copy Geometric Form (N =7)	Before mediation	2.1	.69	2	.015*
	After mediation	3.3	.49	3	
Reproduction of a 2D Model (N =7)	Before mediation	2.0	.82	2	.019*
	After mediation	3.4	.53	3	
Pegboard Construction (N =7)	Before mediation	1.1	.38	1	.011*
	After mediation	2.1	.38	2	
Coloured Block Design (N =7)	Before mediation	2.9	1.35	3	.037*
	After mediation	3.6	1.51	4	
Plain Block Design (N =7)	Before mediation	2.1	.69	2	.020*
	After mediation	3.0	1.00	3	
Reproduction of a Puzzle (N =7)	Before mediation	1.1	.38	1	.020*
	After mediation	2.0	.58	2	
Drawing a Clock (N =6)	Before mediation	1.5	.84	1	.026*
	After mediation	2.7	.82	2.5	
ROC Unstructured (N =6)	Before mediation	2.3	.52	2	.037*
	After mediation	3.2	.41	3	
Geometrical Sequence A (N =6)	Before mediation	2.2	.41	2	.034*
	After mediation	4.0	1.10	4	
Geometrical Sequence B (N =6)	Before mediation	2.2	.41	2	.034*
	After mediation	4.0	1.10	4	

N= Number of participants needed mediation to complete assessment

\* p< .05 level

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instruments from English to Chinese for use in cognitive assessments for adults with ID. Most existing instruments focus on either informant-based measurement or self-report measures, primarily identifying or measuring cognitive changes. When screening for cognitive decline in individuals with ID, it is essential to assess the extent of deterioration from their premorbid level of functioning (Paiva et al., 2020).

In the feasibility analysis, 13 out of 24 subtests showed improved scores on retesting after different levels of mediation were applied. Scores improved on subtests such as copying geometric forms, reproduction of a 2D model, and geometrical sequence after retesting with Level 4-5 grading of mediation. This indicates that individual performance could be enhanced with more demonstration and practice. However, for subtests such as categorization and pictorial sequence, the retest scores remained unchanged even after Level 5 mediation. This suggests that learning is required to gain more experience with unfamiliar and abstract objects. Although the mediation process is structured for each subtest, therapists select the best options based on the performance of the adults with ID.

Using the DLOTCA, which the DLOTCA-CV is based on, involves a dynamic assessment approach that allows therapist-client interaction. The therapist will follow the mediation guidelines systematically modifying the task through prompts or other forms of mediation to improve the individual's performance (Katz et al., 2012). This is particularly important for adults with ID, who may have limited spontaneous performance but can enhance their cognitive skills with appropriate support. Dynamic assessment emphasizes individual variations, recognizing that every adult with ID is unique. The study results demonstrated that assessment scores help therapists understand individuals' cognitive abilities and impairments. It also identifies the learning potential and improvement skills for adults with ID, which is crucial for therapists to determine an appropriate and effective intervention plan tailored to each individual's needs.

Although evidence supports the feasibility of applying DLOTCA to individuals with ID, the administration, interpretation, and familiarity with the content can affect performance. Occupational therapists who participated in the pilot test of DLOTCA-CV reported encountering difficulties with the content, execution, and scoring criteria.

### Content

Researchers reported that some tasks in the DLOTCA were culturally irrelevant to the people of Hong Kong. These tasks included naming objects like teapots (in subtest 5 "Object Identification"), identifying gardening tools (in subtest 21 "Categorization") and performing symbolic actions like slicing bread (in subtest 13 "Symbolic Actions"). The assessment required a high level of receptive and expressive language ability and motor skills, particularly in the categorization, pictorial sequence, and object utilization subtests. This suggests limitations in the assessment's ability to accurately evaluate cognitive function for individuals with moderate to severe ID, expressive aphasia, or physical impairments, due to the high language and motor demands.

This mismatch between the assessment requirements and the capabilities of the target population may cause difficulties in interpretation and execution, potentially confounding the validity of the results. Additionally, some instructions were found to be too long, complex, and stilted for therapists to administer, which may have resulted in client misinterpretation and underperformance. Therefore, this issue should be one of our great considerations when making further modifications in the instruction part for DLOTCA-CV.

Since the DLOTCA was originally designed for adults with neurological problems rather than ID, the unique challenges faced by the ID population - such as attention, communication, learning, and memory - may not have been adequately addressed. Some tasks were deemed inappropriate and overly complicated for ID cases. Multistep instructions also posed a significant challenge for these individuals to remember, understand, and follow.

Furthermore, for the timed subtests, the results may not accurately reflect the cognitive abilities of individuals who were unable to complete the tasks within the given time limit. So, the exact time for clients to complete the tasks should be taken into consideration to overview the actual cognitive abilities of clients, especially for those with moderate to severe grade ID. Similarly, questions related to hospitalization ("How long is it since you came to the hospital?") and injury ("Why are you in the hospital?"), used to assess orientation and awareness, were found to be irrelevant to the daily lives of individuals with ID, as most of the target clients are living in the community rather than in a hospital.

Thus, these hospital-related questions are found to be an incomplete means of evaluating the level of orientation and awareness in cases of ID.

Regarding the functionality of the tasks, some test items were considered “abstract and unfamiliar”, such as copying geometric forms and demonstrating how to cut bread with a knife. These tasks were performed out of context, and some individuals lacked the relevant real-life experience to complete them effectively (Rodger et al., 2005).

### Test Administration

The dynamic assessment process using mediation, while useful for evaluating cognitive improvement after intervention, also lengthened the test duration by requiring repeated tasks to obtain higher scores. This resulted in a decrease in the individual’s attention and tolerance. Moreover, the repetitive nature of the mediation process sometimes affected the motivation of the individuals and caused potential self-esteem issues. One case reported feeling exhausted after being given mediation from level 1 to level 4/5 and started to self-blame for “not being smart enough to complete the tasks”. This repetitive process even led some individuals to become off-task (Thompson et al., 2018). Adaptation of administration based on individual needs could be made, including breaking down the assessment into multiple sessions to prevent exhaustion.

The complexity of the DLOTCA-CV test and mediation cues required examiners to devote significant time to preparation and practice to ensure a smooth administration of the assessment. Consequently, when the research team first attempted to administer the pilot test of DLOTCA-CV, the duration of the test was much longer than expected. This was because the examiners, who were using the tool for the first time, had to navigate the complexity of the test and interpret the scoring.

### Scoring Criteria

Although the DLOTCA is generally considered reliable in various subtests, including those in the thinking operations group, the scoring descriptions for the assessment can be intricate, with detailed categorization and ROC (receiver operating characteristic) analysis, making it challenging for examiners to read and rate performance. Additionally, the scoring instructions for some subtests, such as copying geometric forms, reproducing a puzzle, and drawing a clock, may be inadequate or confusing. Without clear guidelines on what constitutes

acceptable or unacceptable performance in these drawing-based subtests, it can be difficult for examiners to rate cases effectively. Incorporating more accurate and valid pictorial descriptions of the marking criteria for these subtests could help improve the assessment process.

Moreover, some subtests have time requirements, but the scoring sheet may not provide a designated space for formal documentation of the time taken. This could lead to missing data and incomplete results.

### Future Direction

The pilot study has demonstrated the potential of DLOTCA-CV as a feasible tool to assess a wide range of cognitive abilities in individuals with ID, while also facilitating cognitive function improvement through mediation. However, several issues were encountered during administration, such as complexity, length, and language use (cultural relevance and idiomatic expression).

To address these concerns and enhance the utilization of DLOTCA-CV in Hong Kong for individuals with ID, several modifications can be considered:

- 1. Careful Revision of the Cantonese Translation:** The wording should be chosen and modified after a thorough understanding of the assessment procedure and scoring criteria. It is essential to balance the intended assessment, cultural relevance, and comprehension level of individuals with ID in Hong Kong.
- 2. Adaptation of Administration Based on Individual Needs:** Examiners should assess the attention span and level of tolerance of the participants. The assessment can be adapted and administered in a manner that suits the needs and abilities of adults with ID. This could include breaking down the assessment into multiple sessions, dividing complex tasks into smaller, manageable steps, and incorporating visual supports to guide the actions and sequence of steps.
- 3. Modifications to the Scoring Sheet and Test Materials:** Changes may be needed, such as adding a column for recording time, clearly indicating which materials are used in certain subtests, and including visual directions for the participants to follow.

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After addressing the translation issues, further studies could recruit more individuals with ID in Hong Kong to explore the validity and level of utilization of the DLOTCA-CV in assessing the cognitive function of this population.

## Conclusion

The pilot study on the application of the DLOTCA-CV assessment in Hong Kong for individuals with ID has revealed both benefits and challenges in its implementation. On the positive side, the DLOTCA-CV has demonstrated its potential as a user-friendly and comprehensive tool to assess a wide range of cognitive abilities in the ID population. It can also facilitate the improvement of cognitive functions through the embedded mediation process, making it a promising assessment approach for supporting the cognitive development of adults with ID in Hong Kong.

The process of translating and adapting the DLOTCA-CV has resulted in a version that is culturally and linguistically suitable for adults with ID in Hong Kong. Despite initial challenges related to test duration and item suitability, the modifications made based on user feedback have enhanced the assessment's reliability and validity. This adapted version demonstrates feasibility for implementation in Hong Kong, providing a valuable tool for occupational therapists to better understand and address the cognitive and perceptual needs of adults with ID.

## 摘要

### 翻譯和應用動態洛文斯頓職業治療認知評估 (DLOTCA) 於香港智力障礙的成人

**背景與目的：**動態洛文斯頓職業治療認知評估 (DLOTCA) 是一份用作評估成人的認知技能及視覺感知的工具。而本研究旨在將 DLOTCA 翻譯成廣東話，並嘗試應用於香港的智力障礙成人身上，以確保其文化及語言的適切性。

**方法：**七位職業治療師參與翻譯工作，採用符合本地語言習慣的翻譯方法，過程包括平行翻譯、審查會議及裁定，最終形成測試版本。隨後職業治療師用該版本為七名智力障礙服務使用者進行測試，以評估其易讀程度及可行性。

**結果：**參與者年齡介乎 21 至 60 歲，具有不

同程度的智力障礙。一名參與者未有完成評估，其餘六名參與者需要用超過 120 分鐘完成評估，超出預期的 45 至 90 分鐘。結果顯示，某些項目對上肢功能較弱的參與者的挑戰較大；測試時間過長亦容易使參與者感到疲勞和焦慮，需要進一步調整評估的執行程序和長度。

**結論：**本研究成功將 DLOTCA 初步翻譯成符合香港文化的版本，並應用於香港有智力障礙的成人身上，為職業治療師提供了一份有效了解智力障礙人士認知能力的評估工具。

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