Dynamic Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version (DLOTCA–G): Assessing Change in Cognitive Performance

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KEY WORDS
- aged
- cognition
- learning
- outcome assessment (health care)
- stroke

OBJECTIVE. We studied the internal consistency reliability and construct validity of the new Dynamic Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version (DLOTCA–G), a dynamic version of the Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version (LOTCA–G), and examined the properties of the mediation system.

METHOD. Participants included 61 clients hospitalized after stroke in three rehabilitation centers (mean age = 77.6 yr, standard deviation [SD] = 6.2) and 52 healthy control participants (mean age = 77.8 yr, SD = 6.4). All participants were assessed with the DLOTCA–G.

RESULTS. Internal consistency reliability showed moderate to high $\alpha$ coefficient levels in all domains ($\alpha$s = .68–.85) except the Memory domain ($\alpha$ = .26). Both groups benefitted from mediation, but the stroke clients needed more concrete levels of mediation (Levels 3–5).

CONCLUSION. The addition of mediation to the LOTCA–G is effective in providing insights into clients’ cognitive status and learning potential. Our findings are similar to the results of the validation study for the DLOTCA for adults and support the use and benefits of the dynamic version.


The Dynamic Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version (DLOTCA–G) is a new version of the Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version (LOTCA–G), a battery used to assess basic cognitive skills in the older adult population. The new DLOTCA–G uses mediation guidelines and scoring that are based on the ideas and the system developed by Toglia (1994), with her permission, and adapted to the specific subtests of the assessment (Bar-Haim Erez & Katz, 2003; Elazar, Itzkovich, & Katz, 1996; Itzkovich, Averbuch, Elazar, & Katz, 2000; Katz, Golstand, Traub Bar-Ilan, & Parush, 2007; Katz, Itzkovich, Averbuch, & Elazar, 1989; Katz, Parush, & Traub Bar-Ilan, 2005).

Dynamic Assessment

Conventional standardized cognitive tests are static in nature and aim to identify and quantify cognitive deficits (Toglia, 2005). However, such static tests fall short of the goal of estimating the ability to learn (Guthke & Beckmann, 2000). Dynamic assessment is a form of assessment that addresses the issue of learning potential. The goal is to measure how and to what extent performance can improve with guidance (Haywood & Lidz, 2007). It is an interactive procedure that systematically and objectively measures the degree of change that occurs in response to cues, strategies, feedback, or task conditions that are introduced during testing. In contrast to static assessment,
dynamic assessment focuses on individual variations and changes rather than on comparison with normative or typical performance.

In recent years, awareness has increased of the potential ability of dynamic assessment techniques to enable professionals to estimate a person’s potential for learning or receptiveness to instruction (Feuerstein & Feuerstein, 1991). Dynamic assessment is based on Vygotsky’s (1978) concept of the zone of proximal development, which refers to the discrepancy between what a child can do independently and what he or she can do with the help and guidance of others (Grigorenko & Sternberg, 1998; Sternberg & Grigorenko, 2002). This concept is similar to the mediated learning experience that Feuerstein and colleagues (1979; Feuerstein et al., 1980; Hadas-Lidor & Weiss, 2005). In dynamic assessment, mediation is defined as the process by which the tester or evaluator provides cues that may facilitate the person’s ability to perform the task better.

Toglia (1994, 2005) introduced the use of a structured, graded system of cues (i.e., a mediation process) to the assessment of cognitive and perceptual deficits among adults with cognitive impairments. Following in the footsteps of earlier dynamic cognitive theorists, she believed that the examiner could learn about underlying information processing strategies by observing a client’s responses to such cues. In this way, dynamic assessment becomes naturally linked to intervention and can be used as a baseline for choosing and designing an intervention program (Lidz, 1992; Lidz & Elliot, 2000; Toglia, 1994). Toglia and Cermak (2009) demonstrated that clients with unilateral neglect who received an intervention based on dynamic assessment showed significant differences on an object search task compared with a control group who did not receive cues; the treatment group demonstrated greater initiation of left-sided search and reduced neglect.

In dynamic assessments, such as the DLOTCA–G, a person’s initial incorrect response is not taken as the final product of the evaluation task. Instead, the examiner uses a systematic approach to modify the task through prompts or other forms of mediation to understand the type of information the person requires for the optimal performance of the task. This feature, which is unique to dynamic assessments, also enables the examiner to collect information that can be helpful in developing effective remediation strategies (Lidz, 1992). Indeed, the use of such feedback during and after testing demonstrates how dynamic assessment ascribes to the basic principle of the learning test concept: that learning can take place even within the actual testing process (Hadas-Lidor & Weiss, 2005; Haywood & Lidz, 2007; Katz et al., 2007).

LOTCA–G Psychometric Properties

The LOTCA–G was developed in response to clinical experience showing that elderly clients had difficulties in performing the LOTCA that may be related to the normal aging process, such as difficulty in seeing or manipulating small objects or in coping with a lengthy test procedure. The LOTCA–G version was made shorter, items were enlarged and details reduced, and a short memory screen was added. Currently, the LOTCA–G is used to obtain a detailed cognitive profile of older adult clients with neurological deficits, enabling intervention planning for management and maintenance and caregiver guidance.

The LOTCA–G was standardized and has been assessed for reliability and validity in various populations. Katz, Elazar, and Itzkovich (1995) did the initial development and established validity. Their findings supported construct validity, indicating that healthy older adult clients performed better on the geriatric version than on the adult LOTCA version. The LOTCA–G version appears to compensate for the performance limitations that result from the normal aging process. Also, significant differences were found between healthy older adults and older adults who had experienced a stroke; healthy people performed better than those who exhibited deficits.

A second study was conducted with 72 healthy people from the greater Boston area (Katz, Champagne, & Cermak, 1997). This study examined the Puzzle Reproduction subtest and supported the validity of using the simplified version with older clients. Another study examined the performance of 30 people with dementia versus 43 healthy older control participants (Bar-Haim Erez & Katz, 2003). Results showed significant differences between healthy elderly people and people with dementia in all LOTCA–G domains. On the basis of scores on the Mini–Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975), most LOTCA–G subtests differentiated between people with mild dementia (MMSE scores of 20–23) and people with moderate dementia (MMSE scores of 16–19), suggesting that the LOTCA–G is sensitive to levels of dementia. Also, significant moderate
correlations were found between the LOTCA–G domains and MMSE score.

After the transformation of the DLOTCA from a static to a dynamic model of assessment (Katz, Livni, Bar-Haim Erez, & Averbuch, 2011), we sought to apply the same evaluation process to the geriatric version, the DLOTCA–G, with the same objectives: to identify the cognitive abilities and disabilities of an older adult in the different domains, to measure his or her potential for learning and change, and to identify the most beneficial mediation levels in each domain. This study had three purposes: (1) to study the psychometric properties, internal consistency reliability, and construct validity of the new DLOTCA–G, a dynamic version of the LOTCA–G; (2) to examine the contribution of mediation to performance on the DLOTCA–G subtests; and (3) to examine which levels of mediation are most frequently required in the different domains by older clients after stroke and by healthy older control participants.

Method

Research Design

The study design is a comparative study between stroke clients and healthy control participants to establish the psychometric properties of the DLOTCA–G. The Lowenstein Rehabilitation Hospital, Beit Balev, Macabbi Bat Yam, Beit Rivka Hospital, Petah Tikva, and Herzog Hospital, Jerusalem, human rights committees approved the study, and every participant signed an informed consent before testing.

Instrument

The DLOTCA–G (Katz, Averbuch, & Bar-Haim Erez, 2011) is a battery consisting of 24 subtests in eight cognitive domains: Orientation, Awareness, Visual Perception, Spatial Perception, Praxis, Visuomotor Construction, Thinking Operations, and Memory. The battery is designed to assess cognitive performance in older adults age ≥70 yr. The objectives of the assessment are as follows:

- Identify the cognitive abilities and disabilities of the person in the different domains.
- Measure learning potential and change.
- Recognize thinking strategies through the use of dynamic assessment.
- Identify the person’s level of awareness of his or her condition and cognitive disabilities.

The DLOTCA–G is a dynamic assessment. Thus, the evaluator uses a four- or five-step mediation option in each subtest in five of the domains: Visual Perception, Spatial Perception, Praxis, Visuomotor Construction, and Thinking Operations. The mediation and set of cues are based on those developed by Toglia (1994), which were adapted and structured with her permission for the Dynamic Occupational Therapy Cognitive Assessment for Children (Katz et al., 2007) and, later, for the DLOTCA (Katz, Livni, et al., 2011) and DLOTCA–G (Katz, Averbuch, et al., 2011). The mediation process is graded from general to specific cues. The following five levels of mediation are provided for each subtest:

- **Level 1:** General intervention—“Pay attention, don’t hurry….”
- **Level 2:** General feedback—“Is that exactly the same?” “How many parts do you see?” “Where is the . . . ?”
- **Level 3:** Specific feedback—The examiner points to the error: “You made a mistake here. . . . Try and correct it.”
- **Level 4:** Structured category—The examiner gives cues through the use of key points.
- **Level 5:** Copying or subtracting amount—The examiner performs the task and then asks the client to perform it, or the examiner reduces the number of stimuli (e.g., the number of cards in the categorization task) and then asks the client to complete the task.

Administration of the entire battery takes 1–2 hr, depending on the amount of mediation needed. If the client is unable to complete the assessment in one session, it is possible to administer it in more than one session within a reasonable period of time.

In the domains of Visuomotor Construction and Thinking Operations, the performance time is measured for each subtest, with a maximum of 2 min before mediation starts. The scoring consists of three components for each subtest: a basic before-mediation score (in which higher scores indicate better performance), a mediation score (1 = little mediation and 5 = extensive mediation), and an after-mediation score (in which higher scores indicate better performance).

Participants

Clients with stroke were recruited from three rehabilitation centers and were entered into the study consecutively, and healthy participants who volunteered for the study were included as controls. Inclusion criteria for all participants were a score above the cutoff point of 24 for dementia on the MMSE and age >69 yr. In addition, only clients who had had their first stroke were included in the study. People with any previous neurological or psychiatric illness or with severe unilateral neglect and aphasia were excluded from the study.
Procedure

All prospective participants were first assessed with the MMSE, and only those who met the inclusion criteria (i.e., score ≥24 and age >69 yr) were entered into the study. All participants were assessed with the DLOTCA–G, administered over one or two sessions. Assessment sessions lasted no more than 1 hr according to the participant’s level of fatigue or attention span. If needed, a second session was conducted within a few days of the first.

Data Collection and Analysis

Six experienced occupational therapists, trained to administer the instrument by the test developers and authors of this article, collected the data. They had all practiced administering the DLOTCA–G with guidance before collecting data, and all participated in the study establishing interrater reliability for the DLOTCA, which showed Spearman correlation coefficients between all pairs of .90–.98 (Katz, Livni, et al., 2011).

After data collection, we calculated Cronbach’s α for internal consistency reliability of the DLOTCA–G domains. We also calculated means and standard deviations of the performance scores of each group on each DLOTCA–G domain and performed two sample t-tests comparisons between the healthy control and stroke groups on the domain scores from before and after mediation for level of mediation and performance time. We calculated frequencies for each level of mediation in each domain to examine the change within each group from before to after mediation. We then performed a paired t-test for participants who needed mediation and calculated Cohen’s d effect sizes.

Results

Participants included 61 clients with stroke (mean age = 77.6 yr, standard deviation [SD] = 6.18; mean yr education = 10.11, SD = 4.66) and 52 healthy control participants (mean age = 77.8 yr, SD = 6.36; mean yr education = 11.10, SD = 3.86).

Internal Consistency Reliability

The α coefficient level in each domain of the battery was found to be high, ranging from .68 to .85, except in the Memory domain (Visual Perception = .71; Spatial perception = .85; Praxis = .79; Visuomotor Construction = .83; Thinking Operations = .68; Memory = .26). Further analysis of the intercorrelations within the subtests of the Memory domain revealed a low but significant correlation between the first subtest, Famous Personality, and the second subtest, Personal Possession (r = .27, p = .004). Correlations between these two subtests and the Everyday Objects subtest were very low and not significant.

Construct Validity

Means and standard deviations, including quartiles, of the performance scores of each group on all domains before and after medication are presented in Tables 1 and 2. Moreover, we used two sample t-tests to compare the performance of the healthy control participants and stroke clients on the DLOTCA–G domains before and after medication and levels of medication and performance at Time 3. For all the domains, significant differences existed between the groups before medication. Healthy participants performed better, requiring less medication and shorter performance times. Although performance after medication was also better in the healthy group, the differences were not statistically significant. Examination of the quartiles data reveals that overall, healthy participants achieved maximal scores at the 50% quartile, whereas clients with stroke achieved maximal scores at the 75% quartile.

Mediation Process

A comparison of the before- and after-mediation scores of the clients with stroke who needed mediation reveals that they benefited from mediation in three domains: Praxis, Visuomotor Construction, and Thinking Operations (see Table 3). Clients showed deficits in these domains at baseline and significantly improved their scores after mediation. The clients’ scores in the Visual Perception and Spatial Perception domains were already high in the static evaluation. Effect sizes were moderate in two domains, Praxis and Thinking Operations. Healthy participants showed significant differences after mediation in two domains: Spatial Perception and Thinking Operations (see Table 3); the effect size was high in those domains. Some healthy participants did not reach maximal scores in the Visuomotor Construction and Thinking Operations domains even after mediation. Further analysis of the subtests of each domain revealed that, on average, the lowest scores were obtained in the colored block design and clock drawing (Visuomotor) tasks and in the categorization task (Thinking Operations).

The two histograms in Figure 1 illustrate the distribution of the types of mediation used in each domain for both groups separately. Overall, the clients with stroke needed more mediation than the healthy participants. Both groups needed the greatest amount and highest levels (structured category and reduced amount) of mediation in the Visuomotor Construction and Thinking
Operations domains. The most frequent type of mediation required was specific feedback.

Discussion

The purpose of this study was to determine the reliability and validity of the DLOTCA–G, a new version of the LOTCA–G that transformed it from a static to a dynamic format. This study was performed in line with the validation process of the DLOTCA version for adults, and the findings are similar (Katz, Livni, et al., 2011). In the current study, moderate to high internal consistency was found in all domains of the DLOTCA–G except memory. This exception may be attributable to the structure of the Memory domain, which contains only three subtests that examine different constructs of memory. The subtests of Famous Personality and Personal Belongings examine prospective memory, and the Famous Personality condition has a greater long-term memory component. In contrast, the Everyday Objects subtest examines memory recognition, which is affected more by attention. Further exploration of this issue may improve the psychometric properties of the DLOTCA–G.

Healthy control participants and clients with stroke differed significantly in their performance in the Memory domain. The clients with stroke scored lower than the healthy participants on all three subtests and, on average, displayed greater difficulty in performing the Everyday

### Table 1. Performance on DLOTCA–G Domains Before and After Mediation, by Group (Two-Sample t-Test Analyses)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Healthy Control Participants</th>
<th>Clients With Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quartiles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Orientation</td>
<td>52</td>
<td>1.96</td>
</tr>
<tr>
<td>Visual Perception</td>
<td>Before mediation</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>12</td>
</tr>
<tr>
<td>Spatial Perception</td>
<td>Before mediation</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>10</td>
</tr>
<tr>
<td>Praxis</td>
<td>Before mediation</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>48</td>
</tr>
<tr>
<td>Visuomotor</td>
<td>Construction</td>
<td>Before mediation</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>48</td>
</tr>
<tr>
<td>Thinking Operations</td>
<td>Before mediation</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>48</td>
</tr>
<tr>
<td>Memory</td>
<td>[1–4]</td>
<td>51</td>
</tr>
</tbody>
</table>

Note. Mediation levels are reported only for those who needed mediation. DLOTCA–G = Dynamic Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version; M = mean; SD = standard deviation. Numbers in brackets indicate score range.

* p < .05. ** p < .01.

### Table 2. Performance on DLOTCA–G Domains, Levels of Mediation, and Performance Times, by Group (Two-Sample t-Test Analyses)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Healthy Control Participants</th>
<th>Stroke Clients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quartiles</td>
<td>Quartiles</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Visual Perception</td>
<td>Before mediation</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>25</td>
</tr>
<tr>
<td>Spatial Perception</td>
<td>Before mediation</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>25</td>
</tr>
<tr>
<td>Praxis</td>
<td>Before mediation</td>
<td>52</td>
</tr>
<tr>
<td>Thinking Operations</td>
<td>Before mediation</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>After mediation</td>
<td>49</td>
</tr>
</tbody>
</table>

Note. Mediation levels reported only for only those who needed mediation. DLOTCA–G = Dynamic Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version; M = mean; SD = standard deviation.

** p < .01.
Objects task (26.2% of clients had difficulty with this task, with scores ranging from 2 of 4 to 3 of 4). Although they scored higher on average, however, the healthy participants did not reach the maximal scores on the Everyday Objects subtest (13.8% scored 3 of 4). Only 2 healthy participants displayed difficulties on the other subtests, whereas 16.4%–19.7% of clients with stroke demonstrated difficulties in performance. The performance of these 2 healthy participants may be in line with the age-related memory decline reported in the literature (Levy, 2005, 2011; Small, 2001; Zehnder, Martin, Altgassen, & Clare, 2009).

Results of the current study support the use of the DLOTCA–G in the evaluation of clients with stroke. The data demonstrated differences between the scores of healthy participants and clients who had experienced a stroke in the basic cognitive processes assessed before mediation using the static form of evaluation. It was also apparent that the healthy participants needed less cueing than the clients with stroke. This trend is the same as that discovered in the DLOTCA research, supporting construct validity for the geriatric version as well. Nevertheless, the healthy participants did show deficits in areas such as visuomotor construction and thinking operations, supporting research indicating that increasing age is associated with lower levels of cognitive performance (Levy, 2005). Levy (2011) stated that the sensory decline and changes (e.g., in vision, hearing, taste, smell, vestibular system, and proprioception) experienced by older adults cause restricted information processing that, in turn, affects cognitive functions.

Another cognitive process that affects the performance of older adults is the speed of the learning process, which decreases with increasing age (Salthouse, 1996). Although it appears that older adults retain the ability to learn and remember, it may take them longer to process and retain

### Table 3. Mean Before- and After-Mediation Scores in the DLOTCA–G Domains (Paired t Tests)

<table>
<thead>
<tr>
<th>Domain and Mediation</th>
<th>Clients With Stroke</th>
<th>Healthy Control Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual Perception</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>3.22 (0.70)</td>
<td>3.58 (0.29)</td>
</tr>
<tr>
<td>After</td>
<td>3.41 (0.80)</td>
<td>3.79 (0.39)</td>
</tr>
<tr>
<td><strong>Spatial Perception</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>0.67 (0.25)</td>
<td>0.81 (0.17)</td>
</tr>
<tr>
<td>After</td>
<td>0.79 (0.35)</td>
<td>1.00 (0.00)</td>
</tr>
<tr>
<td><strong>Praxis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>1.35 (0.41)</td>
<td>1.72 (0.16)</td>
</tr>
<tr>
<td>After</td>
<td>1.57 (0.45)</td>
<td>1.74 (0.45)</td>
</tr>
<tr>
<td><strong>Visuomotor Construction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>3.29 (1.14)</td>
<td>4.01 (0.83)</td>
</tr>
<tr>
<td>After</td>
<td>3.56 (1.23)</td>
<td>4.19 (1.15)</td>
</tr>
<tr>
<td><strong>Thinking Operations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>2.64 (1.18)</td>
<td>3.41 (0.96)</td>
</tr>
<tr>
<td>After</td>
<td>3.48 (1.43)</td>
<td>4.26 (1.15)</td>
</tr>
</tbody>
</table>

**Note.** DLOTCA–G = Dynamic Lowenstein Occupational Therapy Cognitive Assessment–Geriatric Version; *M* = mean; *SD* = standard deviation. *p < .05. ***p < .001.
complex new information. Evidence has indicated that if older adults take the time and make the mental effort to learn, they will remember what they learned as accurately as younger adults (Albert, 2002; Levy, 2011). The development of the original LOTCA–G took these sensory changes and decline into consideration (Katz et al., 1995), and in addition, the new dynamic version provides opportunities to perform tasks in an optimal manner by using mediation strategies to assist in learning and performance.

**Implications for Occupational Therapy Practice**

As Toglia and Cermak (2009) stressed, dynamic assessment supplements static assessment by enabling the examination of learning potential. The value of the new DLOTCA–G is in providing the advantages of dynamic principles in assessment. These benefits were revealed in the analysis of the mediation process, which indicated that significant differences were found in both groups from before to after mediation, strengthening the contention that dynamic assessments can lead to learning and change.

The results of the present study therefore have the following implications for occupational therapy practice:

- This form of valuation, in which clinicians explore how best to assist clients in improving their cognitive performance and learning, creates a link between evaluation and treatment. Practitioners can translate information about which level of mediation best assists a specific client into more effective treatment.
- This study also highlighted the benefits of dynamic assessment for the healthy participants, who also improved their performance as a result of the mediation process. The static portion of the assessment indicated that a certain percentage of the healthy participants exhibited some cognitive decline; however, after mediation, the performance of almost all of them reached normal levels. This finding suggests that the use of appropriate approaches and strategies can enable older adults who exhibit normal declines resulting from aging to perform well.
- Levy (2011) argued that the intervention strategies occupational therapists use are meant to help older adults learn more effectively.

![Figure 1. Distribution of mediation levels within the (A) stroke and (B) healthy participant groups.](http://ajot.aota.org/pdfaccess.ashx?url=/data/journals/ajot/929907/ on 11/09/2018 Terms of Use: http://AOTA.org/terms)
adults better understand the changes they are undergoing and develop alternative strategies to manage the cognitive problems they experience that interfere with overall occupational performance, productivity, and quality of life. She called on practitioners to introduce specific intervention strategies to enable older adults to compensate for their increased problems, particularly those that interfere with the learning and retrieval of newly acquired information. Thus, practitioners need to include new methods of assessment like the DLOTCA–G that shed light on the type of treatment that can facilitate learning and improved performance.

- We suggest that using dynamic assessments in evaluating older adults is essential to reveal their abilities and learning potential and provides practitioners with the optimal tools for intervention planning (Toglia, 2005; Toglia & Cermak, 2009).

**Limitations and Future Research**

The current study has some limitations that must be acknowledged. The sample sizes are not large, and the sample of clients with stroke comprised only people who had their first stroke. Further research is needed on larger samples of healthy participants and clients with stroke and on other client populations with various neurological disorders. Studies should examine cultural differences, especially with respect to the appropriate system of mediation. Such studies are already underway for the DLOTCA. In addition, the Memory domain included in the geriatric version needs further study in light of the low internal consistency reliability found for its subtests. ▲

**Acknowledgments**

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**References**


