

LOTCA – Assessment review
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LOTCA Summary Page

The Loewenstein Occupational Therapy Cognitive Assessment (LOTCA) is a series of tests designed for occupational therapists to look at a person's cognitive processing ability and to determine whether a person is able to carry out everyday functional tasks (LOTCA Manual, 2000). The battery can also be used to determine where to begin in intervention, to help set goals for intervention and as a follow up tool to check for improvement during intervention. It was originally designed by Katz, Elazar, Everbach and Itzkovich to be used on brain injured clients, but can be used with many different clients such as: patients following stroke, spinal cord injured, individuals with dementia or brain degeneration, traumatic brain injury patients, brain tumour patients, individuals with CNS dysfunction, individual's with intellectual disability, mental illness patients, and children with learning difficulties. The LOTCA can be used on persons above age 6 through to age 70 years. There is a geriatric version called the LOTCA-G suitable for age 71-90years, and an adapted version can be used for children or adults with intellectual impairment and language difficulties (LOTCA Manual, 2000).

The original LOTCA was developed in 1990 and consists of 20 sub-tests within 4 areas; orientation, perception, visuomotor organization and thinking operations, however, the revised edition LOTCA-II consists of 26 sub-tests within 6 areas: Orientation (2 items); Visual Perception (4 items); Spatial Perception (3 items); Motor Praxis (3 items); Visuomotor Organization (7 items); and Thinking Operations (7 items) . It is scored on a scale from 1-4 (1 being poor performance, through to 4, being optimal performance), except for 3 categorizing tests, which score on a 1-5 scale and 2 orientation sub-tests which score on a 1-8 scale. At the end, the scores are tallied to give a possible score between 26 and 115. The LOTCA and LOTCA-II take approximately 45 minutes to administer. The LOTCA-G takes approximately 30-45 minutes to administer. There are specific instructions and specifications to consider when administering the LOTCA, these are all located in the administration section of the manual.

Several studies have been carried out on the use of the LOTCA/LOTCA-II providing reliability, validity and standards of performance for brain injured and CVA Adults patients, healthy adults and healthy children ages 6-12years (Averbuch & Katz, 1991; Cermak, Katz, McGuire, Greenbaum, Peralta & Flangan, 1995; Katz, Itzkovich, Averbuch & Elazar, 1989 as cited in; Katz, Elazar, & Itzkovich, 1995). Studies have also been carried out validating the reliability of the LOTCA-G version for elderly patients. The strengths of the LOTCA are that it provides a comprehensive analysis of cognitive function in a relatively short amount of time and weaknesses are that it doesn't incorporate memory testing and doesn't pick up mild cognitive deficiencies.

Overall, the LOTCA/LOTCA-II is a good Micro-battery that the OT can use in conjunction with informal/formal interviewing processes and functional/observational assessments of the client, to establish their cognitive ability to perform daily occupations. Furthermore, to establish goals for intervention and as a screening tool, during and after intervention.

The Loewenstein Occupational Therapy Cognitive Assessment (LOTCA)

Background information and client groups

The Loewenstein Occupational Therapy Cognitive Assessment (LOTCA) is a series of tests designed for occupational therapists, to look at a person's cognitive processing ability and to determine whether a person is able to carry out everyday functional tasks (LOTCA, 2011). The Battery was developed using information gathered from clinical experience, neuropsychological and developmental theories. In addition to determining a patient's abilities and deficits, the battery can be used to develop intervention goals for therapy and as a follow up screening tool during intervention to detect for improvement (Annes, Katz & Cermak, 1996). It was initially developed, by the Loewenstein Rehabilitation hospital (LRH), as a tool for evaluating brain injured clients following the war in Israel. However, today the LOTCA is used on a variety of client's where cognitive status has to be established (Lotca Manual, 2000). It can be used in; patients following stroke, spinal cord injured, individuals with dementia or brain degeneration, traumatic Brain injury patients, brain tumour patients, individuals with CNS dysfunction, individual's with intellectual disability, mental illness patients, and children with learning difficulties (LOTCA, Manual, 2000).

The LOTCA is considered a valid cognitive assessment tool for persons above age 6 through to age 70 years, there is a geriatric version called the LOTCA-G suitable for ages 71-90years, and an adapted version can be used for children or adults with intellectual impairment and language difficulties (LOTCA Manual, 2000). However, culture can affect construct reliability when used in a paediatric population (Josman, Abdallah & Engel-Yeger, 2011). The original LOTCA was developed by Itzkovich, Averbuch, Elazar and Katz in 1990 and consists of 20 sub-tests within 4 areas; orientation, perception, visuomotor organization and thinking operations, however, the revised edition LOTCA-II consists of 26

sub-tests within 6 areas: Orientation (2 items) looking at the individuals orientation to place and time; Visual Perception (4 items) looking at the individuals ability to identify pictures of everyday objects, objects photographed from unusual angles, distinguish between overlapping figures, and recognize spatial relations between objects; Spatial Perception (3 items) looking at the individuals ability to differentiate between right and left and to determine spatial relationships between objects and self; Motor Praxis (3 items) looking at the individuals ability to imitate motor actions, use objects and perform symbolic actions; Visuomotor Organization (7 items) looking at the individuals ability to copy geometric figures, reproduce a 2D model, copy a coloured block design and a plain block design, reproduce a puzzle, complete a pegboard task, and draw a clock; and Thinking Operations (7 items) looking at the individuals ability to complete tasks including sorting, categorization, picture and geometric sequences (LOTCA Manual, 2000). It is scored on a scale from 1-4 (1 being poor performance, through to 4, being optimal performance), except for 3 categorizing tests, which score on a 1-5 scale and 2 orientation sub-tests which score on a 1-8 scale. At the end, the scores are tallied to give a possible score between 26 and 115 and the time taken to perform specific tasks on the test is noted. The LOTCA and LOTCA-II take approximately 45 minutes to administer. The LOTCA-G takes approximately 30-45 minutes to administer. There are specific instructions and specifications to consider when administering the LOTCA; these are all located in the administration section of the manual.

Research, Psychometric properties, strengths and weaknesses

Several research studies have been carried out on the LOTCA battery, providing normative data and validity and reliability of the assessment tool. Two major studies were carried out at the time of development of the original battery in Israel. The first study by Katz, et al., 1989, as cited in the LOTCA Manual, 2000 looked at the reliability and validity of the LOTCA, whilst comparing the performance of Brain-injured patients with normal

patients. The sample consisted of three groups, 2 groups of brain injured adults, 20 with Cranio-Cerebral injury (CCI) and 28 with Cerebro-vascular accident (CVA), and a control group of 55 normal adults (Katz et al., 1989 as cited in LOTCA Manual, 2000). Results indicated that among normal subjects, years of education, was related to perceptual cognitive performance and in the patient groups none of the variables were significantly related to performance, indicating the level of brain damage (Katz et al., 1989 as cited in LOTCA Manual, 2000). The control group performed almost perfectly on all sub-tests except for categorization, classification and geometrical sequencing and the client groups show impairment on almost all sub-tests in the first assessment and showed some improvement on average, more so in the CCI than the CVA after 2 months (Katz et al., 1989 as cited in LOTCA Manual, 2000).

Inter-rater reliability ranged from .82 to .97 on the Spearman's rank and observation by six OT's of a patient caring out an assessment reached agreement levels of 100% in 14 subtests, 86% in 4 sub tests and 86% in 1 sub-test, indicating acceptable reliability (Katz et al., 1989 as cited in LOTCA Manual, 2000). High alpha co-efficient levels were found on three of the sub-domains (perception, visuomotor and thinking operations) respectively .87, .95 and .85 lending support to the battery (Katz et al., 1989 as cited in LOTCA Manual, 2000). Validity was tested through the Wilcoxon's two-sample test and the Kruskal Wallis test among three groups and they both showed the same level of significance of .001 at both assessment times, thus lending support to validity in assessing perceptual cognitive impairment and differentiating between groups (Katz et al., 1989 as cited in LOTCA Manual, 2000).

Another study by Annes, Katz, and Cermak (1996) compared younger and older healthy American adults on the LOTCA. Specifically, looking at performance and

comparing to normative data found on Israeli subjects. They found that it took older adults significantly longer than younger adults on six of the seven sub-tests and also that performance of normal adult Americans was similar to Israeli adults, thus supporting the use of the LOTCA in the United States (Annes, Katz & Cermak, 1996).

Katz, Elazar & Itzkovich (1995) carried out a study on a geriatric version of the LOTCA, their study looked at 33 elderly CVA patients and 43 healthy subjects aged between 70-91 years. They compared subjects on the use of the LOTCA and LOTCA Geriatric version (LOTCA-G). The differences made to the LOTCA-G were; the items used in the test were enlarged to reduce vision and motor co-ordination difficulties, reduced details in items for less complexity of tasks, shortened sub-tests and battery to shorten administration time and a memory sub-test was added (Katz, Elazar & Itzkovich, 1995). Their results indicated that elderly can be assessed with the original LOTCA, but the LOTCA-G version compensates for the normal aging process of slowing performance and sensorimotor difficulties, it was therefore, recommended that the LOTCA-G version be used when evaluating the elderly person or any person who is slow in performance, lending support to the LOTCA-G tool (Katz, Elazar, & Itzkovich, 1995). Strengths of the micro-battery are that it is a comprehensive tool for looking at cognitive abilities; it has good reliability and validity and can be used with a variety of patients. Weaknesses are, that no studies have looked at re-test reliability and intra-rater reliability, and that the battery is time consuming and doesn't pick up on mild cognitive impairments.

Administration challenges

Challenges that have been noted when administering the LOTCA/LOTCA-II in practice are as follows: the LOTCA is a time consuming assessment, therefore it is necessary

to be aware that in brain injured clients, the elderly and intellectually impaired patients fatigue may be an issue and the administration process may need to be stopped and started at a later time (LOTCA Manual, 2000). Therefore, the evaluator must rate the client according to the level of attention and concentration used, based on observation during the assessment and time taken should be marked accordingly. Within certain sub-tests if a client has comprehension difficulties/receptive problems (e.g. Receptive aphasia), expression problems, or language difficulties, the evaluator has alternate methods that can be used in order to answer these sections as best they can, this may be challenging in severely brain damaged clients (LOTCA Manual, 2000). Difficulties in administering the LOTCA to elderly clients has also been an issue, due to some items being too small to see or manipulate and the battery taking too long as a whole to administer, affecting attention and causing fatigue, hence the development of the LOTCA-G (Katz, Elazar, & Itzkovich, 1995). To be able to administer the LOTCA appropriately prior assessments are necessary, to know what the client has difficulty with and to be able to administer the appropriate sub-tests accordingly.

OT Client Evaluation and obtaining information

The LOTCA/LOTCA-II and LOTCA-G are all comprehensive assessments that provide an in-depth profile of an individual's cognitive status and guidelines for directing intervention. The LOTCA-G in particular, provides an early cognitive decline status in elderly individuals and enables a look at changes that occur over time, by repeat analysis (Bar-Haim Erez & Katz, 2003). OT's can use two approaches to assessing cognition; one they can assess function to make inferences about cognitive capacities and abilities, and two they can assess cognitive capacities and abilities to make inferences about function (Radomski as cited in Trombley & Radomski, 2002, p. 268). Generally, an OT may use a theory model such as Canadian occupational performance model (COPM) or Person-

Occupation- Environment (PEO) to gain insight into a client's, roles, occupations, interests and routines, through an informal interview process. They may then use, standardized assessments, such as the LOTCA/LOTCA-II, to gain insight on their client's cognitive status, which can inform on how to plan intervention and can be used as a follow up tool, during and after intervention. Furthermore, they may then carry out functional assessments/observation based assessments of client's carrying out activities of daily living (ADL), instrumental ADL's (IADL) or work simulated activities, to gain further insight into their cognitive capacities and abilities to perform certain occupations. This information about the client can then be collaborated, to devise a client-centered and meaningful approach to intervention.

For example, during an activities of daily living assessment, OT's observe attention to a task by listing episodes of distraction, memory of instructions/sequencing and evidence of organizing and planning (Radomski as cited in Trombley & Radomski, 2002, p. 268). This method of assessment is preferable when a client can't understand verbal or written instruction speaks a different language or has communication issues (Radomski as cited in Trombley & Radomski, 2002, p. 268). In particular there are three standardized assessments that an OT can use to examine function and cognition together, these are; the Arnadottir OT-ADL Neurobehavioral evaluation (A-ONE), the Rabideau kitchen evaluation-revised and the kitchen task assessment (Radomski as cited in Trombley & Radomski, 2002, p. 268). Standardized tools such as the LOTCA, which provide a bottom-up and top-down approach to assessment, can then be used to assess cognitive capabilities to make inference about function and find out which specific areas of cognitive function are impaired. There are other micro-batteries besides the LOTCA that could also be used these are; Mini-Mental State Examination (MMSE), Cognitive Assessment of Minnesota (CAM) and the Cognistat (Neurobehavioural Cognitive Status Examination) (Radomski as cited in Trombley & Radomski, 2002, pp.274-275).

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