

Original Article

Validation study of the Chilean version of the Dynamic Loewenstein Occupational Therapy Cognitive Assessment (DLOTCA)

Estudio de validación de la versión chilena de la Evaluación Cognitiva Dinámica de Terapia Ocupacional de Loewenstein (DLOTCA).

Estudo de validação da versão chilena do Loewenstein Dynamic Cognitive Assessment of Occupational Therapy (DLOTCA)

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Abstract

Objective: To validate the Chilean Spanish translation of the tenth English version of the Dynamic Loewenstein Occupational Therapy Cognitive Assessment for use in the Chilean population. **Method:** The translation into Chilean Spanish was carried out, and then a pilot test was carried out for the application of the instrument, for which 40 adults were recruited with an average age of 42.7 years, with various brain damages and made up of 70% women and 30% men. To evaluate the reliability of the instrument, Cronbach's Alpha was calculated as a measure of Internal Consistency, applying 3 perspectives, "Item-Total Reliability", "Item-Domain Reliability", and "Domain-Total Reliability". To measure feasibility, the percentage of items not answered by the sample is identified, and the percentage of items that is identified in the cognitive tests as understood. **Results:** The Item-Total reliability yielded a Cronbach's Alpha of 0.953, which translates into excellent reliability. Item-Domain reliability was mostly between excellent and good, with weak reliability for the factors "time orientation" and "visual perception". The Domain-Total reliability yielded a Cronbach's Alpha of 0.810, which translates into good reliability. Finally, in relation to feasibility, the participants answered 100% of the items, evidencing the translation to be accessible. **Conclusion:** The DLOTCA translated into Chilean Spanish; it presents

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a high reliability, which allows obtaining results with very low biases, becoming an instrument that can be used in a pertinent way in the Chilean population.

Keywords: Reproducibility of Results, Occupational Therapy, Cognition.

Resumen

Objetivo: Validar la traducción al español chileno de la décima versión en inglés de la Dynamic Loewenstein Occupational Therapy Cognitive Assessment para ser utilizado en la población chilena. **Método:** Se realizó la traducción de el DLOTCA al español chileno. Se realizó un pilotaje para la aplicación del instrumento, para lo cual se reclutó a 40 personas adultas con una media de 42,7 años, con diversos daños cerebrales y compuesto por un 70% de mujeres y un 30% de hombres. Para evaluar la confiabilidad del instrumento se calculó el Alfa de *Cronbach* como medida de Consistencia Interna, aplicando 3 perspectivas, “Fiabilidad Ítem-Total”, “Fiabilidad Ítem-Dominio”, y “Fiabilidad Dominio-Total”. Para medir la Factibilidad se identificó el porcentaje de ítems no contestados por la muestra, y el porcentaje de ítems que es identificado en las pruebas cognitivas como comprendido. **Resultados:** La fiabilidad Ítem-Total arrojó un Alpha de *Cronbach* 0,953, lo que se traduce en excelente confiabilidad. La fiabilidad Ítem-Dominio, estuvo mayormente entre excelente y buena, existiendo una fiabilidad débil para los factores “orientación temporal” y “percepción visual”. La fiabilidad Dominio-Total arrojó un Alpha de *Cronbach* 0,810 lo que se traduce en una buena confiabilidad. Finalmente, con relación a la factibilidad, los participantes respondieron el 100% de los ítems, evidenciando la accesibilidad de la traducción. **Conclusiones:** El DLOTCA traducido al español chileno; presenta una alta confiabilidad, lo que permite obtener resultados con muy bajos sesgos, convirtiéndose en un instrumento que puede ser utilizado de manera pertinente en la población chilena.

Palabras-clave: Reproducibilidad de los Resultados, Terapia Ocupacional, Cognición.

Resumo

Objetivo: Validar a tradução para o espanhol chileno da décima versão em inglês do *Dynamic Loewenstein Occupational Therapy Cognitive Assessment* (DLOTCA), para uso na população chilena. **Método:** Após a tradução para o espanhol chileno, foi realizado um teste piloto para a aplicação do instrumento, para o qual foram recrutados 40 adultos com idade média de 42,7 anos, com lesões cerebrais diversas e composto por 70% de mulheres e 30% de homens. Para avaliar a confiabilidade do instrumento, calculou-se o Alfa de *Cronbach* como medida de Consistência Interna, aplicando-se três perspectivas, "Confiabilidade Item-Total", "Confiabilidade Item-Domínio" e "Confiabilidade Total-Domínio". Para medir a viabilidade, identificou-se o percentual de itens não respondidos pela amostra e o percentual de itens identificados nos testes cognitivos como compreendidos. **Resultados:** A confiabilidade Item-Total apresentou um Alfa de *Cronbach* de 0,953, o que se traduz em excelente confiabilidade. A confiabilidade item-domínio ficou principalmente entre excelente e boa, com confiabilidade fraca para os fatores "orientação temporal" e "percepção visual". A confiabilidade Domínio-Total rendeu um Alfa de Cronbach de 0,810, o que se traduz em boa confiabilidade. Por

fim, em relação à viabilidade, os participantes responderam 100% dos itens, evidenciando a tradução ser acessível. **Conclusão:** A DLOTCA, traduzida para o espanhol chileno, apresenta uma alta confiabilidade, o que permite obter resultados com vieses muito baixos, tornando-se um instrumento que pode ser utilizado de forma pertinente na população chilena.

Palavras-chave: Reprodutibilidade de Resultados, Terapia Ocupacional, Cognição.

Introduction

An important cause of disability in adults is acquired brain injury [ABI] (Huertas-Hoyas et al., 2015). ABI refers to a brain injury that occurs suddenly and can cause physical, sensory, and neuropsychological sequelae in humans. Neuropsychological sequelae can be cognitive, behavioral, emotional, and relational (Polonio López & Romero Ayuso, 2010).

The main consequences of severe ABI are mortality, disability, and long-term functional impairment. The motor, cognitive, behavioral and emotional consequences of an ABI cause a strong impact on the functioning of the person's and his family's daily lives, and at least 75% present cognitive problems (Polonio López & Romero Ayuso, 2010). The extent of cognitive impairment, as well as the subsequent evolution of neurocognitive dysfunction, depends on a multiple variety of factors, some of them premorbid and others related to the injury (Corregidor, 2015; Villalobos et al., 2020).

Difficulties in cognitive functions in people with ABI can be diverse, including deficits in attention, memory, executive functions, slow information processing and learning (Corregidor, 2015).

Cognitive dysfunction can predict functional capacity, and therefore it shed light on levels of disability in the real world, as well as being directly related to independence in daily living activities [DLA], autonomy, and quality of life (Álvarez-Hernández et al., 2012). Cognitive functions such as fluency, declarative memory, and information processing are directly related to the level of independence or acquisition of disability (Zakzanis & Grimes, 2017; Vallat-Azouvi et al., 2021), while inhibitory control and sequencing predict the possibility of returning to work (Wong et al., 2019). Impaired executive function [EF] in adults with ABI predicts dependency on money management, driving skills and home maintenance (Perna et al., 2012), as well as dependency on instrumental life activities in older people with dementia (Overdorp et al., 2016). In this same population, self-awareness predicts functional independence (Villalobos et al., 2020), and the improvement of the social cognition is related to improved communication (Quinting et al., 2022).

Due to this, after an ABI, a cognitive rehabilitation process is necessary, a complete and fundamental part of any neurological rehabilitation program, which implies an interdisciplinary process to intervene in the cognitive deficits that arise after an ABI and that is effective in extent to which the user is capable of increasing their cognitive abilities reflected in the DLAs (Ginarte-Arias, 2002). Depending on the person's potential for recovery, the occupational therapist facilitates activities by improving skills, teaching

and developing compensatory and recovery strategies, and adapting the environment in order to maintain personal independence (Sánchez Cabeza, 2021).

As part of professional reasoning, an adequate occupational assessment process will be important, which allows to collect information from the user, their performance, and their environment in order to establish an adequate occupational diagnosis (García Peña et al., 2002). In the case of a person with ABI, this process must include a comprehensive assessment of cognitive functions and their impact on the person's daily life (Corregidor, 2015; Cuevas-Lara et al., 2017).

An approach that has led to a better impact of the assessment and approach in people with ABI is the evidence-based practice (Lund et al., 2013), which has allowed the use of valid and reliable assessment instruments. Occupational therapists must assess the global cognitive function and specific cognitive abilities of people, and their impact on performance (Gibson et al., 2022), however, to date, there are no validated disciplinary instruments in the Chilean context.

In Chile, instruments such as the Mini Mental Test [MMSE], the Montreal Cognitive Assessment [MOCA] and the Adenbrooke's Cognitive Examination [ACE] are used to screen cognitive dysfunctions (Cancino et al., 2020); those that share the characteristic of being abbreviated assessments or Screening that provide a general profile of the person's cognitive condition and that can be applied and interpreted by different professionals, however, they do not provide a precise knowledge of the person's cognitive functions (Delgado & Salinas, 2009).

At a global level, there is no consensus in Occupational Therapy on the cognitive assessment approach, highlighting the use of the Canadian Occupational Performance Measure [COPM] together with the use of Screening tests, MMSE and MOCA (Manee et al., 2020).

DLOTCA was developed at the Loewenstein Hospital in Israel based on theories of neuropsychology developed by Luria and of neurodevelopment proposed by Piaget; it was developed to assess people between 18 and 69 years of age with brain damage, identifying the limitations and abilities of the person in their cognitive functioning to delimit the starting points of the specific intervention of the discipline, and thus optimize the patient care times (Ávila Alvarez et al., 2009; Sánchez Dúran, 2011). This battery is part of the five models of cognitive and perceptual assessment tools, among which are:

LOTCA 1st Edition (1990): (1) Applicable to people between the ages of 6 and 69.

LOTCA 2nd Edition (2000): (2) It is a revised version of LOTCA 1st Edition. Also applicable to people between 6 and 69 years old.

LOTCA-G (1996): (3) Applicable to people over 70 years of age.

DOTCA-CH (2007): (4) Applicable to children between the ages of 6 and 12 (Ávila Alvarez et al., 2009).

DLOTCA is used by occupational therapists for the assessment and monitoring of the rehabilitation process of people with ABI (Goodchild et al., 2023). It is the most widely used cognitive assessment battery by occupational therapists in Australia (Hoffmann et al., 2010), while in Arizona, the United States, it is observed a high preference for its use (Katz, 2021). However, it presents a language and cultural barrier to be used in the Latin American and Chilean context.

Compared with assessments such as the MMSE and the cognitive subscale of the Functional Independence Measurement Scale (FIM™), the /DLOTCA battery has been shown to better predict change after rehabilitation in the functional state of the person who suffered a stroke [CVA] (Zwecker et al., 2002), as well as being more useful in the early detection of cognitive decline in people with stroke (CVA) compared to the MMSE (Wang et al., 2014).

DLOTCA is a dynamic battery that addresses seven cognitive areas that include orientation, disease awareness, visual perception, spatial perception, praxis, visuomotor construction, and thinking operations. The objective of this tool is to identify the abilities and difficulties of each person in the different areas, to identify the level of awareness of the subject about his condition and cognitive disability, as well as to measure the learning potential and recognize cognitive strategies through the application of assessment (Katz et al., 2012).

For its application, the examiner must guide the evaluation process with the manual included in the Battery, especially for the application of mediations or keys. The application of the complete battery takes about 1 to 2 hours depending on the amount of mediation required, if the person cannot complete the test in a single session, it is possible to apply it in more than one session (Katz et al., 2012).

These mediations based on Toggia's premises consist of support so that the user can successfully complete each specific item, identifying the barriers to learning that occur in response to the instructions, that is the dynamics of the test, by finding ways to overcome those barriers. Cognitive abilities are changeable and sensitive to teaching, so dynamic tests allow experience through interaction with others, which can increase the commitment, motivation, and sense of competence of the person with ABI (Toggia & Cermak, 2009).

Regarding the mediations, level I corresponds to a general intervention that consists of reiterating the instruction, level II corresponds to a general feedback that allows explaining the instruction, level III is a specific feedback where the person is told the error, level IV corresponds to a partial intervention, where the examiner indicates key clues, and level V corresponds to imitation or simplification of the task, where the examiner performs the task and asks the person to imitate it. The examiner, therefore, scores a static score that corresponds to the person's first performance, and once he performs the required mediations, he obtains a score with the mediation (Katz et al., 2012).

Katz et al. (2012) in the original validation of the instrument studied the psychometric properties of the DLOTCA cognitive battery. In internal consistency, it showed moderate to high Cronbach's alpha values (0.602-0.813) for all domains, showing utility to know if the person requires mediation to achieve optimal performance, and what type and level of assistance is required. Said mediation refers to the fact that the examiner uses an approximation system to modify the task through indications or other forms of support, to understand the type of information that is essential for that individual to complete the task, therefore, DLOTCA provides a guide to planning interventions for people with cognitive disabilities.

In Chile, this instrument is used into the Occupational Therapy Units specialized in adult intervention, based on unofficial constructions and translations that lack statistical validity for the population and therefore can lead to errors in interpretation. In this

context, the translation and adaptation from English into Chilean Spanish of DLOTCA was developed, which was carried out with the guidelines of the World Health Organization (2011) and allowed obtaining a cross-culturally suitable instrument for the Chilean adult population (Neumann-Collyer et al., 2022).

Methods

This research was carried out between the years 2019/2021 by the Santo Tomás University, Viña del Mar headquarters, led by researchers from the Occupational Therapy Faculty, and was approved by its Ethics Committee. The DLOTCA cognitive battery version 10 (Katz et al., 2012) was translated and validated with the permission of researcher Noomi Katz, PhD, OTR; Director, Research Authority; Ono Academic College.

Validity investigates to what level an instrument measures what it should measure, that is, what it has been designed for. The Validity of an instrument has 6 stages or levels: Content Validity, Construct Validity, Reliability, Stability, Criterion and Performance (see Figure 1).

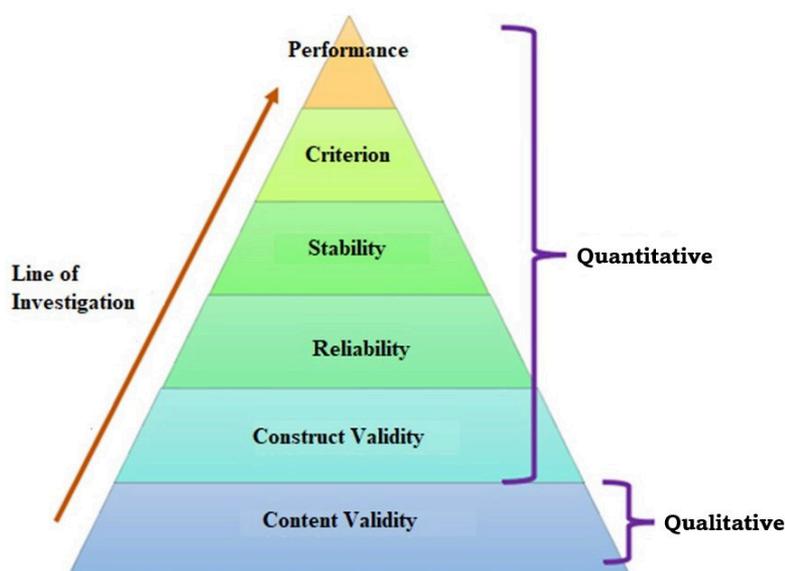


Figure 1. Levels of Validation of a Documentary Instrument. Source: How to Validate an Instrument: The Guide to Validate an Instrument in 10 Steps (Supo, 2013).

In this project, the DLOTCA cognitive battery was validated using content validity and reliability. In a first phase, the cultural adaptation was carried out based on the guidelines for the translation and adaptation of the WHO instruments. This allowed an analysis of intelligibility and feasibility. The result of this phase was obtaining the validated instrument from a qualitative point of view, which allows us to understand that the tests of each cognitive variable are consistent with its theoretical definition (Carvajal et al., 2011; Neumann-Collyer et al., 2022).

As a culmination of the metric assessment of the instrument, it was used the calculation of an internal consistency measure, Cronbach's Alpha. This indicator measures the correlation of the items within the questionnaire, assessing the way in which the different items of the instrument measure the same characteristics and allowing knowing the level of coherence between the final result and the result of each one of the items (Supo, 2013).

Results

A total of 40 subjects were studied, whose main ABI diagnoses according to the computerized categorization of the instrument, corresponded to Cerebrovascular Accident, Traumatic Brain Injury, Parkinson's Disease, Multiple Sclerosis, Depression and other unspecified; the average age was 42.7 years with a wide variability, since the range between the ages of the participants was from 19.1 to 69 years. Regarding gender, the vast majority of the participants were women and around 1/3 of the sample were male (see Table 1).

Table 1. Socio-demographic and Clinical Background of the Participants.

Socio-demographic and Clinical Variables		Absolute Frequency (n)	Frequency Percentage (%)
Average age	42.7 years	----	----
Standard deviation age	14.1 years	-----	-----
Female	----	28	70
Male	----	12	30
Cerebrovascular Accident	----	10	25
Traumatic Brain Injury	----	06	15
Multiple Sclerosis	----	04	10
Depression	----	04	10
Parkinson	----	02	05
Others	----	04	10
No background	----	10	25
Total	----	40	100

Source: (Own elaboration, 2022).

A pilot test made up of subjects was carried out, and only the static scores before mediation were considered, this because not all the research subjects required "Mediation". The calculation of the Internal Consistency Measure, "Cronbach's Alpha" was carried out, and the analysis was made from three perspectives, in order to obtain a comprehensive vision of the instrument operation.

The result of the "Item-Total Reliability" Analysis, which evaluates the behavior of each one of the items with respect to the total number of items, yielded a Cronbach's Alpha of 0.953, a value that according to the authors George & Mallery (2003) falls within of the category of "Excellent Reliability", that is to say that the tests present good consistency (see Table 2).

The result of the "Item-Domain Reliability", which evaluated the level of reliability according to each of the 7 dimensions or areas that make up the instrument, indicated that the "Spatial Orientation" and "Thinking Operations" domains obtained an "Excellent" Reliability. , that is, both domains present coherence with the construct tested by the battery. The "Spatial Perception", "Praxis" and "Visuomotor Construction" domains, obtained a Reliability categorized as "Good". The "Temporal Orientation" and "Visual Perception" domains obtained the lowest Reliability values, being categorized as "Weak". It is important to mention that the items that make up both domains presented the lowest variability among all the areas of the instrument (see Table 2).

The result of the "Total-Domain" Analysis, yielded a Cronbach's Alpha of 0.810 value that according to the authors George & Mallery (2003) falls within the category of "Good", that is to say that the tests present good consistency (see Table 2).

Table 2. Cronbach's Alpha results for Item Total, Item Domain and Total Domain Item.

Category	Cronbach Alpha	Areas	Types of Reliability
Excellent	0.953		ITEM-TOTAL Reliability Analysis
Excellent	0.949	Spatial Orientation	
Weak	0.612	Temporal Orientation	
Weak	0.634	Visual Perception	ITEM_DOMAIN reliability analysis
Good	0.852	Spatial Perception	
Good	0.849	Praxis	
Good	0.874	Visuomotor construction	
Excellent	0.901	Thinking Operations	
Good	0.810		TOTAL-DOMAIN Reliability Analysis

Source: (Own elaboration, 2022).

Discussion

In the current research, the internal consistency of the DLOTCA cognitive battery was assessed, identifying the level of reliability, that is, the level to which the instrument manages to measure the construct without error (Luján-Tangarife & Cardona-Arias, 2015).

Considering the feasibility analysis, regardless of the results of each item, 100% of the items are answered, which indicates that the questions are understood and answered; and considering the perspective of the occupational therapists who applied the test, the answer sheet for recording answers is clear, as well as the Excel where the scores must be recorded to interpret the results (Neumann-Collyer et al., 2022). Therefore, the guideline is feasible to use, and presents an adequate coherence with the theoretical constructs that it seeks to evaluate, allowing more reliable results (Carvajal et al., 2011).

Regarding the time required for its application, it will depend on the cognitive difficulties and the need to use mediations, which can extend the application from one 40-minute session to two sessions with the same length.

Regarding the Reliability of the instrument according to the results of this research and in comparison with the original validation (Katz et al., 2012), it is possible to observe Reliability levels, at least equal or higher in most domains: Visual Perception (Chilean version: 0.6 and original: 0.3), Spatial Perception (Chilean version: 0.9 and original: 0.7), Praxis (Chilean version: 0.8 and original: 0.6), Visuomotor Construction (Chilean version: 0.9 and original: 0.8) and Thinking Operations (Chilean version: 0.9 and original: 0.7), Spatial Orientation (Chilean version: 0.9 and original: without information), Temporal Orientation (Chilean version: 0.9 and original: without information).

On the other side, unlike the validation that resulted in the tenth version of DLOTCA (Katz et al., 2012), in the current research, the process to determine the Reliability analysis was carried out in a more comprehensive way, since it was performed from three different perspectives: Item-Total Reliability Analysis (Reliability: Excellent), Item-Domain Reliability Analysis (corresponding to the categories of values presented in the previous paragraph), and the Total-Domain Reliability Analysis (Reliability : Good). In the three perspectives studied, adequate reliability levels are obtained.

Another important difference to highlight is in the size and type of sample of both studies. The original validation contemplated a n=128 between people with and without acquired brain damage and this study contemplated a n=40 made up only of people with neurological pathologies. There is no doubts that the type of recruited participants was critical to obtain better results in the current research, since Cronbach's Alpha is a metric that rises as the responses of the research subjects are more heterogeneous, and when contemplating only patients with neurological pathology the variability of the responses was greater, since it is directly related to the type and level of brain damage that the person has. The healthy subjects, not having any type of cerebral involvement, tended to answer correctly and with high scores, which allowed the variability of the answers to be rather homogeneous, thus contributing to a lower reliability in the instrument.

The psychometric properties of the different versions (models) of the Loewenstein cognitive assessment battery for the different age groups that it tests have demonstrated their reliability in adaptations to different languages, among which are the Portuguese version DOTCA-CH, Danish LOTCA-II and Malaysia LOTCA-G. The validation of these versions has resulted in reliability levels consistent with the original versions, which allows occupational therapists to have reliable cognitive assessment instruments that can be used to assess and formulate intervention plans for people at different stages of their life course (Lund et al., 2013; Mohd Natar et al., 2015; Uchôa-Figueiredo et al., 2017).

Finally, it is highlighted that according to the feasibility analysis, the instrument is affordable to be used in the Chilean population with ABI, evidencing a simple administration that allows the user to complete the entire battery.

Conclusion

In Occupational Therapy there are few valid and reliable disciplinary assessment instruments for our population. The Dynamic Loewenstein Occupational Therapy Cognitive Assessment (DLOTCA) has presented evidence on its usefulness in the

practice of occupational therapists who care for people with ABI, however, it was not validated for its use in Chile, presenting less rigorous conditions for its use in the country that may have an impact on an unclear or imprecise valuation.

The DLOTCA Cognitive Assessment translated into Chilean Spanish; It presents high reliability and adequate accessibility, which allows obtaining results with very low biases, becoming an instrument that can be used safely in the Chilean population, ensuring precision and evidence in order to obtain coherent conclusions in the approach to occupational problems in people with ABI.

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References

- Álvarez-Hernández, J., Aguilar-Parra, J. M., & Mercader-Rubio, I. (2012). Cognición y autonomía en personas mayores dependientes. *Anales de Psicología*, 28(3), 945-952.
- Ávila Alvarez, A., Viana Moldes, I., Durán Bouza, M., & Peralbo Uzquiano, M. (2009). Revisión bibliográfica sobre la batería de evaluación cognitiva “loewenstein occupational therapy cognitive assessment (lotca)”, “lotca-segunda edición”, “lotca-geriatric”, y “dynamic occupational therapy cognitive assessment for children (dotca-ch)”. *TOG (A Coruña)*, 5(2), 1-17.
- Cancino, M., Rehbein, L., Gómez-Pérez, D., & Ortiz, M. (2020). Evaluación de funcionamiento cognitivo en adultos: análisis y contrastación de tres de los instrumentos de mayor divulgación en Chile. *Revista Médica de Chile*, 148(4), 452-458.
- Carvajal, A., Centeno, C., Watson, R., Martínez, M., & Sanz Rubiales, A. (2011). ¿Cómo validar un instrumento de medida de la salud? *Anales del Sistema Sanitario de Navarra*, 34(1), 63-72.
- Corregidor, A. I. (2015). Principios de evaluación y tratamiento de los problemas cognitivos asociados al daño cerebral. In B. Polonio López. *Terapia ocupacional en disfunciones físicas, teoría y práctica* (pp. 161-174). Madrid: Editorial Médica Panamericana.
- Cuevas-Lara, C., Sobrido-Prieto, M., & Montoto-Marqués, A. (2017). Efectividad de programas de terapia ocupacional en personas con daño cerebral adquirido en el ámbito domiciliario y ambulatorio: una revisión sistemática. *Rehabilitación*, 51(2), 109-118.
- Delgado, C., & Salinas, P. (2009). Evaluación de las alteraciones cognitivas en adultos mayores. *Revista Hospital Clínico Universidad de Chile*, 20(3), 244-251.
- García Peña, M., Sánchez Cabeza, A., & Miján de Castro, E. (2002). Evaluación funcional y terapia ocupacional en el daño cerebral adquirido. *Rehabilitación*, 36(3), 167-175.
- George, D., & Mallery, P. (2003). *SPSS for Windows step by step: a simple guide and reference. 11.0 update*. Boston: Allyn & Bacon.
- Gibson, E., Koh, C. L., Eames, S., Bennett, S., Scott, A. M., & Hoffmann, T. C. (2022). Occupational therapy for cognitive impairment in stroke patients. *Cochrane Database of Systematic Reviews*, 2022(3), CD006430. <http://dx.doi.org/10.1002/14651858.CD006430.pub3>.
- Ginarte-Arias, Y. (2002). Rehabilitación cognitiva. Aspectos teóricos y metodológicos. *Revista de Neurología*, 35(9), 870-876.

- Goodchild, K., Fleming, J., & Copley, J. A. (2023). Assessments of functional cognition used with patients following traumatic brain injury in acute care: a survey of Australian occupational therapists. *Occupational Therapy in Health Care, 37*(1), 145-163.
- Hoffmann, T., Bennett, S., Koh, C. L., & McKenna, K. T. (2010). Occupational therapy for cognitive impairment in stroke patients. *Cochrane Database of Systematic Reviews, 2010*(9), CD006430. <https://doi.org/10.1002/14651858.CD006430.pub2>
- Huertas-Hoyas, E., Pérez, E. J., Maturana, A. M., López-Alberca, S., & Alted, C. (2015). Predictores de funcionalidad en el daño cerebral adquirido. *Neurología, 30*(6), 339-346.
- Katz, N. (2021). Use of cognitive assessments across the continuum of care on a single health care campus. *Journal of Rehabilitation Practices and Research, 2*(1), 1-7.
- Katz, N., Bar-Haim Erez, A., Livni, L., & Averbuch, S. (2012). Dynamic Loewenstein Occupational Therapy Cognitive Assessment: evaluation of potential to change in cognitive performance. *American Journal of Occupational Therapy, 66*(2), 207-214.
- Luján-Tangarife, J., & Cardona-Arias, J. (2015). Construcción y validación de escalas de medición en salud: revisión de propiedades psicométricas. *Archives of Medicine, 11*(3), 1-10.
- Lund, K., Oestergaard, L. G., & Maribo, T. (2013). Danish translation and adaptation of Loewenstein Occupational Therapy Cognitive Assessment 2nd Edition (LOTCA-II). *Scandinavian Journal of Occupational Therapy, 20*(4), 302-305.
- Manee, F. S., Nadar, M. S., Alotaibi, N. M., & Rassafiani, M. (2020). Cognitive assessments used in occupational therapy practice: a global perspective. *Occupational Therapy International, 2020*, 1-8. <http://dx.doi.org/10.1155/2020/8914372>.
- Mohd Natar, A. K., Nagappan, R., Ahmad Ainuddin, H., Masuri, G., & Kannan, C. (2015). Psychometric properties of the Malay Version of the Loewenstein Occupational Therapy Cognitive Assessment for Geriatrics (M-LOTCA-G) among the Malaysian elderly population. *Educational Gerontology, 41*(1), 27-40.
- Neumann-Collyer, V., González, B. P. M., Espinoza, E. A., San Martín, G. P. C., Rauch-Gajardo, M. F., & Hernández-Pérez, K. (2022). Adaptación al español chileno de la Evaluación Cognitiva Dinámica de Terapia Ocupacional de Loewenstein (DLOTCA). *Cadernos Brasileiros de Terapia Ocupacional, 30*, 1-13.
- Overdorp, E. J., Kessels, R. P., Claassen, J. A., & Oosterman, J. M. (2016). The combined effect of neuropsychological and neuropathological deficits on instrumental activities of daily living in older adults: a systematic review. *Neuropsychology Review, 26*(1), 92-106.
- Perna, R., Loughan, A. R., & Talka, K. (2012). Executive functioning and adaptive living skills after acquired brain injury. *Applied Neuropsychology. Adult, 19*(4), 263-271. <http://dx.doi.org/10.1080/09084282.2012.670147>.
- Polonio López, B., & Romero Ayuso, D. M. (2010). *Terapia Ocupacional aplicada al daño cerebral adquirido*. Madrid: Editorial Médica Panamericana.
- Quinting, J., Jonas, K., Kuhn, C., & Stenken, P. (2022). Emotion Recognition, Empathy, or ToM? The Influence of Social Cognition on Communication in Traumatic Brain Injury. *Zeitschrift für Neuropsychologie, 33*(2), 59-69.
- Sánchez Cabeza, Á. (2021). *Terapia Ocupacional en Pacientes con daño cerebral sobrevenido*. Recuperado el 4 de febrero de 2022, de <https://www.neuronup.com/estimulacion-y-rehabilitacion-cognitiva/dano-cerebral-adquirido/terapia-ocupacional-en-pacientes-con-dano-cerebral-sobrevenido/>
- Sánchez Dúran, E. (2011). Instrumentos de evaluación cognitiva en terapia ocupacional. *Revista TOG (A Coruña), 8*(13), 1-16.
- Supo, J. (2013). *Cómo validar un instrumento. La guía para validar un instrumento en 10 pasos*. Peru: Bioestadístico EIRL.
- Toglia, J., & Cermak, S. A. (2009). Dynamic assessment and prediction of learning potential in clients with unilateral neglect. *American Journal of Occupational Therapy, 63*(5), 569-579.
- Uchôa-Figueiredo, L. R., Lima, F. F., Mendes, R. S., Marques, N. C. F., Matteuci, M., Almada, H. S., Novelli, M. M. P. C., & Katz, N. (2017). Adaptação transcultural para a língua portuguesa da Avaliação Cognitiva

- Dinâmica de Terapia Ocupacional para Crianças (DOTCA-Ch). *Cadernos Brasileiros de Terapia Ocupacional*, 25(2), 287-296. <http://dx.doi.org/10.4322/0104-4931.ctoAO0827>.
- Vallat-Azouvi, C., Swaenepoël, M., Ruet, A., Bayen, E., Ghout, I., Nelson, G., Pradat-Diehl, P., Meaude, L., Aegerter, P., Charanton, J., Jourdan, C., & Azouvi, P. (2021). Relationships between neuropsychological impairments and functional outcome eight years after severe traumatic brain injury: results from the Paris-TBI study. *Brain Injury: [BI]*, 35(9), 1001-1010.
- Villalobos, D., Caperos, J. M., Bilbao, Á., Bivona, U., Formisano, R., & Pacios, J. (2020). Self-awareness moderates the association between executive dysfunction and functional independence after acquired brain injury. *Archives of Clinical Neuropsychology*, 35(7), 1059-1068.
- Wang, S. Y., Gong, Z. K., Sen, J., Han, L., Zhang, M., & Chen, W. (2014). The usefulness of the Loewenstein Occupational Therapy Cognition Assessment in evaluating cognitive function in patients with stroke. *European Review for Medical and Pharmacological Sciences*, 18(23), 3665-3672.
- Wong, A. W. K., Chen, C., Baum, M. C., Heaton, R. K., Goodman, B., & Heinemann, A. W. (2019). Cognitive, emotional, and physical functioning as predictors of paid employment in people with stroke, traumatic brain injury, and spinal cord injury. *American Journal of Occupational Therapy*, 73(2), 1-15.
- World Health Organization – WHO. (2011). *Process of translation and adaptation of instruments*. Geneva: WHO. Recuperado el 4 de febrero de 2022, de <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.mhinnovation.net%2Fsites%2Fdefault%2Ffiles%2Ffiles%2FWHO%2520Guidelines%2520on%2520Translation%2520and%2520Adaptation%2520of%2520Instruments.docx&wdOrigin=BROWSELINK>
- Zakzanis, K. K., & Grimes, K. M. (2017). Relationship among apathy, cognition, and real-world disability after mild traumatic brain injury. *Applied Neuropsychology. Adult*, 24(6), 559-565.
- Zwecker, M., Levenkrohn, S., Fleisig, Y., Zeilig, G., Ohry, A., & Adunsky, A. (2002). Mini-mental state examination, cognitive FIM instrument, and the Loewenstein Occupational Therapy Cognitive Assessment: relation to functional outcome of stroke patients. *Archives of Physical Medicine and Rehabilitation*, 83(3), 342-345.

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