Supplementary Material 2

A multimodal database for the collection of interdisciplinary audiological research data

**M. Amparo Callejón-Leblic1, 2, \*, Sergio Blanco-Trejo1, Brenda Villarreal-Garza1, Ana M. Picazo-Reina1, Beatriz Tena-García1, Ana Lara-Delgado1, Manuel Lazo-Maestre1, Francisco López-Benitez1, Fernando Escobar-Reyero1, Marta Álvarez-Cendrero1, M. Luisa Calero-Ramos1, Cayetana López-Ladrón1, Cristina Alonso-González1, Francisco Ropero-Romero1, Leyre Andrés-Ustarroz1, Marta Cuaresma-Giráldez3, Mercedes Atienza-Ruiz4, 5, J. L. Cantero-Lorente4, 5, Alberto Moreno-Conde3, Jesús Moreno-Conde3, Serafín Sánchez-Gómez1**

*1 Otolaryngology Department, Virgen Macarena University Hospital, Seville, Spain*

*2 Biomedical Engineering Group, University of Seville, Seville, Spain*

*3 Innovation Unit, Virgen Macarena University Hospital, Seville, Spain*

*4 Laboratory of Functional Neuroscience, Pablo de Olavide University, Seville, Spain*

*5 Neurodegenerative Diseases Network Research Center (CIBERNED), Madrid, Spain*

**\*Correspondence:** Corresponding author: mcallejon@us.es

This supplementary material includes the questionnaires available on the multimodal platform at the time of publication. The table below indicates, for each category, the name of the test and its acronym, the main objective or purpose of the test, along with its subdomains and values, and some references of interest.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category** | **Test Names (acronym)** | **Objective** | **Subdomains and values** | **References** |
| **Hearing Quality** | Abbreviated Profile of Hearing Aid Benefit (APHAB) | To quantify disability associated with hearing loss and the benefit achieved with a hearing aid | **Subscales**Ease of communication Background noise Reverberation Aversiveness**Score** [-98 – 98]Positive values indicate improved benefit with hearing aidsNegative values indicate worse benefits with hearing aids | (Cox, 1997; Solarte et al., 2016) |
| Audio Processor Satisfaction Questionnaire (APSQ) | To measure the satisfaction of the users with their audio processor | **Subscales**Comfort Social life Usability**Score** [0 – 10]Greater scores indicate higher levels of satisfaction | (Billinger-Finke et al., 2020) |
| Hearing Implant Sound Quality Index-19 (HISQUI-19) | To quantify the level of auditory benefit of cochlear implant (CI) users in everyday listening situations | **Score** [0 – 133]<30: very poor sound quality 31–60: poor sound quality 61–90: moderate sound quality 91–110: good sound quality 111–133: very good sound quality | (Amann & Anderson, 2014; Calvino et al., 2016) |
| Speech Spatial Qualities of Hearing Scale-12 (SSQ-12) | To assess everyday listening abilities and limitations | **Subscales**Speech Spatial Quality**Score** [0 – 10]Higher values indicate less difficulty or not difficulty at all | (Cañete et al., 2022; Noble et al., 2013) |
| Nijmegen Cochlear Implant Questionnaire (NCIQ) | To assess health-related quality of life in CI users | **Subscales**Basic sound perceptionAdvanced sound perceptionSpeech productionSelf-esteemActivitySocial interactions**Score** [0-100]Higher scores indicate better quality of life | (Sanchez-Cuadrado et al., 2015; Hinderink et al., 2000) |
| Hearing Handicap Inventory for the Elderly-Screening (HHIE-S) | To assess social and emotional effects of hearing loss | **Subscales**Emotional Social**Score** [0 – 40] 0-8: no hearing handicap 10-24: mild-moderate hearing handicap 26-40: significant hearing handicap | (Kim et al., 2021; Tamblay et al., 2008) |
| Category of auditory performance (CAP) | To classify auditory performance in CI users in everyday life | **Score** [0 – 7]Higher scores mean better auditory abilities | (Archbold et al., 1995; Mosnier et al., 2020) |
| **Tinnitus** | Tinnitus Handicap Inventory (THI) | To measure the tinnitus handicap  | **Subscales**Functional Emotional Catastrophic**Score** [0 – 100]0-16: slight or no handicap 18-36: mild handicap 38-56: moderate handicap 58-76: severe handicap 78-100: catastrophic handicap | (Herráiz et al., 2001; Newman et al., 1996) |
| **Balance and Dizziness** | Dizziness Handicap Inventory (DHI) | To measure the impact of dizziness on daily life | **Subscales**Functional Physical Emotional**Score** [0 – 100]Higher scores hint greater handicap from dizziness0-30: mild 31-60 moderate 60-100: severe | (Vereeck et al., 2007; Jacobson & Newman, 1990) |
| **Cognitive** | Montreal Cognitive Assessment (MOCA) | To screen for mild cognitive impairment | **Subscales**Visuospatial/executive function Identification Attention Language Abstraction Memory Orientation**Score**≥ 26: Normal cognition | (Delgado et al., 2019; Nasreddine et al., 2005) |
| Short Portable Mental State Questionnaire (SPMSQ) | To assess organic brain deficit in elderly patients | **Score** [0-10]0-2: normal mental functioning 3-4: mild cognitive impairment 5-7: moderate cognitive impairment 8 or more: severe cognitive impairment | (de la Iglesiaa et al., 2001; Pfeiffer, 1975) |
| Mini-Mental State Examination (MMSE) | To screen for cognitive impairment | **Subscales**Orientation Registration Attention Calculation Recall Language**Score** [0-30]≥23: Cognitive impairment | (Lobo et al., 1999, 1979) |
| Subjective Cognitive Decline Questionnaire (SCD-Q): Mycog and Theircog | To assess the individual perception of subjective decline | **Subscales**Memory Language Executive functions**Score** [0-24]Higher scores indicate greater SCD | (Rami et al., 2014) |
| Cognitive Reserve Questionnaire (CRQ) | To measure cognitive reserve accumulated by individuals through their lifespan | **Subscales**Education Work activity Leisure time**Score** [0-25]Higher scores indicate greater cognitive reserve | (Rami et al., 2011) |
| Memory Functioning Questionnaire (MFQ) | To evaluate memory self-appraisals | **Subscales**General rating of memory Retrospective functioning Frequency of forgetting while reading Remembering past events Seriousness of forgetting Mnemonics Usage**Score** Everyday memory [15 - 90] Text Recall [4 - 24] Past events [4 - 24] Mnemonic Strategies [8 - 48] Higher scores indicate worse or better memory functioning, depending on the subscale | (Rubio & Portero, 2008; Gilewski et al., 1990) |
| Digit symbol substitution test (DSST) | To evaluate cognitive functions | **Subscales**Motor speed Attention Visuoperceptual**Score** [0-133]Lower digit symbol test scores indicate worse cognitive ability | (Fellows & Schmitter-Edgecombe, 2020; Joy et al., 2003) |
| Trail making test A & B | To assess for brain damage | **Subscales**Speed of processing Mental flexibilityExecutive functioning**Score** [seconds]The greater the number of seconds the greater the cognitive impairment | (Ashendorf et al., 2008; Salthouse, 2011) |
| N-back | To assess working memory functions | **Subscales**Working memory Attention.**Score** [Number of right answers; response time] | (Gevins & Cutillo, 1993) |
| Progressive Matrices | To measure non-verbal cognitive abilities | **Subscales**Abstract reasoning Fluid intelligence**Score** [Number of right answers; response time] | (Harris et al., 2020) |
| Stroop color-word visual test | To measure the ability to inhibit cognitive interference | **Subscales**Inhibitory control**Score** [Number of right answers; response time] | (Scarpina & Tagini, 2017; Stroop, 1935) |
| **Mood Disorders** | Geriatric Depression Scale-15 (GDS-15) | To classify stages of geriatric depression | **Score** [0-15]0-4: normal 5-8: mild depression 9-11: moderate depression 12-15: severe depression | (Martínez et al., 2002; SheiKh & Yesavage, 1986) |
| DeJong Gierveld Loneliness Scale (DJGLS) | To assess emotional and social loneliness | **Score** [0-11]0 - 2: not loneliness 3 - 8: moderate loneliness 9 - 10: severe loneliness 11: very severe loneliness | (Tomás et al., 2017; Jong-Gierveld, 1987) |
| Dimensional Apathy Scale (DAS) | To assess distinctive characteristics of apathy  | **Subscales**Executive apathy Emotional apathy Initiation apathy**Score** [0-72]Higher scores indicate greater apathy | (Salas et al., 2020; Radakovic & Abrahams, 2018) |
| Beck Anxiety Inventory (BAI) | To measure common somatic and cognitive symptoms of anxiety | **Score** [0-36]0-7: minimal anxiety 8 -15: mild anxiety 16-25: moderate anxiety 26-36: severe anxiety  | (Beck et al., 1993) |
| Subjective age perception | To assess self-appraisal of biological aging | Feeling younger than my age Feeling older than my age Feeling the age I have | (Kwak et al., 2018; Westerhof & Barrett, 2005) |
| **Health Condition and Quality of Life** | European Quality of Life 5-Dimensions (EQ-5D) | To measure generic current health | **Subscales**Mobility Self-care Usual activities Pain/Discomfort Anxiety/Depression**Score** [0-100]Higher scores indicate better health state | (Herdman et al., 2001; Brooks & Group, 1996) |
| Glasgow Benefit Inventory (GBI) | To measure outcome changes in quality of life after an intervention | **Subscales**General factors Social support Physical Health **Score** [-100 - +100]Higher scores indicate better health | (Cuadrado, 2015; Robinson et al., 1996) |
| Health Utility Mark 3 (HUI-3) | To classify quality of life | **Subscales**Vision Hearing Speech Mobility Dexterity Feelings Cognition Pain**Score** [0 - 1]Higher scores indicate better health | (Ruiz et al., 2003; Feeny et al., 1995) |
| **Independent and Physical Activity** | Barthel Index | To measure functional independence | **Score** [0 - 100]21-60: severe dependency 61-90: moderate dependency 91-99: slight dependency 100: independence | (Cid-Ruzafa & Damián-Moreno, 1997; Mahoney, 1965) |
| Instrumental Activities of Daily Living Scale (IADL) | To assess independent living skills | **Score** [0 - 8]Lower scores indicate more dependency | (Vergara et al., 2012; Lawton & Brody, 1969) |
| Self-Reported Physical Activity  | To assess physical activity per week | **Score** [1-5]Higher scores indicate higher physical activity | (WHO, 2010) |
| Physical Activity Scale for the Elderly (PASE) | To measure the level of physical activity in older adults | **Subscales**Leisure Household Occupational activity**Score** [0- ≥400]0 - 40: sedentary 41 - 90: light physical activity ≥90: moderate to intense | (Curcio et al., 2019; NERI, 1991; Washburn et al., 1993) |
| Physical Activity Level (PAL) | To determine the level of physical activity | **Score** PAL = $\frac{Total energy required in 24h}{Basal metabolic rate}$< 1.4: inactive 1.4-1.65: sedentary 1.6 - 2.0: slightly active 2.0 - 2.4: highly active > 2.4: extremely active | (James & Schofield, 1990) |
| **Sleep Quality** | Epworth Somnolence Scale (ESS) | To measure the general level of daytime sleepiness. | **Score** [0-24]0–10: normal range 11–14: mild sleepiness 15–17: moderate sleepiness 18 or higher: severe sleepiness | (Johns, 1991) |
| Pittsburgh Sleep Quality Index (PSQI) | To assess sleep quality and disturbances  | **Score** [0-21]Higher scores indicate lower sleep quality | (Wang et al., 2022; Buysse et al., 1989) |
| **Nutrition** | Mediterranean Diet Adherence Screener (MEDAS) | To estimate the adherence to the Mediterranean diet. | **Score** [0-14]Higher scores indicate more adherence | (García-Conesa et al., 2020; Newby et al., 2003) |

**REFERENCES**

Amann, E., & Anderson, I. (2014). Development and validation of a questionnaire for hearing implant users to self-assess their auditory abilities in every-day communication situations: The Hearing Implant Sound Quality In-dex (HISQUI19. *Acta Otolaryngol*, *134*, 915-923.

Archbold, S., Lutman, M. E., & Marshall, D. H. (1995). Categories of Auditory Performance. *The Annals of Otology, Rhinology & Laryngology. Supplement*, *166*, 312-314.

Ashendorf, L., Jefferson, A. L., O’Connor, M. K., Chaisson, C., Green, R. C., & Stern, R. A. (2008). Trail Making Test errors in normal aging, mild cognitive impairment, and dementia. *Archives of Clinical Neuropsychology*, *23*(2), 129-137. https://doi.org/10.1016/j.acn.2007.11.005

Beck, A. T., Epstein, N., Brown, G., & Steer, R. (1993). Beck anxiety inventory. *Journal of consulting and clinical psychology*.

Billinger-Finke, M., Bräcker, T., Weber, A., Amann, E., Anderson, I., & Batsoulis, C. (2020). Development and validation of the audio processor satisfaction questionnaire (APSQ) for hearing implant users. *International Journal of Audiology*, *59*(5), Article 5.

Brooks, R., & Group, E. (1996). EuroQol: The current state of play. *Health policy*, *37*(1), 53-72.

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry research*, *28*(2), Article 2.

Calvino, M., Gavilán, J., Sánchez-Cuadrado, I., Pé-rez-Mora, R. M., Muñoz, E., & Lassaletta, L. (2016). Validation of the Hear-ing Implant Sound Quality Index (HISQUI19) to as-sess Spanish-speak-ing cochlear implant users’ auditory abilities in everyday communication si-tuations. *Acta Oto-Laryngologica*, *136*(1), Article 1.

Cañete, O. M., Marfull, D., Torrente, M. C., & Purdy, S. C. (2022). The Spanish 12-item version of the Speech, Spatial and Qualities of Hearing scale (Sp-SSQ12): Adap-tation, reliability, and discri-minant validity for people with and without hearing loss. *Disability and Rehabilita-Tion*, *44*(8), Article 8.

Cid-Ruzafa, J., & Damián-Moreno, J. (1997). Valoración de la discapacidad física: El índice de Bart-hel. *Revista es-pañola de salud pública*, *71*, 127-137.

Cox, R. M. (1997). Administration and application of the APHAB. *The Hearing Journal*, *50*(4), Article 4.

Cuadrado, I. P. S. (2015). *Validación de los cuestionarios de calidad de vida" Glasgow benefit inventory" y" Nijmegen cochlear implant questionnaire" en pacientes con implante coclear*.

Curcio, F., Liguori, I., Cellulare, M., Sasso, G., Della-Morte, D., Gargiulo, G., Testa, G., Cacciatore, F., Bonaduce, D., & Abete, P. (2019). Physical Activity Scale for the Elderly (PASE) Score Is Related to Sarcopenia in Noninstitutionalized Older Adults. *Journal of Geriatric Physical Therapy (2001)*, *42*(3), 130-135. https://doi.org/10.1519/JPT.0000000000000139

de la Iglesiaa, J. M., DueñasHerrerob, R., Vilchesa, M. C. O., Tabernéa, C. A., Colomerc, C. A., & Luquec, R. L. (2001). Adaptación y validación al castellano del cuestionario de Pfeiffer (SPMSQ) para detectar la existencia de deterioro cognitivo en personas mayores e 65 años. *Medicina clínica*, *117*(4), Article 4.

Delgado, C., Araneda, A., & Behrens, M. (2019). Validation of the Spanish-language version of the Montreal Cognitive Assessment test in adults older than 60 years. *Neurología (English Edition)*, *34*(6), Article 6.

Dipietro, L., Caspersen, C. J., Ostfeld, A. M., & Nadel, E. R. (1993). A survey for assessing physical activity among older adults. *Medicine & Science in Sports & Exercise*.

Donaire-Gonzalez, D., Gimeno-Santos, E., Serra, I., Roca, J., Balcells, E., Rodríguez, E., & Group, P. A. C.-C. O. P. D. S. (2011). Validación del cuestionario de actividad física de Yale en pacientes con enfermedad pulmonar obs-tructiva crónica. *Archivos de Bronconeumología*, *47*(11), Article 11.

Feeny, D., Furlong, W., Boyle, M., & Torrance, G. W. (1995). Multi-attribute health status classification systems. *Pharmacoeconomics*, *7*(6), Article 6.

García-Conesa, M.-T., Philippou, E., Pafilas, C., Massaro, M., Quarta, S., Andrade, V., Jorge, R., Chervenkov, M., Ivanova, T., Dimitrova, D., & others. (2020). Exploring the validity of the 14-item mediterranean diet adherence screener (Medas): A cross-national study in seven european countries around the mediterranean region. *Nutrients*, *12*(10), 2960.

Gevins, A., & Cutillo, B. (1993). Spatiotemporal dynamics of component processes in human working memory. *Electroencephalography and clinical Neurophysiology*, *87*(3), 128-143.

Gilewski, M. J., Zelinski, E. M., & Schaie, K. W. (1990). The Memory Functioning Questionnaire for assessment of memory complaints in adulthood and old age. *Psychology and aging*, *5*(4), 482.

Harris, A. M., McMillan, J. T., Listyg, B., Matzen, L. E., & Carter, N. (2020). Measuring intelligence with the Sandia Matrices: Psychometric review and recommendations for free Raven-like item sets. *Personnel Assessment and Decisions*, *6*(3), 6.

Herdman, M., Badia, X., & Berra, S. (2001). El EuroQol-5D: una alternativa sencilla para la medi-ción de la calidad de vida relacionada con la salud en atención prima-ria. *Atención primaria*, *28*(6), 425.

Herráiz, C., Plaza, G., & Tapia, M. C. (2001). Evaluación de la incapacidad en pacientes con acúfe-nos. *Acta otorrinolaringoló-gica española*, *52*(6), Article 6.

Hinderink, J. B., Krabbe, P. F., & Van Den Broek, P. (2000). Development and application of a health-related quality-of-life instrument for adults with cochlear implants: The Nijmegen cochlear implant questionnaire. *Otolaryngology-Head and Neck Surgery*, *123*(6), Article 6.

Jacobson, G. P., & Newman, C. W. (1990). The development of the dizziness handicap inventory. *Archives of Otolaryngology–Head & Neck Surgery*, *116*(4), Article 4.

James, W. P. T., & Schofield, E. C. (1990). *Human energy requirements. A manual for planners and nutritionists*. Oxford Uni-versity Press.

Johns, M. W. (1991). A new method for measuring daytime sleepiness: The Epworth sleepiness scale. *sleep*, *14*(6), Article 6.

Jong-Gierveld, J. (1987). Developing and testing a model of loneliness. *Journal of Personality and Social Psycho-Logy*, *53*(1), Article 1.

Kim, A. S., Betz, J. F., Nieman, C. L., Hoyer, M. R., Applebaum, J., Lin, F. R., & Goman, A. M. (2021). Long-term Impact of Hearing Aid Provision or Cochlear Implantation on Hearing Handicap. *The Laryngoscope*, *131*(5), Article 5.

Kwak, S., Kim, H., Chey, J., & Youm, Y. (2018). Feeling how old I am: Subjective age is associated with estimated brain age. *Frontiers in aging neuroscience*, 168.

Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The gerontologist*, *9*(3\_Part\_1), 179-186.

Lobo, A., Ezquerra, J., & Sala, J. M. (1979). Cognocitive mini-test (a simple practical test to detect intellectual changes in medical patients. *Actas luso-espanolas de neurologia, psiquiatria y cien-cias afines*, *7*(3), Article 3.

Lobo, A., Saz, P., Marcos, G., Día, J. L., Cámara, C., Ventura, T., & Aznar, S. (1999). Reva-lidación y normalización del Mini-Examen Cognoscitivo (primera versión en castellano del Mini-Mental Status Examination) en la población general geriátrica. *Med Clin (Barc*, *112*(20), Article 20.

Mahoney, F. I. (1965). Functional evaluation: The Barthel index. *Maryland State Medical Journal*, *14*(2), Article 2.

Martínez, J., Onís, M. C., Dueñas, R., Albert, C., Aguado, C., & Luque, R. (2002). Versión española del cuestionario de Yesavage abreviado (GDS) para el despistaje de depresión en ma-yores de 65 años: Adaptación y validación. *Medifam*, *12*(10), 620-630.

Mosnier, I., Ferrary, E., Aubry, K., Bordure, P., Bozorg-Grayeli, A., Deguine, O., Eyermann, C., Franco-Vidal, V., Godey, B., Guevara, N., Karkas, A., Klopp, N., Labrousse, M., Lebreton, J.-P., Lerosey, Y., Lescanne, E., Loundon, N., Marianowski, R., Merklen, F., … Sterkers, O. (2020). The French National Cochlear Implant Registry (EPIIC): Cochlear implantation in adults over 65   years old. *European Annals of Otorhinolaryngology, Head and Neck Diseases*, *137*, S19-S25. https://doi.org/10.1016/j.anorl.2020.07.011

Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., & Chertkow, H. (2005). The Mon-treal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society*, *53*(4), Article 4.

NERI. (1991). *PASE: Physical Activity Scale for the Elderly: Administration and Scoring Instruction Manual*. New England Research Institutes Watertown, MA.

Newby, P. K., Hu, F. B., Rimm, E. B., Smith-Warner, S. A., Feskanich, D., Sampson, L., & Willett, W. C. (2003). Reproducibility and validity of the Diet Quality Index Revised as assessed by use of a food-frequency questionnaire. *The American journal of clinical nutrition*, *78*(5), 941-949.

Newman, C. W., Jacobson, G. P., & Spitzer, J. B. (1996). Development of the tinnitus handicap inventory. *Archives of Otolaryngology–Head & Neck Surgery*, *122*(2), Article 2.

Noble, W., Jensen, N. S., Naylor, G., Bhullar, N., & Akeroyd, M. A. (2013). A short form of the Speech, Spatial and Qualities of Hearing scale suitable for clinical use: The SSQ12. *International Journal of Audiology*, *52*(6), Article 6.

Pfeiffer, E. (1975). A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. *Journal of the American Geriatrics Society*, *23*(10), Article 10.

Radakovic, R., & Abrahams, S. (2018). Multidimensional apathy: Evidence from neurodegenerative disease. *Current Opinion in Behavioral Sciences*, *22*, 42-49.

Rami, L., Mollica, M. A., García-Sanchez, C., Saldaña, J., Sanchez, B., Sala, I., Valls-Pedret, C., Castellví, M., Olives, J., & Molinuevo, J. L. (2014). The subjective cognitive decline questionnaire (SCD-Q): A validation study. *Journal of Alzheimer’s Disease*, *41*(2), 453-466.

Rami, L., Valls-Pedret, C., Bartrés-Faz, D., Caprile, C., Solé-Padullés, C., Castellví, M., Olives, J., Bosch, B., & Molinuevo, J. L. (2011). Cuestionario de reserva cognitiva. Valores obtenidos en población anciana sana y con enfermedad de Alzheimer. *Rev Neurol*, *52*(4), 195-201.

Robinson, K., Gatehouse, S., & Browning, G. G. (1996). Measuring patient benefit from otorhinolaryngological surgery and therapy. *Annals of Otology, Rhinology & Laryngology*, *105*(6), Article 6.

Rubio, D. A., & Portero, C. F. (2008). Validación de la versión abreviada en español del Cuestionario de Funcionamiento de la Memoria (CFM) en una población mayor de 55 años. *Anales de Psicología/Annals of Psychology*, *24*(2), 320-326.

Ruiz, M., Rejas, J., Soto, J., Pardo, A., & Rebollo, I. (2003). Adaptación y validación del Health Utilities Index Mark 3 al castellano y baremos de corrección en la población española. *Medicina clínica*, *120*(3), Article 3.

Salas, T., Radakovic, R., Rodriguez-Castillo, V., Marín, S., Chaverri, D., & Rodriguez-Santos, F. (2020). Spanish Adaptation of the Dimensional Apathy Scale (DAS) in Amyotrophic Lateral Sclerosis. *Frontiers in Neurology*, *11*, 562837. https://doi.org/10.3389/fneur.2020.562837

Salthouse, T. A. (2011). What cognitive abilities are involved in trail-making performance? *Intelligence*, *39*(4), 222-232. https://doi.org/10.1016/j.intell.2011.03.001

Sanchez-Cuadrado, I., Gavilan, J., Perez-Mora, R., Muñoz, E., & Lassaletta, L. (2015). Reliability and validity of the Nijmegen cochlear implant questionnaire in Spanish. *European Archives of Oto-Rhino-Laryngology*, *272*(7), Article 7.

Scarpina, F., & Tagini, S. (2017). The stroop color and word test. *Frontiers in psychology*, *8*, 557.

SheiKh, J. L., & Yesavage, J. A. (1986). Geriatric Depression Scale (GDS). Recent evidence and development of a shorter version. *Clin Gerontol*, *5*, 165-172.

Solarte, S. E., Chacón, M. M., & Ortiz, Y. A. (2016). Validez de contenido-escala “abbreviated profile of hearing aid benefit”. *Areté*, *16*(1), Article 1.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of experimental psychology*, *18*(6), 643.

Tamblay, N., Villalobos, I., Pastene, A., & Rahal, M. (2008). Impacto social del uso de audífonos en adultos mayores. *Revista de otorrinolaringología y cirugía de cabeza y cuello*, *68*(1), Article 1.

Tomás, J. M., Pinazo-Hernandis, S., Donio-Bellegarde, M., & Hontangas, P. M. (2017). Validity of the de Jong Gierveld Lone-liness Scale in Spanish older population: Competitive structural models and item response theory. *European Journal of Ageing*, *14*(4), Article 4.

Vereeck, L., Truijen, S., Wuyts, F. L., & Van de Heyning, P. H. (2007). The dizziness handicap inventory and its relationship with functional balance performance. *Otology & neurotology*, *28*(1), Article 1.

Vergara, I., Bilbao, A., Orive, M., Garcia-Gutierrez, S., Navarro, G., & Quintana, J. M. (2012). Validation of the Spanish version of the Lawton IADL Scale for its application in elderly people. *Health and Quality of Life Outcomes*, *10*(1), Article 1.

Wang, S., Cha, X., Li, F., Li, T., Wang, T., Wang, W., Zhao, Z., Ye, X., Liang, C., Deng, Y., & others. (2022). Associations between sleep disorders and anxiety in patients with tinnitus: A cross-sectional study. *Frontiers in Psychology*, 4755.

Washburn, R. A., Smith, K. W., Jette, A. M., & Janney, C. A. (1993). The Physical Activity Scale for the Elderly (PASE): Development and evaluation. *Journal of clinical epidemiology*, *46*(2), 153-162.

Westerhof, G. J., & Barrett, A. E. (2005). Age identity and subjective well-being: A comparison of the United States and Germany. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *60*(3), S129-136. https://doi.org/10.1093/geronb/60.3.s129

WHO. (2010). *Global Recommendations on Physical Activity for Health*. World Health Organization. http://www.ncbi.nlm.nih.gov/books/NBK305057/