

Pérez-Rodríguez, M.; García-Hernández J.J.; Pérez-Tejero, J. (201x). Self-Esteem in People with Acquired Brain Injury According to Physical Activity. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. x (x) pp.xx Pendiente de publicación / In press.

ORIGINAL

SELF-ESTEEM IN PEOPLE WITH ACQUIRED BRAIN INJURY ACCORDING TO PHYSICAL ACTIVITY

AUTOESTIMA EN PERSONAS CON DAÑO CEREBRAL ADQUIRIDO SEGÚN PRÁCTICA DE ACTIVIDAD FÍSICA

Pérez-Rodríguez, M.^{1,2}; García-Hernández J.J.^{2,3}; Pérez-Tejero, J.¹

¹ “Fundación Sanitas” Chair in Inclusive Sport Studies (CEDI). Health and Human Performance Department. Faculty of Physical Activity and Sport Sciences (INEF). AFIFE research group. Universidad Politécnica de Madrid (Spain) marta.prodriguez@upm.es, j.perez@upm.es

² Fundación Segunda Parte (Spain) juanjo.gh@fundacionsegundaparte.org

³ Universidad Francisco de Vitoria (Spain)

Spanish-English translator: Pérez-Tejero, J. j.perez@upm.es; revisado por <https://www.proof-reading-service.com/en/>

Código UNESCO / UNESCO code: 3299 Medicina del deporte. 6199 Otras especialidades psicológicas.

Clasificación del Consejo de Europa / Council of Europe classification: 11. Medicina del deporte / Sport Medicine; 15. Psicología del deporte / Sport Psychology. 17. Otras: Actividad Física y Salud / Others: Physical Activity and Health; Entrenamiento Deportivo / Sports training.

Recibido 21 de octubre de 2020 **Received** October 21, 2020

Aceptado 22 de enero de 2022 **Accepted** January 22, 2022

ABSTRACT: People with acquired brain injury (ABI) have long-term consequences, showing low levels of physical activity (PA) and presenting worse self-esteem. Nevertheless, it is proven that exercise practice in this population improves psychological dimensions. The aim was to study if self-esteem in people with ABI in the chronic phase is influenced by exercise practice. A quasi-experimental ex post facto design was used, where an exercise group (n=50) and a sedentary group (n=49) were studied. The Rosenberg Scale was used to measure self-esteem. A descriptive analysis was carried out and the T test for independent samples was used. People who practice exercise perceived better self-esteem and higher autonomy (p ≤0.05). Therefore, the practice of exercise is recommended to improve self-esteem in people with ABI. Furthermore, having practiced exercise before the ABI seems to be crucial for subsequent practice.

KEYWORDS: Acquired brain injury; Chronic phase; Self-esteem; Physical

activity.

RESUMEN

La literatura científica señala la importancia de la actividad física (AF) en las personas con daño cerebral adquirido (DCA) para mantener su salud y funcionalidad; sin embargo, en general presentan secuelas crónicas, bajos niveles de AF y baja autoestima. Con el objetivo de analizar la autoestima en personas con DCA en fase crónica en función de la práctica de AF, se realizó un estudio quasi-experimental ex post facto, comparando dos grupos: personas que realizaban AF (n=50) y personas que no realizaba AF (n=49), evaluando la autoestima con la Escala de Rosenberg. Se realizó un análisis descriptivo y se utilizó la prueba T para muestras independientes. Así, el grupo que realizó AF mostró mejor autoestima y mayor autonomía personal ($p \leq 0.05$). Por ello, se recomienda la práctica de AF para mejorar la autoestima en personas con DCA. Además, haber practicado AF antes del DCA parece ser determinante para su práctica a posteriori.

PALABRAS CLAVE: Daño cerebral adquirido; Fase crónica; Autoestima; Actividad física.

INTRODUCTION

Acquired brain injury (ABI) is a cause of disability that increases every year worldwide (Dewan et al., 2018; Feigin & Vos, 2019). In Spain, ABI is considered a silent epidemic, being traumatic brain injury (TBI) and stroke the main aetiologies of injury, causing chronic sequelae. These have an unequal impact at the individual level and depend on factors such as affected brain area, age, type of rehabilitation received and deficits appearing after damage (Kohnen, Lavrijsen, Smals, Gerritsen, & Koopmans, 2019; Mollayeva, Mollayeva, Pacheco, D'Souza, & Colantonio, 2019; Quezada & Huete, 2016). Because of this, the multidisciplinary rehabilitation model has achieved the best results in improving functionality, being exercise a fundamental tool in this process (García-Hernández et al., 2011; Luo et al., 2020). However, PA levels in people with disability and chronic pathologies are very low, although previous studies confirm that the importance of PA becomes more relevant if we consider ABI possible secondary complications, highlighting psychological and emotional dimensions (Curvis, Simpson, & Hampson, 2018; Jalayondeja, Jalayondeja, Suttiwong, Sullivan, & Nilanthi, 2016; Villalobos et al., 2019).

Self-esteem has been defined by many authors through different psychological models, currently accepting that it refers to a subjective perception regarding feelings of value and acceptance, related to the social environment (Guindon, 2002; Ziller, Hagey, Smith, & Long, 1969). Self-esteem can be altered by ABI, which makes it essential to work on this aspect throughout the recovery process. This variable has been extensively studied for determining psychological and psychosocial well-being (Curvis et al., 2018).

There is scientific evidence on the benefits that exercise has on people with ABI in the physical, cognitive and psychosocial spheres, as well as the decisive improvement it produces on health in relation to quality of life (HRQoL) (Belfiore, Miele, Gallè, & Liguori, 2018; Pérez-Rodríguez, Pérez-Tejero, García-Hernández, Franco, & Coterón, 2020; Perry, Coetzer, & Saville, 2018) and exercise programs have demonstrated a positive impact on the self-esteem of people with ABI (Driver, Rees, O'Connor, & Lox, 2006; Killington, Mackintosh, & Ayres, 2010; Schwandt et al., 2012). However, it would be necessary to design the exercise by determining the type of activity, intensity, duration and volume according to needs and personal context, with the aim of achieving the highest degree of social interaction.

AIM

The aim of this study was to examine the associations between PA levels and self-esteem in people with chronic ABI.

MATERIAL AND METHODS

A quasi-experimental ex post facto study was designed. Data from 100 chronic ABI individuals (64 men and 36 women) were analyzed in this study. It was not possible to randomize the sample, although the participants decided whether they wanted to practice exercise or not. The criteria for inclusion in the study were a) to be older than 18 years old, b) not to have language problems that made it impossible to understand oral and written language, c) to have a level of cognitive functioning sufficient to respond questionnaires in a consistent manner, endorsed by the expert judgement of speech therapists and neuropsychologists in rehabilitation centres, d) at least one year since ABI onset, e) to be users of an outpatient rehabilitation centre, f) to have not return to work after ABI and g) signed consent participation in the study.

Self-esteem was measured with the Rosenberg Self-Esteem Scale (RSES) Rosenberg (1979), the most widely used measure of global self-esteem in the literature (Haagsma et al., 2015; Kelly, Ponsford, & Couchman, 2013; Riley, Dennis, & Powell, 2010; Schwandt et al., 2012), In this study, the Spanish version of Vázquez-Morejón Jiménez, Jiménez García-Bóveda, and Vázquez Morejón (2004) was used.

Demographic characteristics of the participants are presented in Table 1, including age, gender, time since the ABI and aetiology. PA was measured by asking the individuals regarding their PA practice, PA levels before and after ABI onset, the support needed to perform daily activities and their decision ability (using a Likert scale 1-5, being "1" totally autonomous, "2" I sometimes need help, "3" I often need help, "4" I almost always need help or "5" I always need help) and if the physician recommended PA (if yes, any specific activity?, and if not, has he/she told you not to do physical activity?

Data analysis

Descriptive statistics were generated to match scale properties according to the type and distribution of the variables through mean values and standard deviation (SD). Age and self-esteem were normally distributed (Kolmogorov-Smirnov). The T-Test was used for independent samples for age, Rosenberg Scale data and months of evolution variables, in order to check if there were differences in means between the PA and non PA groups after ABI. Spearman rank correlation used for age, months of evolution and Rosenberg scale. SPSS statistical package for Windows (19th Version) was used. The variables were studied according to whether the subjects practiced PA (n=51) or not (n=49). Microsoft Excel 2013 was used for data collection. The value of p 0.05 was considered statistically significant.

RESULTS

Table 1 shows sociodemographic data from study participants. We observed that there was a higher number of men performing exercise compared to women. In addition, of the 36 women who participated in the study, only 16 practiced exercise. With respect to the lesion aetiology, in the group that practiced exercise there was a lower percentage of stroke (58.82%) and a higher number of TBI (23.53%) compared to the group that did not perform exercise, with a higher number of stroke (75.51%) and a lower number of TBI (8.16%). It was observed that participants who did not perform exercise felt that they needed more support to carry out activities of daily life and to decide on fundamental issues of their life, with respect to the group that did perform PA. Based on the results, it was found that, although the doctors recommended exercise practice, they do not recommended a specific PA.

Table 1. Socio-demographic data from study participants

Variable	Category	Do exercise	Do not exercise
Gender	Men	35 (68,63%)	29 (59,18%)
	Women	16 (31,37%)	20 (40,82%)
Injury aetiology	stroke	30 (58,82%)	37 (75,51%)
	TBI	12 (23,53%)	4 (8,16%)
	Brain tumor	3 (5,88%)	4 (8,16%)
	Post anoxic encephalopathies	4 (7,84%)	3 (6,12%)
	Contagious diseases	0 (0,00%)	1 (2,05%)
	Other causes	2 (3,93%)	0 (0,00%)
Exercise before ABI	Yes	43 (84,31%)	30 (61,22%)
	No	8 (15,69%)	19 (38,78%)
Support level needed for daily life activities	Totally autonomous	13 (25,49%)	10 (20,41%)
	Sometimes I need help	26 (50,98%)	21 (42,86%)
	Many times I need help	4 (7,84%)	5 (10,2%)
	Most of the times I need help	7 (13,73%)	7 (14,29%)
	Always need help	1 (1,96%)	6 (12,24%)
Support level needed for decision-making in essential issues	Totally autonomous	27 (52,94%)	23 (46,94%)
	Sometimes I need help	19 (37,25%)	20 (40,82%)
	Many times I need help	3 (5,88%)	3 (6,12%)
	Most of the times I need help	1 (1,96%)	1 (2,04%)
	Always need help	1 (1,96%)	2 (4,08%)
Your doctor has recommended exercise	Yes	35 (68,63%)	20 (40,82%)
	No	16 (31,37%)	29 (59,18%)
Your doctor recommended some specific exercise	Yes	10 (28,57%)	8 (40,00%)
	No	25 (71,43%)	12 (60,00%)
Your doctor told you not to do exercise	Yes	0 (0,00%)	0 (0,00%)
	No	16 (100,00%)	29 (100,00%)

Table 2 shows differences between the two groups (PA vs non-PA) according to age, months of evolution and the Rosenberg scale. The data are presented, on the one hand, without differentiating the aetiology of ABI and, on the other hand, differentiating aetiologies (stroke, TBI and other aetiologies). Significant differences were found in the self-esteem assessed by the Rosenberg Scale in the ABI group and in the stroke group. Of the 100 participants in the study, 13 obtained a score of 25 or lower on the Rosenberg Scale, being higher the score (and therefore greater self-esteem) in the group that perform PA (32.12 ± 4.81), compared to the group that did not PA (29.27 ± 4.59 ; $p \leq 0.05$).

There were no significant differences between the two groups for age and months of evolution. Deepening the data, the age ranges were almost equal in the two groups, being the average age 4 years lower in the exercise group.

Likewise, with respect to the months of evolution, the average was one month lower in the group that did not practice PA, although the range of evolution and the standard deviation was higher in this group compared to the PA group, with no significant differences.

Table 2. Differences in age, months of evolution and Rosenberg scale depending per group

Variable	Participants	PA practice	Range	Mean (\pm SD)	p
Age ABI	51	Yes	21-75	48,37 (\pm 12,64)	0,11
	49	No	18-76	52,37 (\pm 12,10)	
Age STROKE	30	Yes	30-75	53,13 (\pm 10,58)	0,94
	37	No	18-75	53,35 (\pm 11,90)	
Age TBI	12	Yes	21-66	41,33 (\pm 12,80)	0,19
	4	No	37-76	52,25 (\pm 16,98)	
Age other aetiologies	9	Yes	24-66	41,89 (\pm 12,72)	0,32
	8	No	35-67	47,88 (\pm 11,14)	
Months of evolution ABI	51	Yes	12-234	72,41 (\pm 53,50)	0,33
	49	No	12-396	86,08 (\pm 82,63)	
Months of evolution stroke	30	Yes	12-158	63,70 (\pm 45,06)	0,72
	37	No	12-396	69,16 (\pm 71,44)	
Months of evolution TBI	12	Yes	12-234	99,50 (\pm 73,94)	0,10
	4	No	13-334	191 (\pm 133,36)	
Months of evolution other etiologies	9	Yes	15-124	65,33 (\pm 39,63)	0,11
	8	No	39-200	111,88 (\pm 66,24)	
Rosenberg Scale ABI	51	Yes	21-40	32,12 (\pm 4,81)	0,00*
	49	No	18-40	29,27 (\pm 4,59)	
Rosenberg Scale stroke	30	Yes	24-40	32,73 (\pm 4,59)	0,00*
	37	No	20-39	29,24 (\pm 4,43)	
Rosenberg Scale TBI	12	Yes	21-37	31,00 (\pm 4,95)	0,53
	4	No	25-33	29,25 (\pm 3,30)	
Rosenberg scale other etiologies	9	Yes	24-40	31,56 (\pm 5,55)	0,46
	8	No	18-40	29,38 (\pm 6,23)	

* $p \leq 0,05$

DISCUSSION

This study aimed to analyse possible self-esteem differences in individuals with ABI based on their level of PA, exposing the data according to lesion aetiology and also general ABI, to observe possible differences or similarities. It should be noted that it is common to find people with ABI from different aetiologies participating jointly in many PA programs in subacute and/or chronic phases, as well as in group therapies in different areas of neuro-rehabilitation, using same instruments for screening and assessments (De Noreña et al., 2010; Fariñas Lapeña, 2013) and functional level seems determinant, and not the injury aetiology of the person (Díaz-Piñero et al., 2007; Rubio & Atarés, 2019). It should be noted that, according to the literature review carried out for this study, most part of the investigations about self-esteem have been developed on

people who have suffered a TBI, compared to other aetiologies; authors pointed out the lower levels of self-esteem compared to people who had not suffered TBI (Kelly et al., 2013; Ponsford et al., 2014; Riley et al., 2010).

We agree with Eunseo Ahn, Seo Soon-rim, and Eunhee Kim (2019) on the need to work on self-esteem to achieve the highest possible quality of life in people with ABI, related aspects that must be worked together in order to facilitate the reintegration of the person in their community after ABI and to achieve rehabilitation goals (Lapadatu & Morris, 2019; Longworth, Deakins, Rose, & Gracey, 2018). Thus, our study reaffirms the tendency to improve self-esteem through PA which reinforces the idea of including exercise programs designed specifically for this population with the aim of achieving not only physical objectives, but also those related the psychological health (Driver et al., 2006; Schwandt et al., 2012).

Also, our results are in line with those from Mitchell, Veitch, and Passey (2014), where 12 people with ABI performed a leisure program of a week, including sports activities, improved their self-esteem 2.5 points, where 10 out of 12 participants presented TBI. The results showed that people who practice PA before ABI had a better predisposition to its practice after ABI. It is important to note that 49% of participants do not perform any type of exercise after ABI, which could constitute a risk for their health and related with the appearance of secondary complications (Jaarsma, Dijkstra, Geertzen, & Dekker, 2014; Pfeifer & Geidl, 2017). In light of the results obtained, it is necessary to implement exercise programs for people with ABI in order to improve their self-esteem and preventing health risks (García-Hernández & Pérez-Rodríguez, 2011), both in subacute and chronic rehabilitation phases.

Results indicate that the PA group perceives less need for support to carry out activities of daily living and to decide on fundamental questions of their lives, a finding in line with the review carried out by Belfiore et al. (2018), in which the value of PA in people who have suffered a stroke stands out. Based on the results, it is reasonable to insist in the development of PA programs to promote a higher level of activity and to avoid a sedentary lifestyle, coinciding with what was also proposed by Dobkin (2016). In our study, no participant received a medical contraindication for PA practice. In this line, 68.3% of the PA group received a medical recommendation for PA engagement, compared with 40.82% of the non-PA group. This point out the predisposition from the medical field to the practice of PA and the importance of the medical professional in the people with ABI referral, as proposed by Duperly and Lobelo (2015): the adequate PA prescription is necessary for people with TBI, based on their needs, limitations and potentialities.

Despite the obtained and contrasted results, this study presented limitations, since type of PA could be more detailed, the recommended PA duration and intensity to achieve benefits on the variables studied. It is necessary to generate consensus on types of intervention to serve as reference to rehabilitation settings. In this way, future research could assess the approach by type of lesion aetiology, differentiating also between the practice of PA within or outside

rehabilitation settings. It would be of interest to assess the relationship between time of evolution since the ABI and the beginning of PA or sport practice.

CONCLUSIONS

The hypothesis about the positive impact of PA on self-esteem has been reinforced, so that people with ABI who performed PA showed a higher level of self-esteem than those who did not practice. In addition, it is clear the importance of generating a key healthy habit such as PA practice throughout life, given the relevance of adherence to PA practice and its role in the prevention of secondary complications and the promotion of personal autonomy. This study highlights the value of PA not only in the motor sphere but also in the psychological and emotional area and recalls the importance of multidisciplinary work to achieve the objectives of autonomy and functional recovery in people with ABI.

REFERENCES

- Belfiore, P., Miele, A., Gallè, F., & Liguori, G. (2018). Adapted physical activity and stroke: a systematic review. *The Journal of sports medicine and physical fitness*, 58(12), 1867-1875. doi: 10.23736/s0022-4707.17.07749-0
- Curvis, W., Simpson, J., & Hampson, N. (2018). Factors associated with self-esteem following acquired brain injury in adults: A systematic review. *Neuropsychol Rehabil*, 28(1), 142-183. doi: 10.1080/09602011.2016.1144515
- De Noreña, D., Ríos-Lago, M., Bombín-González, I., Sánchez-Cubillo, I., García-Molina, A., & Tirapu-Ustarroz, J. (2010). Efectividad de la rehabilitación neuropsicológica en el daño cerebral adquirido (I): atención, velocidad de procesamiento, memoria y lenguaje. *Revista de Neurología*, 51(11), 687-698.
- Dewan, M. C., Rattani, A., Gupta, S., Baticulon, R. E., Hung, Y. C., Panchak, M., . . . Park, K. B. (2018). Estimating the global incidence of traumatic brain injury. *J Neurosurg*, 1-18. doi: 10.3171/2017.10.jns17352
- Díaz-Piñeiro, G., Fernández, M. L., Vergel, I., Baldonado, C., Asiaín, J. R., Sánchez, G., . . . Bonnin, M. (2007). *Fisioterapia y daño cerebral adquirido*. Madrid: Federación Española de Daño Cerebral.
- Dobkin, B. H. (2016). Behavioral self-management strategies for practice and exercise should be included in neurologic rehabilitation trials and care. *Curr Opin Neurol*, 29(6), 693-699. doi: 10.1097/wco.0000000000000380
- Driver, S., Rees, K., O'Connor, J., & Lox, C. (2006). Aquatics, health-promoting self-care behaviours and adults with brain injuries. [Actividad acuática, promoción de la salud y comportamiento de autosuficiencia en adultos con lesión cerebral]. *Brain Injury*, 20(2), 133-141. doi: KR88M3L0010T68J8 [pii]10.1080/02699050500443822
- Duperly, J., & Lobelo, F. (2015). *Prescripción del ejercicio: Una guía para recomendar actividad física a cada paciente*: LID Editorial.
- Eunseo Ahn, Seo Soon-rim, & Eunhee Kim. (2019). Influences of Self-esteem, Rehabilitation Motivation on Quality of Life in Stroke Patients with

- Rehabilitation Therapy. *Journal of Korea Academia-Industrial cooperation Society*, 20(3), 176-187. doi: 10.5762/KAIS.2019.20.3.176
- Fariñas Lapeña, C. (2013). El daño cerebral. Rehabilitación integral y promoción de la autonomía personal en el CEADAC. *Autonomía personal (IMSERSO)*, 24-39.
- Feigin, V. L., & Vos, T. (2019). Global Burden of Neurological Disorders: From Global Burden of Disease Estimates to Actions. *Neuroepidemiology*, 52(1-2), 1-2. doi: 10.1159/000495197
- García-Hernández, J. J., González-Altad, C., Bilbao, Á., Croche, L. F., Pérez-Rodríguez, M., Bravo, S., . . . Bize, A. (2011). *Daño cerebral adquirido. Guía de actividades físico-deportivas*. Madrid: IMSERSO.
- García-Hernández, J. J., & Pérez-Rodríguez, M. (2011). Cuadernos FEDACE sobre daño cerebral adquirido: actividades físico-deportivas y daño cerebral adquirido. Madrid: FEDACE.
- Guindon, M. H. (2002). Toward accountability in the use of the self-esteem construct. *Journal of Counseling & Development*, 80(2), 204-214.
- Haagsma, J. A., Scholten, A. C., Andriessen, T. M., Vos, P. E., Van Beeck, E. F., & Polinder, S. (2015). Impact of depression and post-traumatic stress disorder on functional outcome and health-related quality of life of patients with mild traumatic brain injury. *J Neurotrauma*, 32(11), 853-862. doi: 10.1089/neu.2013.3283
- Jaarsma, E. A., Dijkstra, P. U., Geertzen, J., & Dekker, R. (2014). Barriers to and facilitators of sports participation for people with physical disabilities: A systematic review. *Scandinavian Journal of Medicine & Science in Sports*, 24(6), 871-881.
- Jalayondeja, C., Jalayondeja, W., Suttiwong, J., Sullivan, P. E., & Nilanthi, D. L. H. K. (2016). Physical activity, self-esteem and quality of life among people with physical disability. *Southeast Asian Journal of Tropical Medicine and Public Health*, 47(3), 546-558.
- Kelly, A., Ponsford, J., & Couchman, G. (2013). Impact of a family-focused intervention on self-concept exerciseter acquired brain injury. *Neuropsychol Rehabil*, 23(4), 563-579. doi: 10.1080/09602011.2013.795903
- Killington, M. J., Mackintosh, S. F., & Ayres, M. (2010). An isokinetic muscle strengthening program for adults with an acquired brain injury leads to meaningful improvements in physical function. *Brain Inj*, 24(7-8), 970-977. doi: 10.3109/02699052.2010.489792
- Kohnen, R., Lavrijsen, J., Smals, O., Gerritsen, D., & Koopmans, R. (2019). Prevalence and characteristics of neuropsychiatric symptoms, quality of life and psychotropics in people with acquired brain injury in long-term care. *J Adv Nurs*, 75(12), 3715-3725. doi: 10.1111/jan.14156
- Lapadatu, I., & Morris, R. (2019). The relationship between stroke survivors' perceived identity and mood, self-esteem and quality of life. *Neuropsychol Rehabil*, 29(2), 199-213. doi: 10.1080/09602011.2016.1272468
- Longworth, C., Deakins, J., Rose, D., & Gracey, F. (2018). The nature of self-esteem and its relationship to anxiety and depression in adult acquired brain injury. *Neuropsychol Rehabil*, 28(7), 1078-1094. doi: 10.1080/09602011.2016.1226185
- Luo, L., Meng, H., Wang, Z., Zhu, S., Yuan, S., Wang, Y., & Wang, Q. (2020). Effect of high-intensity exercise on cardiorespiratory fitness in stroke

- survivors: A systematic review and meta-analysis. *Annals of physical and rehabilitation medicine*, 63(1), 59-68.
- Mitchell, E. J., Veitch, C., & Passey, M. (2014). Efficacy of leisure intervention groups in rehabilitation of people with an acquired brain injury. *Disabil Rehabil*, 36(17), 1474-1482. doi: 10.3109/09638288.2013.845259
- Mollayeva, T., Mollayeva, S., Pacheco, N., D'Souza, A., & Colantonio, A. (2019). The course and prognostic factors of cognitive outcomes exerciser traumatic brain injury: A systematic review and meta-analysis. *Neurosci Biobehav Rev*, 99, 198-250. doi: 10.1016/j.neubiorev.2019.01.011
- Pérez-Rodríguez, M., Pérez-Tejero, J., García-Hernández, J. J., Franco, E., & Coterón, J. (2020). La actividad física en personas con daño cerebral adquirido en la fase crónica: influencia sobre la salud en relación a la calidad de vida. *Psicología del Deporte*, 29, suppl (1), 16-23.
- Perry, S. A., Coetzer, R., & Saville, C. W. N. (2018). The effectiveness of physical exercise as an intervention to reduce depressive symptoms following traumatic brain injury: A meta-analysis and systematic review. *Neuropsychol Rehabil*, 1-15. doi: 10.1080/09602011.2018.1469417
- Pfeifer, K., & Geidl, W. (2017). [Physical Activity Recommendations for Adults with a Chronic Disease: Methods, Database and Rationale]. *Gesundheitswesen*, 79(S 01), S29-S35. doi: 10.1055/s-0042-123699
- Ponsford, J., Kelly, A., & Couchman, G. (2014). Self-concept and self-esteem exerciser acquired brain injury: a control group comparison. *Brain Inj*, 28(2), 146-154. doi: 10.3109/02699052.2013.859733
- Quezada, M., & Huete, A. B., L.M. (2016). Las personas con daño cerebral adquirido en España Retrieved from https://fedace.org/estudio_dano_cerebral.html
- Riley, G. A., Dennis, R. K., & Powell, T. (2010). Evaluation of coping resources and self-esteem as moderators of the relationship between threat appraisals and avoidance of activities exerciser traumatic brain injury. *Neuropsychol Rehabil*, 20(6), 869-882. doi: 10.1080/09602011.2010.503041
- Rosenberg, M. (1979). *Conceiving the Self*. New York: Basic Books.
- Rubio, P. M., & Atarés, N. G. (2019). Secuelas del daño cerebral adquirido, estudio sobre las necesidades terapéuticas. *Revista de Logopedia, Foniatría y Audiología*, 39(2), 52-58.
- Schwandt, M., Harris, J. E., Thomas, S., Keightley, M., Snaiderman, A., & Colantonio, A. (2012). Feasibility and effect of aerobic exercise for lowering depressive symptoms among individuals with traumatic brain injury: a pilot study. *The Journal of head trauma rehabilitation* 27(2), 99.
- Vázquez-Morejón Jiménez, R., Jiménez García-Bóveda, R., & Vázquez Morejón, A. J. (2004). Scale de autoestima de Rosenberg: fiabilidad y validez en población clínica española. *Apuntes de psicología*, 22(2), 247-255.
- Villalobos, F., Vinuesa, A., Pedret, R., Reche, A., Dominguez, E., Arija, V., & Equipo Invest Pas, P. (2019). Effect of a Physical activity program on self-esteem in subjects with chronic diseases. 'Pas a Pas' community intervention trial. *Atencion Primaria*, 51(4), 236-244. doi: 10.1016/j.aprim.2017.11.011

Ziller, R. C., Hagey, J., Smith, M., & Long, B. H. (1969). Self-esteem: a self-social construct. *Journal of Consulting and Clinical Psychology*, 33(1), 84.

Número de citas totales / Total references: 37 (100%)

Número de citas propias de la revista / Journal's own references: 0 (0.0%)

PENDIENTE DE PUBLICACIÓN / IN PRESS