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EFFECT OF AN EQUINE THERAPY PROGRAM ON PSYCHOMOTOR DEVELOPMENT IN CHILDREN BELONGING TO THE SCHOOL INTEGRATION PROGRAM

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ABSTRACT

Background: A large number of children with disabilities exist, who have special educational needs and a delay in psychomotor development; they are frequently incorporated into student integration programs (SIP), forming part of the regular class and receiving complimentary technical and educational assistance. The health system has historically handled these cases through traditional physical therapy; however, currently, other complementary treatment techniques have arisen that produce benefits in the physical, psychological, cognitive, and social aspects of the child. This study aimed to evaluate the impact of an Equine therapy program on the psychomotor development of SIP students.

Methods: A quantitative study with a quasi-experimental design and convenience sampling was conducted. Eighteen students (ten men and eight women) from SIP were obtained to establish a control group (N=9) and an experimental group (N=9). The intervention consisted of an 18-weeks program of equine therapy with two sessions each week. Psychomotor development was assessed before and after the intervention with the "Test de Desarrollo y Aprendizaje" (TADI).

Results: There was a significant improvement in psychomotor development ($p<0,001$) and in the cognitive and motor skills at the end of the intervention ($p<0,05$), the effect size obtained in the psychomotor development construct and the cognition and motor skills indicators were large ($d> 0,8$).

Conclusion: Statistically significant changes were found in the experimental group comparing the initial and final values after the intervention through many variables. It is then possible to conclude that equine therapy has a moderate to large impact on psychomotor development of SIP students, which was also statistically significant.

Keywords: Psychomotor development, Equine therapy, Student integration, Special Educational Needs, Motricity, Cognition.

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INTRODUCTION

In Chile, there is a total of 229,904 children and adolescents with disabilities between two and 17 years old [1], who frequently present special educational needs (SEN) [2] and some level of delay in psychomotor development [3].

The importance of the school context, as the central platform for social interaction for children with disabilities, is quite significant [4], in Chile, they are frequently incorporated to the student integration programs (SIP) [5] with which they form part of the regular class with their classmates and also receive complimentary forms of technical and pedagogical assistance to favor their learning and participation processes (Supreme Decree N°170, 2009). The number of students that are a part of these SIP in different schools has progressively increased nationally [5] and locally [6], which implies a growing need for attention and complementary actions for these students.

The health and rehabilitation field has historically handled these cases through traditional physical therapy [7], however, currently, a surge of other complementary treatment techniques that produce physical, psychological, cognitive and social benefits for the child have arisen [8,9,10], and although its effectiveness is demonstrated in health conditions such as cerebral palsy [11], Down syndrome [7] and autism [12], there is not much information from studies in people with SEN who attend regular schools.

This investigation aimed to evaluate the impact of an integral horse-assisted therapy in the psychomotor development in students belonging to the Student Integration program from the San Clemente district.

METHODOLOGY

The present study was quantitative with a quasi-experimental design and a convenience sampling (non-probabilistic) in which an experimental group (n=9) and a control group (n=9) were established.

The analysis of the dependent variable's construct (Psychomotor Development) provides operationalization in the following indicators: Cognition, Motricity, Language, and Socio-emotionality.

This study was approved by the Scientific Ethics Committee of the Universidad Católica del Maule, through the N°88/2017 act.

For the selection process, the sample had to meet several requirements expressed in the inclusion criteria (being a member of Ramadillas School SIP, having some SEN and age between 4 to 8 years old) and exclusion criteria (medical restriction to practice physical activity or equine therapy and inability to sit unaided), emphasizing the requirement of informed consent and assent by the agents and research participants.

The main evaluation instrument was the "Test de Desarrollo y Aprendizaje" (TADI), which has been designed and validated for the Chilean population between three months and six years old, in the context of health and education services [13].

Amongst other procedures, it was considered: obtaining permits and authorizations, recruitment and division of the sample, once the control group and experimental group were defined, the initial evaluation was conducted for both groups, later the experimental group attended an equine therapy workshop twice a week for 18 weeks, the field activities were always conducted with high protection of the children's health and integrity. Once the intervention process was finalized, the motor development assessment (TADI) was performed again to determine the effects obtained at the end of the intervention.

The data analysis was performed with the help from statistical software such as Microsoft Excel 365 and IBM SPSS Statistics 18, for the comparison between the results of the experimental group versus the control group, the Student t-test was used for independent samples and the comparison of the results between the initial and final evaluation, the Wilcoxon signs test; complementarily the effect size of the Equine therapy's impact was calculated in the experimental group versus control group using the Cohen d test.

RESULTS

A sample of 18 students was obtained from the Ramadillas School, which was divided into two groups, nine students assigned to the control group and nine students assigned to the experimental group. The average age of the sample was 5.72 years old, with a standard deviation of 1.362, while the distribution by gender was ten men and eight women (Table 1).

Table 1: *Characteristics of the Sample*

Criteria	Sample Total	Experimental Group	Control Group
Age (X±DE)	5.72±1.362	5.56±1.509	5.89±1.269
Men (n)	10	4	6
Women (n)	8	5	3

**No significant differences in age were found between both groups. n: number of cases. Elaborated from the information of this investigation.*

To perform comparisons between both groups, the standardized values or "T-scores" delivered by the TADI instrument were used. Once the intervention concluded, statistically significant improvements were found for the sample within all the dependent variable indicators and the total TADI score. Likewise, statistically, significant improvements were found within the experimental group when comparing the initial and final values; while studying the control group; statistically significant differences for the total TADI were found, but not in the indicators for this one. When comparing the results obtained by the experimental group with those of the control group during the final evaluation, it was observed that were statistically significant differences in the cognition and motricity indicators (Table 2).

Table 2: *t-Test values between the experimental group (n=9) versus the control group (n=9) for the differences between the average indicators and TADI points in the final evaluation.*

Comparison EG vs. CG	Cognition Item	Motricity Item	Language Item	Socio-emotional Item	TADI Test
t -Test	2.457	2.349	0.928	0.920	1.945
Statistic Value (p)	0.026*	0.032*	0.367	0.371	0.070

** = sig p<0.05. EG: experimental group; CG: control group. Elaborated from the information of this investigation.*

After establishing the effect size of the interventions, it was found that equine therapy produces a moderate to large impact on psychomotor development and a large impact on the cognition and motricity indicators. In contrast, Student Integration Program's (control group) effect size was very low in all evaluated dimensions (Table 3).

Table 3: *Cohen's d test between the experimental group (n=9) and the control group (n=9) for the final evaluation.*

Comparison EG vs. CG	Cognition Item	Motricity Item	Language Item	Socio-emotional Item	TADI Test
Cohen d Test	1.165[c]	1.107[c]	0.438[a]	0.433[a]	0.918[c]

Interpretation: small impact (a) – large impact (c). EG: experimental group; CG: control group

Elaborated from the information of this investigation.

DISCUSSION

To compare the results at the beginning and the end of the intervention period, statistically significant improvements were found in the total sample [p<0.001]; these improvements were also found in both the experimental group [p<0.01] and the control group [p<0.05]. It is important to remember that both groups received regular interventions from the Student Integration Program, while the experimental group additionally received 18 weeks of Integral Horse-Assisted Therapy. If the results obtained are compared for both groups, the difference of approximately five points (32.36 against 37.69) was observed in favor of the experimental group. Still, it does not reach a significant level (p=0.07). This implies the need for another level of analysis regarding the effect size of the intervention. Since both groups receive attention, the effect size using the "Cohen's d" was used to compare the treatment effect on motor development in the experimental group versus the control group, finding a value of 0.918, which is considered a large impact size. On the other hand, the same test used to measure the effect of therapy on psychomotor development before and after the process showed that horse-assisted therapy had a value of -0.786, which is between the effect size moderate and large. In contrast, the traditional SIP interventions show values of -0.124, which translates into a minimum effect size.

These data indicated that both the SIP interventions and integral horse-assisted therapy produce statistically significant improvements in psychomotor development in children with SEN in normal schools in the San Clemente district and that the difference between these two methods is not enough to be significant. On the other hand, to measure the impact of both techniques on psychomotor development, it was found that Equine therapy produces benefits that range between moderate to large impact, depending on the specific type of comparison that is made. At the same time, the traditional SIP interventions showed minimal size. This could indicate that although both methods (SIP only or SIP plus Equine therapy) produce systematic improvements for this variable and have a similar probability to improve psychomotor development in children from normal schools in the San Clement district, the benefits obtained by combining Equine therapy with SIP are much greater than only working with traditional School Integration Program; the results follow the same trend reported by del Rosario-Montejo and collaborators, 2015 [3] after working with 11 children who had psychomotor retardation for four months in a program, achieved improvements, especially in gross motor function. Other studies grouped in bibliographic reviews reported improvements in different components of psychomotor function [14,15], cognitive function [14,26] and emotional dimension [14].

If an analysis is made on the different indicators considered by the instrument (TADI) that operationalize the "Psychomotor Development" construct, it was found that towards the end of the intervention, there were statistically significant improvements in cognition (p<0.01), motricity (p<0.01), language (p<0.01) ad socio-emotionality (p<0.01) for the total sample, which reinforces the postulate by different authors [3,15,17-20]. When dividing by group, the experimental group maintains these improvements with statistical significance in all the indicators. In contrast, the control group did not present a significant difference in any of the indicators when comparing the final evaluation with the initial assessment; however, the socio-emotionality (p=0.059) and Language (p=0.066) indicators were quite close. In regards to the differences found during the final evaluation when analyzing the experimental group versus the control group, it was observed that integral horse-assisted therapy in combination with SIP produced significant improvements in the cognition (p<0.05) and motricity (p<0.05) indicators in comparison to the results obtained for just SIP. Likewise, when determining the effect size of equine therapy on different indicators, cognition (d=1.165) and motricity (d=1.107) expressed an impact of greater magnitude.

Making an approximation to what the literature indicates, the benefits reported most frequently in research that applied equine therapy were focused on motor function such as muscle tone, postural control, lower limb function or walking [7,20-22], learning [19,23] and socialization [24]. On the other hand, the objectives that SIP proposes, are greater social participation by students, as well as advancement in their learning processes [5]. This could be interpreted, in light of the results as if equine therapy

had an impact where cognition and motricity components were predominate. At the same time, SIP would focus more on the language. Socio-emotional aspects, therefore, the strategy that would yield the greatest benefits to children is that of the combined work of all the intervention to favor psychomotor development and school inclusion [25; 26] and as stated by Pérez and collaborators, 2008 [26], "Equine therapy is an intervention that complements other treatments, it doesn't replace them, and should not be considered as an isolated option but as part of a set of actions aimed to neutralize disabilities."

When comparing the present study with works reported in different systematic reviews in the subject [14,15,27], it must be noted that only 12 of the 38 studies analyzed had a control group, which allows more objective comparisons and provides greater methodological rigor. Furthermore, the extension of the intervention programs is highly variable, since treatment periods between 1 and 26 weeks are reported, in which 31% of the studies had ten-week treatments, 17% had twelve-week treatments, and 13% only had eight-week treatments [14,15,27]; thus it can be concluded that most Equine Therapy programs last for 12 weeks or less. Several authors declared that one of the main challenges of equine therapy, as a discipline, is the need to produce more research and to have greater methodological value. Among the main difficulties found are grouping criteria for different types of patients, the small sample sizes, and the frequent absence of a control group [3,28].

CONCLUSION

From the analyzed information, it is possible to conclude that integral therapy assisted by horses produces significant improvements in psychomotor development, especially in cognition and motricity fields in children with special educational needs. However, it's highly encouraged to use it in conjunction with other treatments.

Support Sources:

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Declaration of conflict of interest:

The investigators declare that there are no conflicts of interest.

The investigators declare the views expressed in the article are our own and not the funders/institutions.

Abbreviations or symbols

SIP = Student Integration Programs
TADI = Test de Desarrollo y Aprendizaje (original name in Spanish)
SEN = Special Educational Needs

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REFERENCES

[1] Servicio Nacional de la Discapacidad (SENADIS). II Estudio Nacional de la Discapacidad. Retrieved from http://www.senadis.gob.cl/descarga/i/3959.

[2] Mary Warnock & Brahm Norwich. Special Educational Needs A New Look. 2nd Edition; 2010.

[3] del Rosario-Montejo, O., Molina-Rueda, F., Muñoz-Lasa, S., & Alguacil-Diego, I. M. Efectividad de la terapia ecuestre en niños con retraso psicomotor. Neurología. 2015;30(7):425-432.

[4] Ortúzar, D. Políticas del Cuerpo en la Discapacidad: Retóricas de la Rehabilitación en Chile. Intersticios. Revista sociológica de pensamiento crítico. 2009; 3(1):67-77.

[5] Centro de Innovación en Educación, Fundación Chile. Análisis de la Implementación de los Programas de Integración Escolar (PIE) en Establecimientos que han incorporado Estudiantes con Necesidades Educativas Especiales Transitorias (NEET). 2013. Retrieved from https://especial.mineduc.cl/wp-content/uploads/sites/31/2016/08/Resumen_Estudio_ImplementacionPIE_2013.pdf.

[6] Departamento de Administración de Educación Municipal (DAEM) Talca. Plan Anual de Desarrollo de la Educación Municipal (PADEM) 2017. Retrieved from https://www.talcatransparente.cl/plan-desarrollo-educativo/doc_download/8789-padem-2019-.

[7] Voznesenskiy, S., Rivera-Quinatoa, J. A., Bonilla-Yacelga, K. A., & Cedeño-Zamora, M. N. Do equine-assisted physical activities help to develop gross motor skills in children with the Down syndrome? Short-term results. Procedia-Social and Behavioral Sciences. 2016; 233:307-312.

[8] González Prior, M. Beneficios de las terapias ecuestres, estudio de caso : Asociación Hispalense de Terapias Ecuestres y la Herradura (Thesis degree). Universidad de Sevilla, Sevilla. 2016. Retrieved from http://hdl.handle.net/11441/44804.

[9] López-Roa, L. M., & Moreno-Rodríguez, E. D. Hippotherapy as a technique of habilitation and rehabilitation. Universidad y Salud. 2015; 17(2), 271-279.

[10] Meregillano, G. Hippotherapy. Physical medicine and rehabilitation clinics of north America. 2004; 15(4), 843-854.

[11] Wollenweber, V., Drache, M., Schickendantz, S., Gerber-Grote, A., Schiller, P., & Pöhlau, D. Study of the effectiveness of hippotherapy on the symptoms of multiple sclerosis–Outline of a randomised controlled multicentre study (MS-HIPPO). Contemporary Clinical Trials Communications. 2016; 3:6-11.

[12] Trzmiel, T., Purandare, B., Michalak, M., Zasadzka, E., & Pawlaczyk, M. Equine assisted activities and therapies in children with autism spectrum disorder: A systematic review and a meta-analysis. Complementary therapies in medicine. 2019; 42:104-

113.
[13] Pardo Quiñones, M. y Edwards Guzmán, M. Manual del examinador TADI. 1st Edition; 2013.
[14] Selby, A., & Smith-Osborne. A systematic review of effectiveness of complementary and adjunct therapies and interventions involving equines. Health Psychology. 2013; 32(4):418-432.
[15] Tseng, S. H., Chen, H. C., & Tam, K. W. Systematic review and meta-analysis of the effect of equine assisted activities and therapies on gross motor outcome in children with cerebral palsy. Disability and Rehabilitation. 2013; 35(2):89-99.
[16] Hoagwood, K. E., Acri, M., Morrissey, M., & Peth-Pierce, R. Animal-Assisted Therapies for Youth with or at risk for Mental Health Problems: A Systematic Review. Applied Developmental Science. 2017; 21(1):1-13.
[17] Catalan L, J., & García P, D. Hipoterapia: Otra alternativa terapéutica en la rehabilitación infantil. Rehabilitación Integral. 2009; 4(2):93-99.
[18] García, I., Rojas, D., Patiño, B., Cárdenas, P., & Vélez, T. Revisión sistemática de programas deportivos aplicados a personas con autismo. Ciencia y Actividad Física. 2017; 3(2):64-74.
[19] Ho, N. F., Zhou, J., Fung, D. S. S., & Kua, P. H. J. Equine-assisted learning in youths at-risk for school or social failure. Cogent Education. 2017; 4(1):1-18.
[20] Sterba, J. A., Rogers, B. T., France, A. P., & Vokes, D. A. Horseback riding in children with cerebral palsy: effect on gross motor function. Developmental Medicine and Child Neurology. 2002; 44(5):301-308.
[21] Casady, R. L., & Nichols-Larsen, D. S. The effect of hippotherapy on ten children with cerebral palsy. Pediatric Physical Therapy. 2004; 16(3):165-172.
[22] Shurtleff, T. L., Standeven, J. W., & Engsberg, J. R. Changes in dynamic trunk/head stability and functional reach after hippotherapy. Archives of physical medicine and rehabilitation. 2009; 90(7):1185-1195.
[23] Heffernan, K., & Heffernan, K. The effect of an equine assisted therapy (EAT) programme on children's occupational performance–a pilot study. Irish Journal of Occupational Therapy. 2017; 45(1):28-39.
[24] Jae Hyun Yoo, Yunhye Oh, Byongsu Jang, Jihye Song, Jiwon Kim, Seonwoo Kim et al. The Effects of Equine-assisted Activities and Therapy on Resting-state Brain Function in Attention-deficit/Hyperactivity Disorder: A Pilot Study. Clinical Psychopharmacology and Neuroscience. 2016; 14(4):357-364.
[25] Noemi Martín-Paredes, Helena Chacón-López. La equinoterapia como nueva práctica educativa para la diversidad funcional: perfiles y actitudes del terapeuta. Revista científica electrónica de Educación y Comunicación en la Sociedad del Conocimiento. 2017; 17(1): 168-184.
[26] Pérez Álvarez, L., Rodríguez Meso, J., & Rodríguez Castellano, N. La equinoterapia en el tratamiento de la discapacidad infantil. Revista Archivo Médico de Camagüey. 2008; 12(1):1-8.
[27] Whalen, C. N., & Case-Smith, J. Therapeutic effects of horseback riding therapy on gross motor function in children with cerebral palsy: a systematic review. Physical & occupational therapy in pediatrics. 2012; 32(3):229-242.
[28] Winchester, P., Kendall, K., Peters, H., Sears, N., & Winkley, T. The effect of therapeutic horseback riding on gross motor function and gait speed in children who are developmentally delayed. Physical & occupational therapy in pediatrics. 2002; 22(3-4), 37-50.