Attention-deficit/hyperactivity disorder and lifestyle habits in children and adolescents

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Introduction. Attention-deficit/hyperactivity disorder (ADHD) is one of the most prevalent disorders in the child and adolescent population, with a known impact on learning, social relations and quality of life. However, the lifestyle habits of patients with this disorder have been poorly studied.

Material and methods. A total of 160 children and adolescents, aged between 6 and 16 years, participated in the study. Half of them were treatment-naïve patients with a clinical diagnosis of ADHD according to DSM-IV-TR criteria, and without comorbidities. The remaining 80 participants were typically developing (TD) controls without known neurodevelopmental or psychiatric disorders. Parents of all participants completed a questionnaire about their children´s lifestyle habits (e.g, daily hours of sleep, media use and study).

Results. The groups had a similar socioeconomic background and did not differ with respect to age and sex distribution. However, patients with ADHD spent more time than TD children studying, and less time watching TV, playing video games, using computers and playing with other people. They also slept fewer hours per night than children and adolescents with TD. ADHD and TD groups spent similar time reading, listening to music and playing sports.

Conclusions. The results of this study suggest that children and adolescents with ADHD have different lifestyle habits compared to age- and sex-matched controls. These findings are not explained by comorbid disorders or medication/psychological treatment.

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Trastorno por déficit de atención/hiperactividad y hábitos de vida en niños y adolescentes

Introducción. El trastorno por déficit de atención/hiperactividad (TDAH) es uno de los trastornos más prevalentes en la población infanto-juvenil con un impacto ya conocido sobre el aprendizaje, la relación social y la calidad de vida. Sin embargo, los hábitos de vida de los pacientes con este trastorno han sido pobremente estudiados.

Material y métodos. Un total de ciento sesenta niños y adolescentes con edades comprendidas entre los 6 y los 16 años (104 varones y 56 mujeres) participaron en este estudio. La mitad de ellos tenían un diagnóstico de TDAH de acuerdo a los criterios del DSM-IV-TR; eran pacientes sin tratamiento y sin comorbilidades. El Group control estaba formado por 80 niños y adolescentes sin trastornos del neurodesarrollo o psiquiátricos conocidos. Las familias completaron un cuestionario sobre los hábitos de vida de sus hijos e hijas (dedicación extraescolar -horas al día- a diferentes actividades durante la semana lectiva).

Resultados. Los Groups tenían un nivel socioeconómico similar y no diferían en edad y sexo. Sin embargo, los pacientes con TDAH dedicaban más tiempo al estudio que los controles y menos a actividades como la TV, el ordenador, los videojuegos y el juego con otras personas. Además, los pacientes con TDAH dormían menos horas diarias que los controles. No se observaron diferencias entre los Groups en el tiempo dedicado a la lectura, el deporte o la música.

Conclusiones. Los resultados del presente estudio sugieren que los niños y adolescentes con TDAH tienen hábitos de vida diferentes a los niños y adolescentes con desarrollo típico. Estos hallazgos no se explican por la presencia de trastornos comórbidos o por el tratamiento farmacológico o psicológico.

Palabras Clave: Trastorno de Déficit de Atención/Hiperactividad, Hábitos de Vida, Televisión, Videojuegos, Estudio, Deberes, Sueño

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders[1,2], affecting between 5-7% of children and adolescents. The cardinal symptoms of ADHD (inattention, hyperactivity, and impulsivity) have to be clearly present for at least 6 months in two or more settings to an extent that is inappropriate for person´s age/general cognitive level. Moreover, they should have a significant impact on social and/or school functioning[3]. Notably, ADHD symptoms and neuropsychological correlates affect the quality of life of patients and their families[4]. Indeed, it has been shown that the severity of the symptomatology and comorbidity are directly related to the patients' quality of life[5].

All neurodevelopmental disorders have a significant impact on patients' lifestyle habits whether due to the symptomatology per se or the functional impairment they cause[4]. However, the lifestyle habits of children and adolescents with neurodevelopmental disorders (including those diagnosed with ADHD) have been scarcely investigated[6-8]. Moreover, previous studies on this issue have generally focused on specific lifestyle habits (e.g., food, sleep or media use)[9-14]. Surprisingly, although ADHD is characterized by impairments in school and/or social functioning, study and leisure time habits have been scarcely examined in these children and adolescents with this disorder[15].

The present study investigated the lifestyle habits of children and adolescents with ADHD in comparison to typically developing (TD) controls. We focused on the amount of time that children and adolescents with ADHD spend studying and doing homework assignments during the school week. Additionally, we examined the amount of time they spend doing leisure-time activities, such as watching TV, playing video games, listening to music or reading books. We hypothesized that, relative to TD controls, patients with ADHD would show different lifestyle habits.

METHODS

Participants

A total of 160 children and adolescents, aged between 6 and 16 years, participated in the study. Half of them were treatment-naïve patients with a clinical diagnosis of ADHD according to DSM-IV-TR criteria, and without comorbidities. The remaining 80 participants were TD controls without known neurodevelopmental or psychiatric disorders. Clinical diagnosis of ADHD was made according to DMS-IV-TR criteria[16] and international guidelines, as assessed by a multidisciplinary team[17-19]. All patients were medication-naïve at the time of the study and did not have any comorbid neurodevelopmental disorders, including intellectual disability, autism spectrum disorder, learning, and language-related disorders. Further exclusion criteria included evidence of a neurological disorder or a history of psychiatric disorders such as psychosis and bipolar disorder. TD controls were free from neurodevelopmental, psychiatric or neurological disorders, as assessed by the same procedure used in ADHD patients. All participants were Caucasian and lived in the *Comunidad de Madrid*. All of them belonged to high socio-economic status according to Graffar´s scale[20].

Parents of all participants completed a questionnaire about their children´s lifestyle habits (e.g, daily hours of sleep, media use or study). A full version of this questionnaire has been previously used in other studies[21]. Parents were asked to complete the questionnaire indicating the time spent by their children in several out-of-school activities during the five-day school week. The following variables were measured: age, sex and amount of time (average number of hours per day) that their children spend studying (including, school homework assignments), watching TV, playing video games, listening to music, reading books (not related to school assignments), playing sports, playing with friends or with family members, and sleeping. Informed consent was obtained from all participants' parents, with the child giving assent.

STATISTICAL ANALYSIS

Before statistical analysis, individual variables were assessed for outliers. They were defined as more than three interquartile ranges below the first quartile, or more than three interquartile ranges above the third quartile. Outliers were then replaced with the value 2 standard deviations from the mean of each group and each dependent variable[22]. Twenty-six outliers were found and replaced (1.6%). Assumptions of normality were checked for each group separately using the Kolmogorov-Smirnov procedure. As expected, the normality assumption was rejected in all de-

pendent variables (all ps<0.001). Thus, non-parametric tests were employed (Mann-Whitney statistic) to investigate possible differences between ADHD and TD controls in lifestyle habits (i,e., the average number of hours per day dedicated to each activity during the school week). The false discovery rate (FDR) procedure was applied to control for multiple comparisons (n=9). Effect sizes were estimated using r (r=Z/√N; (23)), which is similar to Cohen´s d for non-parametric tests. Analyses were performed using SPSS 20 (SPPS Inc, Chicago, USA).

RESULTS

The mean ages and sex distribution of groups can be found in Table 1. Groups did not differ in mean age (Z=-0.83, p=0.41) or the proportion of participants for each age year (from 6 to 16 years in one-year intervals: $\chi 2$=2.42, p=0.99). Groups neither differed significantly concerning sex ($\chi 2$=0.99, p=0.32).

As detailed in Table 2 and Figures 1 and 2, differences between groups were found in six of the lifestyle habits assessed. Specifically, children and adolescents with ADHD spent more time than TD controls studying. By contrast, TD controls spend more time watching television, using a computer and playing video games than those with ADHD. Thus, the time dedicated to playing in the TD group was greater than in the ADHD group. Finally, we also observed that children and adolescents with ADHD slept fewer hours per night than TD controls (see Table 2 and Figure 2).

DISCUSSION

To the best of our knowledge, this is the first study that examined lifestyle habits in medication-naïve children and adolescents with ADHD without any comorbid disorders. As mentioned above, there are only a few studies on lifestyle habits of ADHD patients[6-8], and most of them did not control for multiple testing [25].

Holton and colleagues[7] examined the lifestyle habits of 184 children with ADHD. They found that, compared to TD controls, ADHD children spent more time on screen-related activities (TV, video games, etc.) and less time on reading during the school week (differences were not found on weekends or holidays). By contrast, differences between groups were not found regarding the number of hours of studying and sleeping. However, although the study showed that lifetime habits could be influenced by comorbidity (primarily, anxiety and mood disorders), it did not examine if such comorbid disorders had a significant impact on the lifestyle habits of ADHD patients. Moreover, this study did not control for other comorbid disorders (e.g, dyslexia) that might have influenced habits concerning reading, studying and playing. Similarly, Tong and colleagues[25] reported that children with ADHD spent more time on screen-related activities without affecting other habits such as physical activity[25]. However, they did not control for comorbid disorders or medication use.

Interestingly, lifestyle habits of 25 Spanish adolescents with ADHD compared to 184 Spanish adolescents without the disorder were examined[15]. Results from this study suggested that patients with ADHD spent more time than controls playing video games and watching TV (not only on school days, unlike that in Holton's study), but spent less time with family and friends[15]. In adults, Weissenberger and colleagues[6] reported that individuals showing ADHD symptoms spend less time watching TV but more time carrying out physical activities than those with fewer ADHD symptoms. Although these studies provide evidence that ADHD affects lifestyle habits, their results could be heavily influenced by comorbid disorders. Moreover, given the lack of control for multiple comparisons, some of the significant results might be due to chance (false positives).

The relation between cardinal ADHD symptoms and time spend on screen-related activities has been examined by several groups. However, studies have yielded discrepant results. A number of investigations have shown a significant relationship between ADHD symptoms and time spend watching TV and playing videogames[26-28]. However, results from these previous studies do not clarify whether neuropsychological deficits underlying ADHD (e.g., motivation and/or sustained attention problems) lead to spend more time watching TV and playing video games or, by contrast, whether the use of TV and video games contribute to cognitive deficits and symptoms characteristic of ADHD[29,30]. Nevertheless, other studies have found improvements in cognitive functions after watching TV and/or playing videogames[27,31,32]. Contrarily, other studies have failed to find a significant association between ADHD and media-use[34,35]. Although our study was not designed to analyze the relationship between screen time and ADHD, our results do not support this hypothesis. Our patients with ADHD spent less time on video games and TV than the children in the control group, although they were naïve patients with-

Table 1 Demographic variables

	TDAH	Control
Sex (m/f)*	55/25	49/31
Age	10.1 ±2.39	9.78 ±2.38

*m: male; f: female

Table 2 **Descriptive statistics and results of non-parametric tests used to examine between-group differences on the amount of time (average hours per day) spend in each activity**

	ADHD (mean±SD)	Skewness	Kurtosis	TD controls (mean±SD)	Skewness	Kurtosis	U Mann Whitney (Z)	p	q**	r***
No. of hours studying*	1.94±1.08	1.4	4.9	1.49±0.85	0.4	-0.7	-2.69	0.007	**0.03**	**0.21**
No. of hours watching TV*	0.89±0.63	0.4	-0.3	1.23±0.92	1.4	3.2	-2.32	0.021	**0.04**	**0.18**
No. of hours using computer*	0.28±0.5	2	3.8	0.41±0.53	1.4	1.3	-2.22	0.027	**0.04**	**0.17**
No. of hours playing video game*	0.21±0.4	1.8	2.2	0.52±0.72	1.7	2.5	-3.07	0.002	**0.02**	**0.24**
No. of hours listening to music*	0.27±0.42	1.7	2.6	0.38±0.48	1.1	0.4	-1.66	0.097	0.1	
No. of hours reading*	0.44±0.42	1.6	3.7	0.4±0.38	1.1	2.4	-0.5	0.617	0.08	
Physical activity*	0.7±0.61	0.7	1.3	0.81±0.61	0.4	-0.3	-1.05	0.294	0.29	
No. of hours playing with others*	0.72±0.75	1.1	0.9	1.01±0.89	1.4	3.8	-2.25	0.024	**0.04**	**0.18**
No. of hours sleeping*	9.02±1.17	0.03	-0.2	9.41±0.98	-0.8	0.5	-2.62	0.009	**0.03**	**0.21**

*Hours per day devoted to each activity during the school week; ** P adjusted for multiple comparisons using the FDR procedure24;*** Effect size calculated as r=Z/√N, where Z is the absolute value of the statistic and N is the total number of participants[23]

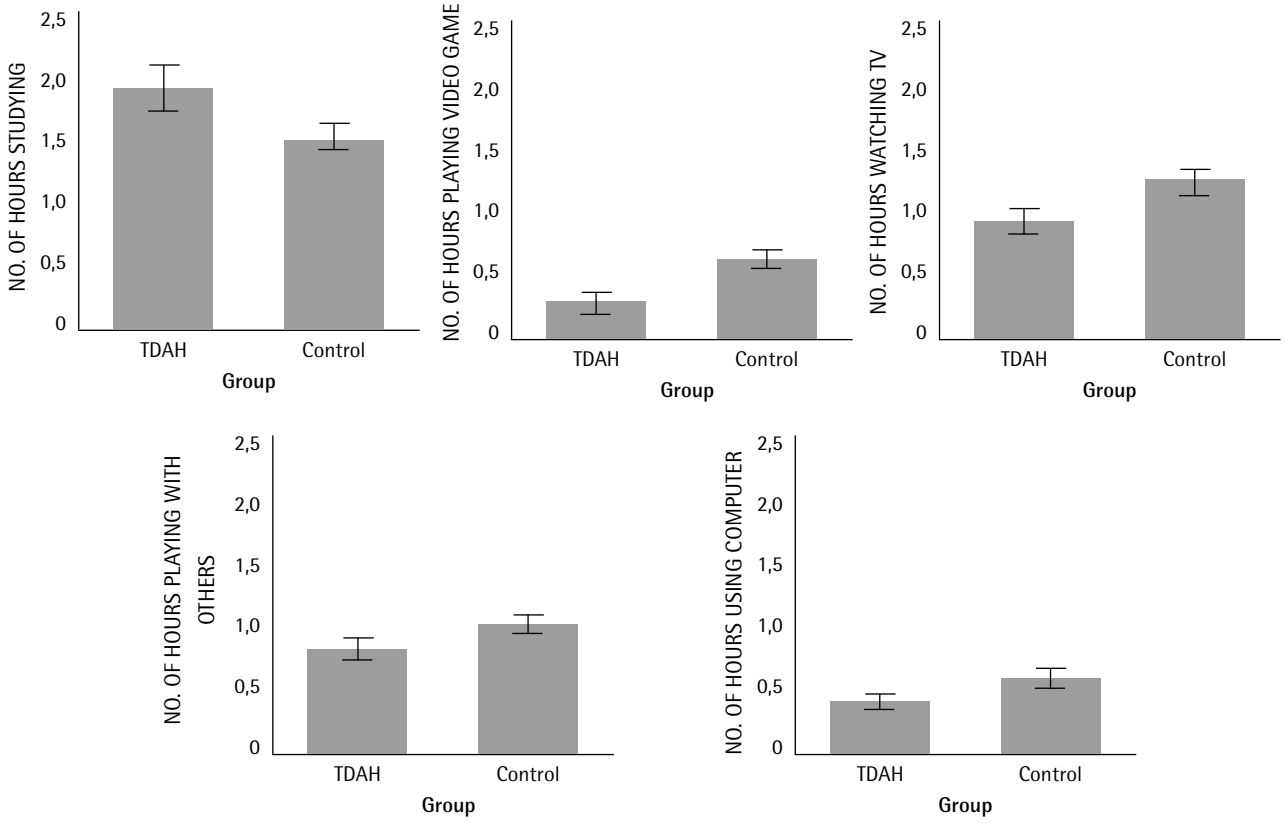

Figure 1 *Lifestyle habits showing significant differences between ADHD and TD groups (error bars represent ±1 standard error of the mean). The average number of hours per day dedicated to each activity during the school week was assessed (0, minimum, and, 10 hours, maximum)*

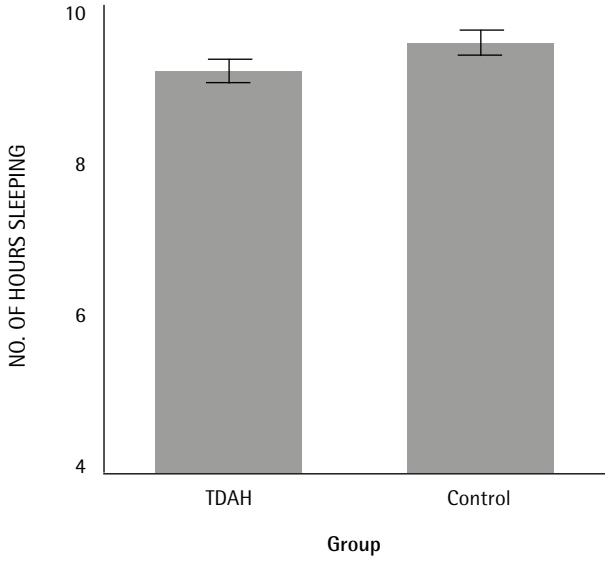

Figure 2 — *Differences between ADHD and TD groups on the average number of sleep hours per night during school days (error bars represent ±1 standard error of the mean)*

out comorbid disorders; the presence of mood disorders, anxiety disorders or behavioral problems seem to be significantly related to increased exposure or dedication to media-use[36-39].Previous studies have also shown that children and adolescents with ADHD spend less time interacting with peers and family members[15]. Whether due to the patients' socio-cognitive difficulties, their symptoms or the social impact of the disorder, individuals with ADHD often encounter problems in social interactions with peers and adults (teachers and parents)[40-42]. Some authors have used these arguments, as well as the presence of comorbid developmental coordination disorder, to explain why patients with the disorder devote less time to sports and physical activities[43-45]. This relation could be influenced by the presence of a coach supervising the activity[43]. ADHD group devoted slightly less time than the control group to playing sports, although this trend is not significant. The absence of comorbidity in our sample of patients with ADHD and the fact that, in most cases, they participated in organized and supervised sporting activities could have influenced present results.

Although we did not find significant differences between ADHD and control groups in the amount of time spent reading or listening to music, we observed that patients slept less than controls. Sleep-related problems (primarily those related to sleep onset difficulties) have been broadly discussed in the literature[11,46,47]. These sleep-related problems may be temporary or permanent, they may contribute to ADHD symptomology, and, in some cases, they may worsen with psychostimulants pharmacological treatments[48-50]. Present results suggest that certain sleep-related difficulties (fewer hours of sleep per night on average) may be even present in medication-naïve children and adolescents with the disorder.

Little research has been done to examine the time dedicated by patients with ADHD to studying and doing homework outside of class. Of note, the time dedicated to these two activities seems to be related to academic performance[51-54]. This association has also been observed amongst ADHD patients[55], with effect sizes from medium to large[54]. Although children and adolescents with ADHD typically have poor academic performance and problems related to the failure of completing homework assignments, a few studies have investigated how many hours per day ADHD patients spend studying and doing homework assignments[56,57]. This lack of information about the time dedicated by individuals with ADHD to studying outside of class is surprising because a negative impact on school functioning is a diagnostic criterion of ADHD[3]. The clinical diagnosis and its treatment should probably be reviewed in those patients who, although they meet the diagnostic criteria for ADHD, do not dedicate time to studying and doing homework assignments outside of class. An alternative or additional disorder could be present in such cases.

Holton and colleagues[7] found that the percentage of individuals who spend more than two hours to homework assignments was slightly higher in the ADHD group compared to the TD group, though these results were not statistically significant. In the current study, medication-naïve and non-comorbid patients with ADHD had to dedicate 30% more time than TD controls to studying. It is therefore likely that the quality of life of ADHD patients was affected[4,5]. Notably, it should be noted that current findings do not support the notion that children and adolescents with ADHD dedicate less time to studying than individuals without the disorder.

Nevertheless, this study is not without limitations. The generalization of the current results to the overall population of patients with ADHD would be limited because "pure" cases of ADHD (without comorbidity) are the exception rather than the rule. Further research on the influence of most common comorbidities on the lifestyle habits of patients with ADHD is therefore needed. Furthermore, future research should examine the effect that psychopharmacological and non-psychopharmacological interventions could have on lifestyle habits. It would be also interesting to examine how spending more time studying and less time playing can affect the quality of life of children and adolescents with ADHD. Finally, the current study did not examine the

living conditions and lifestyle habits of the families, or how patients' habits might be influenced by their parents' lifestyle.

Regardless of these limitations, this study suggests that lifestyle habits of children and adolescents with ADHD are associated to or mediated by the disorder itself and that these habits are different from those observed in TD children and adolescents. Because patients with ADHD were medication-naïve and did not have comorbid disorders, current results seem to be related to the disorder itself. Results obtained in the control group are comparable to those obtained in previous studies using similar procedures[21], thus supporting the current findings. Future studies examining the lifestyle habits of patients with the disorder in different countries and/or regions are needed to gain greater insight into the impact of ADHD on different aspects of patients' lives. Moreover, such studies would facilitate a more in-depth analysis of the alternative diagnostic hypotheses mentioned above.

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REFERENCES

1. Willcutt EG. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: a meta-analytic review. Neurotherapeutics. 2012;9(3):490-9.
2. Fernandez-Jaen A, Lopez-Martin S, Albert J, Martin Fernandez-Mayoralas D, Fernandez-Perrone AL, Calleja-Perez B, et al. Trastorno por deficit de atencion/hiperactividad: perspectiva desde el neurodesarrollo. Rev Neurol. 2017;64(s01):S101-S4.
3. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5. 5th ed. Washington, Londres: American Psychiatric Association; 2013. XLIV, 947 p. p.
4. Fernandez-Jaen A, Martin Fernandez-Mayoralas D, Fernandez-Perrone AL, Calleja-Perez B, Albert J, Lopez-Martin S, et al. Disfuncion en el trastorno por deficit de atencion/hiperactividad: evaluacion y respuesta al tratamiento. Rev Neurol. 2016;62 (Suppl 1):S79-84.
5. Danckaerts M, Sonuga-Barke EJ, Banaschewski T, Buitelaar J, Dopfner M, Hollis C, et al. The quality of life of children with attention deficit/hyperactivity disorder: a systematic review. Eur Child Adolesc Psychiatry. 2010;19(2):83-105.
6. Weissenberger S, Ptacek R, Vnukova M, Raboch J, Klicperova-Baker M, Domkarova L, et al. ADHD and lifestyle habits in Czech adults, a national sample. Neuropsychiatr Dis Treat. 2018; 14:293-9.
7. Holton KF, Nigg JT. The Association of Lifestyle Factors and ADHD in Children. J Atten Disord. 2016.
8. Bijlenga D, van der Heijden KB, Breuk M, van Someren EJ, Lie ME, Boonstra AM, et al. Associations between sleep characteristics, seasonal depressive symptoms, lifestyle, and ADHD symptoms in adults. J Atten Disord. 2013;17(3):261-75.
9. Owens JA. A clinical overview of sleep and attention-deficit/hyperactivity disorder in children and adolescents. J Can Acad Child Adolesc Psychiatry. 2009;18(2):92-102.
10. Betancourt-Fursow de Jimenez YM, Jimenez-Leon JC, Jimenez-Betancourt CS. Trastorno por deficit de atencion ehiperactividad y trastornos del sueno. Rev Neurol. 2006;42(Suppl 2):S37-51.
11. Chamorro M, Lara JP, Insa I, Espadas M, Alda-Diez JA. Evaluacion y tratamiento de los problemas de sueno en ninos diagnosticados de trastorno por deficit de atencion/hiperactividad: actualizacion de la evidencia. Rev Neurol. 2017;64(9):413-21.
12. Lingineni RK, Biswas S, Ahmad N, Jackson BE, Bae S, Singh KP. Factors associated with attention deficit/hyperactivity disorder among US children: results from a national survey. BMC Pediatr. 2012;12:50.
13. Bertholf RL, Goodison S. Television viewing and attention deficits in children. Pediatrics. 2004;114(2):511-2; author reply 511-2.
14. Ray M, Jat KR. Effect of electronic media on children. Indian Pediatr. 2010;47(7):561-8.
15. Aierbe A, Medrano C. Consumo mediático y actividades alternativas: un estudio comparativo entre adolescentes con TDAH y estándar. Infad Rev Psicol. 2011;2:117-26.
16. American Psychiatric Association. Task Force on DSM-IV. Diagnostic and statistical manual of mental disorders: DSM-IV-TR. 4th ed. Washington, DC: American Psychiatric Association; 2000. p. 943.
17. Alda JÁ, Fernández Anguiano M, Grupo de Trabajo de la Guía de Práctica Clínica sobre el Trastorno por Déficit de Atención con Hiperactividad (TDAH) en Niños y Adolescentes, Fundación San Juan de Dios, España. Ministerio de Ciencia e Innovación, España. Ministerio de Sanidad Política Social e Igualdad. Guía de práctica clínica sobre el trastorno por déficit de atención con hiperactividad (TDAH) en niños y adolescentes. Madrid: Ministerio de Ciencia e Innovación; 2010.
18. Kendall T, Taylor E, Perez A, Taylor C, Guideline Development G. Diagnosis and management of attention-deficit/hyperactivity disorder in children, young people, and adults: summary of NICE guidance. BMJ. 2008;337:a1239.
19. Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement Management, Wolraich M, Brown L, Brown RT, DuPaul G, Earls M, Feldman HM, et al. ADHD: clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. Pediatrics. 2011;128(5):1007-22.
20. Graffar M. Une methode de classifcation sociales d´echantillons de population. Courrier. 1956;6:445-59.
21. Román B, Serra L, Ribas L, Pérez C, Aranceta J. Crecimiento y desarrollo: actividad física. Estimación del nivel de actividad física mediante el Test Corto Krece Plus. Resultados en la población española. In: Serra L, Aranceta J, Rodríguez-Santos F, editors. Crecimiento y desarrollo Estudio enKid Krece Plus Barcelona: Masson, S.A.; 2003. p. 57-98.
22. Tabachnick BG, Fidell LS. Using multivariate statistics. 6th ed. Harlow: Pearson; 2014. ii, p. 1056.
23. Field AP. Discovering statistics using SPSS. 2nd ed. London: SAGE Publications; 2005. xxxiv, p. 779.
24. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. J R Stat Soc Series B Stat Methodol. 1995;57(289-300).
25. Tong L, Xiong X, Tan H. Attention-Deficit/Hyperactivity Disorder and Lifestyle-Related Behaviors in Children. PLoS One. 2016;11(9):e0163434.
26. Nikkelen S. The role of media enterainment in children´s and adolescent´s ADHD-related behaviors. Amsterdam: CPI

Koninklijke Wöhrmann; 2015.
27. Acevedo-Polakovich ID, Lorch EP, Milich R, Ashby RD. Disentangling the relation between television viewing and cognitive processes in children with attention-deficit/hyperactivity disorder and comparison children. Arch Pediatr Adolesc Med. 2006;160(4):354-60.
28. Swing EL, Gentile DA, Anderson CA, Walsh DA. Television and video game exposure and the development of attention problems. Pediatrics. 2010;126(2):214-21.
29. Mistry KB, Minkovitz CS, Strobino DM, Borzekowski DL. Children's television exposure and behavioral and social outcomes at 5.5 years: does timing of exposure matter? Pediatrics. 2007;120(4):762-9.
30. Stevens T, Mulsow M. There is no meaningful relationship between television exposure and symptoms of attention-deficit/hyperactivity disorder. Pediatrics. 2006;117(3):665-72.
31. Rosenqvist J, Lahti-Nuuttila P, Holdnack J, Kemp S, Laasonen M. Relationship of TV watching, computer use, and reading to children's neurocognitive functions. J Applied Develop Psychol. 2016;46:11-21.
32. Hubert-Wallander B, Green CS, Sugarman M, Bavelier D. Changes in search rate but not in the dynamics of exogenous attention in action videogame players. Atten Percept Psychophys. 2011;73(8):2399-412.
33. Cao F, Su L, Liu T, Gao X. The relationship between impulsivity and Internet addiction in a sample of Chinese adolescents. Eur Psychiatry. 2007;22(7):466-71.
34. Bioulac S, Arfi L, Bouvard MP. Attention deficit/hyperactivity disorder and video games: a comparative study of hyperactive and control children. Eur Psychiatry. 2008;23(2):134-41.
35. Ferguson CJ. The influence of television and video game use on attention and school problems: a multivariate analysis with other risk factors controlled. J Psychiatr Res. 2011;45(6):808-13.
36. Mundy LK, Canterford L, Olds T, Allen NB, Patton GC. The Association Between Electronic Media and Emotional and Behavioral Problems in Late Childhood. Acad Pediatr. 2017;17(6):620-4.
37. de Wit L, van Straten A, Lamers F, Cuijpers P, Penninx B. Are sedentary television watching and computer use behaviors associated with anxiety and depressive disorders? Psychiatry Res. 2011;186(2-3):239-43.
38. Hoare E, Milton K, Foster C, Allender S. The associations between sedentary behaviour and mental health among adolescents: a systematic review. Int J Behav Nutr Phys Act. 2016;13(1):108.
39. Rikkers W, Lawrence D, Hafekost J, Zubrick SR. Internet use and electronic gaming by children and adolescents with emotional and behavioural problems in Australia - results from the second Child and Adolescent Survey of Mental Health and Wellbeing. BMC Public Health. 2016;16:399.
40. Pardos A, Fernandez-Jaen A, Fernandez-Mayoralas DM. Habilidades sociales en el trastorno por deficit de atencion/hiperactividad. Rev Neurol. 2009;48(Suppl 2):S107-11.
41. Fernandez-Jaen A, Fernandez-Mayoralas DM, Lopez-Arribas S, Garcia-Savate C, Muniz-Borrega B, Pardos-Veglia A, et al. Attention deficit hyperactivity disorder and its relation to social skills and leadership evaluated with an evaluation system of the behavior of children and adolescents (BASC). Actas Esp Psiquiatr. 2011;39(6):339-48.
42. Fernandez-Jaen A, Martin Fernandez-Mayoralas D, Lopez-Arribas S, Pardos-Veglia A, Muniz-Borrega B, Garcia-Savate C, et al. Social and leadership abilities in attention defi cit/hyperactivity disorder: relation with cognitive-attentional capacities. Actas Esp Psiquiatr. 2012;40(3):136-46.
43. Wu X, Ohinmaa A, Veugelers PJ. The Influence of Health Behaviours in Childhood on Attention Deficit and Hyperactivity Disorder in Adolescence. Nutrients. 2016;8(12).
44. Harvey WJ, Reid G, Bloom GA, Staples K, Grizenko N, Mbekou V, et al. Physical activity experiences of boys with and without ADHD. Adapt Phys Activ Q. 2009;26(2):131-50.
45. Gapin JI, Labban JD, Etnier JL. The effects of physical activity on attention deficit hyperactivity disorder symptoms: the evidence. Prev Med. 2011;52 Suppl 1:S70-4.
46. Owens JA, Maxim R, Nobile C, McGuinn M, Msall M. Parental and self-report of sleep in children with attention-deficit/hyperactivity disorder. Arch Pediatr Adolesc Med. 2000;154(6):549-55.
47. Betancourt-Fursow de Jimenez YM, Jimenez-Leon JC, Jimenez-Betancourt CS. Trastorno por deficit de atención de hiperactividad y trastornos del sueño. Rev Neurol. 2006;42 (Suppl 2):S37-51.
48. Lycett K, Mensah FK, Hiscock H, Sciberras E. A prospective study of sleep problems in children with ADHD. Sleep Med. 2014;15(11):1354-61.
49. Idiazabal-Aletxa MA, Aliagas-Martinez S. Sueño en los trastornos del neurodesarrollo. Rev Neurol. 2009;48(Suppl 2):S13-6.
50. Fernández-Jaén A, Martín D, Fernández-Perrone A, Calleja-Pérez B. Psicofarmacología del TDAH: estimulantes. In: Soutullo C, editor. Guía esencial de psicofarmacología del niño y del adolescente. Madrid: Panamericana; 2017. p. 79-92.
51. Mau W, Lynn R. Gender differences in homework and test scores in Mathematics, Reading and Science at tenth and twelfth grade. Psychol Evol Gender. 2010;2(2):119-25.
52. Valle A, Regueiro B, Nunez JC, Rodriguez S, Pineiro I, Rosario P. Academic Goals, Student Homework Engagement, and Academic Achievement in Elementary School. Front Psychol. 2016;7:463.
53. Suarez N, Regueiro B, Epstein JL, Pineiro I, Diaz SM, Valle A. Homework Involvement and Academic Achievement of Native and Immigrant Students. Front Psychol. 2016;7:1517.
54. Cooper H, Robinson JC, Patall EA. Does homework improve academic achievement? A synthesis of research. Rev Educat Research. 2006;76:1-62.
55. Langberg JM, Dvorsky MR, Molitor SJ, Bourchtein E, Eddy LD, Smith Z, et al. Longitudinal evaluation of the importance of homework assignment completion for the academic performance of middle school students with ADHD. J Sch Psychol. 2016;55:27-38.
56. Merrill BM, Morrow AS, Altszuler AR, Macphee FL, Gnagy EM, Greiner AR, et al. Improving homework performance among children with ADHD: A randomized clinical trial. J Consult Clin Psychol. 2017;85(2):111-22.
57. Mautone JA, Marshall SA, Costigan TE, Clarke AT, Power TJ. Multidimensional assessment of homework: an analysis of students with ADHD. J Atten Disord. 2012;16(7):600-9.