Effectiveness of a psychoeducational group intervention developed by primary care nurses on symptom control of pediatric patients with ADHD. ADHD parent study

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ABSTRACT
Attention Deficit Hyperactivity Disorder (ADHD) is a common childhood disorder with an estimated prevalence of 5%. The purpose of this study is to evaluate the effectiveness of a psychoeducational intervention performed by primary care nurses on parents of children with ADHD. We recruited participants composed of parents and children between 6 and 12 years with ADHD. We conducted a two-branch randomized control trial. The intervention programme consisted of nine group sessions (5-12 parents) with a duration of 10 months. The primary outcomes were the attention tasks measured with the Test of Variables of Attention (TOVA) and the ADHD symptomatology. Forty-eight children were included in the study. The average age of the parents was 42.6 years (standard deviation, SD: 6.3), and of the children 10.1 years (SD: 1.9), 81.3% were boys. TOVA and the symptoms after the intervention showed no statistically changes in both groups. The intervention group showed more knowledge of ADHD (17.3 vs 11.5, \( p = 0.008 \)) and knowledge of drugs (6.1 vs. 4.5, \( p = 0.005 \)) than the control group after the intervention. A psychoeducational intervention performed by primary care nurses on parents of children with ADHD did not show any modification in the attention tasks, and only changed the knowledge of ADHD of the parents that received the intervention.

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Introduction
Attention Deficit Hyperactivity Disorder (ADHD) is a common childhood disorder with an estimated prevalence of around 5% (Sayal et al., 2018). Official data in Catalonia indicate differences between sexes: 1.5% in girls and 4.2% in boys between 6 and 17 years old (Catalan Health System Observatory, 2018). This disorder is one of the main reasons for consultation in child and adolescent mental health services in Catalonia (Colls & Pons-Ráfols, 2017).
Parents of children with this disorder often have trouble managing education (parenting), frustration, social isolation, and dissatisfaction in their parenting role (Coghill et al., 2008; Cordoba & Verdugo, 2003; Miranda-Casas et al., 2011). Despite inconsistent results (Galanter, 2013; Sonuga-Barke et al., 2013), some studies that have focused training on parenting behaviour management techniques have shown a reduction in ADHD symptoms, behavioural problems, and difficulties with homework both at home and at school (Daly et al., 2007). Behavioural Family Intervention (BFI) studies have shown its usefulness in training parents to reduce parenting problems in high-risk pre-schoolers with ADHD (Bor et al., 2002). Along the same lines, one review emphasizes the value of training parents in behavioural techniques, particularly in preschoolers at high risk for ADHD (Charach et al., 2013). Another study that used the Positive Parenting Programme (PPP) showed favourable effects on parenting style, mother/child relationship, changes in the mother’s mood, and children’s behaviour problems (Aghebati et al., 2014). A recent review conducted in India (Satapathy et al., 2016) that included non-pharmacological intervention studies, grouped them into four categories: a) psychosocial interventions, which includes behavioural intervention training in parents, social skills training, and school interventions; b) mind/body focused interventions, such as yoga, exercise, and physical relaxation or mindfulness; c) cognitive or neurocognitive: computer attentional training, working memory training, and biofeedback-type intervention; and d) cognitive/behavioural game therapy and cognitive/behavioural therapy. The review shows that interventions in the school-age group are inconclusive.

The Multimodal Treatment of ADHD study (MTA Cooperative Group, 1999) showed that a combined management (stimulant medication and intensive behavioural therapy - IBT) is superior to the results offered by each of these modalities when used in isolation. The pharmacological treatment was essentially responsible for the control of nuclear symptoms, but the conjunction with IBT helped to reduce the doses of the medications used and to reduce other non-essential manifestations (for example, anxiety). These findings suggest that combined strategies may broaden the range of benefits.

Primary care remains the most accessible area in the community and, at the same time, it is the level where low-complexity programmes may be conducted to alleviate the most prevalent problems. The literature suggests that nursing may have an important role in the management of ADHD in facets such as the identification of suspected cases, diagnosis, formulation of an individualized treatment plan, care and support to the families, promotion of coping strategies, providing psychoeducation to patients and their families and school support (Kleve et al., 2022; Paidipati et al., 2020) The intention behind primary care nurses performing this intervention was to bring group psychotherapies closer to the community, integrate the management of ADHD in primary health centres and increase the paediatric nurses’ knowledge and skills in the management of ADHD.

Considering that parents do not have enough knowledge about ADHD and are often overwhelmed by parenting issues, parenting education and training programmes have been developed. In this regard, we proposed a psychoeducational intervention to evaluate its impact on the core clinical manifestations of ADHD, family dynamics, and quality of life; to increase children’s attention skills; to improve the understanding of the disorder and the role of the drugs used for its treatment to strengthen compliance with the
prescriptions; to provide tools to facilitate the daily management of parenting problems particularly associated with ADHD and to favourably affect family dynamics.

If the results of this study are favourable, they will introduce evidence in favour of primary care nurses conducting group psychoeducation for parents, integrating and increasing access to treatment for ADHD. The purpose of this study is to evaluate the effectiveness of a psychoeducational group intervention performed by primary care nurses aimed at parents of children with ADHD.

**Methods**

**Sample and study design**
This study was a randomized control trial developed in a Centre for Child and Adolescent Mental Health dependent on the Vic University Hospital located in Vic, Catalonia. Catalonia is a Mediterranean region in the north-east of Spain with its own language – Catalan – and a number of cultural differences with respect to Spain. It has a population of 7.5 million inhabitants. In Catalonia, there is a network of primary care centres that offer universal care throughout the region. In these centres, and integrated in the primary care teams, paediatric care is provided by a team consisting of a paediatrician and a nurse, who attend to children from 0 to 16 years of age. Vic University Hospital attends a population of 162,499 inhabitants (according to the 2021 census). The study was carried out between February 2019 and December 2019. The psychoeducational sessions were implemented in three primary care centres: two centres located in the city of Vic (47,319 inhabitants) and one in the village of Centelles (7,595 inhabitants). We recruited participants composed of parents and children between 6 and 12 years with ADHD (ages that correspond to primary schooling in our country), diagnosed with the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM 5) (American Psychiatric Association, 2013). The children included in the study received the usual treatment consisting of following-up with their psychiatrist and, in some cases, with their psychologist. Participants had to fulfil the requirement that they had been followed up at our centre in the six months prior to starting the study (February 2019). At our centre, visits are usually spaced every three months, so all of them had at least two visits prior to the start of the study. Out of a pre-selection of 262 candidates, a telephone contact was made with a final participation rate of 18%.

**Intervention**
The programme lasted 10 months, starting in February 2019. It consisted of a psychoeducational programme for parents of children with ADHD with nine group sessions (5-12 people) of 90 minutes each, which were held weekly in three different primary care centres by nurses that conducted all the sessions. The psychoeducational sessions with parents took place during the initial 2.5 months of the study in order to allow parents to put into practice the skills and knowledge acquired during the group sessions over the following 7.5 months. The nurses chosen to apply the intervention were selected based on the following criteria: being part of the paediatric team of the participating primary health centres and having previously participated in another type of group
therapy. The nurses who conducted the intervention programme were trained by a psychologist with expertise in ADHD. They took nine two-hour training sessions and covered the following aspects: 1) the role of play in the development and establishment of a positive relationship; 2) an overview of ADHD, disruptive behaviour disorders and ADHD medications; 3) Barkley’s four-factor etiological model and presentation of the conceptual basis of specific learning and behaviour modification techniques (Barkley, 1987); 4) development of positive care; how to strengthen and motivate collaboration and increase appropriate behaviours; 5) strategies to reduce inappropriate behaviours; 6) limits: what they are and how and when to apply them; 7) ADHD and school; 8) delivery of material (documentation, game material, audio-visual material, etc.); and 9) supervision/advice during the implementation of the groups. The psychologist leading the training gave instructions and recommendations on how to implement these topics during the training sessions with the parents of the ADHD patients included in the study. The programme was based on the experience of the research group and also on Barkley’s manual (Barkley, 1987). The number of sessions required to evaluate the results was seven out of nine.

**Measures and instruments**

Data were collected at baseline and at the end of the intervention for both groups (intervention and control). A questionnaire was used to re-collect the socio-demographic and clinical data and the different study variables. The primary outcomes were the attention tasks measured with the Test of Variables of Attention (TOVA) and the symptomatology of ADHD.

A pre–post evaluation was performed which included the following instruments:

1. **Test of Variables of Attention (TOVA).** TOVA is a neuropsychological assessment that measures attention and inhibitory control. The test lasts about 21.6 minutes and is presented as a computer game. It measures a number of variables that involve the response of the evaluated person to a visual stimulus. The test consists of a flashing white square with a small black box appearing in the middle of the screen for 1/10th of a second in two-second intervals. The subject is instructed to press a small microswitch when the black box appears at the top (target) and to refrain from doing so when it appears at the bottom (nontarget). In the first half of the test (the target infrequent half), the target: nontarget ratio is 1:3.5, i.e.: a target is presented (randomly) only once every 3.5 nontarget presentations. In this half which is similar to most of the other Continuous Performance Tests (CPTs), the task is boring and fatiguing, and the subject must pay close attention to respond to the infrequent target correctly. When a subject does not respond to the target, it is called an error of omission and is a measure of inattention. In the second half of the test (target frequent half), the target: nontarget ratio is 3.5:1, i.e.: 3.5 targets are presented for every 1 nontarget. In this half of the test, the subject expects to respond most of the time but occasionally must inhibit the tendency to respond. When a subject responds to the nontarget, it is called an error of commission and is a measure of impulsivity. Thus, the ability to pay attention to a boring, repetitive task is best measured in the first half of the T.O.V.A. while the ability to inhibit
oneself is best measured in the second half. Like most CPTs, the T.O.V.A. uses a fixed, mid-range interstimulus interval (2 secs) and visual stimuli. However, unlike most CPTs, the T.O.V.A. stimuli are nonsequential, simple geometric configurations and monochromatic. Since these features along with the use of a 2.5-minute practice, minimize practice effects, the T.O.V.A. can be used for serial measurements. Mode of response is a particularly important variable that significantly affects test reliability. Unfortunately, since most CPTs use the keyboard to record responses, they have large inherent errors of measurement of time (up to +/- 28 msec). However, the T.O.V.A. uses a specially designed microswitch with an insignificant error of measurement (+/- 1 msec) and which minimizes muscular fatigue. The duration of testing is a significant factor, since subjects who are older and more intelligent can compensate for mild or moderate attention problems for 5, 10, even 15 minutes. Variables measured T.O.V.A. measures include variability of response time (consistency), response time, commission (impulsivity), errors of omission (inattention), post-commission response times, multiple and anticipatory responses, and an ADHD score, which is a comparison to an age/gender specific ADHD group. (Test of Variables of Attention (T.O.V.A.®, 2017). Scores indicate deviation from the performance of a large normative sample stratified by sex and age. Standard scores above 85 are considered within the normal range, scores between 85 and 80 are considered the normal range, and scores below 80 are not within normal limits. Scores below 70 are considered significantly below the normal range. Standard scores below 40 are more than 4 standard deviations from the normal and are denoted <40. Attention Score is a subtest of the T.O.V.A. consisting of variables used to compare the subject’s performance with a sample of individuals diagnosed independently of ADHD, scores below 0 suggest a performance more similar to that of people with ADHD. (For more information see: https://www.tovatest.com/).

2. Parent and teacher ratings of ADHD symptoms. Attention Deficit/Hyperactivity Disorder Rating Scale (ADHD-RS) allow us to know the frequency of ADHD symptoms based on the DSM IV diagnostic criteria of the American Psychiatric Association (DuPaul et al., 1998). We used the ADHD-RS translation and adaptation scale to Catalan by Ortiz et al (Ortiz Guerra et al., 2008), consisting of an 18-item score based on a Likert scale (0-3), where never or rarely gets a score of ‘0’, sometimes ‘1’; often ‘2’; very often ‘3’. The scale is composed of two subscales: one that explores the inattention factor (odd items), and another that explores hyperactivity-impulsivity (even items). The versions of parents and teachers differ only in the instructions and the heading of the scale; the items are the same. Reliability and validity data can be consulted in the authors’ work (see: https://www.sjdhospitalbarcelona.org/es/).

3. ADHD knowledge questionnaire. We administered this questionnaire to parents. This is a questionnaire initially designed to explore the knowledge teachers have about the general aspects, symptoms, diagnosis, etiology, and treatment of ADHD. The Spanish version was used and consists of 26 items that are answered as ‘true’, ‘false’ and ‘I don’t know’. A score of 26 is the one that corresponds to the greatest knowledge. On this occasion, it was used to investigate the knowledge of the parents, estimating that their children’s disorder could have resulted in them receiving/seeking complementary information about their children’s disorder (Soroa et al., 2014).
4. Specific questionnaire on knowledge of drug treatment, which was developed by the authors specifically for this work. It is a questionnaire of 10 questions that inquire about the knowledge that parents have regarding the value of drug treatment, the type of drugs used, and the nature and impact of side effects. The answer options are ‘true’, ‘false’ and ‘don’t know’. The maximum score is 10 points.

5. Family Adaptability and Cohesion Evaluation Scale (FACES III) (Olson, 1986). This is a validated and modified Spanish version of Faces II (Forjaz et al., 2002), reduced to 20 questions that are answered on a Likert scale – almost never or never; occasionally; sometimes; many times; almost always or always – preserving high reliability and validity. It investigates family cohesion that reflects the family, physical or intellectual unit perceived by the members who participate. It also explores family cohesion understood as the ability of a family system to change its power structure, role relationships and rules of the relationships in response to situational and developmental stress.

6. Quality of Life Questionnaire in the child and adolescent population (KINDL-R). The Kindl questionnaire is a generic HRQL instrument for children and adolescents developed in Germany to be used in clinical practice, as well as in healthy children (Bullinger et al., 2008). The Spanish version contains 24 questions distributed in six dimensions: physical well-being, emotional well-being, self-esteem, family, friends, and school. The questionnaire presents different versions for each age group: children aged 4–7 years (Kiddy-Kindl), 8–12 years (Kid-Kindl), and 13–16 years (Kiddo-Kindl). In the research presented, the last 2 were used. In addition, it includes two versions for parents of children 4–7 years old and 8–16 years old. The Kindl responses are collected on a Likert scale of five categories except for the version Kiddy, which presents three response categories. The questions refer to the week before the interview and the scores obtained from the means of each dimension are transformed to a scale of 0–100 points where a higher score represents better HRQL. A single total score or global HRQL index can be obtained from the means of the six dimensions (Rajmil et al., 2004).

7. Assessment of school performance, obtaining data from school reports.

**Ethical aspects**

The Clinical Research Ethics Committee of the Vic University Hospital approved the protocol (Protocol No: 2018967). Written and oral information was provided and the parents signed the informed consent form. The anonymity of the data has been guaranteed according to national and international norms (Declaration of Helsinki and Tokyo) on ethical aspects and the norms of good practice in the investigation.

**Statistical analysis**

A descriptive analysis of the data was carried out. Qualitative variables were reported as frequencies and percentages, and quantitative variables were reported as averages and standard deviations (SD) if they were under normal distribution; when quantitative variables were not under the normal distribution, the median and the interquartile range (IQR) were used. The comparison for categorical variables was performed using Pearson’s chi-square test or Fisher’s test if appropriate. The comparison of means was
carried out by means of the Student’s T-test (against dichotomous variables) or by means of an Anova test (against polychotomous variables) and if both were under the normal distribution. Their parametric equivalents were used when the distribution of quantitative variables was asymmetric. The level of statistical significance used for all hypothesis tests was 5%. The analysis was carried out with the SPSS programme for Windows, version 26 (IBM International Group B.V. Amsterdam. Hollande).

**Results**

Forty-eight ADHD children were included in the study, with an average age of 10.1 years (standard deviation, SD: 1.9) and 81.3% were boys. Of the 48 cases we included, three cases dropped out (one case due to change of address and two cases due to non-delivery of questionnaires). The average age of the parents was 42.6 (SD: 6.3) [fathers: 43.9 (SD: 10.8) years and mothers 40.4 (SD: 8.4)]. In the entire sample, 4.4% of the parents had a diagnosis of ADHD, 12.5% of the children had other siblings affected by ADHD, and 85.4% of them had assistance usually from a health public assistant. The median number of months since diagnosis was 39.7 months (SD: 14.1) (range 6–68 months). Of the 48 children included, 54.2% had comorbidities: 19.3% intellectual disability, 19.2% specific learning disorder, 15.4% mild autism spectrum disorder, 11.6% family dysfunction, 11.5% oppositional defiant disorder, 7.7% language disorder, 7.7% conduct disorder, 3.8% elimination disorders, and 3.8% epilepsy. No statistically significant differences were observed between the prevalence of comorbidities between the control and intervention group (50.0% vs. 62.5%, \( p = 0.413 \)) (Table 1), nor between the distribution of the different comorbidities in the groups (\( p = 0.495 \)).

At baseline, in the control group, 90.6% were boys and in the intervention group, 62.5% were boys (\( p = 0.044 \)). In the intervention group, parents showed more knowledge of drugs than the control group (4.0 vs. 5.9, \( p = 0.010 \)). Both groups showed no other statistical differences before the intervention (Table 1). 71.9% of the control group took medication for ADHD treatment versus 87.5 in the intervention group (\( p = 0.293 \)).

The comparative analysis between the intervention and control groups after the intervention showed no statistical differences in TOVA parameters or tests (Table 2), except for knowledge of ADHD (intervention group 17.3 vs 11.5 control group, \( p = 0.008 \)) and for knowledge of drugs (intervention group 6.1 vs. 4.5 control group, \( p = 0.005 \)).

Intragroup comparison before and after the intervention showed a reduction in school grade scores in both groups. In the intervention group, it went from 2.3–2.2 (\( p < 0.001 \)) and in the control group from 2.2–1.9 (\( p = 0.002 \)) (Table 3).

**Discussion**

A psychoeducational intervention performed by primary care nurses on parents of children with ADHD did not show any modification in the attention tasks, and only changed the knowledge of ADHD of the parents that received the intervention.

Previous studies have identified the value of non-pharmacological interventions (Dawson et al., 2016; Hodgson et al., 2014). There is also research that indicates that non-pharmacological interventions with parents are not a complementary strategy but
Table 1. Description of the sample according to the relevance to intervention or control group (N = 48).

| Sex (male), n (%)   | Control (n = 32) | Intervention (n = 16) | p-value |
|---------------------|------------------|-----------------------|---------|
|                     |                  |                       |         |
| Clinical background, n (%) |                  |                       |         |
| Pregnancy           | 29 (90.6)        | 10 (62.5)             | 0.044   |
| Birth               | 4 (12.9)         | 3 (21.4)              | 0.356   |
| Development         | 7 (23.3)         | 3 (23.1)              | 1.000   |
| Traumatic           | 1 (3.3)          | 0 (0.0)               | 1.000   |
| Toxics              | 0 (0.0)          | 1 (6.7)               | 0.341   |
| Current medical problems | 5 (19.2)        | 3 (20.0)              | 1.000   |

| Social structure of the families of origin |                  |                       |         |
|-------------------------------------------|------------------|-----------------------|---------|
| Parent’s age, mean (SD)                   |                  |                       |         |
| Father                                    | 44.3 (6.6)       | 43.4 (6.0)            | 0.645   |
| Mother                                    | 41.7 (6.6)       | 40.3 (4.8)            | 0.452   |
| Familiar structure, n (%)                 |                  |                       |         |
| Nuclear Family                            | 22 (73.3)        | 8 (53.3)              | 0.390   |
| Single Parent                             | 4 (13.3)         | 3 (20.0)              |         |
| Blended family                            | 4 (13.3)         | 4 (26.7)              |         |
| Siblings (median, IQR)                    |                  |                       |         |
| Father’s educational level, n (%)         |                  |                       |         |
| Without school / primary                  | 14 (45.2)        | 5 (31.3)              | >0.05** |
| Middle school                             | 7 (22.6)         | 3 (18.8)              |         |
| High school                               | 9 (29.0)         | 3 (18.8)              |         |
| University studies                        | 1 (3.2)          | 5 (31.3)              |         |
| Mother’s educational level, n (%)         |                  |                       |         |
| Without school / primary                  | 14 (43.8)        | 5 (31.3)              | >0.05** |
| Middle school                             | 7 (21.9)         | 0 (0.0)               |         |
| High school                               | 5 (15.6)         | 6 (37.5)              |         |
| University studies                        | 6 (18.8)         | 5 (31.3)              |         |
| Parent full-time occupation, n (%)        |                  |                       |         |
| Father                                    | 23 (79.3)        | 13 (86.7)             | 0.695   |
| Mother                                    | 12 (40.0)        | 7 (43.8)              | 0.970   |
| Comorbidities, n (%)                      |                  |                       |         |
| Level of recognition or acceptance that children have of their own clinical condition | | | |
| Interference awareness (1-10), mean (SD)  |                  |                       |         |
| Social relationships                      | 4.0 (3.9)        | 4.6 (3.9)             | 0.661   |
| Recognition of difficulty                 | 6.6 (3.9)        | 7.8 (3.6)             | 0.349   |
| Recognition of dysfunction                | 5.5 (3.9)        | 6.3 (3.6)             | 0.513   |
| Impact of ADHD                            |                  |                       |         |
| On sleep, n (%)                           |                  |                       |         |
| Insomnia                                  | 16 (53.3)        | 7 (46.7)              | 0.673   |
| Difficulty getting up                     | 12 (41.4)        | 9 (60.0)              | 0.241   |
| Practice sport, n (%)                     |                  |                       |         |
| Single                                    | 6 (20.0)         | 7 (43.8)              | 0.173   |
| Team                                      | 15 (50.0)        | 7 (43.8)              |         |
| Not                                       | 9 (30.0)         | 2 (12.5)              |         |
| Use of screens, median (IQR)              |                  |                       |         |
| TV hours (school days)                    | 3 (1-5)          | 1 (0-5)               | 0.178   |
| Other non-TV hours (school days)          | 3 (1-10)         | 2 (1-4)               | 0.117   |
| TV hours (weekends)                       | 4 (2-6)          | 5 (2-6)               | 0.941   |
| Other non-TV hours (weekends)             | 3 (3-7)          | 3 (1-14)              | 0.825   |
| Academic data, n (%)                      |                  |                       |         |
| Repetition of the academic year           | 5 (16.1)         | 3 (18.8)              | 1.000   |
| Curricular adaptation                     | 16 (59.3)        | 7 (43.8)              | 0.324   |
| Learning difficulties                     | 26 (83.9)        | 12 (80.0)             | 1.000   |
| Actual treatment for ADHD, n (%)          |                  |                       |         |
| T.O.V.A test                              |                  |                       |         |
| Response time variability (<80)           | 16 (50.0)        | 8 (50.0)              | 1.000   |
| Response time                             | 9 (28.1)         | 7 (46.7)              | 0.322   |
| Mistakes made                             | 9 (30.0)         | 5 (31.3)              | 1.000   |
| Omissions                                 | 19 (59.4)        | 5 (31.3)              | 0.125   |
| Attention Comparison Score (negatives)    | 22 (68.8)        | 9 (56.3)              | 0.393   |
| Others tests                              |                  |                       |         |
| Parent ratings of ADHD symptoms, mean (SD)| 29.0 (11.1)      | 30.1 (9.5)            | 0.754   |
| Teacher ratings of ADHD symptoms, mean (SD)| 29.9 (8.3)     | 27.5 (14.1)           | 0.546   |
| KINDL children (8-12y), mean (SD)         | 55.7 (7.8)       | 59.4 (6.5)            | 0.134   |
| KINDL parents (8-16y), mean (SD)          | 48.7 (11.6)      | 51.3 (6.4)            | 0.427   |
| Family Adaptability and Cohesion Evaluation Scale, mean (SD) | 78.2 (16.6) | 77.4 (6.2) | 0.851 |
| Knowledge about ADHD, mean (SD)           | 13.7 (4.2)       | 15.6 (3.8)            | 0.089   |
| Knowledge about ADHD drugs, mean (SD)     | 4.04 (2.3)       | 5.87 (1.6)            | 0.010   |
| School scores, mean (SD)                  | 2.1 (0.4)        | 2.3 (0.4)             | 0.336   |
rather are the main strategy to achieve goals that pharmacological interventions cannot aim for (Tarver et al., 2015). Although there are different types of non-pharmacological interventions (psychosocial, cognitive/neurocognitive, cognitive–behavioural and play) the results are broadly consistent with the results of other research that report no benefit of non-pharmacological interventions on core symptoms, particularly when the severity of the disorder is high (Goode et al., 2018; Pelham et al., 2000; Serrano-Troncoso et al., 2013; Young & Amarasinghe, 2010). Furthermore, when we tried to establish neurocognitive differences between the two groups, no statistically significant values were found as noted in other studies (Huang et al., 2012).

The programme did show usefulness in increasing parents’ knowledge of the disorder, its manifestations, treatment, and the drugs used. Even though it is true that parental knowledge before the intervention was higher in the intervention group than in the control group, the comparison was not statistically significant. The literature reviewed on these issues is ambiguous. Studies recognize the benefit of programmes aimed at parents of children with ADHD, but at the same time point to methodological deficits in the studies that diminish their validity: risk of selection bias (hiding anticipation, sequence generation, lack of control) and detection bias (blinding of outcome assessors is not ensured) (Zwi et al., 2011).

Our results show that a large number of siblings have the disorder, which reinforces the genetic dimension of the disorder. However, the same is not observed in parents. This fact allows us to hypothesize the under-diagnosis of ADHD in parents. This under-recognition of the disorder in parents may lead to difficulties with appropriate compliance with psychotherapeutic programmes, as previous studies have shown (Wang et al., 2014). These findings are important in clinical practice because a careful exploration of parents’ history or active symptoms of ADHD would improve the treatment of ADHD in children (Friedman et al., 2020).

All patients included in our study were being followed up in our centre, and most of them (85%) received psychopharmacological ADHD treatment, even though it was observed that family dynamics were affected and that the intervention did not substantially modify these results. These findings are in correspondence with what has been pointed out in other investigations (Muñoz-Silva et al., 2017; Peasgood et al., 2016).

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### Table 2. Comparison between group control and intervention group post-intervention.

| Test                                    | Control (n = 32) | Intervention (n = 16) | p-value |
|-----------------------------------------|-----------------|-----------------------|--------|
| T.O.V.A. test                           |                 |                       |        |
| Response time variability (<80), n (%)  | 9 (39.1)        | 6 (37.5)              | 0.918  |
| Response time, n (%)                    | 3 (12.0)        | 5 (31.3)              | 0.225  |
| Mistakes made, n (%)                    | 7 (28.0)        | 2 (12.5)              | 0.441  |
| Omissions, n (%)                        | 10 (40.0)       | 3 (18.8)              | 0.154  |
| Attention Comparison Score (negatives), n (%) | 14 (56.0)      | 7 (43.8)              | 0.444  |
| Others tests                            |                 |                       |        |
| Parent ratings of ADHD symptoms, mean (SD) | 26.2 (11.8)    | 29.6 (8.9)            | 0.344  |
| Teacher ratings of ADHD symptoms, mean (SD) | 22.8 (14.0)    | 20.9 (12.1)           | 0.695  |
| KINDL children (8-12y), mean (SD)       | 56.3 (8.1)      | 57.8 (7.0)            | 0.553  |
| KINDL parents (8-16y), mean (SD)        | 51.1 (6.1)      | 51.6 (7.8)            | 0.841  |
| Family Adaptability and Cohesion Evaluation Scale, mean (SD) | 78.5 (13.5)    | 75.8 (10.4)           | 0.494  |
| Knowledge about ADHD, mean (SD)         | 11.5 (7.3)      | 17.3 (5.5)            | 0.008  |
| Knowledge about ADHD drugs, mean (SD)   | 4.5 (1.9)       | 6.1 (1.0)             | 0.005  |
| School scores, mean (SD)                | 2.0 (0.4)       | 2.2 (0.5)             | 0.356  |
The impact can be of such magnitude that it is proposed as a target for specific intervention (Peñuelas-Calvo et al., 2021).

This study led to a series of reflections in the research team that can be summarized as follows: i) strategies should be established that facilitate the involvement of health professionals in research projects and that such work does not generate an extra workload; ii) it is crucial to raise awareness of the ‘social construction of knowledge’; iii) it is important to create incentives aimed at users to join research projects; iv) it is essential to recognize the language limitations that prevent the ideal participation of people from minority socio-cultural groups; or v) it would be beneficial for the entities that finance or sponsor research projects to have strategies or mechanisms that can make execution times more flexible in order to deal with contingencies with greater suitability.

Table 3. Pre and post-intervention by inter-groups control and intervention.

|                          | Group | Pre-intervention mean (SD) | Post-intervention Mean (SD) | p   |
|--------------------------|-------|----------------------------|-----------------------------|-----|
| TOVA scores              |       |                            |                             |     |
| Time response variability | Total  | 80.1 (25.9)                | 87.2 (20.6)                 | 0.057 |
|                          | Control | 81.0 (24.5)               | 86.2 (21.6)                 | 0.191 |
|                          | Intervention | 78.9 (28.7) | 88.7 (19.8) | 0.179 |
| Time response            | Total  | 90.1 (18.8)                | 95.6 (15.8)                 | 0.032 |
|                          | Control | 93.5 (18.8)               | 98.6 (15.4)                 | 0.100 |
|                          | Intervention | 84.7 (18.0) | 90.5 (15.7) | 0.193 |
| Mistakes made            | Total  | 93.5 (18.9)                | 94.7 (24.4)                 | 0.689 |
|                          | Control | 90.9 (18.3)               | 91.1 (24.6)                 | 0.973 |
|                          | Intervention | 97.1 (19.7) | 100.0 (23.9) | 0.599 |
| Control omissions        | Total  | 74.9 (4.3)                 | 81.8 (30.3)                 | 0.190 |
|                          | Control | 68.9 (29.6)               | 76.8 (29.8)                 | 0.274 |
|                          | Intervention | 84.3 (22.4) | 89.7 (30.2) | 0.495 |
| Attention Comparison Score | Total | −1.8 (4.2)                | −2.0 (8.9)                  | 0.876 |
|                          | Control | −1.9 (4.3)                | −3.2 (12.4)                 | 0.602 |
|                          | Intervention | −1.6 (4.1) | −0.1 (3.4)  | 0.159 |
| Tests                    | Parent ratings of ADHD symptoms |       |                             |     |
|                          | Total  | 29.4 (10.8)                | 27.5 (10.9)                 | 0.213 |
|                          | Control | 29.2 (11.7)               | 26.0 (12.0)                 | 0.075 |
|                          | Intervention | 29.6 (9.7) | 29.6 (8.9)  | 1.000 |
| Teacher ratings of ADHD symptoms | Total  | 26.3 (10.6) | 21.6 (13.0) | 0.029 |
|                          | Control | 28.6 (8.4)                | 23.1 (14.1)                 | 0.131 |
|                          | Intervention | 23.6 (12.6) | 9.8 (11.9)   | 0.094 |
| KINDL children (8-12y)   | Total  | 57.0 (7.4)                 | 56.8 (7.6)                  | 0.907 |
|                          | Control | 5.6 (7.7)                 | 56.3 (8.1)                  | 0.774 |
|                          | Intervention | 59.4 (6.5) | 57.8 (7.0)   | 0.570 |
| KINDL parents (8-16y)    | Total  | 49.1 (10.7)                | 51.0 (6.6)                  | 0.369 |
|                          | Control | 47.6 (12.7)               | 50.6 (5.8)                  | 0.328 |
|                          | Intervention | 51.3 (6.4) | 51.6 (7.8)   | 0.934 |
| Family Adaptability and Cohesion Evaluation Scale | Total  | 76.8 (11.5) | 77.3 (12.4) | 0.861 |
|                          | Control | 76.5 (14.0)               | 78.2 (13.7)                 | 0.664 |
|                          | Intervention | 75.4 (6.2) | 75.8 (10.4) | 0.556 |
| Knowledge about ADHD     | Total  | 14.6 (4.0)                 | 13.8 (7.1)                  | 0.499 |
|                          | Control | 19.0 (4.0)                | 11.9 (7.3)                  | 0.182 |
|                          | Intervention | 15.9 (3.8) | 17.3 (5.5)   | 0.179 |
| Knowledge about ADHD drugs | Total  | 5.1 (2.1)                 | 5.2 (1.6)                   | 0.631 |
|                          | Control | 4.5 (2.2)                 | 4.6 (1.7)                   | 0.802 |
|                          | Intervention | 5.9 (1.6)  | 6.1 (1.0)    | 0.486 |
| School scores            | Total  | 2.2 (0.4)                  | 2.0 (0.4)                   | 0.002 |
|                          | Control | 2.2 (0.4)                 | 1.9 (0.4)                   | <0.001 |
|                          | Intervention | 2.3 (0.4)  | 2.2 (0.5)    | 0.002 |
Limitations

The greatest strength of this study has been to establish an alliance between Primary Care and Vic University Hospital in aspects that go beyond mere care: the use of various instruments to assess possible changes that represent the expectations of families who bring a child for consultation and treatment; the use of an instrument (T.O.V.A) that can objectively validate the eventual results of an intervention; admit the importance of each of the conditioning factors identified to overcome them in a new exploration of the same nature.

This study also presents some limitations. Firstly, the target sample was small due to different circumstances: degree of occupation of the parents, limited availability of time, linguistic reasons for immigrants in filling out the instruments, and because it was impossible to contact all the families initially selected, due to geographic location and even open rejection. These difficulties meant that the final sample was smaller than expected and may have influenced the results of the study and the evaluation of the impact of the treatment.

Secondly, there was no follow-up on parental compliance with strategies suggested to parents during the study period. Third, the training time of the nurses that applied the intervention was slightly shorter than initially planned, which may have influenced the result. Fourthly, we consider that it would have been better to use a questionnaire to assess the subjective appreciation of the parents who attended the programme developed in the primary care centres.

Conclusions

Psychoeducational group intervention for parents shows no change in symptoms control. However, although no results have been obtained in this respect, psychoeducational strategies to improve the control of ADHD and that go through high-quality randomized clinical trials that take into account the fragile balance of cost and associated risk should continue to be sought (Catalá-López et al., 2017; Shrestha et al., 2020).

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No potential conflict of interest was reported by the authors.

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Data availability statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Open Scholarship

This article has earned the Center for Open Science badge for Open Data. The data are openly accessible at https://doi.org/10.1080/21642850.2022.2148672.
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