ADHD at pre-primary age - an insight into research

Prćić, Ivona

SVEUČILIŠTE U ZAGREBU

UČITELJSKI FAKULTET

ODSJEK ZA ODGOJITELJSKI STUDIJ

IVONA PRĆIĆ

ADHD AT PRE-PRIMARY AGE – AN INSIGHT INTO RESEARCH

Završni rad

Petrinja, rujan 2021.

SVEUČILIŠTE U ZAGREBU
UČITELJSKI FAKULTET
ODSJEK ZA ODGOJITELJSKI STUDIJ
(Petrinja)

Ivona Prćić

ADHD AT PRE-PRIMARY AGE - AN INSIGHT INTO RESEARCH

ZAVRŠNI RAD

MENTORICA: doc. dr. sc. Alenka Mikulec

Petrinja, rujan 2021.

CONTENTS

SUMMARY

Attention deficit hyperactivity disorder (ADHD) is a very common disorder among children. Children can show symptoms of this disorder very early in life. The role of the parents, preschool teachers, and caregivers is to notice children's behavioral problems so that they can help them as soon as possible. In order for them to be able to do that, it is necessary to develop awareness of this disorder.

The aim of the main part of this final thesis is to present the basic information about ADHD. This thesis will also give an overview of several research papers published in English language on contributions to children's ADHD, parental involvement in treatment, the role of neuropsychological deficits in children's ADHD and teachers' knowledge about ADHD. The thesis will also mention how the children with externalizing behavior problems can be helped.

Keywords: attention deficit hyperactivity disorder, children, behavior problems, parents, preschool teachers

SAŽETAK

Poremećaj hiperaktivnosti i pažnje (ADHD) vrlo je čest poremećaj među djecom. Djeca mogu pokazati simptome ovog poremećaja vrlo rano u životu. Uloga je roditelja, odgojitelja i skrbnika uočiti probleme u ponašanju djece kako bi im mogli pomoći što je prije moguće. Stoga je potrebno razviti svijest o ovom poremećaju.

Cilj glavnog dijela ovoga završnog rada je predstaviti osnovne podatke o ADHD poremećaju. Ovaj će rad također predstaviti pregled nekoliko istraživačkih radova objavljenih na engleskom jeziku koji govore o okolnostima koje doprinose ADHD-u kod djece, uključenosti roditelja u liječenje, ulozi neuropsiholoških deficita kod djece s ADHD-om i znanju odgojitelja o ADHD-u. Također će biti spomenuto kako se može pomoći djeci s problemima u ponašanju.

Ključne riječi: poremećaj hiperaktivnosti i pažnje, djeca, problemi u ponašanju, roditelji, odgojitelji

1. INTRODUCTION

There has been an increased focus on ADHD in children. ADHD is one of the most diagnosed behavioral disorders in children and one of the most common disorders nowadays. Even though the exact causes of ADHD are still unknown, researchers have identified some factors contributing to the development of ADHD in children. It is therefore important for research to be conducted so that we can get expand our knowledge on the disorder because the more information we have the better we can help children.

In order to provide children with ADHD symptoms optimal conditions and opportunities for improvement, parental and teachers need to be involved in the process. This final thesis will present ten research papers on the topic of teacher's knowledge about ADHD and parental involvement in treatment. The thesis will discuss how genetics, environment and maternal mental health can contribute to children's ADHD. It will also address the role of neuropsychological deficits in preschool ADHD, which can be an important factor in this disorder. Finally, some ways in which children can be helped to improve their quality of life will be mentioned.

2. ADHD

Attention deficit hyperactivity disorder (ADHD) is one of the most common mental disorders affecting children (Parekh, 2017). It is a neurodevelopmental disorder with symptoms such as difficulty paying attention, excessive activity and impulsivity (AACAP, 2013). ADHD is generally recognized in children, but can also be diagnosed in adulthood. The behavior like hyperactivity is normal for children, but for children with ADHD that behavior can stand in the way of normal functioning at school or at home. “Some children with ADHD only have problems with attention; other children only have issues with hyperactivity and impulsivity; most children with ADHD have problems with all three“ (AACAP, 2013, p. 2). Even though hyperactivity may be reduced as children with ADHD age, they can still struggle with being easily distracted, being forgetful about completing tasks or interrupting people while they are talking. ADHD can cause children problems in school. They can have trouble with doing homework, following the rules or making friends. “When children become adolescents, ADHD can increase their risk of dropping out of school or having disciplinary problems“ (AACAP, 2013. p. 2). It is also more likely that adolescents with ADHD will have driving offenses and accidents, smoke cigarettes or use drugs, have difficulties with employment or have other mental health problems. It would be beneficial if the ADHD is recognized early in the child's life - usually when the child is in the elementary school. For increased progress it would be useful if medication is used. Treatments can be beneficial for child's functioning at home, school, and in social situations. Researchers are not certain what exactly causes ADHD but it has been shown that genetic and environmental factors have their role in the development of ADHD. There are some other possible causes. “These include low birth weight; exposure to cigarette smoke, alcohol, herbicides or pesticides as a fetus in the womb, and exposure to toxic substances in the environment such as lead from old paint after birth” (AACAP, 2013, p. 3).

3. LITERATURE REVIEW

This section of the thesis presents a review of ten scholarly papers and studies that investigated ADHD at pre-primary age. First, the aim and method of literature review are described, followed by the summaries of the analyzed articles divided according to subtopics.

3.1. AIM AND METHOD

The primary aim of this thesis was to analyze scholarly papers about early childhood and preschool-aged children with ADHD in order to gain more information about how it affects children at this age. The topic was further analyzed in relation to the following five subtopics: contributions to children's ADHD, parental involvement in treatment, the role of neuropsychological deficits in early childhood and preschool ADHD, teachers' knowledge on ADHD, helping children with externalizing behavior problems.

4. ANALYSIS AND DISCUSSION

This chapter gives an overview of the analysis of articles related to ADHD at early childhood and preschool age. The articles are divided into the already mentioned five subtopics, and within each subtopic two research papers are presented.

4.1. CONTRIBUTIONS TO CHILDREN'S ADHD

Even though precise causes of ADHD have not yet been defined, some contributions to the development of ADHD have been proposed. This chapter presents two studies – the first one is about genetic and environmental contributions

to the development of ADHD and the second is describing how maternal anxiety, depression and sleep disorders can contribute to children's ADHD.

4.1.1. Development of ADHD symptoms in preschool children: genetic and environmental contributions – Eilertsen, E. M., Gjerde, L. C., Kendler, K. S., Røysamb, E., Aggen, S. H., Gustavson, K., Reichborn-Kjennerud, T., Ystrom, E., Norway

Attention-deficit/hyperactivity disorder (ADHD) is a common mental disorder among children. There can be many factors contributing to the development of ADHD symptoms, but the authors of this study focused on genetic and environmental contributions. The authors emphasize that is important to discover ADHD symptoms in a child prior to their 7th birthday so that they can get adequate help as soon as possible. The aim of this study was to determine how much genetic and environmental factors contribute to the development of ADHD and to determine the stability of those factors. The research was conducted on children at their 1.5, 3, and 5 years of age who were selected from the Norwegian Mother and Child Cohort Study (MoBa). The participants were selected among Norwegian mothers who were pregnant between 1999 and 2008. “Participants were recruited following a routine ultrasound examination offered to all pregnant women in Norway at week 17-18 during pregnancy. The sample consisted of 302,406 responses from 27,818 siblings connected in 15,704 sibling pairs. “Out of the total number of sibling pairs, 306 were monozygotic twins, 855 were dizygotic twins, 13,518 were full siblings, 627 were maternal half-siblings, and 398 were paternal half-siblings” (Eilertsen et al., 2019, p. 1300). Research instrument used in the study was a short form of the Child Behavior Checklist for preschool children (CBCL), a standardized questionnaire that is used for evaluating behavioral and emotional problems in children. “Mothers rated the appropriateness of statements regarding their child's behavior using three mutually exclusive category options: (1) not appropriate, (2) sometimes appropriate, and (3) appropriate” (Eilertsen et al., 2019, p. 1300). Based on the results, the authors concluded that “heritability estimates of ADHD symptoms at each of the three different ages ranged from 54% to 70%” (Eilersten et al., 2019, p. 1302). In other words, the results of this study confirm that

there are “substantial genetic influences underlying early ADHD symptom expressions” (Eilersten et al., 2019, p. 1304), and that these can be observed as early as 1.5 years of age. It was also found that the causes of ADHD need to be viewed as a dynamic process, i.e. “the importance of unique environmental effects appeared to increase across ages, and was mostly specific to a given age” (Eilertsen, 2019, p. 1299).

4.1.2. Maternal anxiety, depression and sleep disorders before and during pregnancy, and preschool ADHD symptoms in the NINFEA birth cohort study – Vizzini, L., Popovic, M., Zugna, D., Vitiello, B., Trevisan, M., Pizzi, C., Rusconi, F., Gagliardi, L., Merletti, F., Richiardi, L., Italy

Pregnancy is considered to be a period in which mental disorders such as anxiety and depression can easily appear. “It has been reported that approximately 7-15% of women during pregnancy are affected by mental disorders (Gelaye et al. 2016; Van den Bergh et al. 2017), whose common symptoms, such as disordered appetite, sleep disturbances and mood swings are often difficult to distinguish from physiological changes occurring during pregnancy, and thus, the reported prevalence is likely underestimated” (Vizzini et al., 2019, p. 521). It may also happen that mental disorders often exist side-by-side, which exacerbates the harmful effects on the mother and child. “A number of studies reported associations of prenatal maternal depression and anxiety with offspring health outcomes, including low birth weight, preterm birth and respiratory morbidity” (Vizzini et al., 2019, p. 521). Moreover, it has also been found, that mental disorders experienced by mothers during pregnancy may affect their child's “cognitive, emotional, social and behavioural development increasing the risk of emotional (internalising) and behavioural (externalising) difficulties, such as attention-deficit/hyperactivity disorder (ADHD)” (Vizzini et al., 2019, p. 522). About 7500 pregnant women were chosen in the period between 2005 and 2016 to complete the first online questionnaire at any time during pregnancy. The information about children was obtained with five added questionnaires, which their mothers filled out 6 months after delivery and again when the children were 1.5, 4, 7 and 10 years old. For this study, the authors used the data collected when the children were 4 because for this

age group the response rate was the highest, so the final sample consisted of 3634 children. During the pregnancy, the women were asked to mark on a checklist of 30 different chronic conditions any chronic conditions they were diagnosed by a doctor. The questionnaire for this study consisted of questions on these maternal disorders: "(i) diagnosis of depression, (ii) diagnosis of anxiety and (iii) diagnosis of sleep disorders", and the participants were asked to identify if the condition existed "only before pregnancy, only during pregnancy or in both periods" (Vizzini et al., 2019, p. 522). They divided the diagnoses according to the period in which they occurred: "(i) lifetime diagnosis-a disorder ever diagnosed by a doctor, (ii) pre-pregnancy exposure-a previous diagnosis of a disorder that was not active during the index pregnancy and (iii) during pregnancy exposure-a disorder active during the index pregnancy" (Vizzini et al., 2019, p. 522). The authors did not examine sleep disorders during the third trimester of pregnancy "in order to avoid exposure misclassification due to deterioration in sleep quality across pregnancy" (Vizzini et al., 2019, p. 522). The results showed that for 402 (11.1%) mothers at least one of the analyzed mental disorders was diagnosed, and the results for children showed that they "had a mean total ADHD score of 3.6 (SD 3.0), a mean ADHD-H score of 2.4 (SD 2.1) and a mean ADHD-I score of 1.2 (SD 1.5)" (Vizzini et al., 2019, p. 524). It was also found that prenatal maternal problems such as depression, anxiety and sleep disorders are connected with their children's ADHD symptoms. Similar results were reported in other studies as well, i.e. Norwegian MoBa cohort (Bendiksen, et al., 2015), PREDO cohort study (Wolford et al., 2017), and Australian MUSP cohort (Clavarino, et al., 2010). The authors therefore propose that preventive prenatal strategies as a way of reducing mental disorders may have positive effects on children's psychological development.

4.2. PARENTAL INVOLVEMENT IN TREATMENT

The sooner the symptoms of ADHD in children are detected and treated the easier it will be for the child later in life. That is way it is important for parents to be included in the treatment of their children's ADHD symptoms. The following

two studies look into the efficacy of training for parents of children with ADHD symptoms.

4.2.1. An RCT of an online parenting program for parents of preschool-aged children with ADHD symptoms - Franke, N., Keown, L. J., & Sanders, M. R., New Zealand

ADHD is a disorder that is widespread among children, and it can be recognized already at a preschool age. If it is not treated on time, symptoms of ADHD can continue into school age, and it can leave lasting consequences on the child. It can be stressful for parents to have a child with extreme ADHD symptoms, and they can see themselves as less competent because of that. "Evidence exists that parenting interventions for preschool ADHD symptoms are effective for reducing parenting stress, increasing parenting competence, and reducing child ADHD symptoms" (Franke et al., 2016, p. 3). Research showed that group-based parenting interventions have benefits for parents when it comes to managing preschool children with ADHD symptoms. However, the problem is the access to these programs because of obstacles such as cost or transport problems. Considering the prevalence of ADHD, it is necessary to have more available programs for parents to be able to provide help for their children with ADHD symptoms. "This argues for the need for evaluations of evidence-based self-help parenting programs targeting parents of hyperactive-inattentive pre-schoolers" (Franke et al., 2016, p. 4). An online Triple P- Positive Parenting Program has shown some positive results in solving problems in children, but there is no assessment of this program for children with ADHD symptoms. Therefore, the present study aimed to evaluate "the efficacy of the online, self-help Triple P-Positive Parenting Program in this population" and tackle some of the "limitations of previous Triple P research of practitioner delivered interventions for preschool hyperactivity/inattention" (Franke et al., 2016, pp. 4-5). The sample of this study were parents of preschool-aged children with ADHD symptoms. The first hypothesis that the authors defined "was that intervention group parents, compared with delayed intervention group parents, would report lower levels of child ADHD symptoms following interventions" (Franke et al., 2016, p. 6). Additional hypotheses were also defined and they

proposed better results in the intervention group in comparison to the delayed intervention group as follows: a) progress in prosocial behavior and social functioning; b) decreased level of parents' excessive reactions, laxness and verbosity, and increased level of positive parenting; c) decreased level of stress, depression and anxiety; and d) increased level of parenting satisfaction and self-efficacy (Franke et al., 2016). Since a connection between behavior problems and preschool ADHD symptoms had been established, an additional hypothesis focused on decreasing behavior problems after the intervention. Researchers also aimed to find out if mothers with higher levels of ADHD symptoms would report less improvement in child's ADHD symptoms and parenting behaviors after partaking in the Triple P online program (TPOL). In this study the participants were 53 parents and their 3 to 4-year-old children with elevated and impairing levels of ADHD symptoms. They were found through establishments that work with children and young families. To be included in the study, parents had to be interviewed so the researchers could evaluate if the children meet the criteria required for this research. Children's mothers, fathers and teachers were asked to complete the assessment of each child's behavior. For the evaluation of children's behavior in this study the researchers used the WWP (Werry-Weiss-Peters) activity rating scale and the PACS (Parental Account of Child Symptoms) interview. "The WWP has 22 items rated on a 3-point Likert type scale, which ask parents about their child's activity patterns in a range of daily settings." (Franke et al., 2016, p. 9). The PACS is "a standardized semi-structured interview assessing child behaviors at home" (Franke et al., 2016, p. 9), and the researchers choose this instrument to measure the child's ADHD symptoms. Parents answered questions about how frequent and severe the child's ADHD symptoms were in the last 6 months. For the assessment of parent's levels of ADHD symptoms, researchers used the Adult ADHD Self-Report Scale (ASRS) and it was found that for 17 parents the outcome of the assessment was the high possibility of having an adult ADHD. Further instruments used in this study for the assessment of children's behavior are the Conners Early Childhood Behavior scale, the Child Behavior Scale and the Strengths and Difficulties Questionnaire (SDQ). The Conners Early Childhood Behavior scale was used for the assessment of

hyperactivity/inattention and aggression/defiance in child's behavior and child's difficulty in social functioning. The Child Behavior Scale was used to measure preschool children's functioning and relationship with other children in school. For the SDQ, each child's preschool teacher evaluated child's functioning in early childhood or in school environment. The researchers also used the following instruments: 1) the Parenting Scale to evaluate the parent's style of disciplining children – laxness, excessive reactivity and verbosity; 2) the Authoritative Parenting scale of the Parenting Styles and Dimensions Questionnaire (PSDQ) to evaluate positive parenting; 3) the Depression Anxiety Stress Scales (DASS) to investigate the symptoms of depression, anxiety and stress in adults; and 4) the Parenting Sense of Competence (PSOC) scale to investigate parents' beliefs about their competence in parenting. The evaluation was done at three times: "at pre-intervention (T1), post-intervention (T2; 3 months after T1), and at 6 months follow-up (T3)" (Franke et al., 2016, p. 12). After the first (T1) evaluation, families were divided into two groups: the intervention or delayed intervention group. "The delayed intervention group families received the intervention after T3 assessment" (Franke et al., 2016, p. 12). Both groups were given 16 weeks for the parents to complete the program. "TPOL is a self-directed, interactive positive parenting program delivered via the Internet" (Franke et al., 2016, p. 12) which "consists of eight sequenced modules, and its features, such as audio-visual representation of information and interactive exercises, are designed to engage users, to increase knowledge, and to enhance parental self-regulation" (Franke et al., 2016, p. 12). The following results are related to the short-term intervention effects. According to the mothers, children in the intervention group, when compared to the delayed intervention group, showed better progress regarding hyperactivity/inattention, restlessness/impulsivity, social functioning and defiance/aggression (Franke et al., 2016). In addition, teachers also noticed progress in prosocial behavior in the intervention group. Regarding the parents, the changes for the better were seen in the intervention group as well. Parent over-reactivity, verbosity and laxness were decreased and positive parenting increased. After they completed the program, the intervention group mothers were less stressed and depressed than the delayed intervention group mothers. "There

were no significant differences between the intervention and the delayed intervention group for father-reported hyperactivity/inattention, defiance/aggression, and social functioning, for teacher-reported hyperactivity and peer problems, and for mother-reported maternal anxiety" (Franke et al., 2016, p. 19). The results at the six month follow-up "showed that significant differences between the intervention group and the delayed intervention group were maintained for maternal over-reactivity, verbosity, stress and depression, parenting satisfaction, and parenting self-efficacy" (Franke et al., 2016, p. 19). At the follow-up there was also distinction in anxiety between the intervention group and the delayed intervention group. "Intervention effects were not maintained for mother-reported hyperactivity/inattention, restlessness/impulsivity, defiance/aggression, social functioning, maternal laxness, and positive parenting" (Franke et al., 2016, p. 19). The analysis showed that hyperactivity/inattention and restlessness/impulsivity were reduced compared to the pre-intervention time. "Overall, the results suggest the possibility that the parenting strategies learnt via an online program may help deal with the day to day stressors of parenting a preschool child ADHD symptoms and feelings of low efficiency." (Franke et al., 2016, p. 23). This study shows how beneficial the online self-help program is in reducing child ADHD symptoms with intervention and in growing parenting competence, satisfaction in the parenting role and maternal well-being. The results showed that parenting confidence is connected to their parenting style. If the parents believe that they are efficient at parenting, they will practice more positive parenting behaviors like warmth and involvement. On the other hand, if they do not believe in their efficacy, they will practice more negative parenting behaviors like maladaptive disciplining.

4.2.2. Parent Training for Preschool ADHD in Routine, Specialist Care: A Randomized Controlled Trial – Lange, A. M., Daley, D., Frydenberg, M., Houmann, T., Kristensen, L. J., Rask, C., Sonuga-Barke, E., Søndergaard-Baden, S., Udupi, A., Thomsen, P. H., Denmark

Behavioral parent training (PT) is considered a better option than medication for preschoolers with ADHD, especially because a "recent systematic review supported the classification of behavioural PT as a well-established treatment for

preschool children with ADHD" (Lange et al., 2016, p. 3). Despite the fact that PT can reduce the ADHD symptoms in children, there is still not enough information. "The purpose of this study was to evaluate evidence-based PT for preschool ADHD in routine specialist clinics in public Child and Adolescent Mental Health Services (CAMHS), where most children receive their care, and where PT had not previously been available" (Lange et al., 2016, p. 3). The New Forest Parenting Programme (NFPP) was selected because it provides parents with individual sessions and the child may also be present for some sessions. It was anticipated that the NFPP would be more beneficial than the usual treatment with respect to parents' assessment of children's ADHD symptoms and in helping parents feel more competent. The researchers tested the influence of NFPP on children's ADHD symptoms with "parents' and teachers' ratings and with direct laboratory observation; and on parent and teacher ratings of conduct problems, parenting sense of competence, levels of family strain and parent-child interaction" (Lange et al., 2016, p. 4). "The study was a multi-center, randomized, controlled trial comparing the effectiveness of NFPP and TAU[1] in the treatment of ADHD for young children" (Lange et al., 2016, p. 5). The participants were parents and Danish-speaking children aged 3-7 chosen from 3 different specialist ADHD clinics. The children had clinical ADHD diagnosis supported by the Development and Well-being Assessment (DAWBA). The researchers excluded the children who had IQ lower than 70, had parents with major mental disabilities or children with serious difficulties at home, e.g. children in child protection program. Children were divided into two groups - one group was assigned to the PT programme (NFPP- New Forest Parenting Programme) and the other group of children with ADHD got treatment as usual (TAU).

"NFPP includes 5 elements:

1) Psychoeducation about the nature of preschool ADHD to enhance parents' understanding of child's behavior; 2) Scaffolding to help parents work from the child's level of development; 3) Promoting proactive parenting and enhancing parent-child interaction to support child development and reduce parental stress;

[1] TAU – treatment as usual

4) Improving child's ADHD symptoms and related neuropsychological deficits through play and games that target attention, impulsivity and self-regulation; 5) Guiding parents in the use of behavioral strategies to improve behavior and ADHD symptoms" (Lange et al., 2016, p. 7).

Parents participated in 8 sessions in their home, 5 of which they did alone, without the child and 3 lessons required the child's presence. TAU normally involved psycho-education for parents by specialized staff. "TAU included information about a) ADHD as a developmental disorder; b) How ADHD symptoms obstruct normal play and the development of preschool skills; c) how ADHD and executive dysfunctions interrupt daily routines" (Lange et al., 2016, p. 8). Parents were also provided with information on how to help their children through psychosocial management, e.g. visual aids and daily structure. "The primary outcome was parent ratings of child ADHD symptoms. The secondary outcomes included teacher ratings and direct observations of ADHD symptoms. Outcomes were measured at baseline (T1) and post-treatment (T2) and at follow-up (T3: 36 weeks after T2)" (Lange et al., 2016, p. 2). The instruments used in the current study were: ADHD Rating Scale-IV-Preschool Danish Version, Strengths and Difficulties Questionnaire (SDQ), The Parenting Sense of Competence Scale (PSOC), The Family Strain Index (FSI) and The Adult ADHD Self-Report Scale. The number of children who participated in the research were 164 and 88 of them received New Forest Parenting Programme while 76 of them received treatment as usual (TAU). NFPP showed better results on parents' ratings of children's ADHD symptoms, and parenting efficacy and family strain at T2 and T3 than TAU. The family strain was decreased in comparison to TAU and there was an increase in parents' efficacy and fulfillment. "There were no effects on teacher ratings or direct observations of ADHD or on ratings of conduct problems or parenting" (Lange et al., 2016, p. 2). The analysis of the results showed that gender of the child, composition of the family or their socioeconomic status, parental ADHD or child behavior problems did not affect intervention effects. To conclude, evidence-based parent training is important and has its worth for children with ADHD symptoms. In order to achieve optimal improvement in ADHD symptoms the combination of PT and teacher training

interventions in children of early and preschool age with ADHD was suggested, but the tests showed insignificant results on core ADHD symptoms.

4.3. THE ROLE OF NEUROPSYCHOLOGICAL DEFICITS IN PRESCHOOL ADHD

Neuropsychological functioning plays an important role in discoveries about attention deficit hyperactivity disorder. This chapter includes two studies which investigated how the neuropsychological deficits are related to the development of ADHD symptoms.

4.3.1. A critical appraisal of the role of neuropsychological deficits in preschool ADHD – Sjöwall, D., & Thorell, L. B., Sweden

There is more and more focus on the possibility of basing some diagnoses like Attention Deficit Hyperactivity Disorder (ADHD) on homogenous neuropsychological functioning than on heterogeneous behavioral symptoms. Previous studies showed weak connection of preschool children's neuropsychological deficits to ADHD. Authors of this study believe that previous research was not thorough enough and they wanted to continue investigation which deals with these issues: "1) Which neuropsychological deficits are related to preschool ADHD and what is the overlap between these deficits? 2) Which methodological challenges do we face when assessing neuropsychological deficits in preschool ADHD? 3) And what is the relation between neuropsychological deficits and functional impairments in daily life?" (Sjöwall & Thorell, 2019, p. 61). Many studies indicate that ADHD is a neuropsychologically heterogeneous disorder. It was suggested that heterogeneity may create an obstacle to discovering the reasons behind the disorder and finding the right treatments. "In line with this, the Research Domain Criteria (RDoC), presented by the National Institute of Mental Health (NIMH; Insel et al., 2010), states that mental disorders should be characterized by underlying neurobiological deficits rather than by heterogeneous sets of symptoms" (Sjöwall & Thorell, 2019, p. 61). The second problem relates to

the question of whether the measures done in a laboratory and those reported by the teachers/caregivers are comparable. “If different methodological approaches target partially different constructs, this needs to be taken into consideration when comparing the effect sizes or investigating the overlap between different neuropsychological functions” (Sjöwall & Thorell, 2019, p. 62). The authors of this study claim that effects of different neuropsychological functions should be investigated with the identical method of measurement. “For example, the vast majority of studies examining emotional functioning in ADHD have used teacher/caregiver reports, whereas executive deficits have primarily been examined using laboratory measures” (Sjöwall & Thorell, 2019, p. 63). The authors imply that the results might not be trustworthy if they are done using different methods. In addition, they propose that to have a better understanding of the neuropsychological functioning in ADHD we have to understand its connection to functional impairments. “For preschoolers, this primarily includes impairments in social relations within the family and with peers” (Sjöwall & Thorell, 2019, p. 63). There can be some individual differences in the functional impairments connected to ADHD where some individuals may have serious problems in contrast to others who may function almost without impairments. There are studies that investigated neuropsychological functioning and functional impairment, but they “used dimensional analyses and did not include clinically-referred samples” (Sjöwall & Thorell, 2019, p. 64). Also, there is one more issue with previous studies, i.e., they have not had preschool children as subjects. That is why the aim of the present “study was to characterize neuropsychological functioning in preschool ADHD” (Sjöwall & Thorell, 2019, p. 64). To investigate the existing problems and find new discoveries, the authors conducted research focusing on these neuropsychological functions: executive deficits (i.e., working memory, inhibition, and reaction time variability), delay-related behaviors (i.e., the preference for minimizing delay), and emotional functions (i.e., emotion recognition and regulation). They did the variable-oriented and person-oriented analysis and they also added laboratory measures and teacher/caregiver notes on the studied issues. Also, the researchers investigated how individual differences in neuropsychological functioning affect

functional impairments such as peer problems, prosocial behaviors, and family life functioning connected with preschool ADHD. “More specifically, the following specific research questions were addressed:

(1) With regard to what aspects of neuropsychological functioning do preschool children with high versus low ADHD symptoms levels differ?

(2) Are there independent effects of different neuropsychological domains (i.e. how much do deficits overlap) in relation to preschool ADHD?

(3) Are neuropsychological deficits related to individual differences in functional impairments?

(4) Are there differences in findings regarding Question 1 and 2 above when neuropsychological functioning is assessed using teacher reports compared to laboratory measures?” (Sjöwall & Thorell, 2019, p. 64).

The study participants were 124 preschool children 4-6 years old. The number of children in ADHD group was 52 and the control group consisted of 72 children whose teachers or parents marked fewer than three statements with ‘often’ or ‘very often’ in every group of ADHD symptoms. The measures that were done in this study are measures on executive functioning, delay-related behaviors, emotional functioning and functional impairments. Executive functioning was investigated in a laboratory through these measures: inhibition, reaction time variability, verbal working memory and spatial working memory. Delay-related behaviors were researched in a laboratory through situations where a child can avoid or reduce waiting by making a choice to take a small, but instant reward. Other situations to investigate delay-related behavior were those when a child could not escape delay. Emotional functioning was researched in a laboratory by measuring a range of emotional traits including recognizing emotions from faces, frustration tolerance and regulation of exuberance. The data were collected as follows: executive deficits were evaluated by teachers using the Childhood Executive Functioning Inventory; delay-related behavior was measured by teachers using The Childhood Delay Questionnaire; emotional regulation was evaluated using the Emotion Questionnaire and functional impairments were measured by teachers and caregivers using the Strength and Difficulties Questionnaire. It was shown that

ADHD group, when compared to the control group, had worse results on all laboratory measures of executive deficits. There was also some contrast between groups on delay-related measures and emotional functioning. When observing teachers' reports "the results showed that all group differences were significant for executive deficits, delay-related behaviors, and emotional functioning" (Sjöwall & Thorell, 2019, p. 70). Results obtained from executive functioning, delay-related behaviors and emotional functioning in children showed that 23% of the children in the ADHD group did not have any deficits, 38% had only one deficit and 39% had various deficits according to measures done in the laboratory. For the control group the results were 72%, 26% and 1% respectively. According to the teacher reports, 4% of the children in the ADHD group had no deficits, 6% of them had only one deficit and 90% had several. For the control group, the results were 82%, 11% and 7%. The results for functional impairments showed significant differences between the ADHD group and controls for both teacher- and parent-rated peer problems, prosocial behaviors, and family life and social activities as perceived by parents (Söjwall & Thorell, 2019). Deficits in neuropsychological functioning have been suggested to be the basic cause of ADHD, and since it might be used as a different approach to classifying ADHD, a critical approach is required. The outcomes of the presented study raise some significant concerns. Firstly, a considerable number of preschool children with ADHD did not have any neuropsychological deficits. Secondly, a big contrast between groups with large effect sizes was discovered for all measures of functional impairments. However, children without functional impairments were identified within each domain. The results revealed that deficits in neuropsychological functioning cannot explain these individual differences among children with ADHD.

4.3.2. Neuropsychological deficits in preschool as predictors of ADHD and academic achievement in late adolescence - Sjöwall, D., Bohlin, G., Rydell, A-M., & Thorell, L. B., Sweden

Many studies have proved that ADHD is connected to multiple neuropsychological deficits, i.e. some individuals with ADHD are showing only one deficit, some display several and some show no clear neuropsychological deficits. Based on research results, the strongest links have been found between ADHD and deficits in executive functions (e.g., inhibition, working memory, and cognitive flexibility), reaction time variability and emotional dysregulation. The authors of this study included a range of different neuropsychological functions in order to "generate more in-depth knowledge of the overlap between different functions and determine how much of variance in ADHD symptoms in adolescence can be explained by preschool neuropsychological deficits" (Sjöwall et al., 2017, p. 112). They believe that not only early signs for ADHD, but also functional impairments related to ADHD need to be studied. Besides the already mentioned effects of ADHD, the authors also emphasize low academic achievement, as ADHD influences individual's employment, health, financial capability and capability of pursuing higher education. "It is well established that ADHD is associated with poor academic achievement, with up to 56% receiving special education and at least 30% repeating a grade" (Sjöwall et al., 2017, p. 114). It is unknown why the problems are more noticeable for some children than others, but that is why it is important to investigate in what way early neuropsychological deficits can predict later academic problems. "The first aim of the study was to investigate whether neuropsychological functioning in preschool can predict ADHD symptoms in late adolescence (age 18), over and above early ADHD symptom level (…) a second aim was to investigate neuropsychological deficits also in relation to academic achievement in late adolescence, when controlling for early ADHD symptom levels" (Sjöwall et al., 2017, p. 114). The authors hypothesized that preschool neuropsychological functioning would predict formation of future ADHD symptoms (specifically symptoms of inattention) and that executive functioning (specifically working memory and reaction time variability) would predict academic functioning. In this

study, the participants were 128 children, who were almost five years old. Children's parents received a questionnaire which contained questions about their child's socioemotional competence. The final sample was obtained from a larger group "based on a screening measure for ADHD, which included questions related to impulsivity (e.g., "Has a tendency to do things without thinking of the consequences") and inattention (e.g., "Is easily distracted when performing a task") (Sjöwall et al., 2017, p. 115). When children were 5 and 6.5 years old, the researchers conducted some laboratory measurement with them. The measurements that were done when children were 5 years old were: response inhibition and reaction time variability, and measures done at 6.5 years were: interference control, working memory and emotional functioning. Additional measures were ADHD symptoms and parents' socioeconomic status as well as teachers' evaluations of children's ADHD symptoms when the children were 6 years old. When children were 18 years old, parents also gave evaluations of their ADHD symptoms in addition to their academic achievement ratings and self-rated academic achievement. Response inhibition was measured with a go/no-go task where researchers showed the children 4 different pictures – a blue square, a blue triangle, a red square and a red triangle. The children were instructed to press a key when there is a blue picture on a screen, but not to respond when there is a red picture. The second part of the task was similar, but instead of a color, they had to focus on geometrical shapes. Interference control was measured in the task in which children were given four pairs of pictures where every picture had its opposite (day-night, large-small, boy-girl, up-down). The children had to say the opposite every time they were shown a picture (e.g., they had to say "day" each time night was shown). Working memory was measured in the task where a child was shown a series of hand motions and then requested to replicate the sequence. Reaction time variability "was measured using the standard deviations in reaction time on correct trials from the go/no-go task" (see the description above) (Sjöwall et al., 2017, p. 116). Emotional functioning was investigated through parents' reports on their child's emotion regulation and emotional reactivity using the Emotion Questionnaire. ADHD symptoms in preschool years were measured using teacher reports of the

Conners Rating Scale. In late adolescence ADHD symptoms were investigated through parents' reports on the ADHD Rating Scale IV.

The results revealed that at the age of 18, measures of response inhibition, working memory, and reaction time variability were connected to symptoms of inattention, but only response inhibition measures were connected to symptoms of hyperactivity/impulsivity. Also, concerning emotions, happiness regulation and anger reactivity were significantly connected to inattention and hyperactivity/impulsivity while anger regulation was significantly connected only to inattention. In this study, the authors also explored to what extent neuropsychological functioning in preschool is connected to academic achievement in late adolescence. "The results showed that none of the emotional variables, but all other neuropsychological variables, were significantly related to academic achievement" (Sjöwall et al., 2017, p. 120). "The findings of the present study could be interpreted as indicating that it is possible to screen for early neuropsychological deficits and thereby identify children who may be at risk for long-term negative outcomes with regard to both ADHD symptoms and academic achievement" (Sjöwall et al., 2017, p. 121).

4.4. TEACHERS' KNOWLEDGE OF ADHD

ADHD can cause problems in children's academic achievement. Teachers should have some knowledge about the condition because they spend a lot of time with children and they can have a huge impact on them. Moreover, they can contribute to the improvement of children's condition. The following two studies investigated teachers' knowledge of ADHD.

4.4.1. Attention deficit hyperactivity disorder: Training outcomes for Grade R teachers in an urban and semi-rural context - De Jongh, M., & Wium, A.-M., South Africa

Attention deficit hyperactivity disorder can be an obstacle to a person's academic achievements. That is why ADHD should be recognized as soon as

possible to provide a child with the needed help. Many teachers are not educated enough on the topic to recognize and handle the condition. Because of that, it is important to help teachers to gain a better understanding of the disorder. “They should know what the symptoms or behaviour associated with ADHD are, as well as how such learners should be managed to limit the impact of ADHD on learning, particularly on emergent literacy” (De Jongh & Wium, 2021, p. 2). The Department of Basic Education in South Africa realized that teachers need support in managing children with challenges in learning, so they tried to make some changes to improve work conditions for teachers and to improve education quality for learners. Grade R teachers can find it especially difficult to handle children with ADHD as this disorder gets more apparent in the reception year. That is why they require more support, so the researchers have developed support programs to help them. Some studies stated “that support programmes should address gaps in the teachers’ overall knowledge on ADHD and its effect on emergent literacy. Programmes should improve Grade R teachers’ knowledge, awareness, skills, motivation, values, accountability and attitudes regarding such barriers to learning” (De Jongh & Wium, 2021, p. 2). The authors selected two different areas (urban and semi-rural) for launching their support program in order to be able to compare progress in both of these areas. “The main aim of this article is to report on the outcomes of this specific support programme for Grade R teachers on ADHD in two different contexts” (De Jongh & Wium, 2021, p. 3). To achieve that, they collected data from self-constructed questionnaires which were adapted from the original KADDS (Knowledge of Attention Deficit Disorders Scale) by Sciutto, Terjesen and Bender (2000). The KADDS is one of the instruments most widely used to assess teachers’ knowledge of ADHD (De Jongh & Wium, 2021, p. 4). The authors used pre-training and post-training questionnaires. The pre-training questionnaires contained questions about teachers’ demographic data, general knowledge of ADHD and emergent literacy. The post-training questionnaires did not include the demographic information, but they contained open-ended questions about the participants’ view and experiences of the training program. The questionnaires consisted of questions divided into these sections:

- Section 1 of the pre-training questionnaire – demographic information of the participants;
- Section 2 of the pre-and post-questionnaires – questions about diagnosis, identification, symptoms, behavior and the management of ADHD;
- Section 3 of both questionnaires – questions linked to emergent literacy, that is, its terminology, development and the impact of ADHD on emergent literacy;
- Section 4 of both questionnaires – questions about the need for additional support for the participants;
- Section 5 of the post-training questionnaire – questions about feedback on the training benefits (De Jongh & Wium, 2021).

"Both quantitative and qualitative results obtained from the pre-and post-training questionnaires were analysed to determine if the participants' awareness and knowledge improved as a result of the support programme" (De Jongh & Wium, 2021, p. 4). A total number of participants was 65. Out of that number, 44 Grade R teachers were from the township in the semi-rural context, and 21 were from urban schools. To find out how useful the program was for the two groups, the authors analyzed the progress teachers have made in knowledge. "Such findings were obtained by comparing the pre- and post-training knowledge of ADHD in terms of identification, diagnosis, symptoms, behaviour associated with ADHD and the management thereof for each group" (De Jongh & Wium, 2021, p. 4). The results from the pre-training questionnaires showed that before the training, teachers from urban schools had more knowledge of ADHD and its effect on emergent literacy. The results after the training showed that the program was useful for both groups. However, the semi-rural participants gained more from the program because their knowledge on the topic was initially weaker than that of the urban school teachers. The teachers have an important role in the process of diagnosing a child with ADHD. Participation in this program may enable them to use what they have learned about ADHD to help children better navigate their schooling. The authors also emphasize the importance of retraining of teachers, and teacher support is considered fundamental in working with children diagnosed with ADHD. This can

be achieved through teacher support programs that will result in changes in those learners who exhibit barriers to learning.

4.4.2. Preschool teachers' knowledge, opinions, and educational experiences with attention deficit/hyperactivity disorder – Stormont, M., & Stebbins, M. S., USA

It is important to investigate preschool teachers and their views and knowledge of ADHD. Preschool teachers have an important role in a child's life, so it is crucial for them to have a decent level of knowledge about ADHD. Assessment is necessary in order to find out how informed the teachers are on the topic. Based on the results of assessment, areas of teachers' knowledge of ADHD could be pointed out as well as the areas of which they need to have a better understanding. Working with preschoolers with ADHD can be demanding, so teachers must be competent and prepared for the job. To successfully work with children with ADHD and to help them, teachers should have sufficient knowledge about some typical characteristics of the condition. For this reason, the authors assessed teachers' views on multiple issues regarding ADHD such as medication consumption. In this study, they also investigated how different teacher characteristics affect their knowledge of ADHD. The characteristics included were teachers' years of experience and educational level, full or part time status and teachers' perceived knowledge of ADHD (Stormont & Stebbins, 2005). The number of preschool teachers who participated in this study was 138, most were working with preschool children less than four years, and they worked with children aged between three and six years. The Preschool ADHD Questionnaire, used in this study, had three sections (Stormont & Stebbins, 2005). The first was a demographic section and included questions about "teachers' gender, job, status, educational level, number of years teaching, and educational experiences related to ADHD (e.g., reading a book on ADHD)" (Stormont & Stebbins, 2005, p. 55). Teachers also had to estimate their level of knowledge of ADHD with 1 "little to no perceived knowledge" or 2 "moderate to extensive knowledge" (Stormont & Stebbins, 2005, p. 55). In the second section, the teachers had to answer questions that revealed their viewpoint

of preschool ADHD, and the third section explored teachers' knowledge of ADHD. The main aim of the study was to investigate the influence of teachers' independent education connected to ADHD (e.g. reading a book or a magazine article) on their thoughts associated with the disorder. A second aim of the study was to comprehend how teacher qualifications influence higher test score on questionnaires. To find out how much teachers were informed about ADHD, the authors asked them about their sources of information. The result showed that most teachers used magazine articles. "While 81% of preschool teachers had read a magazine article on ADHD, only 61% had read a journal article" (Stormont & Stebbins, 2005, p. 59). This is important as it reveals the quality of teachers' sources of information because they can very easily get false information from the popular media. The results related to teachers' knowledge of ADHD showed that most teachers correctly identified biological facts about ADHD, such as who is more likely to get ADHD, if the children can outgrow ADHD and if the medication is the only treatment that should be used. The data regarding the influence of different teacher characteristics on their knowledge of ADHD showed that teachers' higher education level was related with their higher knowledge of ADHD. In addition, it was found that teachers' years of experience as well as full-time or part-time status did not have influence on their knowledge about ADHD. The authors also studied the preschool teachers' views on medication usage. "The majority of preschool teachers in the current study (68%) believed that too many preschoolers are placed on medication for ADHD" (Stormont & Stebbins, 2005, p. 60). Because of teachers' influence on children, they have to show understanding for children with ADHD, take proper care of them and have a better relationship with them. If the teacher has incorrect information about ADHD, for example, that sugar causes it, they may be less helpful and considerate to the children and their parents. If, on the other hand, teachers know the biological foundations of ADHD, they can provide better support to the children with ADHD and their parents. In this study, understanding the assessment process was identified as "a need area" (Stormont & Stebbins, 2005, p. 60). Preschool teachers reported that it was not easy for them to recognize children who have ADHD. Another conclusion of this study is that experts should provide assistance to teachers in

choosing the right material on ADHD to get information from because there are many sources that have false information on the disorder. “Many popular magazines report the current “hot” topics and issues and may promote more misconceptions related to ADHD (e.g. diet causes ADHD)” (Stormont & Stebbins, 2005, p. 60).

4.5. HELPING CHILDREN WITH EXTERNALIZING BEHAVIOR PROBLEMS

Children can have, very early in life, issues with externalizing behavior, and it can be a sign of possible ADHD disorder. This subsection contains two studies in which the authors investigated different methods to help children with externalizing behavior problems.

4.5.1. Early intervention for preschoolers at risk for attention deficit/hyperactivity disorder: Preschool first step to success – Feil, E. G., Small, J. W., Seeley, J. R., Walker, H. M., Golly, A., Frey, A., Forness, S. R., USA

It is possible that children with attention-deficit/hyperactivity disorder show first symptoms already at preschool age. According to research, some symptoms of ADHD may occur already by 17 months of age and those children who had exhibited high levels of behaviors associated with ADHD at that age usually had the same levels of hyperactive behaviors at the age of 6 years. When comparing children with and without ADHD, it has been observed that children with ADHD can have difficulties making and maintaining friendship. Taking early actions to help children as soon as they show some of the ADHD symptoms can help them with further socializing and education. That is why First Step to Success was introduced as an intervention program. Using the First Step program can support children in developing new valuable skills they could use in school or their everyday life. With this study the authors wanted to see if the Preschool First Step (PFS) program has the effect on “the general behavioral symptoms and social functioning of preschoolers with externalizing disorders who are also at risk for ADHD” and “their behavioral symptoms and social functioning specific to ADHD” (Feil et al., 2016, p. 96). The participants in this study were 45 child-parent-teacher triads who had

already participated in the original PFS control trial. From every classroom the researchers chose one child who displayed high levels of externalizing symptoms, to participate in either the PFS intervention or usual-care control condition. In addition, teachers completed three rating scales for each child: The Adaptive Behavior Index, Maladaptive Behavior Index, and Aggressive Behavior Scale. Children were mostly aged four and majority were male (65%). Parent and teacher reports on the 18-item Conners' ADHD Scale (CADS; Conners, 1999) were used to identify children at risk for ADHD. The PFS intervention consisted of workshops and training for teachers. The teachers also had behavioral coaches with whom they could meet and consult about the intervention program. In this program teachers and coaches were responding to children's behavior with a red and green card. For proper behavior, children were given a green card and for inappropriate behavior they got a red card. "The participating child receives points and praise for engaging in appropriate classroom behaviour (e.g., following classroom rules, cooperating, sharing, sitting quietly during circle time)" (Feil et al., 2016, p. 99). At the same time, coaches worked with children's legal guardians to show them how to successfully deal with children at home. Some of the things that children learned at home were "communication and sharing, cooperation, limit setting, problem solving, friendship making, and self-confidence" (Feil et al., 2016, p. 99). The researchers also included measures of social functioning (ADHD-related measures of cooperation, engagement, and self-control), and general measure of adaptive behavior. The results indicate that "PFS seems particularly effective with preschool-age children with externalizing behavior who are also exhibiting elevated comorbid ADHD symptoms" (Feil et al., 2016, p. 103). Moreover, the results showed that children who participated in the Preschool First Step program displayed better behavior than that from before the program. This study confirmed that the PFS was valuable for the preschool children with externalizing behavior connected to ADHD. "Additionally, although PFS was not designed to target specific disorders such as ADHD, it nonetheless appears to improve both the specific symptoms and social functioning associated with this disorder" (Feil et al., 2016, p. 103).

4.5.2. Supporting and developing self-regulatory behaviours in early childhood in young children with high levels of impulsive behaviour – Dan, A., Israel

Being able to control one's emotions, self-guidance of thought and behavior planning, and exhibiting socially acceptable behavior are the signs of self-regulating behavior. Having a power over one's behavior has a significant role in fitting into a society. "Rothbart and others define self-regulation as the child's ability to modulate behaviour according to the cognitive, emotional, and social demands of a particular situation" (Dan, 2016, p. 190). The process of regulation starts developing before we are born and continues to develop throughout childhood. When babies feel overstimulated, they look away, close their eyes or soothe themselves with a pacifier. As children grow, they progress more in motor and mental functions that can help them to self-regulate. "By kindergarten age, 3-6 years, there is an increased ability in cognitive strategies, such as language, to control impulses and emotions, and more awareness of social standards" (Dan, 2016, p. 191). Self-regulation helps a child in accomplishments at school, and it is a significant part of early childhood. "Deficits in self-regulatory skills underlie or contribute to a range of adverse developmental problems and disorders, including ADHD" (Dan, 2016, p. 192).

For a child to be able to get a sense of self and learn behaviors necessary for self-regulation, they need to have stable, nurturing relationships in their life. Also, a child will be more likely to cooperate if we give him or her advice and propose ideas instead of orders. Compared to babies, who mainly need constant adult assistance to calm themselves, preschool children can do some of the calming and regulation without adult help. The teachers who participated in this study had to complete the Achenbach Child Behaviour Checklist consisting of 100 items of behavior. They needed to write about children from their preschool group who exhibited self-regulation problems. "After receiving the checklists from the kindergarten teachers, the researcher was able to build up profiles of the children in the population sample" (Dan, 2016, p. 193). The intervention program occurred in the preschool with the guidance of preschool teachers who met with the researchers every three weeks, for 3 months, in order to conduct the assessment. The intervention program, "based on teaching strategies of Mediated Learning

(Feuerstein, 1991) and scaffolding (Vygotsky, 1978) in everyday situations" (Dan, 2016, p. 194) had five steps:

1. Recognizing and defining a concern;
2. Setting up shared goals between the preschool teachers and the researcher in the program;
3. Co-creating a pedagogical plan based on scaffolding and mediated learning that could be included in the preschool;
4. Implementation of the plan;
5. Obtaining data to establish goal success (Dan, 2016).

Besides the preschool teachers, participants in this study were 23 preschool boys and 7 preschool girls. Preschool teachers identified children's behavioral traits before the intervention and categorized them. There were three categories of behavioral traits: impulsivity, self-regulation and feelings. Some of the behavioral traits that are describing children in the category "impulsivity" were: impulsive, dangers her/himself, unpredictable. After the intervention, some of the behavioral traits in the same category were as follows: thinks before he/she does things, manages to stop him/herself, can sit longer in circle time. In the category "self-regulation", some of the behavioral traits were lack of control, cannot stop when asked to, unruly behavior. Examples of post-intervention behavioral traits in this category are: does less dangerous things, manages to stop him/herself, more cooperative. Some of the behavioral traits identified before the intervention in the category "feelings" were: frustrated and angry, while some of the post-intervention behavioral traits in the same category were: less frustrated, better feelings (Dan, 2016). To conclude, the research showed significant improvements in some aspects of children's self-regulatory behaviors after the implemented program.

5. CONCLUSION

The research studies reported in this thesis are focused on gathering more information on ADHD to increase knowledge about this disorder. The authors believe that the sooner the symptoms are recognized, the sooner can children get adequate help. If children get help soon enough, they will have less problems later in life. And equally, if their symptoms are not treated on time, their condition may worsen. For people in child's life to recognize the symptoms of ADHD and to know when to seek professional help, they must have some basic level of knowledge about the disorder. Most authors also believe that parents and teachers should be supported in dealing with children with ADHD symptoms so they can be a better support to children they are working with.

Studies conducted by Eilertsen et al. (2019) and Vizzini et al. (2019) investigated the contributions to the ADHD. They mentioned some important factors like genetics, environment and maternal mental health that can contribute to the development of this disorder.

Franke et al. (2016) and Lange et al. (2016) highlighted the importance of supporting parents with children with ADHD symptoms. Parental involvement in children's treatment can be beneficial to the child. Nevertheless, that can also be stressful for parents especially if they feel incompetent when dealing with such serious issues like ADHD disorder. A special program for children with ADHD symptoms and for their parents could be useful for both parties.

Even though parents are the closest people in children's lives, teachers also have an important role in the life of every child. Stormont and Stebbing (2005) and De Jongh and Wium (2021) discussed the importance of teachers in child's treatment. Sometimes parents do not have the required knowledge to recognize the symptoms of the disorder. In such cases, teachers are the ones who can point out the issue to parents and refer them to the professionals where they can seek help.

Sjöwall et al. (2017) and Sjöwall and Thorell (2019) explained the importance of researching the neuropsychological deficits in preschool ADHD. They emphasized

that such research may bring new information about ways in which ADHD is connected to neuropsychological deficits and how children with ADHD function.

Feil et al. (2016) and Dan (2016) focus on explaining the ways children with externalizing behavior problems may be helped. These children are very likely to develop ADHD disorder. This is why programs that target critical areas of children's behavior can be really helpful for children with behavioral issues. These programs could help children to communicate better, to be better at making friendships, and to learn self-regulations strategies.

REFERENCES

AACAP (2013). Retrieved from https://www.psychiatry.org/patients-families/adhd/what-is-adhd

Parekh, R. (2017). *What is ADHD*? Retrieved from https://www.psychiatry.org/patients-families/adhd/what-is-adhd

LIST OF JOURNAL ARTICLES

Dan, A. (2016). Supporting and Developing Self-Regulatory Behaviours in Early Childhood in Young Children with High Levels of Impulsive Behaviour. *Contemporary Issues in Education Research*, 9 (4), 189-200. Retrieved from https://clutejournals.com/index.php/CIER/article/view/9789

De Jongh, M., & Wium, A.-M. (2021). Attention deficit hyperactivity disorder: Training outcomes for Grade R teachers in an urban and semi-rural context. *South African Journal of Childhood Education*, 11(1), a894. Retrieved from https://eric.ed.gov/?id=EJ1296435

Eilertsen, E. M., Gjerde, L. C., Kendler, K. S., Røysamb, E., Aggen, S. H., Gustavson, K., Reichborn-Kjennerud, T., & Ystrom, E. (2019). Development of ADHD symptoms in preschool children: Genetic and environmental contributions. *Development and Psychopathology, 31*(4), 1299-1305. Retrieved from https://www-cambridge-org.ezproxy.nsk.hr/core/journals/development-and-psychopathology/article/development-of-adhd-symptoms-in-preschool-children-genetic-and-environmental-contributions/53BE4114A89C232E2D4D627915B03577

Feil, E. G., Small, J. W., Seeley, J. R., Walker, H. M., Golly, A., Frey, A., Forness, S. R. (2016). Early Intervention for Preschoolers at Risk for Attention-Deficit/Hyperactivity Disorder: Preschool First Step to Success. *Behav Disord*, 41(2), 95-106. doi: 10.17988/0198-7429-41.2.95. Retrieved from https://pubmed.ncbi.nlm.nih.gov/29225391/

Franke, N., Keown, L. J., & Sanders, M. R. (2016). An RCT of an online parenting program for parents of preschool-aged children with ADHD symptoms. *Journal of Attention Disorders*. Retrieved from https://pubmed.ncbi.nlm.nih.gov/29225391/

Lange, A. M., Daley, D., Frydenberg, M., Houmann, T., Kristensen, L. J., Rask, C., Sonuga-Barke, E., Søndergaard-Baden, S., Udupi, A., & Thomsen, P. H. (2016). Parent Training for Preschool ADHD in Routine, Specialist Care: A Randomized Controlled Trial. *J Am Acad Child Adolesc Psychiatry*, 57(8), 593-602. doi: 10.1016/j.jaac.2018.04.014. Epub 2018 Jun 18. PMID: 30071980. Retrieved from https://pubmed.ncbi.nlm.nih.gov/30071980/

Sjöwall, D., Bohlin, G., Rydell, A. M., & Thorell, L. B. (2017). Neuropsychological deficits in preschool as predictors of ADHD symptoms and academic achievement in late adolescence. *Child Neuropsychology*, 23:1, 111-128. Retrieved from

https://www.tandfonline.com/doi/citedby/10.1080/09297049.2015.1063595?scroll=top&needAccess=true

Sjöwall, D., & Thorell, L. B. (2019). A critical appraisal of the role of neuropsychological deficits in preschool ADHD. *Child Neuropsychology*. Retrieved from https://pubmed.ncbi.nlm.nih.gov/29536801/

Stormont M, Stebbins MS. (2005). Preschool Teachers' Knowledge, Opinions, and Educational Experiences with Attention Deficit/Hyperactivity Disorder. Teacher Education and Special Education. 2005;28(1):52-61. Retrieved from https://journals-sagepub-com.ezproxy.nsk.hr/doi/abs/10.1177/088840640502800106

Vizzini L, Popovic M, Zugna D, Vitiello B, Trevisan M, Pizzi C, Rusconi F, Gagliardi L, Merletti F, Richiardi L. (2019). Maternal anxiety, depression and sleep disorders before and during pregnancy, and preschool ADHD symptoms in the NINFEA birth cohort study. *Epidemiol Psychiatr Sci*, 28(5), 521-531. Retrieved from https://pubmed.ncbi.nlm.nih.gov/29665879/

Izjava o izvornosti rada

Ja, Ivona Prćić, izjavljujem da sam završni rad na temu „ADHD at pre-primary age - An insight into research“ izradila samostalno te da u izradi nisam koristila druge izvore osim onih koji su u radu navedeni.

_____

Ivona Prćić