Hug- og félagsvísindasvið

Félagsvísindadeild

Sálfræði, 2014

Regulatory problems and ADHD: Connection between sleeping problems, colic and recurrent infections in infancy with ADHD later in childhood

Edda Sigfúsdóttir

Lokaverkefni við Hug- og félagsvísindasvið

Hug- og félagsvísindasvið

Félagsvísindadeild

Sálfræði, 2014

Regulatory problems and ADHD: Connection between sleeping problems, colic and recurrent infections in infancy with ADHD later in childhood

Edda Sigfúsdóttir

Lokaverkefni til 180 eininga BA-prófs við Hug- og félagsvísindasvið

Leiðbeinendur: Elín Díanna Gunnarsdóttir og Dagmar Kristín Hannesdóttir

Yfirlýsing

„Ég lýsi því hér með yfir að ég ein er höfundur þessa verkefnis og að það er ágóði eigin rannsókna“

_____

Edda Sigfúsdóttir

„Það staðfestist hér með að lokaverkefni þetta fullnægir að mínum dómi kröfum til BA- prófs við Hug- og félagsvísindasvið“

_____

Elín Díanna Gunnarsdóttir

_____

Dagmar Kristín Hannesdóttir

Abstract

Various studies have shown a connection between regulatory problems in infancy/toddlerhood with behavioral problems and attention deficit/ hyperactivity disorder (ADHD) in childhood. The intent of this research is to examine associations between sleeping problems, colic and recurrent infections in infancy to ADHD in childhood. Participants were 555 4 to 9-year-old children. In the clinical group there were 283 children, 76% were diagnosed with ADHD and the rest had significant ADHD symptoms. The control group consisted of 272 children that did not have ADHD. Autism was an exclusion criteria for this study. Results show that sleeping problems, colic and recurrent infections in infancy do not predict ADHD later in childhood. There was a significant difference between the clinical group and the control group where the control group had more sleeping problems and more colic than the clinical group. These results indicate that children with ADHD do not have more sleeping problems, colic or recurrent infections in infancy than children without ADHD.

Útdráttur

Nokkrar rannsóknir hafa sýnt samband á milli svefnvanda, óværðar og endurtekinna sýkinga frá 0-2 ára aldurs og hegðunarvanda og ADHD seinna í barnæsku. Tilgangur þessarar rannsóknar var að skoða hvort að tengsl séu þarna á milli. Þátttakendur voru 555 börn á aldrinum 4 – 9 ára. Í klínískahópnum voru 283 börn en hann skiptist í þátttakendur sem höfðu í 76% tilvika ADHD greiningu, restin var með ADHD einkenni sem ekki náðu greiningu. Í samanburðarhópnum voru 272 börn sem ekki eru með ADHD. Í rannsókninni voru börn með einhverfu tekin út til þess að koma í veg fyrir að einkenni svefnvanda, óværðar eða sýkingar skýrðust ekki betur af þeirri röskun. Niðurstöður sýndu að ekki var hægt að spá fyrir um ADHD seinna í barnæsku út frá svefnvanda, óværð og enduteknum sýkingum á 0-2 ára aldursskeiðinu. Það var hinsvegar marktækur munur á milli klínískahópsins og samanburðarhópsins á svefnvanda og óværð þar sem samanburðarhópurinn hafði meiri svefnvandamál og óværð heldur en klínískihópurinn. Þessar niðurstöður benda til að börn með ADHD hafa ekki meiri svefnvandamál, óværð og endurteknar sýkingar á bilinu 0-2 ára samanborið við börn sem ekki eru með ADHD.

Þakkarorð

Ég vil þakka leiðbeinendunum mínum tveimur kærlega fyrir alla hjálpina. Elínu Díönnu Gunnarsdóttur fyrir áhugann sem hún sýndi verkefninu, mjög góða leiðsögn og frábært samstarf. Ég vil þakka Dagmar Kristínu Hannesdóttur fyrir ómældan stuðning, mikla og góða hjálp við hönnun og gerð rannsóknarinnar og fyrir að vera mín hægri hönd í þessu ferli. Ég vil einnig þakka Katrínu Davíðsdóttir barnalækni á Þroska- og hegðunarstöð kærlega fyrir þá ráðgjöf á sviði barnalækninga sem hún veitti mér við gerð rannsóknarinnar. Ég vil þakka öllum þeim sem tóku þátt í rannsókninni og að lokum vil ég þakka Stephen Nielsen unnusta mínum fyrir yfirlestur og Andrew Britten-Kelly fyrir prófarkalestur á verkefninu.

Table of content

Tables

Many infants experience regulatory problems such as sleeping problems, colic and recurrent infections. Some studies have shown that there is a connection between regulatory problems in early childhood and ADHD later in childhood (Hemmi, Wolke and Schneider, 2011; Wolke, Rizzo and Woods, 2002). More studies are needed to determine if there really is a connection between these two constructs and if so, which aspects are related and how do they connect? It is possible that regulatory problems in infancy are an early sign of ADHD and therefore it is important to recognize it. In order to minimize the inhabitation that the symptoms pose for the child, regulatory problems need to be investigated in relation to ADHD. To investigate this, it is important to have a clinical group of children who have been diagnosed with ADHD, with a known developmental history. The developmental history needs to contain information about factors of regulatory problems such as sleeping problems, whether they had colic or not and if they had any recurrent infections. With this in mind the following study was conducted to see whether it was possible to examine retrospectively whether children diagnosed with ADHD were more likely to have had such regulatory problems in infancy compared to children without ADHD.

ADHD

Attention deficit/ hyperactivity disorder (ADHD) begins in childhood and is described as the individual having difficulties paying and sustaining attention and/or having problems with being hyperactive and impulsive. These symptoms can affect the children's functioning or development as well as often being problematic in interaction with others. Three kinds of ADHD subtypes are diagnosed: inattention, hyperactivity/impulsivity and a combination of the two. To be diagnosed with inattention, six or more of nine symptoms have to be present and have been

present for the last 6 months to a degree where they have negative effects on development and/or on social and academic activities. Examples of these symptoms include difficulty paying attention or making careless mistakes, difficulties remaining focused and sustaining attention, difficulties organizing, often loses things, forgetfulness and being very easily distracted (American Psychiatric Associations, 2013).

Being diagnosed with hyperactivity/impulsivity requires six or more of the nine symptoms to be present for one month, to the degree that they have negative effect on development and/or social and academic activities. Examples of these symptoms are fidgeting with hands or feet and squirming when seated, unexpectedly leaving situations, running and climbing when not appropriate, excessive talking, difficulty waiting and interrupting or intruding others (APA, 2013).

The combined version of ADHD is if the criteria for both inattention and hyperactivity/impulsivity are met. To get diagnosed with ADHD several inattentive or hyperactive/impulse symptoms have to have been present before 12 years of age, it is not enough if these symptoms first started after that age. The symptoms also have to be present in two or more environments, for example at school and at home. The diagnosis can be specified by severity: mild, moderate or severe. Mild means that there is a minor impairment functioning and severe means that many of the symptoms required are especially severe. Moderate is a state somewhere in between mild and severe. There are some exceptions about a different combination of symptoms than explained above. That is, if the clinician thinks that diagnosis of ADHD is appropriate even though the criteria are not completely met. Those diagnoses are called Other specified ADHD and Unspecified ADHD (APA, 2013).

The frequency of ADHD is approximately 5 to 10% in school aged children with a higher prevalence in boys (Dulcan, 1997; Scahill and Schwab-Stone, 2000). Boys with ADHD generally receive more negative discipline practices at home, lower grades, more sleeping problems with more speech problems as well as more school suspensions (Bauermeister, 2007). There is little evidence that points to differences between girls and boys when it comes to patterns of associations of ADHD, whether they have the inattentive type, hyperactivity/impulsivity or both. Of the ones with the combined type, boys were more likely to have mood disorders. Of the ones that had the inattentive type, girls were more likely to have anxiety (Bauermeister, 2007). A study from 2002 showed that girls were more likely to have the inattentive type of ADHD than boys and less likely to have learning disabilities. Boys with ADHD were more likely than girls to have conduct disorder and major depression (Biederman et al. 2002). In another study from 2007, ADHD was associated with an increased chance of children's sleeping problems (Bauermeister et al. 2007).

Sleeping problems

Children with ADHD often have problems with sleep but overall getting enough sleep is important for all children, with or without ADHD. Poor sleep can, for example, affect children's mental state and attention span. Examples of sleep problems among children are difficulties with sleep onset, enuresis, night waking, sleep walking, nightmares, night terrors and problems waking up in the morning (Owens, Maxim, Nobile, McGuinn and Msall, 2000; Paavonen et al. 2000).

The definition of Insomnia Disorder according to DSM-5 is a complaint of dissatisfaction of sleep quantity or quality. Along with dissatisfaction of sleep quantity or

quality, three of the following symptoms need to follow to meet the criteria for Insomnia Disorder; difficulty initiating sleep (in children that might have difficulty falling asleep without a caregiver intervening), problems maintaining sleep (where children often need a caregiver to do something about it) or early-morning awakening (without being able to go back to sleep). To get diagnosed with Insomnia Disorder the sleep disturbances have to bring about clinical impairment and distress to the person's social, occupational or other functioning. The sleeping problems need to occur at least 3 nights a week and be present for at least 3 months (APA, 2013).

Sleeping problems and ADHD

Children with ADHD generally have more problems with sleep than healthy children. Compared to healthy children, they often don't get enough sleep during the night. Both parents and the children's own reports show more disturbances in sleep for children with ADHD than children who do not have ADHD (Owens et al. 2000). Some studies have shown that one in every four infants with sleeping problems will later (at 5.5 years old) qualify for the diagnosis of ADHD. The children that are later diagnosed with ADHD also show more problematic behavior as infants such as problems with sleep, feeding problems and more crying than other infants (Thunström, 2002).

Sleeping patterns are different for children who have ADHD. Their total sleep time is shorter because of greater difficulty falling asleep at bedtime compared to their peers. Daytime naps also stop at an earlier age for children that have ADHD compared to children that don't have ADHD (Scott et al. 2013).

For healthy 7 and 8 year old children, sleeping difficulties and short sleep is associated with increased risk of ADHD behavioral symptoms. Sleep duration as well as parental reports

about their children's sleeping difficulties are associated with increased risks of ADHD symptoms (Paavonen et al. 2009). Another study showed that even among healthy children, sleep restrictions affect inattentive behavior and academic performance but not hyperactivity behavior. (Fallone et al. 2001; Fallone et al. 2005).

Some studies have shown that children with ADHD showed more movements during sleep (Cortese et al. 2006; Corkum et al. 1998) but were no different from the control group when it came to sleep duration (Corkum, Tannock and Moldofsky, 1998). In contrast, another study showed that short sleep duration is associated with ADHD symptoms (Paavonen et al. 2009). Overall, it has been observed that children with ADHD experienced more sleepiness during the day (Cortese et al. 2006).

Children that have ADHD co-morbid with other psychological disorders might even have more problems with sleep than children that only have ADHD. For example, children that have both ADHD and an anxiety disorder have more sleeping problems than children that only have ADHD (Hansen, Skirbekk, Oerbeck, Richter and Kristensen, 2011). A 2013 study revealed that in a 7 to 13 year old participation group 76% of the children experienced sleeping difficulties. Sleeping problems in children with ADHD and/or anxiety disorders from 7-13 years old are likely to have the same sleeping problems 18 months later (Hansen, Skirbekk, Oerbeck, Wentzel-Larsen, and Kristensen, 2013). Parent reports, obtained through diaries recording their infant's sleeping problems within the first two years of their life, showed that the sleeping problems decreased after the first two months (Wake et al. 2005).

Colic and feeding problems

Sleeping problems are not the only regulatory problems that some children contend with, colic and feeding problems are also among them. Infantile colic is an uncontrollable crying and fussing in otherwise healthy infants that usually lasts at least three hours a day, three times a week for at least three weeks (Wessel, Cobb, Jackson, Harrison and Detwiler, 1954). For most infants, colic stops around three to four months of age but in about 30% of cases the colic doesn't stop until around the fifth month (Leung and Lemay, 2004). A higher number of babies have colic at the age of 6 weeks than at the age of 3 months. In a study from 2002, 86% of the infants that had colic at 6 weeks of age didn't have it at 3 months of age. (Clifford, Campbell, Speechley and Gorodzinsky, 2002). Feeding and dietary modifications seem to play a role (Lucassen et al. 2000; Lothe and Lindberg, 1989). Elimination of cow's milk protein and behavioral interventions seems to help in some cases (Lucassen et al. 1998).

When looking into if colic predicts any factors in children's development later on in childhood, some studies show that there may be some connections. Associations have, for example, been found with recurrent abdominal pains later on in childhood for children that had colic (Savino et al. 2007; Canivet, Jakobsson and Hagander, 2000). Associations have also been found between colic and allergies when children are 10 years old. Infantile colic has also been associated with psychological disorders in childhood, of which colic may have been an early expression (Savino et al. 2007). In contrast, a study from 2000 didn't find any activity difference between the children that had colic as infants and the ones that didn't. Overall, mothers of ex-colic infants saw their children as more emotional than the mothers of children that did not have colic as infants (Canivet et al. 2000).

Infants with colic have also demonstrated more feeding problems (Miller-Loncar, Bigsby, High, Wallach and Lester, 2004). A study from 2000 showed, for example, that children at 4 years of age that had colic as infants were less likely, according to parents, to enjoy the food they were eating, as well as refusing certain types of food more often than children that did not have colic as infants (Canivet et al. 2000).

The most common feeding problem in early infancy is colic, but the most common feeding problems after six months of age are poor appetite, refusal of solids and general refusal to eat (Lindberg, Bohlin and Hagekull, 1991). In a study from 1991, children that had early refusal to eat grew up normally with regard to health and development. On the other hand, they were more likely to have behavioral problems and eating pattern issues later on (Dahl and Sundelin, 1992). A toddler's refusal of eating often presents itself in a behavior as not being hungry at mealtimes, slow eating and being picky of what kind of food they want to eat (Reau, Senturia, Lebailly and Christoffel, 1996).

Preterm babies are also at a greater risk of developing feeding problems. Associations have also been found between early feeding problems and behavioral problems at 2 years of age (Dahl, 1879; Nathalie et al. 2003). The children that had early feeding problems were also significantly more likely to have recurrent infections (Dahl, 1987).

Combined regulatory problems

Children that had untreated moderate to severe regulatory problems were more likely to have developmental, emotional and behavioral problems when they reached the age of four. (Degangi, Porges, Sickel and Greenspan, 1993). The regulatory problems seem to affect each other to some extent. For those children in which persistent crying went beyond the first 6

months, eating and sleeping difficulties increased (Kries, Kalies and Papušek, 2006). A recent study showed that regulatory problems such as crying, sleeping and feeding disturbances predict dysregulated behavior across childhood and as the number of regulatory problems increases, the more difficult the child's behavior becomes (Winsper and Wolke, 2013). For example, infants that have persistent crying associated with feeding or sleeping problems are at increased risk for developing hyperactivity problems (Wolke, Rizzo and Woods, 2002). Another study showed that more than one regulatory problem increased the probability of eating problems at 20 months and 56 months of age, at least for infants born at risk (Schmid, Schreier, Meyer and Wolke, 2009).

In another study, crying and feeding problems were measured at 5 months and mental development was measured with a Griffiths scale at 20 month and a cognitive assessment at 56 months. Having regulatory problems at 5 months was related to mental and cognitive development in children at the age of 20 months and 56 months. In the same study, poor parent relationship predicted regulatory problems in infants (Wolke, Schmid, Schreier and Meyer, 2009). For maternal-reports behavioral dysregulation in infancy was a risk factor for behavioral concerns among 5 and 14 year old children (Hyde, O'Callaghan, Bor, Williams, and Najman, 2012).

A meta-analysis from 2010 reviewed 22 longitudinal studies from 1987-2006 that studied regulatory problems and behavioral problems. The conclusion was that infants that had regulatory problems such as crying or sleeping problems had more behavioral problems as children. These behavioral problems were ADHD problems, internalizing and externalizing problems (Hemmi, Wolke and Schneider, 2011).

Summary

Regulatory problems in infancy and ADHD later in childhood have in some studies shown a connection. For early treatment and prevention of the escalation of symptoms, it is important to establish if there is a connection, and if so, what kind of connection. Children with ADHD seem to have more problems with sleep, than children who do not have ADHD (Owens et al. 2000). They often have a harder time falling asleep during the night and sleep for a shorter period of time overall (Scott et al. 2013). When infants have sleeping problems, one of every fourth infant will later qualify for the diagnosis of ADHD (Thunström, 2002). However, very few studies have examined retrospective data where parents of children who are diagnosed with ADHD are asked whether their children had regulatory problems in infancy.

Further regulatory problems that infants often contend with are colic and feeding problems. Infantile colic is an uncontrollable crying and fussing in otherwise healthy infants that usually lasts at least three hours a day, three times a week for at least three weeks (Wessel et al. 1954) in which feeding and dietary modifications seem to play a role (Lucassen et al. 2000; Lothe and Lindberg, 1989). Infants with colic show more feeding problems than infants that don't have colic (Miller-Loncar et al. 2004). The most common feeding problem in early infancy is colic, but the most common feeding problems after six months of age are problems such as poor appetite, refusal of solids and general refusal to eat (Lindberg et al. 1991). In a study from 1991, children that had an early refusal to eat grew up normally with regard to health and development. On the other hand they were more likely to have behavioral problems and eating pattern problems later on (Dahl and Sundelin, 1992).

When looking into more than one regulatory problem together, studies have shown that children with untreated moderate to severe regulatory problems were more likely to have

developmental, emotional and behavioral problems later on (Degangi et al. 1993). Infants that had regulatory problems such as crying or sleeping problems have more behavioral problems as children. These behavioral problems were both internalizing and externalizing problems, such as ADHD (Hemmi et al. 2011).

Goal of this study

The goal of this study is to investigate whether regulatory problems such as sleeping problems, colic and recurrent infections from birth to 2 years of age are associated with ADHD in children at the ages of 4 to 9 years old. The study was retrospective in terms of parents of children being diagnosed with ADHD, between 4-9 years of age, being asked to recollect how they were as infants in terms of sleeping patterns, colic and recurrent infections. The goal of the study was therefore to see whether the fairly strong prediction of children who have regulatory problems early on (at least 25%) (Thunström, 2002) and develop behavioral difficulties such as ADHD, would hold if examined retrospectively, and whether the group being diagnosed with ADHD later on showed this pattern of regulatory problems in infancy.

Method

Participants

Participants in the study were 555 children from 4 to 9 years of age born in 2004 to 2009 and living in Iceland. Of these children 283 were in the clinical group and 272 were in the control group. In the clinical group 72% were boys and the rest were girls. In the control group 47.8% were boys, and 51.8% girls (one of the participants did not answer the question about what

gender their child is). The mean age of the participants in the clinical group was 6.6 years and the mean age for the control group was 6.8 years.

The clinical group consisted of children whose parents sought services for them at the Centre for Child Development and Behavior (CCDB) from January 2008 to March 2014. CCDB is part of the Primary Health Care of the Capital Area in Reykjavik, Iceland and provides services for the entire country. The children were all diagnosed at the CCDB with ADHD (75.6%) or it was conclusive that they had significant ADHD symptoms but did not meet diagnostic criteria (24.4%). Twelve children (original clinical sample was 295 children) had been diagnosed with autism and were therefore omitted from the sample as they could have had regulatory problems in infancy that were not due to ADHD symptoms. Of the children who were diagnosed with ADHD, some received a diagnosis of mainly inattentive ADHD with others hyperactivity/impulsive ADHD, but most received a diagnosis of ADHD combined (58.3%).

The children in the control group came from four preschools and four elementary schools in three different cities and towns in Iceland: Reykjavík, Akureyri and Borgarnes. These locations were selected to resemble the clinical group the closest. One child was removed from the control group data because that child was adopted at 2 years of age and little was known about his sleeping or eating habits before this time. In the control group seven children had a diagnosis of autism and were therefore excluded from participation. Six children were excluded from the control group because they were diagnosed with ADHD (original sample was 283 children). As an incentive, parents in the control group were offered to enter a lottery pool upon completing the internet survey, where they could win movie tickets.

Measures

Clinical group

The clinical group is divided into children that have ADHD diagnosis and children that have ADHD but do not reach the criteria for diagnosis. In current study, these two groups were compared to each other as well as both groups were compared to the control group. Definition for the clinical group's regulatory problems (sleeping problems, colic and recurrent infections) came from the pediatricians registering and evaluating the developmental history. Definitions for how to get similar data from the control group were made in cooperation with one of the pediatricians at the CCDB.

Control group

Parents of the children in the control group received an internet survey that contained 23 multiple choice questions (the questionnarie is provided as an appendix at the end). The goal was to get similar information about the control group as was already known about the clinical group. The questions were then stipulated in the survey, based on the existing information from the clinical group about the children's developmental history.

Each of the multiple choice questions had a varying amount of answer choices and most of them were formulated with the parent being asked if their children had "any of the following" problems. For example, one of the questions asked if the child had any number of sleeping problems from 1-2 years of age. The answer choices were "Woke up often during the night (3-5 times or more nights a week)", "The parents sought sleep counselling for the child because the problem was extensive". "The child had to be given sleep medicine" and the last choice was "none of the above". The participants were asked to mark everything that was applicable.

Many of the questions were basic yes/no questions that gave information about if the problem was present or not. For example one question was, “Did your child have colic the first month of its life?” and the possible choices were either yes/no (see Appendix 1).

Overall, the questions were about sleeping problems from 0-2 years of age and current sleeping problems over the past six months. To control for the fact that the sleeping problems were due to anxiety, those parents who marked “yes” for current sleeping problems were asked if they thought that anxiety was the reason behind the sleeping problem. Then other questions were about colic and recurrent infections in infancy, if the child was born prematurely and/or low birth weight. The last questions were about if the children had been diagnosed with ADHD or if there were any concerns about ADHD symptoms. These questions were in order to prevent having the same children in both the clinical group and the control group. To prevent that the reason for regulatory problems were because of autism, parents were asked about if their child had autism or if there were any concerns currently regarding autism.

Six questions were in the survey from the behavioral list Strength and Difficulties Questionnaire (SDQ) (Goodman, 2001). These questions were asked to compare the differences in SDQ score between the clinical group and the control group. The SDQ measures prosocial behavior and psychopathology of 3 to16year-olds and predicts five-factors: emotional, conduct, hyperactivity/inattention, peer and prosocial behavior (Goodman, 2001). The current study only used the questions about hyperactivity and impulsivity to scheme for ADHD (see in the back Appendix 1, questions 16 to 21). The translated and normed Icelandic version of the SDQ list has been shown to have good psychometric properties, including internal consistency (r=.81). When children score over 1.5 standard deviations from the mean, a clinical threshold has been reached

and the child has significant hypeactivity and/or impulsivity (Skarphéðinsson and Magnússon, 2008).

Sleeping problems

Sleep was considered to be a problem when the baby woke up 3-5 times a night, a few nights a week from 1-2 years of age, when the parent got sleep counseling and when sleeping medicine was needed for the baby. Concerning current sleep problems, the parents were asked about the last 6 months; if their child had problems falling asleep in the evening and if the child woke up regularly during the night, few times a week. It was also considered to be a problem if their child got nightmares 3-4 times a month or more.

Colic

Parents were asked if their child had colic as an infant. Colic was not further defined.

Recurrent infections

Parents were asked if their children got recurrent infections when they were babies, such as ear infections that led to ear tubes, pneumonia, sinusitis, urinary infection or any other infections that the parents had an opportunity to note in the comment section. These infections were not further defined.

Procedure

Approval for the research was given by the Icelandic Data Protection Authority (2013101226AT) and the National Bioethics Committee (14-021).

The data for the clinical group was accessed at the CCDB database. Variables such as ADHD diagnosis, ADHD symptoms, developmental history such as sleeping problems, feeding problems, colic, recurrent infections, birth weight, anxiety diagnosis, autism diagnosis, and SDQ scores were collected from the database.

Parents of the participants in the control group were contacted through their schools. Principals from elementary schools and preschools in three different cities/towns in Iceland were contacted and asked to participate in the research by sending an internet survey to parents that had children from 4 to 9 years of age. The principals that accepted to participate gave a written consent and received a link via email with the internet survey. Subsequently they forwarded the internet survey to the parents. Two weeks later the parents were reminded to answer the survey. In the beginning of the survey the parents had to give an informed consent before they were able to proceed to the questions in the survey.

Statistical analysis

SPSS 19 was used for the analyses. Descriptive statistics were calculated to compare the clinical group and the control group. Chi square tests were applied to compare and indicate statistical significance for the categorical variables. An independent samples *t*-test with the *p* value of $\leq .05$ was used to indicate statistical significance when comparing means for SDQ and ADHD rating list.

Results

The goal of this study was to investigate whether regulatory problems such as sleeping problems, colic and recurrent infections from the age 0 to 2 years old are associated with ADHD in children at the age 4 to 9 years old.

Table 1

Descriptive statistics for the clinical group (split to diagnosed ADHD and ADHD symptoms) and the control group, for comparison.

	Diagnosed ADHD (n=214)	ADHD symptoms (n=69)	Control group (n=272)
Boys	157 (77%)	47 (23%)	130 (47.8%)
Girls	57 (72.2%)	22 (27.8%)	141 (51.8%)
Age			
4 – 6 years old	63 (29.4%)	31 (44.9%)	37 (13.7%)
6.01 – 8 years old	115 (53.7%)	27 (39.1%)	152 (55.9%)
8.01 – 9.9 years old	36 (16.8%)	11 (15.9%)	82 (30.2%)
SDQ scores			
Parents (SD over 1.5)	149 (82.8%) (n=180)	33 (58.9%) (n=56)	40 (14.7%)
Teacher (SD over 1.5)	125 (70.2%) (n=178)	38 (64.4%) (n=59)	
ADHD rating scale			
Attention deficit (SD over 1.5)	153 (78.1%) (n=196)	36 (54.1%) (n=66)	
Hyperactivity (SD over 1.5)	142 (72.8%) (n=195)	35 (53.0%) (n=66)	
Premature baby	15 (7%)	5 (7.2%)	19 (7%)
Light weight baby	7 (3.3%)	4 (5.8%)	5 (1.8%)

ADHD = Attention Deficit Hyperactivity Disorder SDQ = Strengths and Difficulties Questionnaire
SD = Standard deviation *p < .05

The difference within the clinical group between children that are diagnosed with ADHD and children that have ADHD symptoms is shown, as well the results for the control group in Table 1. The clinical group has a higher percentage of boys, whereas in the control group the number of girls and boys were rather similar. In both the clinical group and the control group the majority of participants were in the age range 6 to 8 years old.

The table shows that the majority of participants in the clinical group scored over the clinical threshold in SDQ (1.5 standard deviations above the mean), both in the diagnosis group and the symptoms group. That means that the majority of the clinical group had clinically high scores in inattention and/or hyperactivity/impulsivity with the group that had ADHD diagnosis being higher in those scores than the group that had ADHD symptoms.

The parents of children diagnosed with ADHD reported greater ADHD symptoms in their children ($M=2.65$, $SD=0.98$) compared to parents whose children were not diagnosed with ADHD but showed some ADHD symptoms ($M=1.8$, $SD=1.27$), $t(236)=5.231$, $p<.05$). The teachers of the children diagnosed with ADHD reported greater ADHD symptoms in their children ($M=1.87$, $SD=0.84$) compared to teachers whose children did not get diagnosis but had ADHD symptoms ($M=1.5$, $SD=1.18$), $t(237)=-2.192$, $p<.05$).

Table 1 showed that the majority of the participants in the clinical group were over the clinical score for ADHD (1.5 standard deviations above the mean). There was a significant difference in attention deficit ($t(262) = -3.761$, $p<.05$) and hyperactivity ($t(261) = -3.824$, $p<.05$) within the clinical group, between the group that had ADHD diagnosis and the group that had ADHD symptoms. Participants in the ADHD diagnosis group had more attention deficits and hyperactivity than the ADHD symptoms group compared to the ADHD rating list that the children‘s parents answered.

There was a similar percentage of premature babies in all three groups. No significant difference was observed between clinical group and control group for babies born light weight $\chi^2(1,N=16)=2.06$, $p=.151$).

Table 2

Outcome for regulatory problems from 0-2 year of age and ADHD from 4-9 years of age, between the clinical group (diagnosed ADHD and ADHD symptoms) and control group.

	Diagnosed ADHD (n=214)	ADHD symptoms (n=69)	Control group (n=272)
Sleeping problems	30 (14%)	6 (8.7%)	54 (19.9%)
Colic	21 (9.8%)	5 (7.2%)	62 (23%)
Recurrent infections	36 (16.8%)	9 (13.2%)	28 (10.3%)

ADHD = Attention deficit hyperactivity disorder *p < .05

There was not a significant difference within the clinical group between children that are diagnosed with ADHD and the group that did not reach the diagnosis criteria but have ADHD symptoms with regard to regulatory problems (see Table 2). That refers to sleeping problems $\chi^2(1,N=36)=1.332$, p=.249), colic χ^2 (1,N=26)=0.412, p=.521) and recurrent infections $\chi^2(1,N=45)=0.557$, p=.455). The percentages may be different between the two clinical groups as showed in Table 2, but the difference is not significant. There is however a significant difference between the clinical group (the ADHD diagnosis group and ADHD symptoms group together) and the control group for sleeping problems χ^2 (1,N=90)=5.193, p=.023), with the control group having more sleeping problems than the clinical group. There was also a significant difference between the clinical group and control group for colic $\chi^2(1,N=88)=19.596$, p<.001) where children in the control group had more occurrences of colic than the clinical group. There was not a significant difference between groups for recurrent infections $\chi^2(1,N=73)=3.562$, p=.059).

Information was also collected about current sleep problems (within the past 6 months) both for the clinical group and the control group. For the clinical group there was a connection between children that had sleeping problems as infants and children that have sleeping problems now and for the past six months $\chi^2(1,N=34)=20.33$, $p<.001$), which means that the majority of children that have sleep problems now, between 4-9 years of age, also had sleeping problems as infants. For the control group, parents of 68 of the 272 children reported their children currently having difficulty falling asleep. Of those 68 children 59% were reported to have difficulty falling asleep due to anxiety/worry, according to their parents. Sleep problems must therefore be interpreted with caution since some aspect of the problem can be due to anxiety and not just difficulties falling asleep due to restlessness or ADHD symptoms.

Discussion

The objective of this study was to examine if there was any connection between regulatory problems (sleeping problems, colic and recurrent infections) from 0-2 years of age and ADHD at 4-9 years of age. The outcome of the current study was that sleeping problems, colic and recurrent infections as infants could not predict ADHD later on in childhood. In the current research there was however a significant difference between the clinical group and control group concerning sleeping problems and colic. The control group had more sleeping problems and higher rates of colic than the clinical group. That result indicates that children that have ADHD do not have more sleeping problems, colic or even recurrent infections more often as infants than children that do not have ADHD.

The conclusion is interesting because some studies have shown a connection between regulatory problems and ADHD later on (Hemmi, Wolke and Schneider, 2011; Wolke, Rizzo

and Woods, 2002). Thunström showed in his study from 2002 that one in every four infants with sleeping problems will later qualify for the diagnosis of ADHD (Tunström, 2002). The results from the current study contradicts with that study since infants with sleeping problems were not fond to be more likely to develop ADHD later on. Current results rather indicate that children with ADHD are more protected against regulatory problems, although further studied are needed to investigate this concept further. Additional studies have shown that children that have regulatory problems were more likely to have behavioral problems later on (Degangi, Porges, Sickel and Greenspan, 1993; Winsper and Wolke, 2013). A meta-analysis from 2010 showed that infants that had regulatory problems such as crying or sleeping problems had more behavioral problems like ADHD as children (Hemmi, Wolke and Schneider, 2011). The outcome of the current study does not support these views but rather demonstrates an opposite outcome. It is important to bear in mind that the regulatory problems are not always the same in every study, in the current study crying problems were not investigated, as was done in the meta-analysis.

The strength of the current study is that the finding was based on a large clinical sample, using data from interviews of a pediatrician with parents of hundreds of children with mild to severe ADHD symptoms over the span of six years. The study is the only research that we know of that approaches this matter, regulatory problems and ADHD or behavior problems, by examining a group of children that are already diagnosed with ADHD. It is really important to view this matter from that retrospective angle instead of only doing a long term study where infants who have regulatory problems are followed until later childhood.

The present study is not without its limitations. Limitations could apply regarding the questionnaire that was designed for the control group. It is possible that the questionnaire did not

sufficiently resemble the evaluation that the clinical group received, and that the way the problems for the clinical group were registered was not captured well enough for the control group. There could also be limitations in that some questions for the control group were not further explained, for example the question about colic contained no further definition. It can also provide a certain inaccuracy to ask the parents of 4 – 9 year old children to remember their child's state when they were 0-2 years old. To prevent that from becoming a real issue the questions were made with an emphasis on the questions not becoming too detailed but still focused on getting the required answers.

The connection between regulatory problems in infancy and ADHD in childhood still remains unclear, although this study contradicts some of the studies that have been made within the same area. It indicates that sleeping problems, colic and recurrent infections as infants cannot predict ADHD later on in childhood. These results are an important indicator for this field of study, but it is crucial that further studies investigate if there is any connection between regulatory problems and ADHD.

References

American Psychiatric Association (2013). Diagnostic and Statistical Manual of Mental Disorders (fifth edition). Washington, DC: American Psychiatric.

Bauermeister, J. J., Shrout, P., Chavez, L., Rubio-Stipec, M., Ramirez, R. et al. (2007). ADHD and gender: are risks and sequela of ADHD the same for boys and girls? *Journal of Child Psychology and Psychiatry*, 48(8), 831-839.

Biederman, J., Faraone, S. V., Mick, E., Williamson, S., Wilens, T. E. and Spencer, T. J. et al. (1999). Clinical correlates of ADHD in females: Findings from a large group of girls ascertained from pediatrics and psychiatric referral sources. *Journal of American Academy of Child and Adolescent Psychiatry*, 38(8), 966-975.

Biederman, J., Mick, E., Faraone, S. V., Braaten, E., Doyle, A. and Spencer, T. (2002). Influence of gender on attention deficit hyperactivity disorder in children referred to a psychiatric clinic. *The American Journal of Psychiatry*, 159(1), 36-42.

Canivet, C., Jakobsson, I. and Hagander, B. (2000). Infantile colic. Follow-up at four years of age: still more "emotional". *Acta Paediatr*, 89, 13-17.

Clifford, T. J., Campbell, M. K., Speechley, K. N. and Gorodzinsky, F. (2002). Sequela of infant colic evidence of transient infant distress and absence of lasting effects on maternal mental health. *Archives Pediatrics Adolescent Medicine*, 156(12), 1183-1188.

Corkum, P., Tannock, R. and Moldofsky, H. (1998). Sleep Disturbances in Children With Attention-Deficit/Hyperactivity Disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 37, 637-646.

Cortese S., Konofal E., Yateman N., Mouren M. C., Lecendreux M. (2006). Sleep and alertness in children with attention-deficit/hyperactivity disorder: a systematic review of the literature. *Sleep*, 29(4), 504–511.

Dahl, M. and Sundelin, C. (1992). Feeding problems in an affluent society. Follow-up at four years of age in children with early refusal to eat. *Acta Paediatr*, 81, 575–9.

Dahl, M. (1987). Early feeding problems in an affluent society. III. Follow-up at two years: natural course, health, behavior and development. *Acta Paediatrica Scandinavica*, 76(6), 872-880.

Degangi, G. A., Porges, S. W., Sickel, R. Z. and Greenspan, S. I. (1993). Four-year follow-up of a sample of regulatory disordered infants. *Infant Mental Health Journal* 14(4), 330-343.

Dulcan, M. (1997). Practice parameters for the assessment and treatment of children, adolescents and adults with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36(10), 85-121.

Fallone, G., Acebo, C., Arnedt, J. T, Seifer, R., Carskadon, M. A. (2001). Effects of acute sleep restriction on behavior, sustained attention, and response inhibition in children. *Percept Mot Skills*, 93(1), 213–229.

Fallone, G., Acebo, C., Seifer, R., Carskadon, M. A. (2005). Experimental restriction of sleep opportunity in children: effects on teacher ratings. *Sleep*, 28(12), 1561–1567.

Goodman, R. (2001). Psychometric Properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40(11), 1337-1345.

Hansen, B. H., Skirbekk, B., Oerbeck, B., Richter, J. T. and Kristensen, H. (2011). Comparison of sleep problems in children with anxiety and attention deficit/hyperactivity problems. *Eur Child Adolesc Psychiatry*, 20, 321-330.

Hansen, B. H., Skirbekk, B., Oerbeck, B., Wentzel-Larsen, T. and Kristensen, H. (2013). Persistence of Sleep Problems in Children with Anxiety and Attention Deficit Hyperactivity Disorders. *Child Psychiatry Hum Dev*, 44, 290-304.

Hemmi, M. H., Wolke, D. and Schneider, S. (2011). Associations between problems with crying, sleeping and/or feeding in infancy and long-term behavioral outcomes in childhood: a meta-analysis. *Arch Dis Child*, 96, 622-629.

Hyde, R., O'Callaghan M. J., Bor, W., Williams, G. M. & Najman, J. M. (2012). Long-term Outcomes of Infant Behavioral Dysregulation. *Pediatrics*, 130(5), 1243-1251.

Kries, R., Kalies, H., Papušek, M. (2006). Excessive Crying Beyond 3 Months May Herald Other Features of Multiple Regulatory Problems. *Archives of Pediatrics & Adolescent Medicine*, 160, 508-511.

Leung, A. K. C., Lemay, J. F. (2004). Infantile colic: review. *The Journal of the Royal Society for the Promotion of Health*, 124, 162-166.

Lindberg, L., Bohlin, G. and Hagekull, B. (1991). Early feeding problems in a normal population. *International journal of eating disorders*, 10(4), 395-405.

Lucassen, P. L. B. J., Assendelft, W. J. J., Gubbels, J. W., Eijik, J., Douwes, A. C. (2000). Infantile colic: Crying time reduction with a whey hydrolysate: A double-blind randomized, placebo-controlled trial. *Pediatrics*, 106, 1349-1354.

Lucassen, P. L. B. J, Assendelft, W. J. J., Gubbels, J. W., Eijik, J. T. W., Geldrop, W. J., Neven, A. K. (1998). Effectiveness of treatments for infantile colic: systematic review. *BMJ*, 316, 1561-1569.

Lothe, L., Lindberg, T. (1989). Cow's milk whey protein elicits symptoms of infantile colic in colicky formula-fed infants: A double-blind crossover study. *Pediatrics*, 83, 262-266.

Miller-Loncar, C., Bigsby, R., High, P., Wallach, M. and Lester, B. (2004). Infant colic and feeding difficulties. *Arch Dis Child*, 89, 908-912.

Nathalie, R., Meyer, A. D., Feenstra, L., Weereman-Wauters, G. (2003). The Complexity of Feeding Problems in 700 Infants and Young Children Presenting to a Tertiary Care Institution. *Journal of Pediatric Gastroenterology & Nutrition*, 37(1), 75-84.

Owens, J. A., Maxim, R., Nobile, C., McGuinn, M., Msall, M. (2000). Parental and Self-report of Sleep in Children with Attention-Deficit/Hyperactivity Disorder. *Arch Pediatr Adolesc Med*, 154(6), 549-555.

Paavonen, E. J., Aronen, E. T., Moilanen, I., Piha, J., Räsänen, E., Tamminen, T. and Almqvist, F. (2000). Sleep problems of school-aged children: a complementary view. *Acta Paediatrica*, 89, 223-228.

Paavonen, E., Räikkönen, K., Lahti, J., Komsi, N., Heinonen, K., Pesonen, A. et al. (2009). Short Sleep Duration and Behavioral Symptoms of Attention-Deficit/ Hyperactivity Disorder in Healthy 7 to 8 Year Old Children. *Pediatrics*, 123, e857-e864).

Reau, N. R., Senturia, Y. D., Lebailly, S. A. and Christoffel, K. K. (1996). Infant and toddler feeding patterns and problems: Normative data and a new direction. *Journal of Developmental & Behavioral Pediatrics*, 17, 149-153.

Savino, F., Castagno, E., Bretto, R., Brondello, C., Palumeri, E. and Oggero, R. (2007). A prospective 10-year study on children who had severe infantile colic. *Acta Pædiatrica*, 94, 129-132.

Schmid, G., Schreier, A., Meyer, R., Wolke, D. (2009). A prospective study on the persistence of infant crying, sleeping and feeding problems and preschool behavior. *Acta Pediatrica*, 99, 286-290.

Scahill, L., Schwab-Stone, M., 2000. Epidemiology of ADHD in school-age children. *Child and Adolescent Psychiatric Clinics of North America*, 9(3), 541-555.

Scott, N., Blair, P. S., Emond, A. M., Fleming, P. J., Humphreys, J. S., Henderson, J. et al. (2013). Sleep patterns in children with ADHD: a population-based cohort study from birth to 11 years. *Journal of Sleep Research*, 22, 121-128.

Skarphéðinsson, G. and Magnússon, P. (2008). *Spurningar um styrk og vanda (Strenghts and Difficulties Questionnaire)*. Reykjavík: BUGL.

Thunström, M. (2002). Severe sleep problems in infancy associated with subsequent development of attention-deficit/hyperactivity disorder at 5.5 years of age. *Acta Pædiatrica*, 91, 584-592.

Wake, M., Morton-Allen, E., Poulakis, Z., Hiscock, H., Gallagher, S. and Oberklaid, F. (2005). Prevalence, Stability, and Outcomes of Cry-Fuss and Sleep Problems in the First 2 Years of Life: Prospective Community-Based Study. *Pediatrics*, 117, 836.

Wessel, M. A., Cobb, J. C., Jackson, E. B., Harrison J. R., G. S., Detwiler, A. C. (1954). Paroxysmalfussing in infancy sometimes called “colic”. *Pediatrics*, 14, 421-435.

Winsper, C. and Wolke, D. (2013). Infant and Toddler Crying, Sleeping and Feeding Problems and Trajectories of Dysregulated Behavior Across Childhood. *Journal of Abnormal Child Psychology*.

Wolke, D., Rizzo, P. and Woods, S. (2002). Persistent Infant Crying and Hyperactivity Problems in Middle Childhood. *Pediatrics* 109, 1054-1060.

Wolke, D., Schmid, G., Schreier and A, Meyer, R. (2009). Crying and Feeding Problems in Infancy and Cognitive Outcome in Preschool Children Born at Risk: A Prospective Population Study. *Journal of Developmental & Behavioral Pediatrics*, 30, 226-238.

Appendix 1

Kæri þátttakandi. Takk fyrir að gefa þér tíma og taka þátt. Könnunin ætti ekki að taka lengur en 10 mínútur og er 23 spurningar. Þú ert beðin/n um að svara af bestu getu og taktu eftir að sumar spurningarnar snúa að barninu þínu í dag, enn aðrar að því þegar barnið var nokkra mánaða, enn aðrar þegar barnið þitt var 1-2 ára. Í hverri spurningu fyrir sig er þetta vel skilgreint. Ef þú átt fleiri en eitt barn á þessum leikskóla/grunnskóla veldu þá bara eitt barnið sem er á aldrinum 4-9 ára til að hafa í huga þegar þú svarar spurningunum. Vinsamlegast fyllið bara út eina könnun fyrir hvert barn en foreldrum er velkomið að svara þessum spurningum saman.

SAMÞYKKI FYRIR ÞÁTTTÖKU Í RANNSÓKN

o Ég veiti samþykki mitt fyrir því að taka þátt í rannsókninni Tengsl milli svefnvanda og óværðar á fyrstu æviárum við ADHD í bernsku

o Öll gögn eru ópersónugreinanleg og er ekki hægt að rekja til mín eða barnsins míns.

o Ég geri mér grein fyrir að mér er frjálst að hætta eða sleppa því að svara einstökum spurningum í rannsókninni hvenær sem er.

o Ég samþykki að fulltrúar rannsóknaraðila hafi aðgang að rannsóknarniðurstöðum. Upplýsingar um rannsóknina má geyma í tölvutæku formi.

Dagmar Kr. Hannesdóttir sálfræðingur á Þroska- og hegðunarstöð, Edda Sigfúsdóttir BA nemi í sálfræði við HA og Elín Díanna Gunnarsdóttir dósent við Hug- og félagsvísindadeild í HA.

1. Hver er aldur barnsins þíns?
   ◯ 4 ára
   ◯ 5 ára
   ◯ 6 ára
   ◯ 7 ára
   ◯ 8 ára
   ◯ 9 ára

2. Hvert er kyn barnsins þíns?
   ◯ Drengur
   ◯ Stúlka

3. Merktu við ef eitthvað af þessu átti við frá 1-2 ára aldurs hjá þínu barni (merktu við allt sem við á)
   ◯ Vaknaði oft upp á nóttunni (3-5 sinnum eða oftar nokkrar nætur í viku)
   ◯ Svefnráðgjöf var fenginn vegna þess að vandinn var mikill
   ◯ Barnið fékk svefnlyf
   ◯ Ekkert af ofangreindu á við
   ◯ Einhverjar athugasemdir _____

4. Ef þú hefur merkt við að barnið eigi erfitt með að sofna á kvöldin, telur þú það vera vegna kvíða/áhyggna?
   ◯ Já
   ◯ Nei
   ◯ Barnið mitt á ekki erfitt með að sofna á kvöldin

5. Merktu við ef barnið þitt hefur verið með einhvern af eftirtöldum erfiðleikum miðað við stöðuna eins og hún er í dag og síðustu 6 mánuði (merktu við allt sem við á):
   ◯ Erfiðleikar við að sofna á kvöldin
   ◯ Vaknar reglulega á nóttunni nokkrum sinnum í viku
   ◯ Fær oft martraðir (3-4 sinnum eða oftar í mánuði)
   ◯ Ekkert af ofangreindu á við
   ◯ Einhverjar athugasemdir_____

6. Ef þú hefur merkt við að barnið eigi erfitt með að sofna á kvöldin, telur þú það vera vegna kvíða/áhyggna?
   ◯ Já
   ◯ Nei
   ◯ Barnið mitt á ekki erfitt með að sofna á kvöldin

7. Var barnið þitt með tíða ungbarnakveisu/magakveisu á fyrstu mánuðum ævinnar?
   ◯ Já
   ◯ Nei

8. Upplifði barnið þitt endurteknar erynabólgur og/eða vökvasöfnun í eyra sem leiddi til þess að barnið þurfti rör í eyrun eða að fara í nefkirtlatöku?
   ◯ Já
   ◯ Nei

9. Fékk barnið þitt endurteknar sýkingar fyrir tveggja ára aldur (3-5 sinnum eða oftar) t.d. lugnabólgur, kinnholubólgur, þvagfærasýkingar eða annað?
   ◯ Já
   ◯ Nei

   Ef já hvaða sýkingar (merktu við allt sem við á):
   ◯ Lugnabólgur
   ◯ Kinnholubólgur
   ◯ Þvagfærasýkingar
   ◯ Annað _____

10. Var barnið þitt fyrirburi?
    ◯ Já
    ◯ Nei

    Ef já :
    Hversu löng var meðgangan? _____ vikur

11. Fæddist barnið þitt 6 merkur/1500 grömm eða léttara?
    ◯ Já
    ◯ Nei

12. Er barnið þitt með ADHD greiningu (ofvirkni/hvatvísi og/eða athyglisbrest)?
    ◯ Já
    ◯ Nei

13. Hefur verið grunur/áhyggjur af ADHD hjá barninu (t.d. frá leikskóla/skóla)?
    ◯ Já
    ◯ Nei

14. Er barnið þitt með röskun á einhverfurófi?
    ◯ Já
    ◯ Nei

15. Hefur verið grunur/áhyggjur af röskun á einhverfurófi hjá barninu (t.d. frá leikskóla/skóla)?
    ◯ Já
    ◯ Nei

SDQ – Spurningar um styrk og vanda

Svarið hverri fullyrðingu með því að merkja í einn reit: Ekki rétt, Að nokkru rétt eða Örugglega rétt. Þið eruð beðin að merkja við allar fullyrðingarnar, jafnvel þótt þið séuð ekki alveg viss, eða þær sýnist heimskulegar! Svarið með tilliti til atferlis barnsins síðustu 6 mánuði.

	Ekki rétt	Að nokkru rétt	Örugglega rétt
16. Eirðarlaus, ofvirk/ur, getur ekki verið kyrr lengi	◯	◯	◯
17. Fær oft skapofsaköst eða er heitt í hamsi	◯	◯	◯
18. Almennt hlýðin/n, gerir yfirleitt eins og fullorðnir óska	◯	◯	◯
19. Stöðugt með fikt eða á iði	◯	◯	◯
20. Auðvelt að stela athygli hans/hennar, einbeiting á flakki.	◯	◯	◯
21. Hugsar áður en hann/hún framkvæmir	◯	◯	◯
22. Fylgir verkefnum eftir til enda, heldur góðri athygli	◯	◯	◯

Kærar þakkir fyrir þátttökuna! Þín þátttaka er mikils metin.

Ef það vakna upp einhverjar spurningar varðandi rannsóknina er þér velkomið að hafa samband við Dagmar K. Hannesdóttur sálfræðing á Þroska- og hegðunarstöð í síma 585-1300 eða við Eddu Sigfúsdóttur BA nema í sálfræði í gegnum netfangið ha110564@unak.is.