B.Sc in Psychology
Department of Psychology

The association between ADHD symptoms and academic performance, time spent on homework and attitude towards school in the lives of adolescent boys and girls

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Student: María Katrín Auðardóttir

ID number: 070794-2929

Foreword

Submitted in partial fulfillment of the requirements of the BSc Psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.

This thesis was completed in the fall of 2021and may therefore have been significantly impacted by the COVID-19 pandemic. The thesis and its findings should be viewed in light of that.

Abstract

The primary goal for this study was to see if there were any differences in academic performance, academic attitude and time spent doing homework for students with ADHD symptoms and thos who did not report ADHD symptoms and if there was any gender difference. This study tested four hypotheses. The first one was whether higher ADHD symptoms were associated with worse academic performance for boys and girls. The second hypothesis was that there was a link between higher ADHD symptoms and less time spent doing homework for worse outcomes for academic performance for both boys and girls. The third hypothesis was that there was a link between higher ADHD symptoms and worse outcomes for academic performance for both boys and girls. The fourth hypothesis stated that ADHD symptoms would have different effects on males and females in all variables.

A questioners from ICSRA from 2018 was used. Participants were 2215 young Icelandic adolescents from the 8th to 10th grade. The statistical program, SPSS (version 27) was used to analyze the data. Descriptive statistics, Pearson correlation coefficient and Liniear regression was used to define the relationship between the variables. The results showed a negative correlation between ADHD symptoms and all of the academic variables. The benefit of this study is that it shows that it is important for students to get diagnosed. Even though ADHD has been studied all over the world, there are still some issues to be resolved. Teenagers still go through their academic lives without being diagnosed, or without receiving the help they need.

Keywords: ADHD, Gender, Time spent doing homework, Academic performance, Academic attitude.

Útdráttur

Þessi rannsókn skoðaði tengsl milli ADHD einkenna, kyns, námsárangurs, viðhorfs til náms, námsárangurs og tíma sem fer í heimavinnu. Í þessari rannsókn voru settar fram fjórar tilgátur. Fyrsta tilgátan var að tengsl væru á milli hærri ADHD einkenna og verri námsárangurs fyrir bæði stúlkur og drengi. Önnur tilgátan var að hærri ADHD einkenni hefðu þau áhrif að minni tíma væri eytt í heimavinnu. Þriðja tilgátan var að tengsl væru á milli hærri ADHD einkenna og verri líðan í námi. Fjórða tilgátan var að ADHD einkenni hefðu mismunandi áhirf á drengi og stúlkur hvað varðar námsárangur, tíma eytt í heimanám og viðhorf til náms.

Þátttakendur voru 2215 unglingar í 8-10 bekk í grunnskólum á Íslandi. Spurningarlisti frá ICSRA frá árinu 2018 var notaður. Tölfræði forritið SPSS var notað til þess að vinna úr gögnum lýsandi tölfræði, fylgni og línulega aðhvarfsgreiningu. Niðurstöður rannsóknarinnar sýndu að lítil neikvæð marktæk fylgni var á milli ADHD einkenna, námsárangurs, tíma eytt í heimavinnu og viðhorf til náms. Niðurstöður þessara rannsóknar sýna að það er mikilvægt fyrir nemendur að fá ADHD greiningu. Unglingar eru enn að fara í gegnum allt sitt nám án þess að fá greiningu eða þá aðstoð sem þeir eiga rétt á

Lykilorð: ADHD, Kyn, Tími eyddur í heimavinnu, Námsárangur, Viðhorf til náms.

The association between ADHD symptoms and academic performance, time spent on homework and attitude towards school in the lives of adolescent boys and girls

Attention-deficit hyperactivity disorder (ADHD) is a neurobiological disorder that is caused by dysfunctional neurotransmitters (American Psychiatric Association, 2013). The neurotransmitters are the brain's main messengers and when they are not working properly, the brain cannot function at full capacity (Swanson et al., 2006). ADHD was once believed to be a condition that only affected children and that they would grow out of, but recent studies have shown that it is a disorder that can affect people throughout their lives (Kessler et al., 2005). ADHD can cause difficulties in a wide variety of people's lives, including their academic performance, their social and family lives (Daley & Birchwood, 2010). ADHD affects 3-5% of children nationwide, making it the most common childhoods psychological disorder. The likelihood of boys getting diagnosed with ADHD is three times higher than that of girls (Durston et al., 2003). It is estimated that as many as 4% of adults suffer from ADHD (Montes, García & Ricardo-Garcell, 2007), yet there will always be misdiagnoses(Sayal et al., 2018).

ADHD can be divided into three categories, inattentive, impulsive and hyperactive (Sonuga-Barke et al., 2013). The symptoms can vary between genders, oftentimes, girls are misdiagnosed with ADHD duo to their tendency to be less attentive than their male peers (Young et al., 2020) which in turn makes them more likely to develop the hyperactive/impulsive type of ADHD with accompanying behavioral problems (Mowlem et al., 2019). Despite the fact that boys tend to have more obvious signs of hyperactivity and impulsivity, girls often suffer from undiagnosed hyperactivity and impulsivity symptoms (Bauermeister, 2007). Some research have shown that girls may cope better with academic disadvantages by simply working harder and thus hiding their difficulties (Slobodin & Davidovitch, 2019). While some studies find that there is a big gender difference, with boys

more often getting diagnosed than girls, others seem to find that there is not a gender difference (Gómez-Benito et al, 2015). Girls with ADHD often present their symptoms by having impaired social skills, they are shy, forgetful, disorganized or self-critical (Hinshaw et al., 2012). Boys with ADHD tend to be are more outgoing, very energetic, disrupt, or interrupt others (Daley & Birchwood, 2010).

Life with ADHD

The majority of hyperactivity or impulsivity symptoms often tends to fade away when children become teenagers or adults (Faraone et al., 2000), and more symptoms of inattention follow up instead (Biederman, 2004). Some researchers have suggested that adolescents and adults may have more difficulty with internal distraction, for example, daydreaming or a constant flow of different ideas (Wayandt et al., 2003). In Hasson & Fine (2012) research on gender differences among children diagnosed with ADHD, their sample count was 772 boys and 325 girls. They found that boys were typically more impulsive than girls, but when they looked at the inattentive part there were no major differences between the genders. According to Hasson & fine, there seems to be a need for further research because boys are a bigger sample. Two meta-analyses indicate that males with ADHD display higher levels of externalizing behaviours than females, but females tend to show more internalizing behaviour. The effect sizes for both of the comparisons were small, and it did not report any gender differences on measures of academic or social functioning. As a result of both reviews, further research is recommended to better understand the underlying mechanisms of the sex differences in ADHD prevalence and to address the challenges of biased arising from differential referral rates between males and females for clinical services (Leopold et al., 2019).

Sibley and colleges (2012) found that approximately 75% of young adolescents diagnosed with ADHD in childhood were still experiencing symptoms in their adolescence

and 60% had clinical problems when it came to daily functioning. In a study Halperin and colleagues (2008) conducted on 183 high school adolescents, they found that 98 of them had ADHD, while 85 demonstrated no history of ADHD. Researchers found that even though their participants were not in their childhood, they still demonstrated more fidgety behavior than their peers that did not have ADHD. They also found that their ADHD participants who had fidgety behavior had gotten used to it and did not mind it because seems that it did not interfere with their quality of life. These results show that the activity level for ADHD does not necessarily decline through their lives but it is important that they learn to live with it.

Children with ADHD often struggle to control their emotions or behavioral symptoms, so they are more likely to react with more feelings than children without ADHD (Arruda et al., 2015). Harpin and colleagues (2013) did a study on students with untreated ADHD and found out that they had much worse social function and self-esteem for long term than students that had no history of ADHD. Studies have shown that about two-thirds of children that are diagnosed with ADHD also show symptoms for at least one other psychiatric diagnosis, for example, anxiety, depression, or conduct disorder (Cuffe et al., 2005; Reale et al., 2017). Bauermeister and colleagues (2007) found out that boys that were diagnosed with hyperactive and impulsivity were at a greater risk than girls for developing depression and that girls with inattentive ADHD are at greater risk than boys for developing an anxiety disorder. A nationwide survey on adolescent girls and boys with ADHD found that 14% of girls were treated with antidepressants before they were diagnosed with ADHD. On the other hand, only 5% of boys got the wrong diagnosis before being diagnosed with ADHD. These results show that it is extremely important to look at ADHD as a possible diagnosis for girls to try to prevent them from being misdiagnosed (Quinn, 2005).

ADHD and academic performance and school related factors

Young adolescent with ADHD typically underperform academically and have poor educational outcomes (Loe & Feldman, 2007). When teenagers with ADHD begin in high school they often have weak self-discipline, a lack of self-regulation skills, and have a hard time analyzing and reflecting on their own behaviors, thoughts, and actions (Litner, 2003). Studies have shown that when children with ADHD go from elementary school to middle school, it seems to be a lot harder for them compared to children without ADHD (Sciutto et al., 2004). Kent and colleague's (2010) study showed that adolescents with ADHD experienced significant academic impairment in high school relative to their peers. Students with this disorder are more likely to fail courses, get low grades, turn in a lower percentage of assignments, and have a negative attitude towards their disorder (Connor, 2012; Prevatt & Young, 2014; Fredriksen et al., 2014). Bussing and colleagues (2010) study found that young adolescents with ADHD did not perform as well in school as their peers without the disorder. They also found that when the school level gets higher, the gap between school outcomes for teenagers with ADHD compared to their peers will become wider.

According to the study by Murphy and colleagues (2002), there was no significant difference between the outcomes of those with combined ADHD and those with inattentive behaviors. Both groups had low academic performance and a lower likelihood of graduating from college. While the findings in Bugler and colleagues (2013) ADHD girls were more motivated to learn, especially when it came to valuing, learning focus and goalsetting. Girls with ADHD also value learning more than boys, are more focused on learning, organize their study time efficiently, and are more likely to persist with difficult material. Abikoff and coleagues (2002) examined differences in classroom behavior between boys and girls with ADHD. They found out that there was a higher rate of gross motor activity and fidgeting, negative verbalizations, and off-task behaviors in students with ADHD compared to their peers. The results also suggested that boys with ADHD displayed more interfering behaviors,

gross motor activites, and aggression than girls. On the other hand, girls with ADHD sought support and attention from teachers more oftan than boys with ADHD. These results indicate that there might be important differences in the classroom behavior for both boys and girls with ADHD

The chances of young adults with ADHD receiving a higher degree or training are much lower than those of their peers who do not suffer from the condition, and they are more likely to dop out of school than their peers who do not suffer from ADHD (Evans et al., 2014). May and colleague's (2020) study showed that there was a strong connections between being a student that had ADHD and having difficulties in school. Students with ADHD had been identified that they had special educational needs. They also found that students with ADHD reported feeling less happy at school than their peers that did not show any signs of ADHD. Wiener (2020) did a study on young adolescents who were struggling with ADHD in the school system. Her results showed that they were at a greater risk for social and academic difficulties. She also found out that these students often were aware of their diagnoses, and they felt that they often struggled with their social relationship with their peers.

The time that students spend on their homework is one of the best ways to predict their grades and achievements (Cooper et al., 1998). Students with attention problems may find it difficult to concentrate on classroom activities or complete homework assignments, which will result in less efficiency learning compared with similarly able classmates with no history of attention problems (Westerlund et al., 2010). As children and young adolescents with ADHD can experience problems with following instructions, organizing, planning, and prioritizing. It is more likely that their homework will suffer (Daley & Birchwood, 2010). Langberg and colleagues (2011) study showed that students with ADHD were more likely to forget to take their homework home, work on it and bring it back to school.

Children with ADHD often start to show symptoms when they begin in elementary school, but sometimes their symptoms are misdiagnosed and they are diagnosed later in life (Perou et al., 2013). Studies have shown that over 45% of children with ADHD also have at least one or more learning difficulties, for example, impairments in reading, spelling, or arithmetic (DuPaul, Gormley & Laracy, 2013; Gershon, 2002; Mayes et al., 2000). Even though there are performance problems, many young adolescents with ADHD will perform well enough to get through their first years of school but when they attend to a higher degree (for example high school or collage) the effect of ADHD will start to show (DuPaul et al., 2009).

Current study

The aim of this research was to examine the position of young adolescents with ADHD in the academic system in Iceland. The purpose of this study was to examine the relationship between ADHD symptoms in boys and girls and school-related factors such as academic performance and academic attitude. There were four hypotheses tested in this research. The first hypothesis was that ADHD symptoms would be associated with academic performance for both girls and boys, with more symptoms relating to worse academic performance. The second hypothesis was that ADHD symptoms would be associated with time spent on homework, with more symptoms predicting less time spent on homework. The third hypothesis was that ADHD symptoms would be associated with attitude towards school, with more symptoms predicting more negative attitude to school. The fourth hypothesis stated that ADHD symptoms would have different effects on males and females in terms of academic performance, time spent on homework and attitude towards school.

Method

Participants

Data for this study came from a population-based study, Youth in Iceland 2018 and was conducted by the Icelandic Center for Cosiscal Research and Analysis (ICSRA). A total of responses were received from 10.563 students. In this current study 2215 participants were randomly selected. There were 1065 (48,8%) males and 1119 (51,2%) of them were females. All elementary schools in Iceland participated and students from 8^{th} (N = 735), 9^{th} (N= 718) and 10^{th} (N = 730) grades were randomly selected.

Measurement

The study used a questionary data from the 2018 Youth in Iceland gathered by ISCRA. The questionnaire contained 83 questions on 29 pages, out of the 83 questions five questions were used for the present study. Five variables were used in this study. The independent variables that were used with questions were gender and ADHD symptoms. The dependent variables were academic performance, time spent on homework and academic attitude. A more detailed description of the measures for this study can be seen here below.

ADHD symptoms

A self-reported questionnaire list with 18-item was used to screen for ADHD symptoms. The Barkley current symptoms scale (Reebye, 2008) was used to estimate ADHD symptoms that have persisted for the last six months. The list contained nine symptoms of hyperactivity/impulsivity and nine inattention symptoms. Using a four-point scale, participants were asked how often they experienced any of these symptoms in the last six months (1 = never or rarely to 4 = very often), All of the 18-item were computed into one variable for the analysis and named ADHD symptoms. The scale range was from 0 to 18, where a higher score meant a higher ADHD symptoms. In this study internal reliability was calculated with Cronbachs' Alpha = 0.87 ($\alpha = 0.87$).

Academic homework

One questions was asked about academic homework *"how much time do you spent on doing homework every day"?*. The format for responding was on a 8-point ordinal scale *"1= I never do my homework, 2= less than half an hour, 3= half an hour, 4= around one hour, 5= around two hours, 6= around three hours, 7= around four hours, 8= more than four hours".*

Academic performance

To measure academic performance the following three questions were used "*how have your grades in Icelandic, mathematics, and English"?* The format for responding was on a 8-point ordinal scale *" under 4, around 4, around 5, around 6, around 7, around 8, around 9, around 10".* First all three variables were recoded into three subgroups, the first group included grades below 5, the second group included grades 5.01-8.0, and the third group included grades 8.01 and above. All of three questions were then computed into one variable for the analysis and named academic performance with the same subgroups. In this study internal reliability was calculated with Cronbachs' Alpha = 0.75 ($\alpha = 0.75$).

Academic attitude

Seven questions were used to measure the attitude towards school: *"I think that school is pointless, I find the school boring, I do not feel prepared for class, I do not think that I put enough effort into my studies, I find the school too difficult, I feel unhappy at school, I want to quit school"*. The answers were on 5-point ordinal scale *"1= almost always applies to me, 2= often applies to me, 3= sometimes applies to me, 4= rarely applies to me and 5= almost never applies to me".* The scale range was from 7-35, were higher score meant better academic attitude. In this study internal reliability was calculated with Cronbachs' Alpha =0.82 ($\alpha = 0.82$).

Procedure

Before the study was conducted, all parents were informed by an email and if they did not want their child participate in the study they should let know through the email. Questionnaires were printed out and sent to all of the elementary schools in Iceland in February 2018. All students that attendant to the class that day took the survey. Students were instructed to fill out the best of their ability, and if they had any questions the teacher could help them. Teachers had their own questionnaires so that participants' answers were not visible to the teachers. Students were reminded that they should not put their names on the paper and when they were finished they should put the questionnaire in a white unmarked envelope that was on their desk, raise their hand, and their teacher would come and collect their envelope. When everyone had finished their questionnaire list the envelope was sent to ICSRA. The National Bioethics Committee (in Iceland) gave permission for this study.

Data analysis

The statistical program, SPSS (version 27) was used to analyze the data. Descriptive statistics was used to calculate mean, standard deviation (std) and range for all variables. A frequency analysis was run to see how many participants answered each symptom from 0-18. Pearson r correlation and liniear regression was used to define the relationship between the variables using gender and ADHD as independent variables and academic performance, time spent on homework and academic attitude as dependent variables to test main and interaction effects. Eight out of nine assumptions that had to be met for liniear regression were met, with the exception of homoscedasticity.

Results

Descriptive statistics

Table 1 shows descriptive statistics for all variables, for both boys and girls. Participants in this study were 2215, gender distribution was 48.8% males (N = 1065) and 51.2% females (N = 1119). Most participants (37.4%, N = 816) spent approximately one hour

per day on homework. For the academic performance, most (38.5%) of the participants were in the second group with the average grade from 5.01 to 8.0. Most (38.5%) participants scored between 24 and 33 on the academic attitude variable which would be considered a good mindset. There were 12.5% (N = 270) participants that said they were diagnosed with ADHD and 87.5% (N = 1898) were not diagnosed with ADHD. There were only 5.3% (N = 107) of the participants that answered that they never or rarely experienced any ADHD symptoms. The proportion of participants who experienced ten or fewer symptoms from the questionary list was 71.3% (N = 115). The most common answer (7.7%, N = 155) was that participants experienced five ADHD symptoms.

Table 1

Descriptive Statistics for gender, ADHD symptoms, academic attitude, academic performance and time spent doing homework

Variable	Boys				Girls			
	N	Range	*M*	*SD*	N	Range	*M*	*SD*
ADHD symptoms	945	0.00 – 18.00	8.03	4.97	1038	0.00 – 18.00	7.26	4.72
Academic attitude	1023	7.00 – 35.00	26.6	4.94	1093	7.00 – 35.00	27.7	4.91
Academic performance	1020	1.00 -– 3.00	1.92	0.54	1083	1.00 – 3.00	2.05	0.58
Time spent doing homework	1050	1.00 – 8.00	3.28	1.34	1108	1.00 – 8.00	3.57	1.14

Note. M = Average score, *SD* = Standard Deviation, *N* = Number of participants

Correlation between ADHD symptoms, time spent doing homework, academic attitude and academic performance

Table 2 shows the correlations for boys and all variables. Pearson correlation between ADHD symptoms and academic performance was small although statistically significant ($r(917) = -0.26$; $p < 0.001$) for boys, with higher levels of ADHD symptoms and time spent

doing homework relating to lower academic performance. Pearson correlation between ADHD symptoms and time spent doing homework showed statistically significant negative association ($r(938) = -0.11$; $p < 0.001$) for boys, although this correlation was small. Pearson correlation between ADHD symptoms and academic attitude showed a moderate significant negative association ($r(924) = -0.49$; $p < 0.001$) for boys.

Table 2

Correlation for boys and time spent doing homework, ADHD symptoms, academic performance and academic attitude.

Variable		1	2	3	4
1. Time spent doing homework		-			
	p	-			
2. ADHD symptoms		-0.11**	-		
	p	<0.001	-		
3. Academic performance		0.04	-0.26**	-	
	p	0.17	<0.001	-	
4. Academic attitude		0.15**	-0.49**	0.38**	-
	p	<0.001	<0.001	<0.001	-

Note. ** Correlation is significant at the 0.01 level (2-tailed)

Table 3 shows the correlations for girls and all variables. Next Pearson correlation was run for girls and ADHD symptoms. Academic performance was small although statistically significant ($r(1009) = -0.28$; $p < 0.001$) for girls. Pearson correlation between ADHD symptoms and time spent doing homework showed statistically significant negative association ($r(1033) = -0.17$; $p < 0.001$) for girls, although this correlation was small. Pearson

correlation between ADHD symptoms and academic attitude showed a negative association ($r(1018) = -0.60$; $p < 0.001$) for girls.

Table 3

Correlation for girls and time spent doing homework, ADHD symptoms, academic performance and academic attitude.

Variable		1	2	3	4
1. Time spent doing homework		-			
	p	-			
2. ADHD symptoms		-0.17**	-		
	p	<0.001	-		
3. Academic performance		0.05	-0.28**	-	
	p	0.10	<0.001	-	
4. Academic attitude		0.24**	-0.60**	0.41**	-
	p	<0.001	<0.001	<0.001	-

Note. ** Correlation is significant at the 0.01 level (2-tailed)

ADHD and gender as predictors of school related variables

To test the fourth and final hypothesis linear regression was run. To see if gender, ADHD symptoms and the interaction of gender and ADHD symptoms statistically predicted school related variables. Results showed that the predictors explained 17.6% of the variance of time spent on homework and that the model was significant ($R^2 = 0.031$, $F(3,1967)=20.844$ $p < 0.001$). ADHD symptoms contributed significantly to the model ($B = -0.035$, $p<0.001$)

and so did gender (B = 0.234, p<0.001). Interaction between gender and ADHD symptoms did not contribute significantly to the model (B = -0.01, p =0.362).

Table 4

Liniear regression table for gender, ADHD symptoms and time spent on homework

Variable	B	*SE*(B)	ß	*p*
Gender	0.23	0.05	0.09	<0.001
ADHD symptoms	-0.03	0.00	-0.13	<0.001
Gender*ADHD	-0.01	0.01	-0.02	0.36

Note. Gender: boy = 1; girl = 2.

Linear regression was run to test if gender, ADHD symptoms and the interaction of gender and ADHD symptoms statistically predicted academic attitude. Results showed that the predictors explained 56% of the variance and that the model was significant (R^2= 0.031, F(3,1938)=293.507 p <0.001). ADHD symptoms contributed significantly to the model (B = -0.54, p<0.001) and so did gender (B = 0.80, p<0.001). Interaction between gender and ADHD symptoms was contribute significantly to the model (B = -0.11, p<0.003), indicating that ADHD symptoms have a significant effect on average academic performance.

Table 5

Liniear regression table for gender, ADHD symptoms and academic attitude

Variable	B	*SE*(B)	ß	*p*
Gender	0.80	0.18	0.08	<0.001
ADHD symptoms	-0.54	0.01	-0.54	<0.001
Gender*ADHD	-0.11	0.04	-0.06	<0.001

Note. Gender: boy = 1; girl = 2.

Linear regression was run to test if gender, ADHD symptoms and the interaction of gender and ADHD symptoms statistically predicted academic performance. Results showed that the predictors explained 29.2% of the variance and the model was significant (R^2= 0.09,

F(3,1922)=59.801 p <0.001). ADHD symptoms contributed significantly to the model (B = -0.03, p<0.001) and so did gender (B = 0.10, p<0.001). Interaction between gender and ADHD symptoms was not contribute significantly to the model (B = -0.00, p = 0.31), indicating that when gender and ADHD symptoms are taken into account they do have significant negative impact on academic attitude.

Table 6

Liniear regression table for gender, ADHD symptoms and academic performance

Variable	B	*SE*(B)	ß	*p*
Gender	0.10	0.02	0.09	<0.001
ADHD symptoms	-0.03	0.00	-0.27	<0.001
Gender*ADHD	-0.00	0.00	-0.02	0.31

Note. Gender: boy = 1; girl = 2.

Discussion

This study examined the position of young adolescents with ADHD in the academic system in Iceland. It aims to determine the relationships between ADHD symptoms in boys and girls and school-related factors such as academic performance, academic attitude and time spent on homework.

The first hypothesis was that ADHD symptoms would be associated with academic performance for both boys and girls, with more symptoms predicting worse academic performance. The results showed a small significant negative correlation between ADHD symptoms and academic performance for both boys and girls. These results support the first hypothesis that higher levels of ADHD symptoms are related to worse academic performance. These findings are in line with previous studies that have shown that young adolescents with ADHD do struggle with their academic performance. (Bussing et al., 2010; Connor, 2012; DuPaul et al., 2009; Kent et al., 2010; Loe & Feldman, 2007; May et al., 2020;).

The second hypothesis was that ADHD symptoms would be associated with time spent on homework, with more symptoms predicting less time spent on homework. The results showed a small significant negative correlation between ADHD symptoms and time spent doing homework for both boys and girls. These results support the second hypothesis by showing that ADHD symptoms were associated with less time spent on homework. These findings are in line with previous studies that indicated that students with ADHD work less on their homework (Connor, 2012; Daley & Birchwood, 2010; Langberg et al., 2011).

The third hypothesis was that ADHD symptoms would be associated with attitude towards school, with more symptoms predicting more negative attitude towards school. The results showed a moderate significant negative correlation between ADHD symptoms and attitude towards school for both boys and girls. These results showed higher ADHD symptoms were associated with a worse attitude towards school, and therefore support the third hypothesis. These results are in line with previous studies that have indicated that young adolescents with ADHD do suffer from a negative academic attitude (May et al., 2020; Wiener 2020).

The fourth hypothesis, that ADHD symptoms would have different effects on males and females in terms of academic performance, time spent on homework and attitude towards school. The results indicated that there was not a significant difference in time spent on homework and academic performance between genders, which is not consistent with the part of the hypothesis. These findings are in line with previous studies that showed there is no difference between gender when it comes to academic performance (Murphy et al., 2002; Leopold et al., 2019). The results showed that there was a significant gender difference regarding academic attitude towards school. Girls had worse attitude towards school than boys. These findings are not in line with previous studies, as previous studies have not shown

that there is a gender difference, only that adolescents with ADHD had worse academic attitude (May et al., 2020).

This study had some limitations. First, the questionnaire the participants filled out was a self-report, so it is impossible to tell whether or not they were telling the truth. Second, this was a cross-sectional study, making it impossible to conclude a causal relationship. And third, the study only examined participants who indicated that they had some symptoms of ADHD, and not those who had been diagnosed as having ADHD.

Several studies have examined the gender differences of young adolescents with ADHD and have found differences in the symptoms they exhibit, but fewer studies have examined the differences between ADHD symptoms based on the same academic variables (academic performance, academic attitude and time spent doing homework), as was done in this study. Future research could examine the causal relationship of these factors in a long-term research format to better understand the relationship.

The present study had several strengths. It consisted of a large random sample of over 2000 participants from all over Iceland. The gender distribution was good (male 48.8 % and 51.2 % female), which was important since gender differences could be noticeable. All participants were given an appropriate instruction on how to answer the questions and it was supposed to be anonymous. It is a good list of questions from ICSRA, the questions are compiled by professionals, the research is conducted over many years, and many scientific studies have been published based on the research (Hrefna Pálsdóttir et al., 2018). Though there was a small negative correlation between all variables and gender, the results indicate that there might be differences regarding the genders. Further research is needed to look into gender differences and academic performance, academic attitude and time spent on homework. Young adolescents still go through their academic career without being diagnosed, or without receiving the proper support. In recent years more focus has been

focused on ADHD symptoms among girls and as result there has been a rise in ADHD diagnosing for girls. With the rise in diagnoses in girls there is a further need and support for research relating to the gender difference and academic outcomes. It is important to examine further what support is available for children and adolescents during the start of their academic career, and further look into if there is a gender difference in where support is needed. These results add to the existing literature of ADHD among young adolescents and add valuable information to the limited knowledge about gender difference and academic performance. Early interventions and screening of ADHD can be critical for children as it can improve academic performance, self-confidence, and reduce the likelihood of young adolescents dropping out of high school.

References

Abikoff, H. B., Jensen, P. S., Arnold, L. L. E., Hoza, B., Hechtman, L., Pollack, S., Martin, D., Alcir, J., March, J. S., Hinshaw, S., Vitiello, B., Newcorn, J., Greiner, A., Cantwell, D. P., Conners, C. K., Elliott, G., Greenhill, L. L., Kraemer, H., Pelham, W. E … & Wigal, T. (2002). Obsered classroom behavior of children with ADHD: relationship to gender and comorbidity. *Journal of abnormal child psychology, 30*, 349-359. https://doi.org/10.1023/A:1015713807297

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders: DSM-5 (5th ed.). Washington: American Psychiatric Association.

Arruda, M. A., Querido, C. N., Bigal, M. E., & Polanczky, G. V. (2012). ADHD and mental health status in Brazilian school-age children. *Journal of Attention disorders, 19,* 11-17. https://doi.org/10.1177/1087054712446811

Bauermeister, J. J., Shrout, P. E., Chávez, L., Rubio-Stipec, M., Ramírez, R., Padilla, L., Anderson, A., García, P., & Canino, G. (2007). ADHD and gender: are risks and sequela of ADHD the same for boys and girls?. *Journal of Child Psychology and Psychiatry, 48,* 831-839. https://doi.org/10.1111/j.1469-7610.2007.01750.x

Biedermn, J. (2004). Attention-deficit/hyperactivity disorder: A selective overview. *Biological Psychiatry, 57,* 1215-1220. https://doi.org/10.1016/j.biopsych.2004.10.020

Bugler, M., McGeown, S. P., & Clair-Thompson, S. (2013). Gender differences in adolescents academic motivation and classroom behavior. *Educational psychology, 35(5),* 541-556. doi:10.1080/01443410.2013.8493

Bussing, R., Porter, P., Zima, B. T., Mason, D., Garvan, C., & Reid, R. (2010). Academic outcome trajectories of students with ADHD: Does exceptional education status matter? *Journal of emotional and behavioral disorders, 20(3),* 131-143. https://doi.org/10.1177/1063426610388180

Connor, D. J. (2012). Helping students with disabilities transition to college. *Teaching Exceptional Children, 44*, 16-25. https://doi.org/10.1177/004005991204400502

Cooper, H., Lindsay, J. J., Nye, B., & Greathouse, S. (1998). Relationships among attitudes about homework, amount of homework assigned and completed, and student achievement. *Journal of Educational Psychology, 90*, 70-83. https://doi.org/10.1037/0022-0663.90.1.70

Cuffe, S. P., Moore, C. G., & McKeown, R. E. (2005). Prevalence and correlates of ADHD symptoms in the national health interview survey. *Journal of Attention Disorders, 9,* 392-401. https://doi.org/10.1177/1087054705280413

Daley, D., & Birchwood, J. (2010). ADHD and academic performance: Why does ADHD impact on academic performance and what can be done to support ADHD children in the classrom?. *Blackwell publishing ltd, Child: care, health and development, 36(4),* 455-464. https://doi.org/10.1111/j.1365-2214.2009.01046.x

DuPaul, G. J., Weyandt, L. L., O'Dell, S. M., & Varejao, M. (2009). College students with ADHD: Current status and future directions. Journal of Attention Disorders, 13, 234-250. doi:10.1177/1087054709340650

DuPaul, G. J., Gormley, M. J., & Laracy, S. D. (2013). Comorbidity of LD and ADHD: implications of DSM-5 for assessment and treatment. *Journal of Learning Disabilities, 46(1),* 43-51. https://doi.org/10.1177/0022219412464351

Durston, S., Tottenham, N. T., Thomas, K. M., Davidson, M. C., Eigsti, I. M., Yang, Y., Ulug, A. M., & Casey. B. J. (2003). Differential patterns of striatal activation in young children with and without ADHD. *Biological Psychiatry, 53,* 871-878. https://doi.org/10.1016/S0006-3223(02)01904-2

Evans, S. W., Langberg, J. M., Egan, T., & Molitor, S. J. (2014). Middle school-based and high school-based interventions for adolescents with ADHD. *Child & Adolescent Psychiatric Clinics, 23,* 699-715. https://doi.org/10.1016/j.chc.2014.05.004

Faraone, S. V., Biederman, J., Spencer, T., Wilens, T., Seidman, L. J., Mick, E., & Doyle, A. E. (2000). Attention-deficit/hyperactivity disorder in adults: an overview. *Biological Psychiatry, 48,* 9-20. https://doi.org/10.1016/S0006-3223(00)00889-1

Fredriksen, M., Dahl, A. A., Martinsen, E. W., Klungsoyr, O., Farone, S. V., & Peleikis, D. E. (2014). Childhood and persistent ADHD symptoms associated with educational failure and long-term occupational disability in adult ADHD. *ADHD attention deficit and hyperactivity disorders, 6*, 87-99. https://doi.org/10.1007/s12402-014-0126-1

Gershon, J. (2002). A meta-analytic review of gender differences in ADHD. *Journal of attention disorders, 5(3),* 143-154. https://doi.org/10.1177/108705470200500302.

Gómez-Benito, J., Van, F. J. R., Balluerka, N., & Caterionu, L. (2015). Cross-cultural and gender differences in ADHD among young adults. *Journal of attention disorders,* 1-10. https://doi.org/10.1177/1087054715611748

Halperin, J. M., Trampush, J. W., Miller, C. J., Marks, D. J., & Newcorn, J. H. (2008). Neuropsychological outcome in adolescents/young adults with childhood ADHD: Profiles of persisters, remitters and controls. *Remitters and controls. 49(9),* 958-966. https://doi.org/10.1111/j.1469-7610.2008.01926.x

Harpin, V., Mazzone, L., Raynaud, J. P., Kahle, J., & Hodgikins, P. (2013). Long-term outcomes of ADHD: A systematic review of self-esteem and social function. *Journal of attention disorders, 20(4),* 294-305. https://doi.org/10.1177/1087054713486516

Hasson, R., & Fine, J. G. (2012). Gender differences among children with ADHD on continuous performance tests: A meta-analytic review. *Journal of attention disorders*, *16(3),* 190-198. https://doi.org/10.1177/1087054711427398

Hinshaw, S. P., Owens, E. B., Zalecki, C., Huggins, S. P., Montenegro-Nevado, A. J., Schrodek, E., & Swanson, E. N. (2012). Prospective follow-up of girls with attention-deficit/hyperactivity disorder into early adulthood: Continuing impairment includes elevated risk for suicide attempts and self-injury. *Journal of Consulting and Clinical Psychology, 80*(6), 1041–1051. https://doi.org/10.1037/a0029451

Hrefna Pálsdóttir, Ingibjörg Eva Þórisdóttir, Jón Sigfússon, Álfgeir Logi Kristjánsson, Margrét Lilja Guðmundsdóttir, Þorfinnur Skúlason, & Inga Dóra Sigfúsdóttir. (2014). Ungt fólk 2018. https://www.rannsoknir.is/wp-content/uploads/2020/04/Ungt-f%C3%B3lk-2018-8.-10.-bekkur.pdf

Kent, M. K., Pelham, W. E., Molina, B. S. G., Sibley, M. H., Waschbusch, D. A., Yu, Jihnhee., Gnagy, E. M., Biswas, A., Babinski, D. E., & Karch, K. M. (2011). The academic experience of male high school students with ADHD. *Journal of Abnormal Child Psychology, 39,* 451-462. https://doi.org/10.1007/s10802-010-9472-4

Kessler, R. C., Adler, L. A., Barkley, R., Biederman, J., Conners, K. C., Faraone, S. V., Greenhill, L. L., Jaeger, S., Secnik, K., Spencer, T., Ustün, T. B., & Zaslavsky, A. M. Patterns and predictors of attention-deficit/hyperactivity disorder persistence into adulthood: results from the national comorbidity survey replication. *Biol psychiatry, 57(11),* 1442-1451. https://doi.org/10.1016/j.biopsych.2005.04.001

Langberg, J. M., Epstein, J. N., Girio-Herrera, E., Becker, S. P., Vaugn, A. J., & Altaye, M. (2011). Materials organization, planning, and homework completion in middle-school students with ADHD: Impact on academic performance. *School mental health, 3,* 93-101. https://doi.org/10.1007/sl12310-011-9052-y

Leopold, D. R., Christopher, M. E., Olson, R. K., Petrill, S. A., & Willcutt, E. G. (2019). Invariance of ADHD symptoms across sex and age: A latent analysis of ADHD and

impairment ratings from early childhood into adolescence. *Journal of abnormal child psychology, 47,* 21-34. https://doi.org/10.1007/s10802-018-0434-6

Litner, B. (2003). Teens with ADHD: The challenge of high school. *Child and Youth Care Forum, 32*, 137-158. https://doi.org/10.1023/A:1023350308485

Loe, I. M., & Feldman, H. M. (2007). Academic and educational outcomes of children with ADHD. *Journal of Pediatric Psychology, 32*, 643-654. https://doi.org/10.1093/jpepsy/jsl054

May, F., Ford, T., Janssens, A., Newlove-Delgado, T., Russel, A, E., Salim, J., Ukoumunne, O, C., & Hayes, R. (2020). Attainment, attendance, and school difficulties in UK primary school children with probable ADHD. *British journal of educational psychology*. https://doi.org/10.1111/bjep.12375

Mayes, S. D., Calhoun, S. L., & Crowell, E. W. (2000). Learning disabilities and ADHD: Overlapping spectrum disorders. *Journal of learning disabilities, 33(5),* 417-424. https://doi.org/10.1177/002221940003300502

Montes, G. A. M., García, A. O. H., & Ricardo-Garcell, J. (2007). ADHD prevalence in adult outpatients with nonpsychotic psychiatric illnesses. *Journal of attention disorders, 11(2)*, 150-156. https://doi.org/10.1177/1087054707304428

Mowlem, F., Agnew-Blais, J., Taylor, E., & Asherson, P. (2019). Do different factors influence wheter girls versus boys meet ADHD diagnostic criteria? Sex differences among children with high ADHD symptoms. *Psychiatry Research, 272,* 765-773. https://doi.org/10.1016/j.psychres.2018.12.128

Murphy, K., Russel, B., & Bush, R. (2002). Young adults with attention deficit hyperactivity disorder: Subtype differences in comorbidity, educational and clinical history. *Journal of nervous and mental disease, 190(3),* 147-157.

Pálsdóttir, H., Sigfússon, J., Þórisdóttir, I. E., Guðmundsdóttir, M. L., Kristjánsson, Á. L., & Sigfúsdóttir, I. D. (2014). Ungt fólk 2014: Menntun, menning, félags-, íþrótta- og tómstundastarf, heilsa, líðan og vímuefnaneysla unglinga í 8., 9. og 10. bekk á Íslandi. Reykjavík: Rannsóknir og Greining.

Perou, R., Bitsko, R. H., Blumberg, S. J., Pastor, P., Ghandour, R. M., Gfroerer, J. C., Hedden, S. L., Crosby, A. E., Visser, S. N., Schieve, L. A., Parks, S. E., Hall, J. E., Brody, D., Simile, C. M., Thompson, W. W., Baio, J., Avenevoli, S., Kogan, M. D., & Huang, L. N. (2013). Mental health surveillance among children – United States, 2005-2011. *Centers for Disease Control and Prevention, 62(02),* 1-35.

Prevatt, F., & Young, J. L. (2014). Recognizing and treating attention-deficit/hyperactivity disorder in college students. *Journal of college student psychotherapy,28(3)* 182-200. https://doi.org/10.1080/87568225.2014.914825

Quinn, P. O. (2005). Treating adolsecent girls and women with ADHD: gender-specific issues. *National center for gender issues and ADHD, 61(5),* 579-587. https://doi.org/10.1002/jclp.20121

Reale, L., Bartoli, B., Cartabia, M., Zanetti, M., Costantino, M. A., Canevini, M. P., Termine, C., & Bonati, M. (2017). Comorbidity prevalence and treatment outcome in children and adolescents with ADHD. *European Child & Adolescent Psychiatry, 26,* 1443-1457. https://doi.org/10.1007/s00787-017-1005-z

Reebye, P. (2008). Attention–Deficit Hyperactivity Disorder: A Handbook For Diagnosis And Treatment, Third Edition. Journal of the Canadian Academy of Child and Adolescent Psychiatry, 17(1), 31–33. https://doi.org/10.1177/070674370805300113

Sayal, K., Prasad, V., Daley.D., Ford, T., & Coghill. D. (2018). ADHD in children and young people: prevalence, care pathways, and service provision. *The Lancet Psychiatry, 5,* 175-186. https://doi.org/10.1016/S2215-0366(17)30167-0

Sciutto, M. J., Nolfi, C. J., & Bluhm, C. (2004). Effects of child gender and symptom type on referrals for ADHD by elementary school teachers. *Journal of emotional and behavioral disorders, 12(4),* 247-253. https://doi.org/10.1177/10634266040120040501

Sibley, M. H., Pelham, W. E., Jr., Molina, B. S. G., Gnagy, E. M., Waxmonsky, J. G., Waschbusch, D. A., Derefinko, K. J., Wymbs, B. T., Garefino, A. C., Babinski, D. E., & Kuriyan, A. B. (2012). When diagnosing ADHD in young adults emphasize informant reports, DSM items, and impairment. *Journal of Consulting and Clinical Psychology, 80*(6), 1052–1061. https://doi.org/10.1037/a0029098

Slobodin, O., & Davidovitch, M. (2019). Gender differences in objective and subjective measures of ADHD among clinic-referred children. *Frontiers in human neuroscience, 13*. https://doi.org/10.3389/fnhum.2019.00441

Sonuga-Barke, E. J. S., Brandeis, D., Cortese, S., Daley, D., Ferrin, M., Hotlman, M., Stevenson, J., Danckaerts, M., Oord, S., Döpfner, M., Dittmann, R. W., Simonoff, E., Zuddas, A., Banaschewski, T., Buitelaar, J., Coghill, D., Hollis, C., Konofal, E., Lecendreuw, M., Wong, I. C. K., & Sergeant, J. (2013). Nonpharmacological interventions for ADHD: Systematic review and meta-analyses of randomized controlled trials of dietary and psychological treatments. *American journal of psychiatry, 170(3),* 275-289. doi:10.1176/appi.ajp.2012.12070991

Swanson, J. M., Volkow, N. D., Newcorn, J., Casey, B., Moyzis, R., Grandi, D., & Posner, M. (2006). Attention deficit hyperactivity disorder. *Encyclopedia of Cognitive Science.* https://doi.org/10.1002/0470018860.s00416

Westerlund, J., Holmberg, K., & Fernell, E. (2010). Academic performance of adolescents with ADHD and other behavioral and learning problems – a population-based

longitudinal study. *Acta paediatrica, 100(3),* 401-406. https://doi.org/10.1111/j.1651-2227.2010.02048.x

Weyandt, L. L., Iwaszuk, W., fulton, K., Ollerton, M., Beatty, N., Fouts, H., Schepman, S., & Greenlaw, C. (2003). The internal restlessness scale: Performance of college students with and without ADHD. *Journal of learning disabilities, 36(4),* 382-389. https://doi.org/10.1177/00222194030360040801

Wiener, J. (2020). The role of school psychologists in supporting adolescents with ADHD. *Canadian journal of school psychology, 35(4),* 299-310. https://doi.org/10.1177/0829573520923536

Young, S., Adamo, N., Ásgeirsdóttir, B. B., Branney, P., Beckett, M., Colley, W., Cubbin, S., Deeley, Q., Farrag, E., Gudjonsson, G., Hill, P., Hollingdale, J., Kilic, O., Lloyd, T., Mason, P., Paliokosta, E., Perecherla, S., Sedgwich, J., Skirrow, C ... & Woodhouse, E. (2020). Females with ADHD: an expert consensus statement taking a lifespan approach providing guidance for the identification and treatment of attention-defic/hyperactivity disorder in girls and women. *BMC Psychiatry, 20*, 404. https://doi.org/10.1186/s12888-020-02707-9