

# Gender as a moderator and age as a mediator variable in predicting the school adjustment based on self-evaluated symptoms of ADHD

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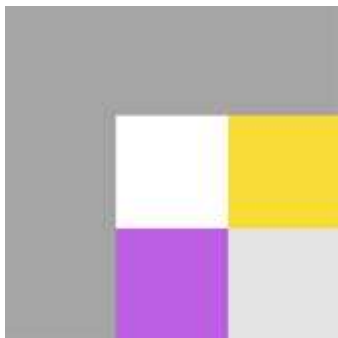
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## GENDER AS MODERATOR AND AGE AS MEDIATOR VARIABLES IN PREDICTION OF SCHOOL ADJUSTMENT BY SELF-EVALUTED SYMPTOMS OF ADHD<sup>2</sup>

The aim of the research was to examine the moderating role of gender and the mediating role of age in predicting the school adjustment by self-evaluating the symptoms of ADHD. The study included 501 students from higher grades of primary school, out of which 50.7% were boys, and the average age was 12.72. They completed Hyperactivity-impulsivity-attention Scale, Self-efficacy Questionnaire for Children, and were given some general information. Research showed that gender had only main effect on the school success, meaning that being female predicted a better school success. Age had completely mediating role for symptoms of hyperactivity and a school success (i.e., as the students' age increases, there is no correlation between hyperactivity and the school success), and a partial mediating role for symptoms of inattention and both measures of school adjustment (i.e., as the students' age increases the correlation among symptoms of inattention and academic self-efficacy and school success become weaker).

**Key words:** ADHD, age, gender, predictors, school adjustment

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## Introduction

Attention-Deficit Hyperactivity Disorder (ADHD) is a common developmental disorder in school age children, which has a great negative impact on the children's school adjustment, and consequently on children's academic future. The ADHD diagnosis is hard to recognize before the fourth or the fifth year of age, because younger children greatly differ in their usual behavior, and there are less demands on children to focus their attention and control the behavior (Barkley, 2006; McGoey, Eckert, & Dupaul, 2002). However, most frequently, diagnosis of ADHD is set when the child starts going to school or in higher classes of primary school, because in these periods there are higher demands for school adaptation (Velki & Cimer, 2011). Even more problematic situation is with children who are only suspected to have ADHD. They also have significant problems in everyday functioning, especially problems within the school domain (Velki & Dudaš, 2016; Velki & Romstein, 2017), and since they have not been diagnosed with ADHD, they are not included in the school intervention educational programs.

## Gender and Age Differences in ADHD

ADHD is more commonly diagnosed in boys than in girls, 4 to 1, but research on ADHD in adulthood suggests an equal ratio, 1 to 1, between men and women (Velki, 2012a). For boys, the dominating symptoms are usually hyperactivity and impulsivity (i.e., disruptive behavior), which commonly interfere significantly with learning. Therefore, it can be much more recognizable in the earlier age (at the beginning of the primary school, even sometimes in the kindergarten), and more frequently diagnosed (Biederman et al., 2002; Cantwell, 1996; Ramtekkar, Reiersen, Todorov, & Todd, 2010; Rucklidge, 2010). The identification period for boys is in the lower grades, while the identification period for girls is in the higher grades of primary school (usually at the 6<sup>th</sup> grade), due to the predominant symptoms of inattention, which at that time significantly disrupt the students' school success (Gaub & Carlson, 1997; Velki, 2012b). A major research has shown that almost 82 percent of the teachers believe that the attention deficit disorder is more prevalent in boys (Quinn & Wigal, 2004). Furthermore, 25 percent of the teachers admit they have more difficulty recognizing ADHD symptoms in girls than in boys. Meta-analysis of gender differences in ADHD has shown how ADHD boys in comparison to ADHD girls have stronger symptoms of hyperactivity, inattention, impulsivity, and externalizing problems, while ADHD girls have greater intellectual impairments and more internalizing problems (Gershon, 2002). Girls with unrecognized ADHD diagnosis are also more likely to have problems at school, social settings, and personal relationships (Gershon, 2002; Rucklidge & Tannock, 2001).

The symptoms of ADHD also differ depending on children's age. Most common ADHD symptoms in school children are manifested in a typical way: in

the classroom, they cannot sit calmly for a longer period, or they often stand up or walk around the classroom. In addition, children with ADHD constantly ask questions to other children and teachers, spin objects, tap their hands, and shake their feet or legs excessively, often leave the table during meals and talk excessively (Barkley, 1998, 2000; Velki, 2012a). As children mature, symptoms of hyperactive behavior generally become less obvious. By late childhood and early adolescence, signs of an excessive motor activity are less common and can be reduced to just squirming and feeling irritable and restless (Wasserstein, Wasserstein, & Wolf, 2001; Wells, Dahl, & Snyder, 2001). For school children, symptoms of inattention affect their classroom work and academic achievement. It often happens that a child copies the text from the board incorrectly, that he/she continuously turns to other students in the classroom, does not remember his/her homework, forgets when he/she needs to arrive to extracurricular activities, or forgets to bring money for the snacks, etc. (Velki, 2012). Predominantly inattentive type of ADHD often remains unrecognized, since school demands up to the fourth grade are not so high. However, in the higher grades of primary school, i.e., the sixth grade, when school demands and lessons become more difficult, inattention problems become more visible, and girls usually get the ADHD diagnosis.

### **Academic Adjustment in Children Suspected of ADHD**

Numerous studies have confirmed that children with ADHD, regardless of their average or even above average intellectual abilities, have poorer academic adjustment, meaning poorer school success and perception of lower academic self-efficacy. ADHD has a negative impact on the academic performance of students, because it causes problems with memory, executive functions, self-regulation, and concentration (Turnbull, Turnbull, & Wehmeyer, 2010). Students with ADHD tend to have poorer school performance, lower scores on the standardized measures of achievement, they report more academic problems and are less likely to complete high school and continue their education in comparison to their peers who do not have ADHD (Barkley, 2006; DuPaul & Langberg, 2015; Frazier, Youngstrom, Glutting, & Watkins, 2007; Weyandt & DuPaul, 2008; Wu & Gau, 2013). According to Weyandt and DuPaul (2008), the ability to maintain attention is the best predictor of their GPA. Furthermore, Frazier et al. (2007) have found that it is possible for students with ADHD, who have particularly prevalent problems with symptoms of inattention and impulsivity, to confidently predict ADHD students' average rating, even at the end of the first year of the faculty. Similarly, Young, Heptinstall, Sonuga-Barke, Chadwick, and Taylor (2005) have conducted an eight-year longitudinal study in which the girls with ADHD have been observed, and it has been found that the main risk factor for poor academic self-efficacy is the combination of hyperactivity and inattention. Additional studies have found that up to 70% of children with ADHD have comorbidity with some of the learning difficulties (Mayes, Calhoun, & Crowell, 2000). However, even the students who are

only suspected of ADHD have almost the same school related problems. Students suspected of ADHD have an increased risk for poorer school success than the control group of children, which is shown in the two-year follow-up of this group where children have shown a significant decline in the school success (Bussing et al, 2010), and drop out of the school more (Norén Selinus et al., 2016). Although children suspected of ADHD achieve better school success in all domains (reading, writing, mother language, and math), as well as on executive function tests compared to their peers who have ADHD diagnosed, they are worse in comparison to the peers without the ADHD diagnosis (August, Ostrander, & Bloomquist, 1992; Hong et al., 2014). In addition, most students with the ADHD diagnosis drop out of school and fail to get a degree until the age of 25, immediately followed by the students suspected of ADHD (Fergusson, Boden, & Horwood, 2010).

Previous studies have mainly focused on children who already have a confirmed diagnosis of ADHD (Balázs & Keresztény, 2013), as well as a frequent comorbidity with other disorders, whereas in the present study, the focus is on children who are suspected of ADHD. They show more prominent symptoms of the disorder, since they have neither organized treatment nor prevention. Study with the primary school teachers has shown that over 90% of the teachers are not familiar with the DSM-V criteria for the ADHD diagnosis, but regardless of the ignorance of the problem, they have readily estimated which children are suspected of ADHD (Rafalovich, 2008). The assumption is that children who are suspected of ADHD, not just those with diagnosis, also have problems with academic adjustment, due to existence of some ADHD symptoms.. Previous studies have generally found consistent results on gender and age differences in the expression of symptoms of ADHD (Biederman et al., 2002; Cantwell, 1996; Gershon, 2002; Ramtekkar et al., 2010; Rucklidge, 2010), but studies that examine the moderating role of gender and the mediating role of age in terms of ADHD symptoms and academic adjustment cannot be found. Confirmed gender differences in expression of ADHD symptoms suggest that gender is very important in predicting children's school adjustment based on the ADHD symptoms. . In addition, the problems that cause the ADHD symptoms vary with the child's age. Studies (Velki, 2012b; Wasserstein et al. 2001; Wells et al., 2001) indicate greater difficulties in more prominent symptoms of hyperactivity and impulsivity for younger children, which is characteristic for boys, and symptoms of inattention that significantly disrupt school function in older children, which is typical for girls.

## Objectives

The goal of this research is to test the moderation role of gender in predicting the school adjustment (two aspects: school success and academic self-efficacy) based on the self-evaluated symptoms of ADHD (predictors are: self-evaluated hyperactivity, impulsivity and inattention), and also the mediating role of age in

predicting the school adjustment based on the self-evaluated symptoms of ADHD. In doing so, the participants have been carefully selected: children in the fourth grade of primary school (who have passed the first identification period in which the boys are more often diagnosed with a combined and hyperactive-impulsive type of ADHD), children in the sixth grade of primary school (the age for the second identification period in which the girls are more often diagnosed with an inattentive type of ADHD), and children in the eighth grade of primary school (the age in which both identification periods are completed, and where the ratio of boys and girls with ADHD is almost equal).

## Hypotheses

H1: Gender will be a direct predictor of the school adjustment. Girls will have better school success and higher academic self-efficacy.

H2: Gender will have a moderating role in predicting the school adjustment by self-evaluating symptoms of ADHD. All self-evaluated symptoms of ADHD (impulsivity, hyperactivity and inattention) will be better predictors of the school adjustment (school success and academic self-efficacy) for girls than for boys.

H3: Self-evaluated symptoms of ADHD will be direct predictors of the school adjustment. Students with greater self-evaluated symptoms of ADHD (impulsivity, hyperactivity and inattention) also have poorer school success and lower academic self-efficacy.

H4: Age will have a mediating role in correlation between the school adjustment and self-evaluated symptoms of ADHD. Correlation between self-evaluated symptoms of ADHD (impulsivity, hyperactivity, and inattention) and the school adjustment (school success and academic self-efficacy) will become weaker as students become older.

## Method

### Sample and Procedure

The study included six primary schools. The participants were students of the fourth, sixth and eighth grades. The total number of students who were asked to participate was 896, and 501 (55.92%) of them agreed to participate (254 boys and 247 girls). The age range was 10-16, and the average age was 12.72 ( $SD = 1.62$ ). According to the place of residence, 368 participants lived in the city (73.4%) and 133 of them lived in the rural areas (26.6%). Table 1 shows the distribution of students by gender, age and grades which they attend.

Table 1  
*Distribution of students by gender and grade they attend*

Grade	Gender	<i>f</i>	%	Mean age
4th grade	boys	50	48	<i>M</i> = 10.9 <i>SD</i> = 0.48
	girls	54	52	
	total	104	20.8	
6th grade	boys	91	49.2	<i>M</i> = 12.25 <i>SD</i> = 0.46
	girls	94	50.8	
	total	185	36.9	
8th grade	boys	112	52.6	<i>M</i> = 14.32 <i>SD</i> = 0.49
	girls	100	47.4	
	total	212	42.3	
Overall	boys	254	50.7	<i>M</i> = 12.72 <i>SD</i> = 1.62
	girls	247	49.3	
	total	501	100.0	

*Note.* *M* – mean, *SD* – standard deviation.

Ethical commission of the Faculty of Education at the University of Osijek approved the study. Cross-sectional data were collected during the summer school semester, in the school year 2015/2016. After consulting with the schools and getting permission to use the questionnaires, consents from parents were collected. The research was conducted in groups, and lasted about 45 minutes. It took place in the classes with their homeroom teacher. It was emphasized that the survey was anonymous and that there were no right or wrong answers, but the sincerity in answers was important in completing the questionnaires. At the beginning of each questionnaire, detailed instructions were given to the students, and if there were some questions during the completion of the questionnaires, the researcher provided an individual explanation. Participants could give up at any time during the research, but there were no such cases.

## Instruments

**Hyperactivity-Impulsivity-Attention Scale (HIP, Vulić-Prtorić, 2006).** HIP Scale measures hyperactive and impulsive behaviour and difficulty in managing attention. It consists of 19 items, which are divided into three sub-scales: hyperactivity (6 items), impulsivity (4 particles) and inattention (9 items). The items are actually claiming that they describe the most common symptoms of hyperactivity, impulsivity and inattention. HIP Scale is designed on the basis of a list of symptoms from DSM-IV, which are used to measure symptoms of attention deficit hyperactive disorder, and for the theoretical interpretation of ADHD symptoms.. The task of the participants is to self-evaluate how often certain behaviour has

occurred in the last 6 months. Accordingly, next to each claim they should circle a number: 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *very often*. The result is obtained by calculating the arithmetic mean of the selected items. Internal reliability for the hyperactivity subscale is Cronbach  $\alpha = .86$ , the impulsivity subscale  $\alpha = .80$ , and for the subscale of inattention  $\alpha = .88$ .

**Self-efficacy Questionnaire for Children (SEQ-C, Vulić-Prtorić & Sorić, 2006).** Self-efficacy Questionnaire for Children measures children's sense of self-efficacy in 3 different areas: academic self-efficacy, social self-efficacy, and emotional self-efficacy. The questionnaire consists of 24 items divided into three subscales: Academic Self-Efficacy Scale ( $k = 8$ ), which relates to the perceived ability to cope with the school tasks and learning materials, and to meet the school expectations; Social Self-Efficacy Scale ( $k = 9$ ); Emotional Self-Efficacy Scale ( $k = 7$ ), and for the purpose of this study only, academic self-efficacy scale was used. The task of the participants was to self-evaluate to which degree certain described behaviour applies to them. Accordingly, next to each description they should circle a number: 1 = *not at all*, 2 = *mostly not*, 3 = *not sure*, 4 = *mostly yes*, 5 = *always yes*. The results were obtained by calculating the arithmetic mean of each claim. Internal reliability in our research for academic self-efficacy subscale was Cronbach  $\alpha = .84$ .

**General Information.** At the beginning of the research, the students completed the survey on demographic data (gender, age, place of residence, and who they live with). Also, they provided information on their school success (general success at the end of semi-semester and at the end of the last school year; grade in mathematics at the end of semi-semester and at the end of last school year; grade in Croatian language (mother tongue) at the end of the semi-semester and at the end of last school year). Internal reliability in our survey was Cronbach  $\alpha = .79$ .

## Results

### Descriptive Statistics

Descriptive statistics are shown in Table 2. Variables for self-evaluated symptoms of ADHD are mean values of items measured on the subscales of Hyperactivity-impulsivity-attention Scale (HIP). School success is the mean value of students' mathematics school grade at the semi-semester and at the end of school year; mother tongue and general school success and academic self-efficacy is the mean value of items from the Academic Self-efficacy Scale of Self-efficacy Questionnaire for Children (SEQ-C). School success and academic self-efficacy together represented a measurement of the school adjustment. There was no major deviation from the normal distribution (skewness and kurtosis did not exceed the value greater than  $\pm 1$ ) thereby for analysing data parametric statistics were used.



Table 2

*Descriptive statistics for variables measured in research*

Variables	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>Sk</i>	<i>Ku</i>
Hyperactivity	501	1.00	5.00	2.28	1.02	0.74	-0.28
Impulsivity	500	1.00	5.00	2.15	0.95	0.85	0.06
Inattention	500	1.00	4.78	2.14	0.89	0.66	-0.28
School success	501	1.67	5.00	4.09	0.80	-0.58	-0.58
Academic Self-Efficacy	501	1.00	5.00	3.57	0.83	-0.39	-0.05

*Note.* *N* – number of participants, *Max* – maximal score, *Min* – minimal score, *M* – mean,

*SD* – standard deviation, *Sk* - skewness, *Ku* – kurtosis.

### Gender as Moderator Variable

Hierarchical multiple regression was used to assess the effects of the moderating role of gender (Table 3). In the first step, symptoms of ADHD were tested as direct predictors of the school adjustment. In the second step, gender was added as a predictor (coded 0 for males and 1 for females), and in the third step, interaction of gender with every symptom of ADHD (impulsivity, hyperactivity, and inattention) was added to check the moderation role of gender. Gender only significantly predicted the school success, but not the academic self-efficacy, concluding that female students had better school success. There was no statistically significant interaction effect (moderator) of gender. Lower level of self-evaluated symptoms of hyperactivity and inattention were predictors of better school success, and lower level of self-evaluated symptoms of impulsivity and inattention were predictors of better academic self-efficacy.

Table 3

*Results of hierarchical regression analysis for predicting the school success and academic self-efficacy based on hyperactivity, impulsiveness, inattention and gender*

	School success	Academic Self-Efficacy
	$\beta$	$\beta$
Hyperactivity	-.19*	.08
Impulsivity	.02	-.18**
Inattention	-.38***	-.54***
Regression model	$R = .26; R^2 = .07$ $R^2_{\text{kor}} = .06$ $F_{(3,490)} = 11.87; p < .001$	$R = .49; R^2 = .24$ $R^2_{\text{kor}} = .23$ $F_{(3,490)} = 50.87; p < .001$
Hyperactivity	-.16*	.07
Impulsivity	-.01	-.17**
Inattention	-.36***	-.54***
Female vs Male	-.19***	.02
Regression model	$R = .32; R^2 = .10$ $R^2_{\text{kor}} = .09$ $F_{(4,489)} = 19.24; p < .001$	$R = .49; R^2 = .24$ $R^2_{\text{kor}} = .23$ $F_{(4,489)} = .27; p > .05$
Hyperactivity	-.05	.07
Impulsivity	-.05	-.24*
Inattention	.15	.26
Female vs Male	-.25*	-.06
Hyperactivity x Gender	.32	-.02
Impulsivity x Gender	-.11	-.14
Inattention x Gender	.35	-.10
Regression model	$R = .33; R^2 = .11$ $R^2_{\text{kor}} = .10$ $F_{(7,486)} = .89; p > .05$	$R = .49; R^2 = .24$ $R^2_{\text{kor}} = .23$ $F_{(7,486)} = .70; p > .05$

Notes. Male gender is coded with 0 and female with 1.

\*\*\*  $p < .001$ . \*\*  $p < .01$ . \*  $p < .05$ .

### Mediating Role of Age: Symptoms of ADHD as Predictors of School Adjustment

The hierarchical multiple regression analysis was also used to examine the mediating role of age (Figure 1).

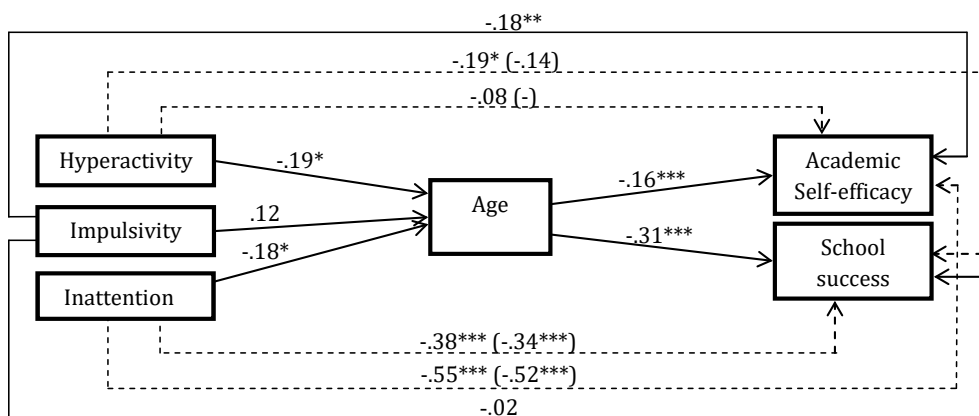


Figure 1. Mediation model: age as a mediator variable in relation between self-evaluated symptoms of ADHD and school adjustment.

\*\*\*  $p < .001$ . \*\*  $p < .01$ . \*  $p < .05$ .

In the first step, predicting the school adjustment by ADHD symptoms was checked. In the second step, the prediction of age by ADHD symptoms was checked. In the third step prediction of the school adjustment by age was checked. In the last step, hierarchical multiple regression was done with all predictors, symptoms of ADHD, and gender. If mediation occurred, the mediator (age) would be significant in this fourth equation (partially or fully mediated). Age had a mediating role in correlation between two self-evaluated symptoms of ADHD, hyperactivity and inattention, and two measures of the school adjustment, academic self-efficacy, and the school success. Greater self-evaluated symptoms of hyperactivity predicted lower school success, but they did not predict academic self-efficacy. Students who had greater self-evaluated symptoms of hyperactivity also had lower school success, but when we included age as a mediating variable, there were no significant connection between self-evaluated symptoms of hyperactivity and the school success, i.e., age had a full mediating role and as the students' age increased, there was no correlation between self-evaluated hyperactivity and the school success. Greater self-evaluated symptoms of inattention predicted lower school success and lower academic self-efficacy. Age had a partially mediating role in these relations, i.e., with students' age it was increasing, while the correlation between self-evaluated symptoms of inattention and both measures of school adjustment, academic self-efficacy and school success, became weaker. Self-evaluated symptoms of impulsivity predicted only academic self-efficacy and mediation effect was not found, i.e., students who had greater self-evaluated symptoms of impulsivity also had lower self-estimated academic self-efficacy.

## Discussion

### Moderating Role of Gender in Predicting School Adjustment by Self-Evaluated ADHD

Recent studies have shown that the problems causing the symptoms of ADHD vary depending on the child's gender, as well as that symptoms of ADHD manifest with greater intensity in boys than in girls, which leads to boys being diagnosed with ADHD more often (Biederman et al., 2002; Ramtekkar et al., 2010; Rucklidge, 2010; Velki, 2012a). According to the first aim of the study, testing the moderation role of gender, the results showed that gender had only main effect on one measure of the school adjustment, i.e., the school success, meaning that being female predicted better school success. It was possible because of our sample, which covered students from the fourth to the eighth grade of primary school (higher grades of primary school), and had approximately the same number of boys and girls with ADHD symptoms, moderation effect of gender was not significant, which would be different if our sample covering children from the first to the fourth grade. Also, it was possible that insignificant moderation effect occurred due to using self-evaluation measure of ADHD symptoms, and the research did not include children with the diagnosis of ADHD.

The results of the research have shown that all self-evaluated symptoms of ADHD predict poorer school adjustment (for boys and for girls), i.e., hyperactivity and inattention predict poorer school success and impulsivity, and inattention predicts poorer academic self-efficacy. Problems of inattention, i.e., a lack of concentration, disability to follow the instruction, not finishing exams, etc., directly influence the school success, meaning that children with inattention problems get poorer school grades, but also feel less successful and able to carry out academic tasks. Hyperactivity, as an externalized problem behavior, is a predictor of negative school success. Students with hyperactivity are restless, they do not finish the tasks teacher gave them, they are always in motion, make fun of the classes, etc. Due to the previously mentioned behavior they have problems with the school grades. These results are in accordance with previous studies that have shown that combination of inattention and impulsivity predict poorer school success even in college students (Frazier et al., 2007). Impulsivity, which is more biological problem, is the predictor of poorer academic self-efficacy. Since these students have problems with self-control, they also have problems with following the rules not only the school rules, but the social ones as well (Corkum, Corbin, & Pike, 2010). Because of this, they feel unsatisfied and do not have the ability to produce the desired or intended result, which ends in poor academic self-efficacy. Children suspected of ADHD typically externalize their frustrations and show more externalized problems, which are more often recognized as inappropriate behavior, and consequently are punished more often. Although teachers and parents recognize this kind of problem behavior, they are usually unaware that the problem

behavior is a part of the ADHD symptomatology. Therefore, they do not solve the problem adequately (i.e., with the use of appropriate methods and techniques for teaching and working with children with ADHD), but give more negative feedback and more sanctions to those children (Velki & Dudaš, 2016).

### **Mediating Role of Age in Predicting School Adjustment by Self-Evaluated ADHD**

Previous studies have shown that different types of ADHD are often diagnosed at a different period of life (Velki, 2012b; Wasserstein et al., 2001; Wells et al., 2001). In younger children, more externalizing problems dominate in kindergartens and lower grades of primary school, (i.e., hyperactivity and impulsivity), and in older children and adolescents, symptoms of inattention mostly cause problems with school adjustment in higher grades of primary school and the high school. Consistently with the second aim, testing the mediating role of age, the results have shown that age has a mediating role in correlation between self-evaluated hyperactivity and inattention, with academic self-efficacy and school success. Age has a full mediating role in correlation between self-evaluated hyperactivity and school success. Greater self-evaluated symptoms of hyperactivity are significant predictors of poor school success, but as the students' age increases, this correlation becomes insignificant. These results are consistent with the previous research which shows how symptoms of hyperactive behavior usually become less obvious and less common with children growing up (Wasserstein et al., 2001; Wells et al., 2001). Usually, adolescents with ADHD partially learn how to control their excessive motor activity due to the maturing processes, which enable them to control their disruptive behavior during class. Hyperactive behavior at the adolescent age has the tendency to become more internalized, meaning that they have more problems with organizing their thoughts and a constant feeling of inner restlessness.

The obtained results also show a partially mediating role of age for the self-evaluated symptoms of inattention and both measures of school adjustment, i.e., school success and academic self-efficacy. Greater self-evaluated symptoms of inattention predict lower school success and lower academic self-efficacy, but when we include age as a mediating variable, correlation between the self-evaluated symptoms of inattention and both measures of school adjustment, academic self-efficacy and school success, become weaker, which is also in accordance with the previous studies (Barkley, 2000; Weyandt & DuPaul, 2008). In younger school age children, problems with inattention are evident in their everyday school life, i.e., they usually incorrectly copy the text from the board, they do not remember what they have for homework, they forget tasks that teachers just gave them, etc. and teachers usually attribute that behavior to laziness and children's immaturity (Barkley, 2000; Passolt, 2002). However in adolescence, especially in the 5<sup>th</sup> and the 6<sup>th</sup> grade of primary school (when more demanding tasks are set in front

of them), dominating symptoms of inattention are usually recognized as a disorder (predominantly inattentive type of ADHD is most commonly diagnosed at this period). Afterwards, the teacher and the school counselor can start working appropriately with these children, meaning that children and adolescents can start learning how to handle problems caused by the symptoms of inattention (Velki, 2012a). At this period, people from children's environment realize that problems with grades and academic self-efficacy are not the reflection of their spoiled behavior and laziness, but rather consequences of the disorder. Inattention has the worst effects on children's academic success, i.e., negative influence on results of the cognitive and achievement tests, GPA, processing information, and executive functions (DuPaul & Langberg, 2015; Todd et al., 2002). Therefore, it is expected that this strong connection cannot be fully mediated just with the child's age, especially because this research has included only students from the primary school, and not the older ones. They should be in some kind of intervention and therapy for a certain period of time, and that can help them to learn how to deal with the attention deficits. In addition, at the high school and college level of education, attention deficit has the most negative influence on academic and social functioning, as well as on learning habits and learning skills (Norvilitis, Sun, & Zhang, 2010; Norwalk, Norvilitis, & MacLean, 2009; Pagani et al., 2008). Self-evaluated symptoms of impulsivity are only direct predictors of academic self-efficacy, i.e., greater self-evaluated symptoms of impulsivity predict lower academic self-efficacy. This is consistent with the previous research (Frazier et al., 2007), which has shown it is possible to predict academic problems for students with particularly prevalent problems with inattention symptoms even at the end of the first year of faculty. Symptoms of impulsivity occur due to the reaction inhibition problem in children with ADHD, and this is a more biological problem, i.e., it is a deficit in inhibitory system of the child (Barkley, 2000; Gardner, 2002). Therefore it is expected that it has a more direct influence on the school adjustment. Children who have problems with self-regulation and self-control need constant supervision from the adults. Many intervention programs at schools can be used in working with ADHD children. One of them is psycho-education of teachers. In order for teachers to know how to respond properly to the needs of children with ADHD, they need to be fully acquainted with the disorder itself. Teachers need to know and recognize the symptoms of ADHD in their students, and distinguish them from other problem behaviors. In addition, some basic techniques taken from the cognitive-behavioral therapy has proved to be very successful in the class environment, such as a technique stop-think-do for problems with impulsivity, or a reward system for developing better attention (Velki, 2012b). Furthermore, the class organization can have an important role, in a way that the teacher could constantly monitor and correct unwanted behaviors. Furthermore, a child with ADHD needs an additional guidance due to attention deficits, and the teacher should ensure that the child does not have any additional distractions (e.g., not sitting at the desk beside students who show inappropriate behavior, not sitting too close

to the window, to remove toys from desk, etc.). Moreover, application of educational technology in the classroom can have quite a few benefits for children with ADHD. Due to a large number of distractors in the environment and the attention difficulties, children with ADHD generally respond very well to new technologies, which require a certain degree of attention and concentration, but in an interesting and acceptable way. The use of computers, tablets and smart phones greatly facilitates their work, which actually leads them systematically and gives them an immediate feedback of the task. (Velki, 2012a).

## Contributions and Limitations of the Study

The obtained results should be observed with regard to some methodological shortcomings. As it has been already stated, it is a population of children who are generally not under medical treatment, who have not been diagnosed with the disorder, but instead who have self-estimated that some symptoms of ADHD more often occur to them than to their peers. Although in this study we have been interested in children suspected of ADHD, it should be taken into account that we have categorized them as suspected based only on the self-evaluation of symptoms. However, statistically speaking, children with ADHD represent about 5% of the population in most cultures (APA, 2014). Including children who are also suspected of ADHD, it is about 20% of the population of children. Another shortcoming of the study was a small response of the participants (55.92%). The survey was anonymous, but not all parents gave the permission for the child's participation in the study. The issue was who were the parents that did not give the consent. It was possible that they were the parents whose children exhibited symptoms of ADHD, or had some behavioral problems. Although generalization would be easier if we had a higher participant response, statistically speaking, our study included a total of 24.6% of children who self-estimated that they were suspected of ADHD, which was in line with the general trends, giving us, to some extent, the possibility for generalization of the given results.

Future research should focus on getting a larger number of participants, both children with a confirmed diagnosis of ADHD and those suspected of it, in order to make an easier comparison of these two groups, and the detection of the common factors of ADHD on which we can act preventively before the child receives the diagnosis. The use of other measures is also recommended, in addition to self-assessment (e.g., assessment of peers, parents, teachers, doctors), to get a complete insight into this issue, particularly for children suspected of ADHD. ADHD in boys is usually identified as early as the age of five. However, in girls ADHD is commonly diagnosed only in higher grades of primary school, and even in high school. Accordingly, it would be desirable for the future studies to include participants of different age groups, from preschool to high school education.

## Conclusion

The conducted research has shown the importance of the role of gender and age in predicting an academic adjustment based on the self-evaluated symptoms of ADHD. As well as the previous studies, this study has shown that boys with more intensive symptoms of hyperactivity and inattention also show poorer school success (Velki, 2012b). However, unlike the previous research, our study has confirmed that it is enough if the child only self-evaluates the symptoms of ADHD, i.e., if the child is suspected of ADHD (and does not have a medical diagnosis), and that these symptoms can significantly impair a school adjustment, especially in boys. All symptoms of ADHD significantly predict poorer school adjustment. In addition, based on the research results, it can be concluded that it is necessary to work with children who are suspected of ADHD, and not only with children who already have ADHD diagnosis. Throughout their education, teachers should gain competencies with which they can distinguish normative from disruptive behaviour in children at certain developmental stage, and accordingly, they can identify children who show deviating and suspicious behaviour for developing a particular disorder. Besides parents, teachers are the ones who spend most time with the children. In the cases of the child's disruptive behaviour, they should react immediately and look for help for the child, especially because children who are suspected of ADHD are not included in intervention and prevention programs, which could significantly help them in the school adjustment, and ensure continuation of their education.

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# SPOL KAO MODERATOR I DOB KAO MEDIJATOR VARIJABLE U PREDVIĐANJU ŠKOLSKE PRILAGODBE SAMOPROCijenjenim SIMPTOMIMA ADHD-A

Cilj ovog istraživanja je ispitivanje moderatorske uloge spola u predviđanju školske prilagodbe (školskog uspjeha i akademske samoeфикаsnosti) na temelju samoprocijenjenih simptoma ADHD-a (hiperaktivnosti, impulzivnosti i nepažnje). Također je cilj ispitati i medijacijsku ulogu dobi u predviđanju školske prilagodbe na temelju samoprocijenjenih simptoma ADHD-a. U tu svrhu odabran je uzorak od 501 učenika, 4., 6. i 8. razreda osnovne škole, kako bi se obuhvatila oba potencijala identifikacijska perioda. Dječaka je bilo 50.7%, a prosječna dob je bila  $M = 12.72$  ( $SD = 1.62$ ). Za vrijeme trajanja jednog školskog sata učenici su ispunili Skalu Hiperaktivnost-Impulzivnost-Pažnja, gdje su procijenili izraženost svojih simptoma na temelju DSM-IV liste simptoma ADHD, zatim Upitnik samoeфикаsnosti za djecu i na kraju su dali opće podatke uključujući i podatke o školskom uspjehu. Rezultati su pokazali kako je varijabla spol imala samo glavni efekt, a ne moderatorski kako je pretpostavljeno. Varijabla dob je imala medijacijsku ulogu u povezanosti simptoma hiperaktivnosti i školskog uspjeha, tj. s povećanjem dobi učenika korelacije između hiperaktivnosti i školskog uspjeha prestaje biti statistički značajna. Također je dobivena i djelomična medijacijska uloga dobi u povezanosti simptoma nepažnje i obje mjere školske prilagodbe, tj. kako se povećava dob učenika dolazi do slabljenja povezanosti između simptoma nepažnje sa akademskom samoučinkovitosti i školskim uspjehom. Također su sva tri simptoma ADHD-a predviđala slabiju školsku prilagodbu, što govori u prilog tome da je i kod djece suspektne na ADHD, a ne samo one s dijagnozom, otežano funkcioniranje u školskoj domeni te ih pravovremeno treba uključiti u intervencijske programe, odnosno osigurati im odgovarajuću edukacijsku podršku.

**Ključne riječi:** ADHD, dob, prediktori, spol, školska prilagodba

