Predictors of Aggressive Behaviour in Children with Autism Spectrum Disorder

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Abstract

Introduction: Aggressive behaviour is not the main symptom of autism spectrum disorders, and if it occurs in this population, it is a consequence of some other factors.

Objectives: With regard to that, the aim of this paper is to determine to what extent certain aspects of executive functions, severity of autism, sleep habits, and parenting actions contribute to the manifestation of different forms of aggressive behaviour in children with an autism spectrum disorder.

Methods: The sample included 40 children with autism spectrum disorders, 5-7 years of age (M=6.18, SD= .55). The following instruments were used in the assessment: The Children's Scale of Hostility and Aggression – Reactive/Proactive, Gilliam Autism Rating Scale – Third Edition, The Children's Sleep Habits Questionnaire and Behavior Rating Inventory of Executive Function.

Results: The obtained results showed that sleep problems were the most significant predictor of verbal, physical and covert aggression. From the domain of behavioural aspects of executive functions, only task monitor was a significant predictor of bullying, and inhibit and shift were significant predictors of hostility. From the field of autistic disorders, significant predictors of aggressive behaviour were emotional responses (as predictors of bullying, covert aggression and hostility), and maladaptive speech (as a predictor of verbal aggression, covert aggression and hostility). Punitive discipline was a significant factor only in explaining verbal aggression.

Conclusion: Practical implications of this research indicate that, in treating aggressive behaviour in children with ASD, more attention should be paid to sleep habits, practising task monitor, inhibit and shift skills, and avoiding rigorous punitive measures.

Key words*: Maladaptive behaviour, Sleep habits, Executive functions*

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1. Introduction

There are many definitions of aggression, however, most authors agree that it is a form of behaviour with the aim to inflict injury, harm or unpleasantness on others (Anderson & Bushman, 2002; De Almeida et al., 2015; Miczek et al., 2007). According to contemporary understanding, there are two main types of aggression: proactive aggression, where the motive is to achieve an objective with aggressive behaviour, and reactive, i.e. provoked, aggression, which occurs in response to aggressive behaviour of others or similar disturbing circumstances (Eagly & Steffen, 1986). In further division into subtypes, some authors distinguish between verbal and physical aggression, bullying, covert aggression, and hostility (Farmer & Aman, 2009). Verbal aggression is most frequently manifested in shouting, swearing, threatening, teasing, while physical aggression is manifested in physical assault on another person (Žužul, 1989). Bullying is repetitive aggressive behaviour characterised by attacks on others who typically have difficulties in defending themselves because they are at a disadvantage compared to the bully (Smith, 2016). Indirect aggressive behaviour is covert aggression, which is often manifested as manipulative behaviour with adverse effects on another person (Žižak & Jeđud, 2005), while hostility is defined as an impulsive, unplanned, emotional reaction to a perceived threat (Ahsan, 2015).

Most research studies on aggressive behaviour in people with autism spectrum disorders (hereafter ASD) focus on examining the functions of such behaviour (Farmeret al., 2015). The results of studies which examined the incidence of aggressive forms of behaviour indicate a somewhat higher incidence of these problematic patterns of behaviour in the population of people with ASD compared to people with intellectual disabilities and other types of atypical development (Hattier, Matson, Belva, & Horovitz, 2011). However, the authors emphasize that in the population with ASD, as well as in the general population, high levels of aggression are not expected, but that increased aggression occurs as a consequence of some other factors, and not ASD directly (Farmer & Aman, 2009). In accordance with this, Farmeret al. (2015) point out that there is insufficient research

to examine both risk and protective factors associated with different types of aggressive behaviour in the population of people with ASD.

The severity of ASD symptoms is inconsistently related to the manifestation of aggressive behaviour. With regard to that, Matson & Rivet (2008) point to the existence of such relation, while other authors have not found significant correlations between these two constructs (Kanne & Mazurek, 2011; Visser, Berger, Prins, Van Schrojenstein Lantman-De Valk, & Teunisse, 2014).

Sleep difficulties are one of the most common problems in people with ASD (Cortesi, Giannotti, Ivanenko, & Johnson, 2010). The most frequent sleep difficulties in children with ASD include getting them to sleep, insomnia, night awakenings, nightmares and daytime drowsiness (Krakowiak, Goodlin-Jones, Hertz-Picciotto, Croen, & Hansen, 2012). Research results indicate that sleep problems are significant risk factors of aggressive behaviour in children with ASD (Adams, Matson, & Jang, 2014; Chen et al., 2017).

The findings of some studies indicate that parenting behaviour and actions may also be related to the manifestation of aggressive behaviour in children with ASD. Research by Dieleman et al. (2017) shows that when children with ASD manifest externalizing behavioural problems, a lower level of closeness between parents and children is registered, and also, in these situations, parents report lower levels of parental competence. When children with ASD manifest aggressive behaviour, or behaviour which breaks the rules, parents feel as if they have no control over their child's behaviour and see that as a reflection of their own incompetence.Certain studies show that deficit in executive functions contributes to the presence of repetitive behaviours in children with ASD (Boyd, McBee, Holtzclaw, Baranek, & Bodfish, 2009), and that problems with shifting difficulties influence the manifestation of aggression (Visser et al., 2014).

2. Aim od the Article

The aim of this research is to determine to what extent certain aspects of executive functions, ASD severity, sleep habits and parenting actions contribute to the manifestation of verbal, covert,

and physical aggression, as well as bullying and hostility in children with ASD.

3. Materials and Methods

3.1. Sample

The inclusion criteria were: existence of ASD and the child's age from five to seven years. Any children who did not meet diagnostic criteria for autistic disorder or for age were excluded.

The sample included 40 children with ASD, out of whom 37 were boys (92.5%) and three were girls (7.5%). The participants were 5-7 years of age (M=6.18, SD= .55). ASD was diagnosed by a child psychiatrist in all participants in the sample. The children did not use pharmacological therapy and had no other comorbid diagnoses.

For the purpose of this research, the severity of autism was assessed in all participants by GARS-3 (Gilliam, 2014). Descriptive data is shown in Table 1.

Table 1

Results of GARS-3 scale

	Scale range	Min	Max	M	SD
Restricted/Repetitive behaviours	0 – 39	8	39	21.40	8.37
Social interaction	0 – 39	0	39	24.40	12.35
Social communication	0 – 27	0	27	22.65	7.10
Emotional responses	0 – 24	0	24	15.80	6.86
Cognitive style	0 – 21	0	21	6.78	6.62
Maladaptive speech	0 – 21	6	21	15.36	4.51

The presence of ASD can be confirmed in all participants on the basis of the calculated Autism index (Table 2). Most participants had severe (60%) or moderate (35%) ASD symptoms. Only two participants (5%) can be classified as having mild ASD symptoms.

Table 2

Autism index (descriptive data)

	Min	Max	M	SD
Autism index	60	133	102.42	16-88
Categories/classification			N	%
≤ 54	Uncertain		/	/
55 – 70	Mild autism (level 1)		2	5.0
71 – 100	Moderate autism (level 2)		14	35.0
≥ 101	Severe autism (level 3)		24	60.0

The research also included 40 parents; 29 mothers (72.5%) and 11 fathers (27.5%). The parents were 28-45 years of age (M = 36.63, SD = 4.62). More than half of parents have higher education (60%), while 16 parents have secondary education (40%). Data were also collected from educators, 26-59 years of age (M = 36.70, SD = 7.92), with 2-39 years of work experience (M = 10.07, SD = 8.58).

3.2. Instruments

The Children's Scale of Hostility and Aggression – Reactive/Proactive (C-SHARP, Farmer & Aman, 2009) was used to assess aggression. The instrument assesses five dimensions of aggression: verbal aggression, bullying, covert aggression, hostility and physical aggression. The instrument consists of 48 items accompanied by a four-point scale (from 0 – absence of such behaviour, to 3 – frequent). The instrument showed good psychometric characteristics in a validation study, Cronbach's alpha coefficients ranged from .74 for Physical aggression to .92 for Verbal aggression (Farmer & Aman, 2009). In our study, Cronbach's alpha ranged from .81 for Covert aggression to .90 for the Bullying subscale.

Gilliam Autism Rating Scale – Third Edition (GARS-3, Gilliam, 2014) was used to assess the severity of ASD symptoms. The instrument consists of 57 items accompanied by a four-point scale which assesses the extent to which a child manifests the described behaviour (from 0 – does not manifest such behaviour, to 3 – fully manifests such behaviour). This instrument includes six subscales: Restricted/Repetitive behaviours, Social interaction, Social communication, Emotional responses, Cognitive style and Maladaptive speech. Raw scores are converted to scaled scores according to the instrument manual, and then the Autism index is calculated on the basis of scaled scores. In previous studies, this instrument showed high reliability with Cronbach's alpha above .90 (Gilliam, 2014), which was also confirmed in our research, where Cronbach's alpha ranged from .86 to .96.

Behaviour Rating Inventory of Executive Function (BRIEF, Gioia et al., 2000) was used to assess executive functions. The instrument consists of 86 items grouped into eight dimensions: Inhibit, Shift, Emotional control, Initiate, Working memory, Plan/organize, Task monitor and Organization of materials. Inhibit, Shift, and Emotional control are used in calculating Behaviour Regulation Index (BRI), while other dimensions are used in calculating Metacognition index (MI). Global Executive Composite (GEC) can be calculated on the basis of these two indexes. The scale showed high reliability in a validation study, Cronbach's alpha was above .80 for all dimensions (Gioria et al., 2000). In our research, Cronbach's alpha was above .80 for most subscales (from .82 for Working memory, to .85 for Emotional control), except for Initiate and Organization of materials, where the reliability coefficient was .76.

The Children's Sleep Habits Questionnaire (CSHQ, Owens, Spirito, & McGuinn, 2000) was used to assess sleep habits. The questionnaire consists of 22 items accompanied with a seven-point scale (from 1 – never, to 7 – always) on which parents assess the extent to which a child manifests certain sleep related behaviours (grinding teeth, night awakening, etc.). These items are used to calculate a general score, which is the extent to which a sleep related problem is manifested, in a way that a higher score indicates greater difficulties. Apart from that, the questionnaire includes general questions about usual bedtime, typical waking time, average daily naps time, and average daily sleeping time. In our research, this instrument showed a satisfactory level of internal consistency (α = .76).

The Parenting Behaviours and Dimensions Questionnaire (PBDQ, Reid et al., 2015) was used to assess parenting style. The questionnaire consists of 36 items grouped into six dimensions: Emotional warmth, Punitive discipline, Anxious intrusiveness, Autonomy support, Permissive discipline and Democratic discipline. All items are accompanied by a six-point scale on which parents assess their behaviour towards their child (from 1 – never, to 6 – always). In a validation study, satisfactory reliability was obtained for all questionnaire dimensions (Cronbach's alpha ranged from .70 for Permissive discipline to .83 for Emotional warmth), except for Anxious intrusiveness, where Cronbach's alpha was .66 (Reid et al., 2015). In our research, the instrument showed high reliability – Cronbach's alpha ranged from .79 for Permissive discipline to .96 for Democratic discipline.

In addition to the mentioned instruments, basic sociodemographic data (gender, age, diagnosis) were also collected for each child.

3.3. Procedure

Prior to completing the questionnaires, parents and educators received an explanation as to the purpose of the research and asked to sign a written consent to participate in the research. Educators completed the following instruments: C-SHARP and BRIEF. Parents provided data for CSHQ and PBDQ. Information for GARS-3 was obtained by analysing data gathered from parents and educators.

3.4. Ethical considerations

Standard ethical procedures were followed throughout the study. Consent was sought and received from the special educators and from each participating child's parents. Special educators and parents were given a clear explanation of the purpose of the study, and informed that their data would be treated in confidence and that they would remain anonymous.

3.5. Data processing

For the purpose of this research, descriptive statistics (arithmetic mean, standard deviation, and interval values – minimum and maximum), correlation analysis (Pearson correlation coefficient) and multiple linear regression were used in data processing. Data were entered and processed in SPSS for Windows, version 21.

4. Results

Table 3 shows descriptive indicators of the used instruments.

Table 3

Descriptive indicators of C-SHARP, BRIEF, CSHQ and PBDQ

	Scale range	Min	Max	M	SD
C-SHARP					
Verbal aggression	0 – 36	0	15	1.70	3.36
Bullying	0 – 36	0	27	9.65	7.85
Covert aggression	0 – 30	0	17	5.40	5.19
Hostility	0 – 27	0	25	9.02	6.64
Physical aggression	0 – 24	0	20	4.55	4.71
BRIEF					
Inhibit	10 – 30	10	28	20.77	4.67
Shift	8 – 24	8	24	16.55	3.85
Emotional control	10 – 30	10	30	22.42	4.92
Initiate	8 – 24	8	24	17.67	3.67
Working memory	10 – 30	10	30	22.87	4.66
Plan/organize	12 – 36	12	36	27.10	5.36
Organization of materials	6 – 18	6	17	11.77	2.87
Task monitor	8 – 24	8	24	17.70	4.29

CSHQ					
Sleep habits – total score	22 – 154	35	102	64.02	13.90
PBDQ					
Emotional warmth	6 – 36	26	36	32.57	2.94
Punitive discipline	5 – 30	7	28	14.80	4.88
Anxious intrusiveness	7 – 42	14	42	28.95	7.27
Autonomy support	6 – 36	11	36	28.40	6.19
Permissive discipline	7 – 42	7	38	25.10	7.14
Democratic discipline	5 – 30	7	30	22.25	7.07

In order to determine statistically significant bivariate correlation between the assessed variables – aggression, parenting behaviours, sleep habits, behaviour executive function and autism severity, parametric Pearson correlation coefficients were calculated. The values obtained ranged from weak to moderate (Table 4).

Table 4

Relation between the assessed variables

C-SHARP	Verbal	Bullying	Covert	Hostility	Physical
BRIEF					
Inhibit	.189	**.429****	.088	**.372***	**.354****
Shift	.112	**.349***	.098	**.485****	**.317***
Emotional control	.230	**.551****	.167	**.452****	**.479****
Initiate	.203	**.456****	.118	.296	**.445****
Working memory	.261	**.422****	.127	**.332****	**.389****
Plan/organize	.130	**.353***	.082	.279	.302
Organization of materials	.289	**.578****	.247	**.428****	**.537****
Task monitor	.178	**.535****	.139	**.384***	**.389***
GARS-3					
Restricted/Repetitive behaviours	.219	**.442***	.030	.201	**.327***
Social interaction	-.070	-.078	-.220	.027	.014
Social communication	-.186	.098	-.278	-.033	.024
Emotional responses	.256	**.568****	**.333***	**.596****	**.502****
Cognitive style	.289	.086	.241	.207	.036
Maladaptive speech	**.417****	.144	**.387***	**.452****	.199
Autism index	.094	**.356***	-.022	.272	.242
CSHQ					
Sleep habits – total score	**.635****	**.395***	**.551****	**.394***	**.521****
PBDQ					
Emotional warmth	-.120	-.284	-.252	-.281	-.155
Punitive discipline	**.400***	.307	.308	.228	**.382***
Anxious intrusiveness	.153	.236	.225	.095	**.323***

Autonomy support	-.270	-.230	-.159	-.144	-.308
Permissive discipline	.201	.151	.106	.115	.245
Democratic discipline	-.050	-.192	-.057	.023	-.011

** p<0,01, * p<0,05

Then, five regression models were tested, with aggression variables treated as criteria. In each of the five models, variables which were in previously conducted analyses singled out as significant correlates, were included as criteria.

Table 5

Regression analysis for the Verbal aggression criterion

R	R^2	F	p	Predictors	β	p
.799	.608	21.16	.000	Maladaptive speech	.417	**.000**
				Sleep habits – total score	.598	**.000**
				Punitive discipline	.211	**.050**

The Regression model shown in Table 5 indicates that Maladaptive speech, Sleep habits – total score, and Punitive discipline, as predictors, can explain about 61% of Verbal aggression variance. Sleep habits stand out as the best predictor. The following table shows regression model for the Bullying criterion (Table 6).

Table 6

Regression analysis for the Bullying criterion

R	R^2	F	p	Predictors	β	p
.807	.515	4.76	.000	Inhibit	.005	.990
				Shift	-.472	.067
				Emotional control	.319	.320
				Initiate	.095	.753
				Working memory	-.249	.439
				Plan/organize	-.316	.293
				Organization of materials	.045	.851
				Task monitor	.750	**.022**
				Restricted/Repetitive behaviours	.077	.606
				Emotional responses	.482	**.018**
				Sleep habits – total score	.194	.174

Table 6 shows that behavioural aspects of executive functions, Restricted/Repetitive behaviours, Emotional responses and Sleep habits – total score, can explain about 51% of Bullying variance. Even though the included criteria can explain much of the variance, only Task monitor (β

= .75, p < .05) from the domain of behavioural aspects of executive functions, and Emotional responses (β = .482, p < .05) from the domain of autistic disorders, stand out as significant predictors. Table 7 shows regression model for the Covert aggression criterion.

Table 7

Regression analysis for the Covert aggression criterion

R	R^2	F	p	Predictors	β	p
.726	.488	13.41	.000	Emotional responses	.247	**.041**
				Maladaptive speech	.361	**.004**
				Sleep habits – total score	.556	**.000**

According to data presented in Table 7, regression model was obtained in which Emotional responses, Maladaptive speech and Sleep habits – total score can predict about 49% of Covert aggression. All three predictors significantly contributed to explaining the criteria, with sleep habit difficulties being the strongest predictor (β = .556, p < .01) of Covert aggression. The Regression model for the Hostility criterion is shown in Table 8.

Table 8

Regression analysis for the Hostility criterion

R	R^2	F	p	Predictors	β	p
.875	.695	10.89	.000	Inhibit	.645	**.020**
				Shift	.405	**.047**
				Emotional control	.038	.865
				Working memory	-.769	**.002**
				Organization of materials	.004	.981
				Task monitor	-.164	.498
				Emotional responses	.451	**.005**
				Maladaptive speech	.402	**.000**
				Sleep habits – total score	.453	**.000**

Table 8 shows that the included predictors can explain about 69% of the Hostility variance. The strongest predictors were Sleep habits – total score (β = .453, p < .01), and autistic disorders – Maladaptive speech (β = .402, p < .01) and Emotional responses (β = .451, p < .01). Inhibit (β = .645, p < .05) and Shift (β = .405, p < .05) also had a significant impact. Negative contribution of the Working memory predictor (β = -.769, p < .01), contrary to positive correlation of the predictor with the criterion, is a statistical artifact resulting from multicollinearity of the predictors. Table 9 shows regression model for the Physical aggression criterion.

As shown in Table 9, the predictors included in the model can explain about 41% of the Physical aggression criterion. Sleep habits – total score (β = .451, p < .01) were the only significant predictor, while partial contributions of other predictors from the model were not significant.

Table 9

Regression analysis for the Physical aggression criterion

R	R²	F	p	Predictors	β	p
.760	.413	3.49	.004	Inhibit	-.076	.845
				Shift	-.060	.833
				Emotional control	.189	.539
				Initiate	.213	.418
				Working memory	.004	.989
				Organization of materials	.352	.161
				Task monitor	-.126	.711
				Restricted/Repetitive behaviours	-.095	.566
				Emotional responses	.306	.168
				Sleep habits – total score	.451	**.004**
				Punitive discipline	.005	.975
				Anxious intrusiveness	.099	.540

5. Discussion

This research was conducted with the aim to determine the most significant predictors of different subtypes of aggressive behaviour in children with ASD.

The obtained results showed that sleep problems were the most significant predictor of verbal, physical, and covert aggression, while they were the second most significant predictor of hostility (after inhibit).

Similar findings on the importance of sleep problems for the manifestation of physical aggression in people with ASD are found in Mazurek, Kanne, & Wodka (2013), who, when attempting to explain this relation, state that it is possible that sleep problems may underlie physical aggression, but that the relations between these two concepts have not been explored enough, and that future studies should determine the mechanisms of their interactions. These authors state that when planning treatment to mitigate aggressive behaviour, the possibility of influencing sleep problems should be considered. In the research conducted by Chen et al. (2017), the results indicate that sleep problems are a significant risk factor for the occurrence of aggressive behaviour in both typically developing children and children with ASD. The authors believe that sleep problems may have a negative effect on prefrontal cortex, which leads to a decrease in emotional intelligence and difficulties in inhibitory control. Furthermore, they point to the relation between sleep problems and serotonin, which plays an important role in causing and modulating aggressive behaviour.

From the domain of behavioural aspects of executive functions, only task monitor was a significant predictor of bullying, and inhibit and shift were significant predictors of hostility, while other variables were not significant predictors. In studies on typically developing children, inhibit is defined as a significant predictor of aggressive behaviour of different form and function (Utendale, Hubert, Saint-Pierre, & Hastings, 2011), indicating that poor inhibitory control contributes to aggressive response to frustration or in situations when children want to achieve their goal (Poland, Monks, & Tsermentseli, 2016). Shift is a cognitive ability to change and apply different strategies in new circumstances (Miller, Ragozzino, Cook, Sweeney, & Mosconi, 2015). Since people with

ASD resist changes, we assume that unplanned and unpredictable circumstances and events can be stressful and threatening for them, and thus cause an aggressive reaction.

From the domain of autistic disorders, only emotional responses (for bullying, covert aggression, and hostility) and maladaptive speech (for verbal aggression, covert aggression and hostility) were significant predictors of certain aggression aspects. Emotional responses indicate children's reactions in situations when certain changes occur, or when a child is expected to solve tasks which are too difficult, when unexpected sounds are heard, or when a child is forbidden to do some activities. Since these reactions are manifested as rage attacks, frustration and anxiety, i.e. the assessed variables in some way overlap, it is not uncommon that there is a relation between emotional responses and different types of aggression. Regressive contribution of maladaptive speech in predicting hostility, verbal aggression, and covert aggression indicates that inappropriate use of speech (e.g. repeating abusive words they have heard somewhere before, presence of abnormal speech in pitch, intensity, etc.) can be interpreted by the environment as a form of aggression. In their research study, Matson & Rivet (2007) found that more severe basic symptoms of ASD were related to greater inclination towards provocative behaviour and point out that the symptoms related to communication disorders underlie aggressive and disruptive behaviour.

The results of our research show that parenting behaviour can contribute to only one aspect of aggression, i.e. verbal aggression, through the aspect of punitive discipline. This finding may indicate that parents may provoke aggression in the verbal domain through inadequate parenting actions, which is consistent with previous findings that aggression may occur in response to aggressive behaviour of others or similar disturbing circumstances (Eagly & Steffen, 1986).

5.1. Limitations

The results obtained in this study should be interpreted with caution, given the relatively small research sample. The presented results refer to boys with ASD, since the research sample was predominantly male. Future research should include more female participants, which would allow comparative analysis for children of both genders. Also, it would be significant for future research to include additional variables, extend the age range of the sample, and conduct longitudinal monitoring.

6. Conclusion

Despite its limitations, this research provides a new insight into possible predictors of different subtypes of aggressive behaviour. Practical implications of this research indicate that, in treating aggressive behaviour in children with ASD, more attention should be paid to sleep habits, practicing inhibit and shift skills, and avoiding rigorous punitive measures. Also, predictor knowledge should be used in conjunction with functional behaviour analysis to mitigate or eliminate inappropriate behaviours.

Conflict of interests

The authors declare no conflict of interests.

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References

Adams, L. H., Matson, L. J., Jang, J. (2014). The relationship between sleep problems and challenging behaviour among children and adolescents with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 8, 1024-1030.

Ahsan, M. (2015). Physical, verbal, anger and hostility aggressiveness in University's physical education students. *International Journal of Sports and Physical Education*, *1*(2), 20-23.

Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, 53, 27-51.

Boyd, B. A., McBee, M., Holtzclaw, T., Baranek, G. T., Bodfish, J. W. (2009). Relationships among repetitive behaviours, sensory features, and executive functions in high functioning autism. *Research in Autism Spectrum Disorders*, 3, 959-966.

Chen, C., Shen, Y., Xun, G. L., Cai, W. X., Shi, L. J., Xiao, L., Wu, R. R., Zhao, J. P., Ou, J. J. (2017). Aggressive behaviours and treatable

risk factors of preschool children with autism spectrum disorder. *International Society for Autism Research*, 10, 1155-1162.

Cortesi, F., Giannotti, F., Ivanenko, A., & Johnson, K. P. (2010). Sleep in children with autistic spectrum disorder. *Research in Sleep Medicine*, *11*(7), 659-664.

De Almeida, R. M. M., Cabral, J. C. C., & Narvaes, R. (2015). Behavioural, hormonal and neurobiological mechanisms of aggressive behaviour in human and nonhuman primates. *Physiology & Behaviour*, 143, 121-135.

Dieleman, M. L., Pauw, S., Soenens, B., Mabbe, E., Campbell, R., & Prinzie, P. (2017). Relations between problem behaviours, perceived symptom severityand parenting in adolescents and emerging adults with ASD: the mediating role of parental psychological need frustration. *Research in Developmental Disabilities*, 73, 23-30.

Eagly, A. H., & Steffen, V. J. (1986). Gender and aggressive behaviour: A meta-analytic review of the social psychological literature. *Psychological Bulletin*, *100*(3), 309-330.

Farmer, C. A., & Aman, M. G. (2011). Aggressive behaviour in a sample of children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(1), 317-323.

Farmer, C., Butter, E., Mazurek, M. O., Cowan, C., Lainhart, J., Cook, E. H., ... & Aman, M. (2015). Aggression in children with autism spectrum disorders and a clinic-referred comparison group. *Autism*, *19*(3), 281-291.

Gilliam, J. C. (2014). *GARS-3: Gilliam Autism Rating Scale–Third Edition*. Austin, TX: Pro-Ed.

Gioia, G. A., Isquith, P. K., Guy, S. C., & Kenworthy, L. (2000). Behaviour raiting inventory of executive function. *Child Neuropsyhology*, *6*(3), 235-238.

Hattier, M. A., Matson, J. L., Belva, B. C., & Horovitz, M. (2011). The occurrence of challenging behaviours in children with autism spectrum disorders and atypical development. *Developmental Neurorehabilitation*, *14*(4), 221-229.

Holden, B., & Gitlesen, J. P. (2006). A total population study of challenging behaviour

in the county of Hedmark, Norway: Prevalence, and risk markers. *Research in Developmental Disabilities*, *27*(4), 456-465.

Kanne, S. M., & Mazurek, M. O. (2011). Aggression in children and adolescents with ASD: Prevalence and risk factors. Journal of Autism and Developmental Disorders, 41(7), 926-937.

Krakowiak, P., Goodlin-Jones, B., Hertz-Picciotto, I., Croen, L. A., & Hansen, R. L. (2012). Sleep problems in children with autism spectrum disorders, developmental delays, and typical developmental: a population-based study. *Research in Sleep*, *21*(2), 231-239.

Matson, J. L., & Rivet, T. T. (2008). The effects of severity of autism and PDD-NOS symptoms on challenging behaviours in adults with intellectual disabilities. *Journal of Developmental and Physical Disabilities*, *20*(1), 41-51.

Mazurek, M. O., Kanne, S. M., & Wodka, E. L. (2013). Physical aggression in children and adolescents with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *7*(3), 455-465.

McTiernan, A., Leader, G., Healy, O., & Mannion, A. (2011). Analysis of risk factors and early predictors of challenging behaviour for children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, *5*(3), 1215-1222.

Miczek, K. A., de Almeida, R. M., Kravitz, E. A., Rissman, E. F., de Boer, S. F., & Raine, A. (2007). Neurobiology of escalated aggression and violence. *Journal of Neuroscience*, *27*(44), 11803-11806.

Miller, H. L., Ragozzino, M. E., Cook, E. H., Sweeney, J. A., & Mosconi, M. W. (2015). Cognitive set shifting deficits and their relationship to repetitive behaviours in autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *45*(3), 805-815.

Owens, J., A., & Witmans, M. (2004). Sleep problems. *Current Problems Pediatric Adolescent Health Care*, *34*(4), 79-154.

Poland, S. E., Monks, C. P., & Tsermentseli, S. (2016). Cool and hot executive function as predictors of aggression in early childhood:

Differentiating between the function and form of aggression. *British Journal of Developmental Psychology*, *34*(2), 181-197.

Reid, C. A., Roberts, L. D., Roberts, C. M., & Piek, J. P. (2015). Towards a model of contemporary parenting: The parenting behaviours and dimensions questionnaire. *PloS one*, *10*(6), e0114179.

Smith, P. K. (2016). Bullying: Definition, types, causes, consequences and intervention. *Social and Personality Psychology Compass*, *10*(9), 519-532.

Utendale, W. T., Hubert, M., Saint-Pierre, A. B., & Hastings, P. D. (2011). Neurocognitive development and externalizing problems: The role of inhibitory control deficits from 4 to 6 years. *Aggressive Behaviour*, 37, 476-488.

Visser, E. M., Berger, H. J. C., Prins, J. B., Van SchrojensteinLantman-De Valk, H. M. J., &Teunisse, J. P. (2014). Shifting impairment and aggression in intellectual disability and *Autism Spectrum Disorder*. *Research in Developmental Disabilities*, *35*(9), 2137-2147.

Zhou, T., & Yi, C. (2014). Parenting styles and parents' perspectives on how their own emotions affect the functioning of children with autism sectrum disorders. *Family Process*, 53, 67-79.

Žižak, A. & Jeđud, I. (2005). Agresivnost djece i mladih. *Dijete i društvo, 7*(1), 60-76.

Žužul, M. (1989). *Agresivno ponašanje-psihologijska analiza*. Zagreb: Radna zajednica republičke konferencije saveza socialističke omladine Hrvatske.