

Mothers' temperament and psychosocial functioning of children with autism spectrum disorder

Temperament matek a funkcjonowanie psychospołeczne dzieci z zaburzeniami ze spektrum autyzmu

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Słowa kluczowe: zaburzenia ze spektrum autyzmu, cechy osobowości, funkcjonowanie psychospołeczne, typy temperamentu matki.

Abstract

Introduction: The need for research aimed at identifying risk factors influencing both the occurrence and severity of autism spectrum disorder symptoms is justified by the rising prevalence of this disorder. Among significant predictors of difficulties in functioning of children with autism spectrum disorder (ASD) are the parents' personality traits, temperament being one of them.

Aim of the research: The aim of the study was to analyze the correlation between mothers' temperament characteristics and the psychosocial functioning of their children, medically diagnosed with disorders belonging to the autism spectrum. Moreover, an attempt was made to distinguish the types of temperament of the surveyed women.

Material and methods: The study included 58 women raising children diagnosed with ASD (according to DSM-5). The following research methods were used in the study: a self-designed questionnaire, the EAS-D version of the Temperament Questionnaire by Buss and Plomin, a set of questionnaires for the Autism Spectrum Rating Scales by Goldstein and Naglieri and the Strengths and Difficulties Questionnaire by Goodman.

Results: The results of statistical analyses indicate the occurrence of a statistically significant positive correlation between the mothers' negative emotionality and social isolation, and difficulties in psychological and social functioning in their children diagnosed with ASD. Based on the cluster analysis in the group of mothers of children with ASD, two subgroups differing in temperament types were distinguished. Mothers with distinguished types of temperament differ significantly in the assessment of the intensity of psychosocial difficulties in children diagnosed with ASD. Mothers' temperament traits: a tendency to react with aggression, dissatisfaction and avoidance of social relationships are correlated with the child's increased problems with behavior, social relations, and difficulties with emotion control and communication. Mothers of children with ASD constitute a diverse group in terms of temperament types. A group of mothers with a withdrawn temperament type/with increased negative emotionality and a group with an open type/with a low level of negative emotionality were distinguished. Women with the withdrawn/negative emotionality type of temperament assess that their children have significantly more increased difficulties with emotion control, social relations, behavior problems and more increased symptoms of ASD.

Conclusions: Children raised by mothers who avoid interpersonal interactions and have a propensity to express negative emotions (temperament type 1), struggle more with psychological and social functioning than children of mothers who are receptive to interpersonal interactions and do not have a propensity to react with aggression, hostility, or anxiety (type 2 temperament).

Streszczenie

Wprowadzenie: Wzrost rozpowszechnienia zaburzeń należących do spektrum autyzmu uzasadnia potrzebę prowadzenia badań, których celem jest poszukiwanie czynników ryzyka sprzyjających zarówno wystąpieniu, jak i nasileniu objawów tych zaburzeń. Wśród istotnych predyktorów trudności w funkcjonowaniu dzieci z zaburzeniami należącymi do spektrum autyzmu (ASD) wymieniane są między innymi cechy osobowości rodziców, do których należy między innymi temperament. **Cel pracy:** Celem pracy była analiza zależności między cechami temperamentu matek a funkcjonowaniem psychospołecznym ich dzieci z diagnozą lekarską zaburzeń należących do spektrum autyzmu. Podjęto ponadto próbę wyodrębnienia typów temperamentu badanych kobiet.

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Materiał i metody: W badaniu wzięło udział 58 kobiet wychowujących dzieci z diagnozą ASD (wg DSM-5). W pracy zastosowano następujące metody badawcze: ankietę własnej konstrukcji, Kwestionariusz temperamentu w wersji EAS-D autorstwa Bussa i Plomina, Zestaw kwestionariuszy do diagnozy zaburzeń ze spektrum autyzmu autorstwa Goldsteina i Naglieri oraz Kwestionariusz mocnych stron i trudności autorstwa Goodmana.

Wyniki: Wyniki analiz statystycznych informują o występowaniu statystycznie istotnych dodatnich korelacji między negatywną emocjonalnością i dążeniem do izolacji społecznej u matek a trudnościami w zakresie funkcjonowania psychologicznego i społecznego u dzieci z diagnozą zaburzeń należących do spektrum autyzmu. Na podstawie analizy skupień u matek dzieci z ASD wyodrębniono dwie podgrupy różniące się typami temperamentu. Matki z wyodrębnionymi typami temperamentu różnią się istotnie oceną nasilenia trudności psychospołecznych u dzieci z diagnozą ASD. Cechy temperamentu matek: tendencja do reagowania agresją, niezadowolaniem i unikanie relacji społecznych, łączą się z obserwowanymi u dziecka nasilonymi problemami z zachowaniem, relacjami społecznymi oraz trudnościami z kontrolą emocji i komunikacją. Matki dzieci z ASD są grupą zróżnicowaną pod względem typów temperamentu. Wyodrębniono grupę matek z typem temperamentu wycofanym (z nasiloną negatywną emocjonalnością) i typem otwartym (z niskim poziomem negatywnej emocjonalności). Kobiety z typem temperamentu wycofanym (z nasiloną negatywną emocjonalnością) oceniają, że ich dzieci mają istotnie bardziej nasilone trudności z kontrolą emocji, relacjami społecznymi, problemy z zachowaniem oraz bardziej nasilone objawy zaburzeń należących do spektrum autyzmu.

Wnioski: Dzieci wychowywane przez matki wycofujące się z kontaktów społecznych, z tendencją do ujawniania negatywnych emocji (typ 1 temperamentu) mają większe trudności w zakresie funkcjonowania psychologicznego i społecznego niż dzieci matek otwartych na relacje interpersonalne, bez tendencji do reagowania agresją, wrogością i lękiem (typ 2 temperamentu).

Introduction

Zeidan *et al.* [1] estimated that 1 in 100 children worldwide has autism spectrum disorder (ASD). According to estimates by the Centers for Disease Control and Prevention [2], in the United States, up to 1 in 44 children may meet the diagnostic criteria for ASD, and the average age of the diagnosis is just over 4 years [2]. Fombonne [3] and Maenner *et al.* [4] reported an increase in the prevalence of ASD. ASD is an early-onset neurodevelopmental disorder characterized by deficits in communication, social relations, and the presence of repetitive behaviors and interests [5]. The increase in the prevalence of ASD justifies the need to conduct research aimed at searching for biological, psychological and social conditions conducive to both the emergence and strengthening of the symptoms of this disorder. The parents' personality traits are mentioned among the significant environmental predictors of difficulties in the functioning of children with ASD [6], which include, inter alia, temperament [7].

Temperament is defined as relatively stable features of the organism, originally biologically conditioned, manifested in formal aspects of behavior, and reflecting individual differences. Temperament reflects early-onset emotions and behavioral traits that result from the interaction of genetic, biological and environmental factors [8–12]. Shiner *et al.* [8] stated that temperament consists of three dimensions: (a) negative emotionality, i.e. the tendency to experience negative emotions, (b) sociability, i.e. the tendency to actively engage in relationships with others, and (c) self-regulation, i.e. the ability to regulate cognitive, emotional and behavioral processes. The dimensions of temperament described above interact in a complex way, and have either a positive or a negative impact on the development of social and emotional competences [13].

The parents' temperament and their personality traits [7] constitute one of the factors determining the strategies, parenting methods, attitudes and behaviors they adopt towards the child. These strategies affect the development of self-control in children, the level of their adaptation and socialization [14–17]. The aim of many studies was the analysis of the clinically important relationship between the parents' influence and various types of difficulties in the functioning of children with externalizing behaviors, ADHD, ODD, ASD [18–26]. The assessment of the correlation between the parents' temperament and difficulties in the psychosocial functioning of their children with ASD has been the subject of a few studies.

Puff and Renk [6] point out that parents' temperament and personality traits influence their behavior towards their children and, together with the children's temperament, play an important role in predicting behavioral problems in the children. On the one hand, children with fewer behavioral problems were raised by mothers with more positive and less negative parenting attitudes. On the other hand, the child's difficulties and behavior problems resulted in a smaller volume of positive, warm upbringing influence on the part of the parents [14, 21, 24, 27–29]. Karreman *et al.* [28] reported a strong correlation between mother's temperament and parental attitudes only in the group of mothers raising children who had behavioral problems.

Frick [21] and Macari *et al.* [5] emphasize that negative affectivity, low effort control and emotional reactivity in the mother are associated with the increase in behaviors disrupting social norms and may determine the increase in developmental disorders and/or the persistence of their symptoms in the child. According to Kochanska [30] the mother's high level of negative emotionality is associated with less involvement in interactions with the child, and less sensitivity to

him. Puff and Renk [6] observed that mothers with emotion control problems used inconsistent parenting methods. Such methods contribute to the intensification of difficulties in the regulation of emotions in the children. Mother's emotional instability was correlated with higher rates of abnormal regulation of emotions and behavioral problems in the situations that made children angry or frustrated. A positive correlation was found between the mother's ability to control emotions and better emotion regulation and self-control skills, and more adapted behavior in the child [30, 31]. Similar research results were described by Gulsrud *et al.* [32], who reported on the relationship between the mother's proper emotion control and less impulsiveness in the child with ASD.

The influence of the mother's temperament and her preferred parenting style on supporting the children's independence and regulating their negative emotions, such as fear and anger in difficult situations, was studied by Hirschler-Guttenberg *et al.* [26]. They pointed out that children with ASD have difficulty regulating emotions, especially anger and fear [26, 33–35]. Puff and Renk [6] emphasize that parents' parenting attitudes are conditioned, *inter alia*, by their personality traits, including temperament. Therefore, the parents' temperament and other personality traits were identified as significant predictors of children's functioning.

In a study of mothers and their children with autism and Down syndrome, Pokorska and Pisula [36] found a correlation between the mother's and the child's temperaments, and several dimensions of the mother's positive parental perception. In these studies, attention was paid to significant differences in the assessment of a child's sociability made by mothers of children with autism and Down syndrome. Pisula and Woźniak-Rekucka [37] presented a review of research on the temperament of children with ASD and the relationship between the child's temperament and the stress experienced by the parents. They described the relationship between temperament characteristics and behavioral problems, as well as the relationship between parental stress, parent's behavior towards the child, and the child's behavioral problems.

Aim of the research

The aim of the study was to analyze the correlation between the mothers' temperament characteristics and the psychosocial functioning of their children with disorders belonging to the autism spectrum (according to DSM-5). An attempt was also made to distinguish temperament types in the group of surveyed women.

Material and methods

The study included 58 women raising children diagnosed with ASD. Children with the listed disorders

belonging to autism spectrum (according to DSM-5) are from 5 to 16 years old. The average age of the surveyed mothers was 38 years. 29 (50%) mothers live both in the countryside and in the city. Vocational education was obtained by 10 (17.24%) women, secondary by 15 (25.86%), and higher education by 33 (56.89%). There were 26 (44.83%) professionally active women, 2 (3.45%) were on disability/retirement, 18 (31.03%) did not work by choice, 1 (1.72%) woman had the status of an unemployed person. 10 (17.24%) mothers raised the child alone, and 48 (82.76%) mothers raised the child together with the child's father. Sensory integration classes were provided to their children with ASD by 43 mothers (74.14%), speech therapy classes by 20 (34.48%), psychological therapy by 43 (74.14%), classes with a pedagogue by 25 (43.10%), and physical rehabilitation by 4 (6.90%).

Methods

The following research methods were applied in the study:

1. A self-designed survey, which allowed us to collect data on the age of the surveyed women and their children, the level of education of the surveyed mothers, their place of residence, marital status, professional activity, and the medical diagnosis the children received.

2. The EAS-D Temperament Questionnaire (the EAS Temperament Questionnaire by A. Buss and R. Plomin) in the Polish adaptation by W. Oniszczenko [38]. On its basis, the surveyed women assessed their temperament traits. The authors of the EAS Questionnaire distinguished the components of temperament, which were included in the following scales: activity, sociability, dissatisfaction, fear, and anger [39, 40]. The questionnaire consists of 20 items. They are in the form of statements whose truth the responder assesses on a five-point scale.

3. A Set of Questionnaires for the Autism Spectrum Rating Scales (ASRS) by S. Goldstein and J. A. Naglieri. On its basis, the intensity of difficulties in children was determined in terms of communication skills, attention deficits, difficulties in contacts with peers and with adults. The full version of the questionnaire includes 71 items and allows one to calculate the following scores: total score, DSM score, ASRS score and therapeutic scale score. The parent chooses the answer out of 5 available options: 0 – never, 1 – rarely, 2 – sometimes, 3 – often, 4 – very often, which best describes the difficulties encountered by the child. Goldstein and Naglieri (2016) distinguished the following ASRS scales: social relations/communication, atypical behavior, self-regulation. The DSM scales have symptoms directly corresponding to the DSM-IV-TR diagnostic criteria for ASD. Therapeutic scales include: peer socialization, adult socialization, social-emotional reciprocity, atypical language, stereotypies, rigidity of behavior, sensory sensitivity, attention/self-

regulation [41]. In 2014, Polish standardization studies were conducted. Standards and the assessment of reliability and accuracy of the questionnaires were developed. The internal agreement determined by Cronbach's α coefficient is very high; it is 0.93 for the total score of the parent version. The highest reliability is held by the scales distinguished on the basis of factor analysis – the coefficients for these scales range from 0.87 (social relations/communication) to 0.96 (unusual behavior). The coefficients for the DSM scale were also very high and ranged from 0.88 to 0.96 [41]. The study used a parent version of the questionnaire.

4. The Strengths and Difficulties Questionnaire (SDQ) by R. Goodman is a tool used to assess the intensity of symptoms of emotional, social difficulties and behavior problems in children aged 3 to 16. It consists of 25 statements describing various characteristics of the surveyed person, of which 10 statements concern the child's strengths, 14 describe his weaknesses, and 1 is a neutral statement. The SDQ questionnaire consists of 5 subscales (5 items each): hyperactivity/inattention, emotional symptoms, conduct problems, peer relationships, and pro-social behavior. The first 4 subscales are part of the Total Score, which is about the intensity of psychopathology symptoms altogether. The answers are scored from 0 to 2 points for negative statements and from 2 to 0 points for positive statements. The total score of the SDQ Questionnaire ranges from 0 to 40 points. A high number of points is associated with an increase in the intensity of the child's difficulties. The scores for individual subscales and the total score are categorized as: "normal", "borderline", "abnormal." In Poland, only norms for the self-report version of the SDQ for adolescents are available [42], and researchers most often refer to the English norms of the SDQ questionnaire [43, 44]. The study used a parent version of the questionnaire.

Procedure

The study was approved by the Bioethics Committee at the Medical University in Lublin, No. KE-0254/3/2020. The individuals who consented to the study were provided with a set of questionnaires. They were informed that they could use the psychologist's explanations at any time in case of questions about the study. The surveyed women completed the questionnaires individually in the clinic, but they also had the opportunity to complete them in their place of residence. Each of the subjects received the material including instructions, a demographic survey, and a set of questionnaires described above. The study was completely voluntary. The subjects had the opportunity to ask for psychological help if needed.

Statistical analysis

The obtained scores were statistically analyzed with Statistica 10.0PL software. The consistency

of the distribution of individual variables within the groups with the normal distribution was checked using the Kolmogorov-Smirnov test with the Lilliefors correction. Relationships between interval variables were determined by calculating Pearson's r correlation coefficient. Non-hierarchical cluster analysis was used to distinguish people with different temperament traits. Cluster analysis leads to the grouping of objects based on their mathematical similarity. The technique used is called the k -means method. It consists in creating clusters in such a way that the average distance between all cases in the emerging cluster is as small as possible, i.e. it is aimed at minimizing the variance within clusters and maximizing the variance between clusters [45]. Differences between the distinguished groups differing in temperament types in terms of selected variables were determined using Student's t -test for independent groups. The value of 0.05 was considered statistically significant.

Results

In order to determine whether and what correlations exist between the surveyed mothers' temperament traits (activity, sociability, dissatisfaction, fear, and anger) and difficulties in their children's psychosocial functioning, Pearson's r correlation coefficient values were calculated between the scores on the scales of the Temperament Questionnaire, the EAS-D version and on the scales of the Strengths and Difficulties Questionnaire (SDQ), and the Autism Spectrum Rating Scales (ASRS) Questionnaire (Table 1).

Correlation coefficients calculated between the scores on the scales of the EAS-D and SDQ Questionnaires inform about the occurrence of a significant correlation between the increased tendency of the surveyed mothers to react with aggression, anger and dissatisfaction and increased behavior problems observed in the child. Moreover, there was significant correlation between mother's increased dissatisfaction and increased difficulties in peer relationships and low emotion control in the child. There was no statistically significant correlation between the mother's temperament traits of activity, sociability and fear and the problems observed in the child, measured with the SDQ Questionnaire.

Correlation coefficients calculated between the scores on the scales of the EAS-D and ASRS Questionnaires inform about the occurrence of statistically significant correlations between the increased tendency to react with a sense of dissatisfaction, aggression, anger shown by the surveyed mothers and increased ASD symptoms, difficulties in relationships with adults and peers, problems with self-regulation, communication and empathy, and excessive sensory sensitivity observed in the children. Avoidance of social contacts by the mothers is significantly associated with increased problems in social relations, mainly with peers, dif-

Table 1. Pearson's *r* correlation coefficient values calculated between the scores on the EAS-D scales, and the SDQ and ASRS scales

Variable	EAS-D				
	Activity	Sociability	Dissatisfaction	Fear	Anger
SDQ:					
Hyperactivity/inattention	0.04	0.01	0.22	0.01	0.32
Emotional symptoms	0.12	0.02	0.27*	0.07	0.25
Conduct problems	0.08	-0.01	0.41***	0.15	0.40**
Peer relationships	-0.04	-0.23	0.26*	0.08	0.25
Prosocial behavior	0.06	0.11	-0.31	-0.03	-0.16
Total score	0.07	-0.07	0.39**	0.1	0.41***
ASRS:					
Social/communication	0.09	-0.40**	0.39**	0.18	0.29*
Unusual behavior	0.18	-0.18	0.29*	0.23	0.25
Self-regulation	0.02	-0.08	0.28*	0.10	0.31*
DSM	0.13	-0.32*	0.36**	0.23	0.29*
Peer socialization	0.06	-0.47***	0.33**	0.18	0.32*
Adult socialization	0.03	-0.15	0.35**	0.14	0.38***
Social-emotional reciprocity	0.14	-0.27*	0.39***	0.17	0.31**
Atypical language	0.10	-0.13	0.28*	0.20	0.09
Stereotypies	0.13	-0.12	0.15	0.19	0.18
Rigidity of behavior	0.16	-0.16	0.20	0.17	0.21
Sensory sensitivity	0.23	-0.18	0.33*	0.24	0.33**
Attention	0.02	-0.15	0.23	0.11	0.25

p* < 0.05, *p* < 0.01, ****p* < 0.001.

difficulties in communication, emotional and social reciprocity, and increased ASD symptoms in the children. There was no statistically significant correlation between the mother's temperament traits of activity and fear and the symptoms included on the Autism Spectrum Rating Scales (ASRS) Questionnaire.

In the last stage of the study, we sought an answer to the question whether and what types of temperament can be distinguished in the group of mothers raising children with ASD. Based on the cluster analysis, two groups of mothers were distinguished, which are characterized by a characteristic arrangement of scores in terms of the scales of the Temperament Questionnaire, the EAS-D version. The division into two subgroups is justified by statistical and substantive arguments: the size of the subgroups enables their comparison in terms of specific variables, and the clear psychological significance of the revealed types of temperament (Figure 1).

In the first place, two groups of women with temperament types 1 and 2 were compared using Student's *t*-test in terms of criterion variables (scores on the scales of the EAS-D Questionnaire) (Table 2).

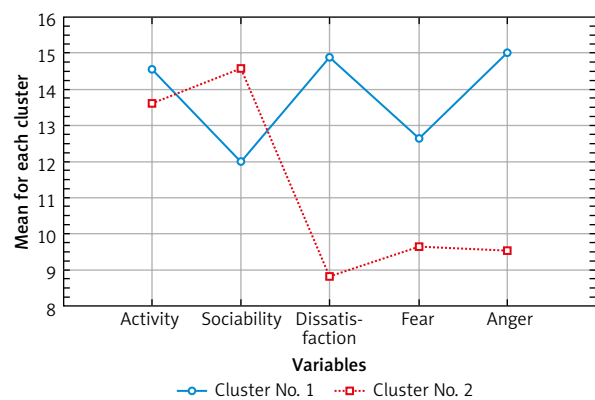


Figure 1. Distinguished groups of mothers of children with ASD with two temperament types: type/cluster 1 and type/cluster 2

Group 1 (cluster 1) consists of 28 women. It is characterized by significantly higher – compared to group 2 (cluster 2) – sensitivity to stimuli that cause dissatisfaction, a tendency to react with anger, aggression, hostility, anxiety, and pursuit of solitude and isolation. The type of temperament presented by

Table 2. Comparison of the mean scores obtained by the distinguished groups of women with temperament type 1 and 2 on the EAS-D scales

EAS-D	Type 1		Type 2		t
	M	SD	M	SD	
Activity	14.54	3.42	13.60	2.55	1.19
Sociability	12.00	3.60	14.57	2.56	-3.15**
Dissatisfaction	14.89	2.06	8.80	1.75	12.16***
Fear	12.64	2.68	9.63	2.06	4.81***
Anger	15.00	2.33	9.53	2.08	9.45***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

the mothers from group 1 was called isolating/with increased negative emotionality.

Group 2 (cluster 2) consists of 30 women. It is characterized by a significantly higher – compared to group 1 (cluster 1) – tendency to seek and establish social relationships, avoidance of solitude, and a lower tendency to react with anger, aggression, and a sense

of dissatisfaction. The type of temperament presented by the 2nd group (cluster 2) of the surveyed mothers was called the open type/with a low level of negative emotionality. It should be emphasized that “activity” understood as the strength and speed of motor reactions did not significantly differentiate mothers with distinguished types of temperament.

Then, the two distinguished groups of women with temperament types 1 and 2 were compared in terms of assessing the psychological and social functioning of children with ASD, using Student’s *t*-test. Psychological and social functioning of children was determined on the basis of the answers given by the respondents in the SDQ and ASRS questionnaires (Table 3).

Women with temperament type 1 (withdrawing/with a high level of negative emotionality) assess that their children with ASD have significantly more increased problems with concentration, behavior, difficulties in expressing emotions, and in relations with peers than mothers with type 2 temperament (open/with a low level of negative emotionality). Mothers with type 1 temperament significantly less frequently

Table 3. Comparison of mean scores obtained by selected groups of women with temperament type 1 and 2 on the SDQ and ASRS scales

Variables	Type 1 Isolating/High level of negative emotionality		Type 2 Open/low level of negative emotionality		t
	M	SD	M	SD	
SDQ:					
Hyperactivity/inattention	7.57	2.30	6.03	2.37	2.50*
Emotional symptoms	5.89	1.93	4.33	2.70	2.52*
Conduct problems	4.57	2.06	2.87	1.94	3.24**
Peer relationships	5.50	2.13	4.30	1.99	2.22*
Prosocial behavior	5.57	1.53	6.73	2.08	-2.41*
Total score	23.54	5.39	17.53	6.61	3.78***
ASRS:					
Social/communication	38.79	8.58	29.40	11.83	3.44***
Unusual behavior	52.14	17.99	40.43	17.41	2.52*
Self-regulation	40.61	9.66	34.03	11.48	2.35*
DSM	76.64	17.47	60.23	20.93	3.23**
Peer socialization	21.43	5.67	15.60	5.94	3.82***
Adult socialization	13.82	3.71	10.57	4.58	2.96**
Social-emotional reciprocity	27.50	6.27	21.63	8.29	3.02**
Atypical language	9.00	5.54	6.67	4.81	1.72
Stereotypies	10.32	5.04	8.93	3.85	1.18
Rigidity of behavior	20.46	6.57	16.73	7.04	2.08*
Sensory sensitivity	11.68	4.74	7.60	5.11	3.15**
Attention	25.86	5.27	22.40	6.49	2.22*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

than women with type 2 observe pro-social behavior in their children, and more often symptoms belonging to ASD. Women with type 1 temperament believe that their children have significantly more intensified communication difficulties, manifest greater rigidity of behavior and excessive sensitivity to stimuli.

Discussion

The results of the conducted statistical analyses indicate the existence of significant correlations between mothers' temperament characteristics (increased negative emotionality and low level of sociability) and severe difficulties in psychological and social functioning in children with ASD. A strong tendency to easily and intensely react with dissatisfaction, anger and aggression in the mother correlates with, observed by her, increased ASD symptoms, problems with behavior, social relations, communication, self-regulation, and emotional control in the child. At the same time, no significant correlations were found between the mother's temperament traits of activity and a tendency to react with fear and the increase in psychological and social problems in a child with ASD.

These results are consistent with other authors' opinion. Frick [46] and Macari *et al.* [47] pointed out that the intensity of negative affectivity and emotional reactivity in mothers is associated with an increase in the intensity of behaviors that disrupt social norms and may determine the intensity of developmental disorders and/or the persistence of these symptoms in children. It can be assumed that the increased behavior difficulties in the child will result in a smaller volume of positive parental influence, especially when they are characterized by a temperamentally conditioned readiness to react with negative emotions (aggression, dissatisfaction, anger). Puff and Renk [6] reported that mothers' emotional lability was correlated with higher rates of emotional misregulation and behavior problems in the situations that caused anger or frustration in the children. At the same time, proper emotional control in the mother was correlated with less impulsiveness [32], better emotional regulation and self-control, and more adapted behavior in the child [30, 31].

Based on the obtained results, a hypothesis can be formulated that the mother's temperament traits of excessive reaction with dissatisfaction, anxiety, anger, aggression, and avoidance of social relationships will be conducive to their use of negative parenting styles, adversely affecting the child's socialization process and his developmental achievements. The mother's excessive sensitivity to stimuli and reaction with anxiety may also contribute to her use of control that does not match the child's needs, age, development level and capabilities. Mothers with a low threshold of reacting with dissatisfaction and aggression may use disciplinary measures based on enforcing certain behaviors on the child, such as shouting, complaining,

threatening or punishing (including corporal punishment) [24, 48, 49]. The above-mentioned upbringing practices result in a child lacking a sense of security, warmth and stability [17].

As pointed out by Woźniak-Prus and Matusiak [17], on the one hand, parents modify their child's behavior and development by using various parental practices. On the other hand, difficulties in children's functioning resulting from disruptions in their ability to control their actions, due to ASD, may contribute to parents' experiencing negative emotions, a sense of helplessness, and increased level of stress. Such a situation will adversely affect their parental practices, which will be manifested in more frequent reactions with anger, dissatisfaction, aggression, less frequently showing tenderness to the child, and less passing on positive messages. In this way, parents' behavior may secondarily worsen the children's functioning and be a factor shaping or sustaining the occurrence of undesirable behavior, emotional difficulties, and problems in social interactions, as regards communication [22, 25].

The results obtained in the study indicate the occurrence of a significant correlation between mothers' low motivation to establish and sustain social relationships and high tolerance of solitude, and increased difficulties in communication and social relationships, mainly with peers, in children with ASD. Similarly, Page *et al.* [50] and Parr *et al.* [51] describe significant difficulties in social relations and communication in parents raising children with ASD. Schwichtenberg *et al.* [52] suggested that parents' difficulties in social relationships and communication could be a potential barrier to childcare, as parent-mediated therapeutic interventions are common practice in supporting children with ASD. Parr *et al.* [51] believe that social response and mothers' strengths and weaknesses in communication may have a direct impact on the effectiveness of parent-mediated intervention. It can be hypothesized that parents who avoid social relationships may have difficulties in teaching their child to establish proper interpersonal relationships and proper communication. The mother's low motivation to establish social relationships will also not be conducive to her asking for help and support, and may also result in a lack of cooperation in the child's therapeutic process. It should also be pointed out that low motivation of the surveyed mothers to establish and sustain interpersonal relationships may result not only from their temperament characteristics, but also from the sense of guilt, shame, and lack of parenting competences with regard to the difficulties manifested by the child, but also due to the sense of social rejection.

It should be noted that the surveyed group of mothers of children with ASD is not homogeneous in terms of temperament types. Based on the cluster analysis, two groups of mothers differing in temperament traits were distinguished. The type of temperament presented by the first group of mothers was

called isolating/with increased negative emotionality, and the type of temperament presented by the second group was called an open type/with a low level of negative emotionality. The first group consists of 28 women and is characterized by significantly higher sensitivity to stimuli causing dissatisfaction, a tendency to react with anger, aggression, hostility, dissatisfaction, pursuit of solitude, and low motivation to establish social relationships. The second group consists of 30 women. Mothers from this group are more willing to establish social relationships, and have a higher threshold for reacting with negative emotions.

The distinguished types of temperament in the surveyed mothers correspond to the two-factor model of temperament developed by Evans and Rothbart [53]. The type of temperament presented by the first group of surveyed women, called isolating/with intense negative emotionality, corresponds to the temperament factor in which, according to the authors mentioned above [53], negative affect dominates. The type of temperament presented by the second group of surveyed women, which was called open/with a low level of negative emotionality, corresponds to the factor in which, according to Evans and Rothbart [53], positive emotionality dominates. Evans and Rothbart [53] stated that there are negative correlations between negative affect and effort control (executive attention construct), and positive correlations between positive emotionality and orientation sensitivity. Analyzing the temperament and personality traits described in the literature, Evans and Rothbart [53] point out that one dimension of temperament includes the following traits: negative emotionality (negative affect)/neuroticism, and the other includes extraversion/positive emotionality (positive affect). These authors report that variants of these two constructs are common in many studies. It should be emphasized that despite the small number of mothers surveyed in this study, statistical analyses allowed us to distinguish two types of temperament similar to those described by other authors [53], who studied much larger groups of people.

The two distinguished groups of mothers differ in the assessment of the intensity of difficulties in the psychological and social functioning of their children with ASD. Women with type temperament 1 (withdrawn/with a high level of negative emotionality) assessed that their children have significantly more increased symptoms of ASD, communication difficulties, attention problems, behavior problems, difficulty expressing emotions, and problems in relationships with peers than mothers with type 2 temperament (open/low level of negative emotionality). Mothers with temperament type 1 significantly less often than women with temperament type 2 observed prosocial behavior in their children.

Parents and caregivers are the first people from whom a child learns how to establish social relation-

ships, communicate with others, how to express emotions, control them, and deal with them. Parents teach their children not only by using certain educational methods. Children learn by imitating their parents, who are important to them. It can be assumed that mothers who react quickly and intensely with negative emotions, aggression, hostility, and dissatisfaction, and avoid social relationships may have difficulties teaching children to establish positive social relationships, communicate and control emotions and express them in a constructive way. It should be emphasized that the child's difficulties resulting from ASD also overlap with the characteristics of his temperament, which is genetically determined.

A hypothesis can be formulated that mothers who have a high threshold for reacting with aggression, hostility, dissatisfaction, better controlling their emotions, and willingly establishing social relationships will minimize difficulties in social communication and help in the development of self-regulation in children with ASD [26, 54]. Empathic care and sensitivity to the child's needs and messages facilitate adaptation, control of negative emotions, positive perception of the child, and cooperation in the mother-child relationship [30]. Positive parenting practices related to the transfer of positive emotions by mothers, messages, openness to the child, his needs, showing him acceptance, and providing support will be conducive to the child learning and developing pro-social behavior and the principles of proper communication, and expressing emotions [17]. Age-appropriate monitoring of the child by structuring his activities (Grolnick, Pomerantz, 2009), and the use of coherent, consistent discipline will allow the child to acquire a sense of security and predictability of the surrounding reality [49]. Many authors [18, 14, 55, 56] have pointed out that the effects of this type of parental influence are higher social competences of the child, better developed ability to regulate emotions, a lower level of psychopathological symptoms, or even better academic performance. The results of studies investigating the nature of the relationship between the child's functioning and the parents' temperament [17, 19, 24, 57] are primarily of practical importance.

All in all, the mothers' temperament is an important factor influencing the course of a child's development. A certain constellation of temperament traits or extreme intensification of specific temperament traits is perceived by parents as a source of difficulties they encounter in caring for children. The child's temperament, as his innate predisposition, may also shape the parents' behavior towards the child and parental attitudes adopted by them. Research on the relationship between mothers' temperamental traits and symptoms of ASDs needs to be continued, as many issues remain to be clarified. One of the limitations of the present study is the small number of surveyed subjects. Therefore, the obtained results should be

treated with great caution, as hypotheses for future research. It is worth emphasizing that the assessment of the intensity of autism spectrum symptoms was made by the children's mothers, and their assessment may be subjective. Despite these limitations, the results point to a very important issue – the importance of parents' temperament and their impact on the functioning of a child diagnosed with ASD. Considering potential further research, it would be advisable to obtain data from a larger group of mothers, and to consider examining mothers of children developing normally, and mothers of children with other clinical syndromes.

Conclusions

Mothers' temperament traits of a tendency to react with aggression, dissatisfaction and avoidance of social relationships are correlated with the child's increased behavior problems, social relations, and difficulties with emotional control and communication.

Mothers of children with ASD constitute a diverse group in terms of temperament types. A group of mothers with a withdrawn temperament type/with increased negative emotionality and a group with an open type/with a low level of negative emotionality were distinguished.

Women with withdrawn/negative emotionality type of temperament assess that their children have significantly more increased difficulties with emotional control, social relations, behavior problems and more severe symptoms of ASDs, compared to mothers with the open/with a low level of negative emotionality type of temperament.

Conflict of interest

The authors declare no conflict of interest.

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