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MOTHERS WITH SCHIZOPHRENIA: THE RELATIONSHIP BETWEEN MATERNAL ABILITY TO RECOGNIZE AFFECT AND THE CHARACTERISTICS PARENT-CHILD RELATIONSHIPS

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Abstract

Introduction. Mental illness in the mother is associated with dysfunctional parenting styles. There is a view that there is a relationship between affect recognition abilities in mothers and the nature of parent-child relationships. However, the number of studies addressing this issue is extremely limited, and the results are ambiguous and require clarification.
The aim of the study was to investigate the nature of parent-child relationships in mothers with schizophrenia, the maternal ability to recognize affect in study groups consisting of mothers with a diagnosis of schizophrenia and healthy controls and whether affect recognition abilities impact the quality of parent-child relationships in a sample of mothers with schizophrenia, when compared to mothers with no mental health diagnosis.
Materials and methods. The study involved mothers with schizophrenia (n = 85) and mentally healthy mothers (n = 51) who have healthy children aged 3 to 14 who live with them. The assessment of parent-child relationships was carried out using a questionnaire for parents "Analysis of family relationships". In order to identify typological groups with similar styles of parent-child relationships in the studied sample of mothers, an analysis of the internal structure of parent-child relationships was carried out using exploratory factor analysis with subsequent clustering of the set of indicators of the obtained factors based on the K-means method. To test the hypothesis that the ability to recognize affect may be associated with quality of parent-child relationships regression analyses using the results from the emotion recognition tasks to predict variables of parent-child relationships.
Results. Styles of parent-child relationships among mothers with schizophrenia have been determined. A connection was found between the nature of the parent-child relationship and the presence of a diagnosis of schizophrenia in the mother and maternal ability to recognize affect.
Conclusions. Mothers with schizophrenia practice styles of parent-child relationships similar to mentally healthy mothers, while maternal schizophrenia is more often associated with dominant hyperprotection against the background of a phobia of the loss of a child, and less often, child-parent relationships that do not have dysfunctional features. The maternal ability to recognize adult affect impacts the quality of parent-child relationships

Key words: Mothers with schizophrenia, parent-child relationship

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Introduction

According to research about half of women with schizophrenia are parents of minor children under the age of 18 [1]. A mother's schizophrenia causes not only the personal disadaptation of the woman but is also associated with a significant disruption of family functioning. The huge number of disintegrating families among people with mental disorders, the significant number of cases of mothers with schizophrenia being deprived of their parental rights and the lack of programs social and psychological support for such families identified the need to study the family functioning of mothers with schizophrenia. An integrated approach is the most effective to mental health care organization at the present stage and requires consideration of the mental, personal and social characteristics of patients with mental disorders. In this aspect mothers with schizophrenia represent a unique group of the population, requiring the development of intervention programs and measures aimed at rehabilitation, including the successful fulfilment of the parental role.

Contemporary research is more often aimed at studying the effects of maternal mental illness on offspring. Despite the prevailing stigmatizing negative view of the effect of maternal schizophrenia on offspring, there is evidence in the scientific literature of favourable outcomes for children of mothers with schizophrenia [2]. Researchers have identified a number of predictors of outcomes for the offspring of mothers with schizophrenia. One of which is the style of child-parent relationships [2, 3]. The influence of the style of parent-child relationships on the development of psychopathology in the offspring is confirmed in studies not only

of mentally ill parents. Most young people who have experienced high levels of inadequate parental behaviour in childhood have had psychopathological symptoms during adolescence, regardless of whether their parents had any mental disorder. On the contrary, the offspring of mothers with mental disorders were not at increased risk of developing mental disorders if the style of parent-child relationships was adaptive [4].

Despite the increased interest in the problems and needs of mothers with schizophrenia in recent decades, the amount of research into the characteristics of parent-child relationships between mothers with schizophrenia and those children, the definition of the style of parent-child relationships is limited. The results of existing studies indicate mother's schizophrenia correlates with unpredictable and permissive parenting style, reduced parental determination, and authoritarian features [5, 6]. However, there is evidence that the parenting style of mothers with schizophrenia may not have dysfunctional characteristics, as evidenced by the results of a population study in which seventy-five percent of participants with psychotic disorders did not have dysfunctional parenting patterns [7].

Research results indicate that maladaptive behaviour of mothers with schizophrenia is significantly mediated by symptoms of mental disorder, and the maladaptive style of child-parent relationships in turn correlates with an increase in the risk of adverse consequences for offspring [8].

Studies of the influence of differential effects of diagnosis, medical history, severity and chronicity of the disease on parenting behaviour among mothers with chronic mental disorders indicate that diagnosis has a small but significant negative effect on parent-child relationship in mothers with schizophrenia. It was also found that the impact of the diagnosis is partially mediated by the actual symptoms and the level of the general functioning of the mother [6]. Thus, negative and positive symptoms correlate with dysfunctional parent-child interaction, while negative symptoms are associated with distance and emotional lack of expression and positive symptomatology correlates with disorganized inconsistent style of parent-child interaction with features of a rejecting, not being involved and neglecting [9].

The effect of the deficit capacity in maternal schizophrenia on parent-child relationships has also been analysed. Researchers have established a significant relationship between impaired social cognition and neurocognitive deficits with dysfunction of parental roles [10]. In another recent study, the dysfunctional nature of parent-child relationships was associated with both negative symptoms of schizophrenia and impaired recognition of facial emotions [11, 12]. The effect of the ability to recognize emotions has been studied in mentally healthy mothers with a high risk of aggression towards the child. Aggressive mothers were more likely to misidentify certain emotion signals and flag a negative effect as positive in another study [13]. In a recent study differences were found only for fathers at high risk of violence, while differences between mothers were not found [14].

At the same time, the conclusions of recent studies based on the results of the application of mathematical models indicate that a deficit in abilities due to a mental disorder predicts only some dysfunctional patterns of interaction between mother and child, and the direct diagnosis of schizophrenia increases the likelihood of a deficit in maternal sensitivity, but not maternal responsiveness in statistical models [15]. The diagnosis of schizophrenia in the mother was a stronger predictor of problematic interaction with the child than the severity of the disease or poor social stability and support in the study of the interaction of sick mothers with children under six months of age [16]. However, in an earlier study, there was no significant difference in the effect of the direct diagnosis (schizophrenia, depression, or bipolar disorder) on parenting [17].

This study aimed to investigate the characteristics of the parent-child relationships of mothers with schizophrenia and their children and whether impaired affect recognition abilities impact the quality of mother-infant interaction in a sample of mothers with schizophrenia, when compared to mothers with no mental health diagnosis.

Materials and methods

Participants

The research design was a cross, comparative, «case – control». All women who participated in the study were mothers of apparently healthy children aged 3-14 and lived with them. The main group consisted of mothers with paranoid schizophrenia, according to the ICD-10 diagnostic criteria [7]. Interviews and research were carried out at the stage of remission within three days of additional discharge from a psychiatric hospital. The control group was represented by women without mental health diagnosis. The study was approved by the local ethics committee. Only those mothers that gave informed consent were approached to take part in the research. 85 mothers with paranoid schizophrenia participated in the study, forming 100 research dyads. The control group consisted of 51 mothers without mental health diagnosis forming 60 research dyads. The objects of statistical observation were mothers; the unit of statistical observation was the mother-child dyad.

The average age of the participants was 36.3 (5.2) years in the main group and 37.1 (5.8) years in the control group and had no statistically significant intergroup differences ($t = 0.83$, $p > 0.05$). All women who took part in the study lived equally in urban and rural areas ($\chi 2 = 2.75$, $p > 0.05$). The groups did not have statistically significant differences in the age of the children included in the study ($U = 2930.5$, $p > 0.05$).

The average age of onset of the disease in mothers with schizophrenia was 26.9 (6.15), and the duration of the disease averaged 9.31 (6.45) years. In 24.7% (n = 21) of mothers with schizophrenia, a burdened psychopathological heredity was noted, in 4.7% (n = 1) of them, the burdened heredity

was represented by schizophrenia. The number of hospitalizations was 5 (3-7). In 48.2% (n = 41) of the participants, the diagnosis schizophrenia was established before the birth of the child included in the study, in 75.6% (n = 31) of them, an exacerbation of the disease was noted within six months after the birth of the child. In 14.1% (n = 12) of the participants, the disease appeared in the first year after the birth of the child included in the study; at a later date after the birth of the child, the diagnosis was established in 37.7% (n = 32) of women.

Assessment of the child-parent relationship

The questionnaire for parents "Analysis of family relationships" (AFR) was developed by the head of the Department of Child Psychiatry, Psychotherapy and Medical Psychology St. Petersburg Medical Academy of Postgraduate Education¸ E. G. Eidemiller and Professor of the Department of Psychology of the Faculty of Social Policy of the University Mykolos Romeris (Lithuania) V.V. Yustitskis [18]. The method allows the various violations of the process of parenting to be determined, the type of maladaptive style of child-parent relationships to be identified and some psychological causes of these disturbances to be established. For this, 11 scales are measured related to violations of the parenting (the level of protection in the parenting; the degree of satisfaction of the child's needs; the number of requirements presented to the child in the family; and the instability of the parenting style) and 9 scales related to the personal psychological problems of the parents, which they solve for account of the child (the expansion of parental feelings, preference for children's qualities in a teenager, parental upbringing uncertainty, the phobia of loss of a child, the underdevelopment of parental feelings, the projection of one's own unwanted qualities onto the child, bringing the conflict between spouses into the sphere of education, and a shift in parent's attitudes towards the dependent child). The questionnaire allows the types of maladaptive parenting to be identified, as well as an idea of the structural-role aspect of the family's life and the peculiarities of the functioning of the system of mutual influences to be obtained. The questionnaire is available in two versions for children and adolescents. It also includes instructions, an answer sheet, stimulus material in the form of a numbered list of statements, as well as recommendations for processing and interpreting the results. The stimulus material of the two options consists of 130 statements. The processing of the results was carried out by summing the positive answers for each scale. For each positive answer, 1 point is given.

Tests of affect recognition

A computerized neuropsychological battery was used to assess the degree of impairment in emotional perception to study the neuropsychological functioning of the Penn emotion recognition task (PennCNP). Participants are presented in turn with a series of 40 photographs of faces showing five types of expressions - four basic emotions and one neutral. The participant is asked to determine what emotions the face expresses in each photo. 5 possible answers were offered: expression of happiness, sadness, anger, fear and neutral expression. Participants respond to each presentation by clicking on the word describing the emotion on the face of the presented photograph. For each emotion, 4 female faces (4 x 5 = 20) and 4 male faces (4 x 5 = 20) are presented. Faces are depicted in colour photographs and balanced in terms of the intensity of emotions, age, gender [19, 20, 21]. A point is awarded for each correct emotion recognition. The counting is based on the sum of the points of all correct answers, on the sum of correctly identified emotions on male and female faces, as well as on the sum of correctly identified emotions of happiness, sadness, anger, fear and neutral expression.

Statistical methods

The obtained data were checked for normal distribution using the Kolmogorov-Smirnov criterion (n¿ 50). Data for variational series with a non-normal distribution is described as a median and 25 and 75 percentiles - Me (P25; P75), variables with a normal distribution were described as mean and standard deviation - M (SD). To assess intergroup differences, the non-parametric Mann-Whitney test was used to analyse quantitative data. For the analysis of the internal structure of parent-child relations, exploratory factor analysis was used. The acceptability of the applicability of the analysis in groups was evaluated using the Kaiser-Meyer-Olkin criterion and the Barlett sphericity criterion. The Varimax rotation method was applied to factors whose eigenvalues exceeded 1 (Kaiser normalisation). Non-hierarchical cluster analysis based on the K-means method was used to identify typological groups with similar parenting styles in the studied sample. To compare the intergroup difference of a trait (more than two groups), we used the method of one-way analysis of variance and its nonparametric analogue, the Kruskal-Wallace test; for a posteriori analysis we used a correction for multiple comparisons of Bonferonni. A statistical assessment by calculating the odds ratio using the logistic regression method was carried out to identify the predictor influence of a trait on a qualitative trait acting as a dependent resulting indicator. We used a logistic regression model with forced inclusion of predictors to analyse the relationship between one qualitative trait acting as a dependent resulting indicator and a subset of quantitative and qualitative traits. The research results were processed using SPSS Statistics version 17.0 for Windows and Statistica 10.

Results

The internal structure of parent-child relationships in the investigated dyads has been established by applying the method of factor analysis at the level of 20 scales of the AFR.

The results of the transformed matrix of factorial loads, presented in Table 1, made it possible to identify 4 main factors explaining 52.5% of the sum of the variance (Kaiser test = 0.823, Bartlett test = 1064.087, with p <0.001).

Tab. 1: Values of factor loadings according to the scales of the questionnaire for parents «Analysis of family relationships» among all participants in the study.

Scale	Factor 1	Factor 2	Factor 3	Factor 4
Excessive requirements-prohibitions	0.711	-	-	-
Phobia of loss of a child	0.687	-	-	-
Severity of sanctions	0.682	0.309	(-0.323)	-
Hyperprotection	0.617	-	0.400	-
Expansion of the sphere of parental feelings	0.565	-	-	0.431
Preference for children's qualities	0.527	-	-	-
Instability of the parenting style	0.488	-	-	-
Lack of requirements- duties	-	0.691	-	-
Parenting uncertainty	-	0.577	0.486	(-0.317)
Underdevelopment of parental feelings	-	0.703	-	-
Projection on the child of his own undesirable qualities	-	0.693	-	-
Introducing the conflict between spouses into the parenting	-	-	-	0.653
Hypoprotection	-	0.575	-	0.318
Lack of requirements-prohibitions	-	0.444	0.440	0.437
Ignoring the child's needs	-	0.550	-	0.422
Minimum sanctions	-	-	0.780	-
Indulgence	0.301	-	0.728	-
Preference for male qualities	-	-	-	-
Excessive requirements--duties	0.512	-	-	-
Preference for female qualities	0.403	-	-	-
Eigenvalues	5,736	1,999	1,790	1,380
% of variance explained	18.2%	15.9%	10.8%	7.6%

The analysis of the feature structure and vector loads of the factors presented in Table 1 established that there were 4 types of dysfunctional parenting styles in the investigated dyads, determined by the psychological problems of the mother solved in the field of mother-child relations: «dominant hyperprotection against the background of a phobia of loss of a child», «hypoprotection against the background of underdevelopment of parental feelings», «hyperprotection indulging against the background of parenting uncertainty», and «hypoprotection against the background of carrying out a conflict with a spouse in the field of parenting» [2].

Non-hierarchical cluster analysis based on the K-means method was used to identify typological groups with similar parenting styles in the investigated sample of mothers. The number of clusters was determined on the basis of the results obtained on the basis of factor analysis of the presence of four dysfunctional parenting styles in the studied dyads and the assumption of the presence of a parenting style that does not have features of dysfunction. Clustering was carried out according to a set of indicators of four factors and 5 clusters. As a result, a 5-cluster model of parenting styles was obtained which distributes 160 dyads across 5 clusters highly significantly (at a significance level of p <0.0005 according to the results of analysis of variance) over a set of indicators

Tab. 2: Results of clustering observations by a set of factors

Factors	1 cluster	2 cluster	3 cluster	4 cluster	5 cluster	Results of ANOVA clustering of observations by factors F. p
«Dominant hyperprotection against the background of a phobia of loss of a child»	-0.36455	-0.16207	-1.23069	1.31347	0.16471	68,489; 0.000
«Hypoprotection against the background of underdevelopment of parental feelings»	-0.23586	-0.76604	0.29347	-0.07325	1.38877	28,875; 0.000
«Hyperprotection indulging against the background of parenting uncertainty»	0.80402	-1.03034	-0.35958	0.32935	-0.40168	34,908; 0.000
«Hypoprotection against the background of carrying out a conflict with a spouse in the field of parenting»	-0.25194	-0.30277	1.07552	0.55089	-0.92003	24,454; 0.000
Number of observations in a cluster	48	32	22	35	23	

The results of the cluster analysis made it possible to distinguish five typological groups according to the parenting style prevailing in dyadic relationships. In the first group of dyads (n = 48) hyperprotection against the background of parenting uncertainty prevails in the child-parent relationships (style «PU»), in the second group (n = 32) there is no dysfunctional patterns child-parent relationships (style «No dysf»), the third group (n = 22) combined dyads with prevalence of hypoprotection on against the background of carrying out a conflict with a partner in the child-parent relationship area (style «CC»), the fourth group (n = 35) consisted of dyads with a predominance of dominant hyperprotection against the background of a phobia of loss of a child (style «PhL»), and the fifth group (n = 23) combined dyads with hypoprotection against a background of undeveloped parental feelings (style «UPF»).

The statistical analysis to establish a reliable relationship between the presence of schizophrenia in the mother and the

child-parent relationships style ($\chi2 = 23.78$, $p < 0.001$). Further post hoc analysis determined that maternal schizophrenia is associated more often with dominant hyperprotection against the background of a phobia of loss of a child ($\chi2 = 16.0$, $p < 0.001$), and less often with child-parent relationships without dysfunctional patterns ($\chi2 = 8.17$, $p < 0.01$) and hypoprotection against the background of carrying out a conflict with a spouse in the child-parent relationship area ($\chi2 = 5.07$, $p < 0.05$). The relationship between maternal schizophrenia and the «PU» and «UPF» styles has not been established ($p < 0.05$).

Characteristics of the emotional processing of mothers with schizophrenia

The results of the PennCNP Emotion Recognition test presented in Table 3 indicate that mothers with schizophrenia were significantly worse at recognizing emotions in general ($U = 522.5$, $p < 0.001$) and also regardless of gender of the face (male faces ($U = 531.5$, $p < 0.001$), female faces ($U = 658.0$, $p < 0.001$)). The number of correct answers to the test in the main group was 30 (27-33) out of 40 possible, and in the control group - 34 (32-35). The mothers of the main group recognized the expressions of fear ($U = 604.0$, $p < 0.001$) and sadness ($U = 909.0$, $p < 0.05$), neutral expression ($U = 847.0$, $p < 0.005$) significantly worse than the control group. There were no significant statistical differences between the study groups in the ability to identify anger and happiness ($p < 0.05$). The median values and interquartile range of correct answers in recognizing emotions indicate the same difficulty in recognizing anger - 4 (3-5) out of possible 8 correct answers and no difficulty in recognizing expressions of happiness - 8 (8-8) answers in both groups out of 8 maximum possible.

Tab. 3: Values of the results of the PennCNP test «Emotion recognition» in the studied groups Me (25% -75%)

	Schizophrenia	Controls	Statistically significant differences U; p
Total number of correct answers	31(28-33)	33(32-35)	1054.0; 0.000
Correct identification of emotions:			
on female faces	16(14-17)	17(15-18)	1296.0; 0.000
on male faces	15(13-16)	17(15-18)	1010.0; 0.000
anger	4(3-5)	4(3-5)	1881.5; 0.183
fear	6(4,5-7)	7(6-8)	1285.0; 0.000
happiness	8(8-8)	8(8-8)	2082.0; 0.562
neutral expression	7(5-8)	7(7-8)	1524.0; 0.003
sadness	7(6-8)	7(7-8)	1617.5; 0.010

In order to identify a set of features statistically significantly interrelated with the parenting style we made a comparative assessment of the indicators of emotional processing in mothers in dyads with different parenting styles. Statistical analysis was carried out to test hypotheses about the equality of group mean values in the groups formed depending on the parenting style: «PU», «No dysf», «CC», «PhL» and «UPF». Statistical analysis of the empirical results of the PennCNP Emotion Recognition test, presented in Table 4, revealed intergroup differences in the ability to recognize emotions on the faces in mothers with different parenting styles.

Tab. 4: Values of PenCNP emotion recognition test results in mothers with different child--parent relationships styles Me (25% -75%)

	Style PU n=48 (1)	Style No dysf n=32 (2)	Style CC n=22 (3)	Style PhL n=35 (4)	Style UPF n=23 (5)	Statistically significant differences H, p
Total correctly identified emotions:	33 (29,5-34)	31 (29,5-4,75)	34 (33-35)	28 (27-32)	32 (29-34)	H=21.2; 0.003 z_{1-4}=3.28; 0.01 z_{3-4}=4.34;0.0001
on female faces	16,5 (15-17)	16 (15-17)	17 (15,75-18)	16 (13-17)	17 (14-18)	H=10.65; 0.03 z_{3-4}=3.07; 0.02
on male faces	16 (15-17)	15 (14,25-17)	17 (15-18)	14 (13-15)	15 (14-17)	H=22.8;0.0001 z_{1-4}=3.47; 0.005 z_{2-4}=2. 9; 0.03 z_{3-4}=4.28;0.0001
anger	4 (3,25-5)	5 (3-5)	4,5 (3-6)	3 (3-4)	4 (3-5)	H=10.5; 0.032 z_{3-4}=2.79; 0.041
fear	7 (6-8)	6 (5-7)	7 (6-8)	6 (4-7)	7 (5-8)	H=8.8; 0.064
happiness	8 (8-8)	8 (8-8)	8 (7,75-8)	8 (8-8)	8 (8-8)	H=2.5; 0.6
neutral expression	7 (6-8)	7 (6-8)	7 (5-8)	7 (5-8)	7 (6-8)	H=1.6; 0.8
sadness	7 (6-7,75)	7 (7-8)	7,5 (7-8)	7 (5-7)	7 (5-8)	H=18.8; 0.001 z_{2-4}=2.89; 0.038 z_{3-4}=3.15; 0.015

Intergroup differences were established in the total number of correctly recognized emotions ($H = 21.2$; $p = 0.003$), in the number of correctly identified emotions on female faces ($H = 10.65$; $p = 0.03$) and on male faces ($H = 22.8$; $p = 0.0001$). Differences were also found between groups in the ability to recognize expressions of anger ($H = 10.5$; $p = 0.03$) and sadness $H = 18.8$; $p = 0.001$).

Subsequent post hoc analysis determined that the mothers in the group with the «PhL» style performed worse on the PennCNP test. Thus, the total number of correct answers to the test in this group was significantly less than in the groups of mothers with the «PU» style ($p < 0.01$) and «CC» ($p < 0.001$), the number of correctly identified emotions on women's faces was lower, than in the group with the style «CC» ($p < 0.05$), and on men's faces was lower than in the groups with the styles «CC» ($p < 0.05$), «No dysf» ($p < 0.05$), «PU» ($p < 0.01$). Also, mothers with the «PhL» style recognized the expression of anger less often than mothers with the «CC» style ($p < 0.05$), and sadness ($p < 0.05$) was identified correctly less often than mothers with the «No dysf» style and the «CC» ($p < 0.05$).

The deficit of emotional processing influenced the likelihood of the formation of the «PhL» style, which was confirmed by statistically significant associations with the results of the PennCNP test in terms of the total number of

correct answers (OR = 0.85; 95% CI [0.77-0.94]; $\chi2 = 12.17$, p = 0.001), the number of correctly recognized emotions on male faces (OR = 0.69; 95% CI [0.57-0.83]; $\chi2 = 16.65$, p = 0.001), the number of correctly identified expressions of sadness (OR = 0.69; 95% CI [0.53-0.91]; $\chi2 = 7.6$, p = 0.006) and anger (OR = 0.67; 95% CI [0.5-0 , 92]; $\chi2 = 6.7$, p = 0.001). It was also found that the «CC» style is associated with higher results of the emotional processing assessment test in terms of the total number of correct answers (OR = 1.26; 95% CI [1.07-1.49]; $\chi2 = 7.7$, p = 0.006), the number of correctly recognized emotions on female faces (OR = 1.38; 95% CI [1.05-1.82]; $\chi2 = 6.8$, p = 0.009) and on male faces (OR = 1 , 44; 95% CI [1.10-1.89]; $\chi2 = 7.6$, p = 0.006), the number of correctly identified expressions of sadness (OR = 2.04; 95% CI [1.18-3.5]; $\chi2 = 6.8$, p = 0.01) and anger (OR = 1.45; 95% CI [1.01-2.08]; $\chi2 = 4.3$, p = 0.04). For the «No dysf» style, a significant correlate was one indicator of the PennCNP test - the ability to recognize the expression of sadness (OR = 1.63; 95% CI [1.06-2.43]; $\chi2 = 5.9$, p = 0.014).

To determine the contribution of emotional processing to the formation of the parenting style the method of multiple logistic regression was applied to the styles «No dysf», «PhL» and «CC» with an assessment of the share of influence on the variance of the dependent variable through the value of the Nadelkerkes square (approximation of the value of R2, which shows the share of influence of the predictors of the model on variance of the dependent variable). Two models were run for each style: in the first step the variables of the PennCNP test were included, in the second step the diagnosis of maternal schizophrenia was included (see Table 5 for a summary of regression analyses).

Tab. 5: Summary of regression analyses.

Variable	B	SE	test Wald	p	Exp(B)
Style «No dysf»					
Step 1					
Correct identification of the expression of sadness	0.490	0.204	5.785	0.016	1.63
Step 2					
Correct identification of the expression of sadness	0.419	0.206	4.114	0.043	1.520
Diagnosed with schizophrenia in the mother	-0.973	0.416	5.477	0.019	0.378
R2 =0.070 for step 1; ΔR2 =0.052 for step 2, p=0.002					
Style «PhL»					
Step 1					
Total correct answers PenCNP	0.054	0.103	0.269	0.604	1.055
Correct identification of emotions on male faces	-0.425	0.201	4.490	0.034	0.654
Correct identification of the emotions of anger	-0.165	0.182	0.819	0.366	0.848
Step 2					
Total correct answers PenCNP	0.083	0.107	0.603	0.438	1.087
Correct identification of emotions on male faces	-0.359	0.209	2.931	0.087	0.699
Correct identification of the emotions of anger	-0.211	0.190	1.240	0.266	0.810
Diagnosed with schizophrenia in the mother	1.809	0.656	7.602	0.006	6.102
R2 =0.158 for step 1; ΔR2 =0.086 for step 2, p=0.001					
Style «CC»					
Step 1					
Total correct answers PenCNP	-1.151	1.479	0.606	0.436	.316
Correct identification of emotions on female faces	1.257	1.470	0.731	0.392	3.516
Correct identification of emotions on male faces	1.339	1.456	0.846	0.358	3.816
Correct identification of the emotions of anger	0.124	0.223	0.308	0.579	1.132
Correct identification of the emotions of fear	0.169	0.214	0.621	0.431	1.184
Step 2					
Total correct answers PenCNP	-1.038	1.482	0.490	0.484	0.354
Correct identification of emotions on female faces	1.129	1.475	0.585	0.444	3.092
Correct identification of emotions on male faces	1.183	1.466	0.651	0.420	3.263
Correct identification of the emotions of anger	0.141	0.223	0.396	0.529	1.151
Correct identification of the emotions of fear	0.155	0.212	0.531	0.466	1.167
Diagnosed with schizophrenia in the mother	-0.438	0.537	0.667	0.414	0.645
R2 =0.126 for step 1; ΔR2 =0.007 for step 2, p=0.057					

When studying the «No dysf» style the first model that included emotional processing variables had statistical significance ($\chi2 = 7.2$, p = 0.007) and explained 7% of the variance of the variable. Including the diagnosis of schizophrenia in the mother improved the model ($\chi2 = 12.8$, p = 0.002) which accounted for an additional 5.2% of the variance of the dependent variable. When studying «PhL» style the first model that included emotional processing variables had statistical significance ($\chi2 = 17.4$, p = 0.001) and explained 15.8% of the variance of the variable. Including the diagnosis of schizophrenia in the mother improved the model ($\chi2 = 27.6$, p = 0.001) which accounted for an additional 8.6% of the variance of the dependent variable. When studying the «CC» style, the first model included emotional processing variables although it explained 12.6% of the variance of the variable, it was not statistically significant ($\chi2 = 11.54$, p = 0.042). Including the diagnosis of schizophrenia in the mother did not significantly improve the model ($\chi2 = 12.2$, p = 0.057).

Discussion

This study presents data on the characteristics of parent--child relationships in mothers with schizophrenia with their minor children and the nature of the links between parent--child relationships and affect recognition in mothers with schizophrenia as compared to healthy controls.

Child-parent relationships styles in mothers with schizophrenia were found to be similar to child-parent relationships

styles in mentally healthy mothers. At the same time, maternal schizophrenia was associated more often with the style of dominant hyperprotection against the background of fear of losing a child, less often with child-parent relationships without dysfunctional patterns and the style of hypoprotection against the background of a conflict with a spouse in the parenting. The obtained result on the nature of parent-child relations partially reproduces the data of studies in which schizophrenia in the mother correlates with an unpredictable and permissive style of upbringing, a decrease in parental decisiveness, and features of authoritarianism [5, 6]. The psychological factor of fear of losing a child, as a style-forming determinant, is explained by the higher risk of removal of the children from mothers with schizophrenia. Studies show that mothers with schizophrenia are often worried about the risk of being recognized as incapable of parenting and, as a consequence, having the children removed from the family [22].

In the present study, mothers with schizophrenia, compared with mothers without a psychiatric diagnosis, had significantly worse emotion recognition on both male and female faces. The greatest difficulty was the recognition of fear, sadness and neutral expression. At the same time, mothers with schizophrenia did not show any disturbances in the recognition of the emotions of anger and happiness. The results obtained confirm the main scientific ideas about the deficit of emotional processing among patients with schizophrenia, according to which the deficit is more pronounced in the ability to recognize negative emotions [23, 24]. Also, the results of our study coincide with the results of a study of mothers with schizophrenia using the PennCNP Emotion Recognition test, in which the mean value of responses on the test in the group of mothers with schizophrenia was M = 31.41 (3.67), and in the group of healthy people - M = 34.14 (2.30), while the results had statistical differences at the level of $p < 0.06$ [15].

In previous studies emotional processing deficits in the form of difficulty in recognizing expressions of sadness, anger, disgust and surprise in mothers with schizophrenia are associated with parenting problems [12]. The authors of a recent comparative study evaluating the effect of emotional processing on child-parent relationships in mothers with schizophrenia using regression analysis found affect recognition deficit does not fully explain the differences in parenting among women with schizophrenia and mentally healthy mothers, and the ability to recognize emotions is only a predictor of strange and unusual statements of a mother with schizophrenia in interactions with a child [15]. In turn, in the present study, it was found that the deficit in emotional processing predicted dominant hyperprotection against the background of fear of losing a child, and more developed abilities predicted not only child-parent relationships without dysfunctional patterns, but hypoprotection against the background of carrying out a conflict with a spouse in the child-parent relationships area.

The main findings of the present study are: in mothers with schizophrenia parent-child relationships styles were found to be similar to those in healthy mothers; maternal schizophrenia was more often associated with dominant hyperprotection against the background of fear of the loss a child and less often with parent-child relationships without dysfunctional features; the deficit of the mother's ability to recognize emotions increased the likelihood of the formation of dominant hyperprotection against the background of fear of losing the child, while higher indicators of emotional processing parameters were associated with parent-child relationships without dysfunctional features and with hypoprotection against the background of carrying out a conflict with a spouse in the child-parent relationships area.

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