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Original Article

Depressive symptoms and their correlates in parents of children with autism spectrum disorders

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Abstract: This study aims to investigate the relationship between parental self-reported depression, parent personality, the severity of children's autism spectrum disorders (ASD) symptoms and parenting stress. A case-control study including 361 autistic children and 345 typically developing children and their parents, respectively was conducted from 2009 to 2012 in Shanghai. Parents (n=722) of autistic outpatients in Shanghai Mental Health Center completed: One in-house questionnaire; Autism Behavior Checklist (ABC); Self-Rating Depression Scale (SDS); Parenting Stress Index (PSI); Eysenck Personality Questionnaire (EPQ). The mean SDS scores of fathers (t=5.837, *P*=0.000) and mothers (t=10.653, *P*=0.000) were higher in the case group than in controls. Parents of ASD children showed much more parenting stress and different personality profiles compared to control group parents (t=20.836, *P*=0.000). Relative analysis showed that parental emotional symptoms were significantly related to parental education level (father: r=-0.304, mother: r=-0.252), parenting stress (father: r=0.337, mother: r=.462), and parental personality traits like Neuroticism (father: r=0.387, mother: r=0.518) and Psychoticism (father: r=0.228, mother: r=0.301). In the subsequent stepwise multiple regression analysis, emotional stability (Neuroticism subscale of EPQ) was most significantly correlated to paternal depression (adjusted R^2=0.153) and parenting burden (Parent domain of PSI) was most significantly correlated to maternal depression (adjusted R^2=0.284). ASD symptom severity was not related to parental depression. Parental personality traits and parenting stress may be the most salient factors impacting parental depressive symptoms. Understanding how parental personality traits impact on parental emotional states may be an important consideration in the treatment of ASD.

Keywords: Autism spectrum disorders, depression, personality traits, EPQ, PSI

Introduction

Autism spectrum disorders (ASD), are developmental disabilities characterized by three key clinical features: impairments in socialization, impaired verbal and non-verbal communication, and restricted, repetitive and stereotypic behavior patterns [1]. Currently, there are no substantively effective treatments for many children with ASDs and parenting of ASD children can be a stressful situation [2-4]. In the process of treatment of autism, parents bear a great responsibility and many problems exist in the family of ASD children. Among them, the parents' emotional problems are outstanding, especially the depression and anxiety [5, 6]. Parents of ASD children reporting higher levels of stress compared to parents of children with no disease or those with other chronic diseases, such as: Down's syndrome, tuberous sclerosis and epilepsy [7-9]. Parenting stress has been linked to higher rates of depressive and anxious symptoms in parents of ASD children [10, 11] with mothers perhaps more likely to experience depressive symptoms than fathers [12-14]. In addition, father responsive caregiving involvement could reduce maternal depressive symptoms of children with ASD [15].

Understanding the scope of negative emotions in ASD parents is important for developing and implementing treatments for children with ASD, and this issue has recently generated some research interest [16, 17]. Overall, the emergent picture is complex and the cause of the emotional problem of parents of ASD children is

Table 1. Comparison of the parental SDS scores between two groups (Mean ± SD)

	Case Group (n=361)	Control Group (n=345)	t	*P*	95% CI
SDS Score (father)	46.61±10.22	42.22±9.79	5.837	0.000	2.916, 5.873
SDS Score (mother)	50.32±11.00	42.11±9.39	10.653	0.000	6.702, 9.731
Without Life Events[a]	n=110	n=127			
SDS Score (father)	46.31±9.79	41.79±10.23	3.473	0.001	1.956, 7.087
SDS Score (mother)	49.39±10.43	41.79±9.24	5.898	0.000	5.063, 10.144
With Life Events[b]	n=251	n=218			
SDS Score (father)	46.75±10.42	42.47±9.54	4.641	0.000	2.466, 6.087
SDS Score (mother)	50.73±11.24	42.29±9.49	8.714	0.000	6.536, 10.343

Note: a: PSI Life events =0; b: PSI Life events ≥1.

Table 2. Comparison of EPQ scores between two groups (Mean ± SD)

	Case group (n=361)	Control group (n=345)	t	*P*	95% CI
EPQ score (father)					
Extraversion	52.68±11.05	57.22±11.03	-5.463	0.000	-6.174, -2.909
Neuroticism	44.57±11.18	40.64±10.67	4.770	0.000	2.307, 5.537
Psychoticism	47.21±8.86	45.39±8.64	2.774	0.006	0.533, 3.119
Lie	47.19±10.05	50.32±9.73	-4.213	0.000	-4.597, -1.674
EPQ score (mother)					
Extraversion	54.76±10.13	57.01±10.10	-2.954	0.003	-3.745, -0.754
Neuroticism	46.87±11.03	42.05±10.53	5.941	0.000	3.227, 6.413
Psychoticism	47.24±7.95	46.22±7.87	1.715	0.087	-0.148, 2.190
Lie	48.76±9.60	48.92±9.71	-0.227	0.821	-1.592, 1.262

still dimness. Children with ASD are often unable to form close relationships with their parents or other family members and the daily care needs of many children with ASD can take substantial parental time and emotional investment. Some authors report parental negative mood to be related to ASD symptom severity [18-20] while others note that negative emotions in fathers are more likely to be associated with maternal stress [8]. Furthermore, one recent study reported similar findings as well as a significant impact of the child's problematic behaviors on parenting demands and perceptions of parenting skills [21], and another study reported the child's social impairment severity was found to predict parenting-specific stress [22]. Given the familial aggregation of ASD and high heritability of ASD, especially the latest genetic tests showed that maternal genes showing altered expression in the medial preoptic area in the highly social maternal phenotype are related to autism [23], some researchers have studied the relationship between parental personality traits [24, 25] and parental self-reports of emotional distress, but these studies are few in number [26].

Previous studies were always from one aspect to examine parents' emotional problems and failed to rule out other factors to get a comprehensive understanding of the sources and the reasons of depression and anxiety mood of parents of ASD children. And there is the small sample size problem and the selected samples representatives were poor. And majority of studies did not consider the impact of life event on the parents of ASD children.

Our present study focuses on depressive symptoms reported by parents of autistic children. We hypothesized that parental self-reported depressive symptoms would be associated with parental personality, the severity of their children's symptoms and parenting stress. Should this hypothesis be confirmed, therapeutic interventions may need to be developed with parental personality traits in mind.

Subjects and methods

Participants

This case controlled study recruited families of children with ASD served by the Outpatient

Table 3. Comparison of PSI scores between two groups (Mean ± SD)

	Case Group (n=361)	Control Group (n=345)	t	*P*	95% CI
Child Domain	145.16±20.35	110.67±18.89	23.353	0.000	31.589, 37.388
Hyperactivity	30.76±4.80	25.26±4.87	15.078	0.000	4.777, 6.208
Adaptability	34.04±6.48	25.67±5.11	19.012	0.000	7.508, 9.237
Reinforces	15.09±3.86	11.14±3.42	14.357	0.000	3.409, 4.489
Demandingness	28.34±5.08	21.40±4.47	19.219	0.000	6.227, 7.644
Mood	14.64±3.30	12.06±3.01	10.840	0.000	2.114, 3.049
Acceptability	22.29±4.29	15.14±4.15	22.537	0.000	6.534, 7.781
Parent Domain	163.61±22.28	140.21±21.12	14.326	0.000	20.191, 26.605
Competence	40.10±4.83	34.99±5.12	13.617	0.000	4.372, 5.845
Isolation	17.88±3.93	15.40±3.41	8.937	0.000	1.934, 3.023
Attachment	18.39±3.76	16.01±3.16	9.096	0.000	1.870, 2.899
Health	16.04±3.40	14.63±3.00	5.811	0.000	0.928, 1.875
Role restriction	23.54±5.40	18.46±4.99	12.988	0.000	4.311, 5.847
Depression	26.20±5.46	21.85±5.33	10.730	0.000	3.561, 5.156
Spouse relationship	21.45±5.10	18.86±4.35	7.239	0.000	1.886, 3.290
Total score	308.76±37.38	250.88±36.44	20.836	0.000	52.432, 63.341

Child and Adolescent Psychiatric Clinic in the Shanghai Mental Health Center from 2009 to 2012. ASD diagnosis was confirmed by a child psychiatrist, applying DSM-IV diagnostic criteria (n=361 families). Only children with a diagnosis of Autistic Disorder were included in the study. This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of Shanghai Mental Health Center. Written informed consent was obtained from all participants' guardians.

The control group, matched for child's age and sex was randomly selected and recruited from a mainstream kindergarten, a mainstream primary school and a mainstream junior high school in Shanghai (n=345 families).

Procedures and measures

After the parents or guardians agreed to participate in the study, a questionnaire booklet was administered to them. They completed all the items in the booklet in a special room at the clinic site without distractions. The child psychiatrist was available to help them if they had any questions about the questionnaire.

In the control group, clinic researchers explained the objectives of the study to the participants. After obtaining informed consent/assent, they were similarly provided the study materials for completion.

Data was collected on 5 measures. The in-house questionnaire included general information about children and parents, such as their age, sex, nationality, contact details, occupation, the personal history of child and family history. Autism Behavior Checklist (ABC) [27] comprised of 57 yes/no questions divided into five categories: sensory, relating, body and object use, language, social and self-help; was completed by parents. Similarly, the Parenting Stress Index (PSI) [28], comprising 120 items with 13 subscales; the Zung Self-Rating Depression Scale (SDS) [29], a 20 item self-administered survey used to quantify depressive mood; the Gong revision [30] of the Eysenck Personality Questionnaire (EPQ) [31] measuring the dimensions of Extraversion/Introversion, Neuroticism/Stability, Psychoticism/Socialization, and the Lie (L) scale were completed by each parent participant.

Data analysis

We measured parental depressive symptoms using the Zung SDS scale. We measured parenting stress using the PSI and personality traits using the EPQ. Then we analyzed parental SDS scores, PSI scores and EPQ scores between two groups by Independent Samples t-Test to probe the relationship between prevalence of depression and other factors in both fathers and mothers.

Table 4. Relative analysis of SDS scores and various factors in ASD family (r)

Item (n=361)	SDS score (father)	SDS score (mother)
Age of ASD children	0.087	0.020
Course of disease	0.051	-0.006
Family income	-0.212*	-0.207*
Educational level	-0.304*	-0.252*
Extraversion	-0.170*	-0.332*
Neuroticism	0.387*	0.518*
Psychoticism	0.228*	0.301*
Lie	-0.002	-0.111
Spouse SDS	0.359*	0.359*
Sensory	0.135	0.146*
Relating	0.200*	0.134
Body Concept	0.156*	0.113
Language	0.079	0.068
Social Self Help	0.096	0.139*
ABC total scores	0.169*	0.144*
Hyperactivity	0.172*	0.127
Adaptability	0.159*	0.190*
Reinforces Parent	0.258*	0.254*
Demandingness	0.232*	0.274*
Mood	0.143*	0.162*
Acceptability	0.236*	0.162*
Competence	0.282*	0.290*
Isolation	0.284*	0.463*
Attachment	0.346*	0.273*
Health	0.104	0.380*
Role restriction	0.120	0.349*
Depression	0.243*	0.468*
Spouse relationship	0.193*	0.360*
Child domain	0.271*	0.267*
Parent domain	0.318*	0.531*
PSI total scores	0.337*	0.462*

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

Next, we analyzed all variables: such as the influence of partner's emotional status; social economic status; children's symptom severity; parental personality to explore the factors that might serve as correlates of parental emotional symptoms, using Pearson's correlation coefficient to explore correlations between parents' SDS scores and continuous variables such as partners' SDS scores, age of children, educational level, PSI Scores, ABC scores and EPQ components. Spearman's coefficient was determined for categorical variables.

Variables showing a priori determined significant correlations (P<0.01) with parental SDS scores were analyzed with stepwise multiple regression. SPSS Windows (version 13.0) was used for all analyses.

Results

Descriptive statistics

In the present study, 361 ASD children and 722 parents participated while the control group included 345 typically developing children and 690 parents. Mean age of ASD children was 68.96 months (SD: 33.33); of fathers 36.65 years (SD: 5.75) and mothers 33.98 years (SD: 4.64). Mean ages of typically developing children was 73.73 months (SD: 36.64); of fathers 37.31 years (SD: 5.09) and mothers 34.42 years (SD: 4.08). Educational levels of parents in both groups were higher than the average educational level in China. In the case group, the proportion of fathers and mothers with at least high school completion accounted for 78.39% and 73.68% respectively while the control group fathers and mothers accounted for 81.16% and 76.81%, respectively.

SDS statistics

The SDS score of 53 served as our cutoff point for clinical Depression. Depression was present in, 102 fathers and 159 mothers of ASD children; the proportion was 28.25% and 44.04% respectively in the case group. The proportion of maternal Depression was significantly higher than that of paternal Depression (χ^2=19.50, P=0.000). In the control group, 18.55 % of fathers and 15.65% of mothers scored as clinically Depressed with no significant differences between fathers and mother noted (χ^2=1.02, P=0.312). The percent of Depressed parents in the ASD child group was significantly higher compared to controls (χ^2=102.97, P=0.000). The mean SDS score (**Table 1**) of fathers (t=5.837, P=0.000) and mothers (t=10.653, P=0.000) of case group was also significantly higher than that of the control group. The life event items came from one subscale of Parenting Stress Index and if the parents had one or more than one life event, they would be divided into the with life event group. This between groups difference in Depression and depressive symptoms was not related to numbers of life events which were not significantly different between groups (χ^2=3.18, P=0.075).

Table 5. Stepwise multiple regression analysis of emotional symptoms of parents of ASD children

Dependent Variable	Predictors	Adjusted R Square	Beta	*P*
SDS[a] Score of fathers	Neuroticism (father, EPQ[b])	0.153	0.274	0.000
	SDS Score (mother)	0.238	0.210	0.000
	Educational level (father)	0.287	-0.192	0.000
	Attachment (PSI[c])	0.305	0.140	0.005
	Psychoticism (father, EPQ)	0.311	0.101	0.028
	Extraversion (father, EPQ)	0.318	-0.096	0.034
SDS Score of mothers	Parent domain (PSI)	0.284	0.342	0.000
	Neuroticism (mother, EPQ)	0.387	0.324	0.000
	SDS Score (father)	0.435	0.197	0.000
	Extraversion (mother, EPQ)	0.480	-0.199	0.000
	Psychoticism (mother, EPQ)	0.491	0.116	0.004
	Educational level (mother)	0.495	-0.107	0.010
	Competence (PSI)	0.502	-0.133	0.015

a: Zung Self-Rating Depression Scale; b: Eysenck Personality Questionnaire; c: Parenting Stress Index.

EPQ statistics

Analysis of the EPQ scores (**Table 2**) demonstrated that father of ASD children scored significantly different on all dimensions than fathers of controls, lower on Extraversion and Lie subscales and higher on Neuroticism and Psychoticism. ASD children mothers scored significantly lower than mothers of controls on Extraversion and significantly higher on Neuroticism.

PSI statistics

Analysis of the PSI scores (**Table 3**) showed that ASD children parents scored significantly higher than control parents on the total score and all sub scores.

Stepwise regression analysis

Given the above between group results (**Table 4**) we conducted a further stepwise multiple regression analysis using the following variables: child's age; family income; parent's highest level of education achieved; the four EPQ personality traits; the ABC (total score and all sub-dimensions); the PSI (total score, child domain, parent domain) with SDS scores as the dependent variable.

As documented in **Table 5**, the SDS scores of parents were significantly correlated with three dimensions of the EPQ (Neuroticism/Stability, Psychoticism/Socialization, and Extraversion/Introversion), parental education, the depression status of spouse and parenting stress. The severity of children's ASD symptoms and family income were withdrawn during the stepwise multiple regression analysis because they had less influence on SDS scores than other items mentioned above. Among all the predictors, Neuroticism/Stability was the most significant predictor for paternal depression (Adjusted R Square = 0.153) and was the second most significant predictor for maternal depression. Parent domain of PSI was the most significant predictor for maternal depression (Adjusted R Square =0.284).

Discussion

Although the correlation analysis results confirm that parents' depressive symptoms were associated with parental personality, the severity of their children's symptoms and parenting stress, our most unique and important finding was that after regression analysis parental personality traits were more closely related to parental depression than all other factors. The Neuroticism subscale score of the EPQ was especially predictive of parental depression. This finding is consistent with a report from Yamada et al. [32], in which Neuroticism as measured with a different instrument (the NEO Five Factor Inventory) appeared to have been the most robust impact on parental depression. These findings differs from other studies of parental personality which have approached this issue from the perspective risk of autism spectrum symptoms [33, 34] and not from the perspective of parental personality as an independent factor related to child influences on parental emotional status. Our finding suggests that parental neuroticism may be the most important factor in predicting depression related to parenting an ASD child. Whether, as suggested by Qunitero and McIntyre, this personality trait pre-exists the birth of a child with ASD, or that the experience of parenting a child with

ASD influences the measurement of parental personality traits can only be further elucidated using a prospective study design of a sufficiently large cohort of parents with an ASD child and controls to allow for valid analysis of this relationship.

In the present study, the relationship between increased severity of ASD symptoms in the child and parental self-reported depression is consistent with previous reports [35, 36], in which parental depression were related to both overall symptom severity and behavioral problems in ASD children. But after the stepwise multiple regression analysis, the impact of symptoms and behavioral problems was eliminated, suggesting that while these factors may have some bearing on parental depression, their impact does not compare to parental personality characteristics on the dimension of parental mood. It is not known whether our findings differ from previous reports because of differences in study methods or assessment instruments (such as: ABC; CARS; the Development Behavior Checklist; the Autism Screening Questionnaire) so that further research into this issue is necessary.

In this study, parents of autistic children, whether in the six children domain or seven parent domains, the total score of Child Domain and Parent Domain Score, or the total score, were significantly higher than control groups. It reflects that the impact of the disease of ASD to family is all-around. Abidin said when family stress score greater than 260, the family upbringing pressures are too high. Results show that the mean scores of control is less than 260 while the ASD parents' scores greatly exceed this limit point. Only 34 in 361 ASD families are below this limit, it is enough to reflect raising pressure to the problems brought by the parents of autistic children. The results that parents of children with ASD experienced high level of parenting stress and that the stress was associated with depression was consistent with studies in China or other countries [2]. However, Firth reported the stress associated with parenting could not predict the parents' overall levels of stress/tension, anxiety, and depression [22]. One possible explanation of the inconsistent is that two different parenting stress rating tools, PSI and PSS (Parenting stress scale) were used in two studies and in Firth's study parents' personalities were not used as predictors.

As many other studies showed, depression is significantly more prevalent in parents of ASD children, with mothers demonstrating significantly higher rates than fathers and that depression in the parents of ASD children is most closely related to parental personality characteristics than any other variable we studied. These mood differences were not related to life events, which did not differ significantly between groups. This suggests that factors related to internal psychological characteristics of ASD parents may be more important in their development of depressed mood than external impacts such as life events. Our finding that mothers of ASD children reported more depression than fathers is consistent with previous studies [8, 37, 38]. While this difference may, as others have argued, be related to such issues as different gender based family roles, we cannot confirm such speculation as we did not conduct a burden of care analysis nor did we study parental care-giving roles. Clinically, this finding suggests that health providers need to be aware of the potential for substantial depressive symptoms amongst mothers of ASD children. This may translate into a need for greater accommodations such as respite care services or supports such as therapeutic support groups for mothers as compared to fathers [39]. However, it is important that clinicians do not assume that in any given family it will be the mother who is the parent experiencing depression and thus attention needs to be paid to the presence of depression in both parents.

Furthermore, our finding of reciprocal influences in levels of depressive symptoms between mothers and fathers suggest that in some families, the amount of emotional distress in one parent may have a substantive impact on the depression of spouse. This is consistent with findings reported by Hastings in 2005 [37], but not in a study conducted by the same author in 2003 [8], in which maternal depression did not seem to be associated with paternal stress. Clinically however, this finding suggests that if one parent is identified as suffering from substantial emotional distress, then the other parent may be at increased risk as well. Accordingly, targeted assessment of emotional status needs to occur in both parents if one parent is

recognized as exhibiting substantial depressive symptoms.

Limitations

Our study has a number of limitations that may impact on our findings. First, the population that our clinic serves (an urban Chinese population) may not be representative of other Chinese populations, and is not representative of other populations globally. Thus, there may be some unique characteristics within our sample that have influenced our results. Another limitation of our study was that we did not measure other factors previously reported to be related to depressed mood, such as number and type of social supports and specific family characteristics. Further work will need to take these into account as well. Finally, our study design did not allow us to assess other factors that may be involved in the observed relationship between maternal and paternal depression in the ASD child cohort. Perhaps there may be social factors (such as degree of social supports), family factors (such as presence of other non-ASD children in the family) or other factors (such as degree of acceptance of the diagnosis or the amount of improvement associated with clinical interventions, etc.) that may impact on the observed relationship that high levels of depression in mothers tends to be mirrored in fathers and vice-versa. Further research will need to be undertaken to more carefully untangle this complex interaction.

Conclusion

The relationship between parental depression in ASD child caring and outcomes for children and parents alike demands that we better understand the complexities of this relationship to develop clinical interventions that address these issues. In the present study, we collected a relative large sample of ASD children and their parents and analyzed various factors related to self-reported depression symptoms of parents. Despite the aforementioned limitations, our findings suggest that clinicians should consider depression reduction interventions directed towards parents with particular personality traits, lower education levels, higher parenting stress and increased severity of ASD symptoms. Such targeted interventions may be able to substantively impact on both parental mental health and outcomes in their ASD children [40, 41].

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Disclosure of conflict of interest

None.

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