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ORIGINAL CONTRIBUTION

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Does maternal psychopathology discriminate between children with DSM-IV generalised anxiety disorder or oppositional defiant disorder? The predictive validity of maternal axis I and axis II psychopathology

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Abstract What dimensions of maternal psychopathology predict internalising or externalising disorder in children? We conducted a study of maternal axis I and axis II psychopathology in a group of children 8–12 years of age with Generalised Anxiety Disorder (GAD), Oppositional Defiant Disorder (ODD) and non-patient controls (NC). By using Multigroup Discriminant Analyses (MDA) on three groups of children ($N = 85$) and measures of axis I and axis II psychopathology of their mothers, we attempted to discriminate between these groups on a data driven basis. Two separate MDA were computed, one based on maternal axis I disorders, and one based on maternal axis II disorders. The results demonstrated that maternal symptomatic and personality psychopathology was differentially related to childhood anxiety or behavioural disorders. Mothers of children with ODD were characterised by more negative emotions and detached personality styles, whereas mothers of children with GAD seemed to be more somatic preoccupied, controlling and overprotective.

Key words Generalised Anxiety Disorder – Oppositional Defiant Disorder – maternal psychopathology

Introduction

The association between mental disorder in parents and their children has been one of the most prominent areas of research in child psychology and psychiatry. A positive association has been empirically established in several studies [34, 39], but the direction of influence and the implications of the various mental disorders in parents to their offspring are unclear [36]. Studies have predominantly focused on the link between parental axis I psychopathology and outcome in children, and to a less degree the influence of parental axis II disorders. The role of parental axis I disorders for dysfunction in children is reported on parents with schizophrenia [19], parents with depression [4, 15], parents with eating disorder [13], parents with substance abuse [30], and parents with anxiety disorder [3, 17].

However, the overall relationship of psychopathology between parents and children has been in most cases of relatively moderate strength, with a weak specificity. Thus, there is no clear or strong relationship established between a specific parental psychiatric disorder and child psychopathology, and vice versa. A possible exception may be anxiety disorder, which seems to aggregate within families [27,

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39]. However, it does not seem to be a direct transfer of the same type of anxiety disorder in parents to their offspring [3, 26]. Aggregation of any disorder within families does not by necessity imply heritability, as common genes may be confounded with common environment [25].

The Virginia Twin Study of Adolescent Behavioural Development of 1412 Caucasian twin pairs aged 8–16 years showed small to moderate additive genetic effects and moderate to large effects of the unique individual environment. There was marked sex difference in the genetic contribution to separation anxiety, otherwise similar genetic effects appear to be expressed in boys and girls. The study supports a widespread but small influence of genetic factors on risk for adolescent psychopathology, regarding both Oppositional Defiant Disorder (ODD) and overanxious disorder (GAD in DSM-IV), and suggests a greater contribution of different types of social influence, which may vary consistently across various domains of measurements [12].

In accordance with these findings, studies have indicated that the parents' psychiatric diagnoses may not be the important factor by itself, but rather the correlates of the disorders, such as social impairment or contextual stressors related to the disorder may be of more importance [10, 36]. The weak relationship found between parental psychiatric diagnoses and childhood disorders have led many to conclude that there exists only a weak unspecific risk of developing mental disorders in children of parents with mental disorders.

To our knowledge there seem to be rather few studies that have focused more specifically on the role of the personality of the parents of children with externalising or internalising behaviour disorder. This is rather surprising, because there have been some early but important studies which show that long-standing abnormal personality of the parents may precede the development of behavioural disturbances in children. In the early 1980s, Rutter and Quinton [34] conducted a longitudinal prospective study and found that parental personality disorder was a predictor of behavioural disturbances in the child, and also that there were few specific associations between parental mental disorder and type of mental disorder in the child. However, they found that the link between parental personality disorder and conduct disorders (CD) in children could be mediated by exposure to higher levels of parental hostility and aggression, which were significantly higher in the group of parents where one or both had a personality disorder diagnosis. Furthermore, it was reported that the level of social impairment was higher in parents with personality pathology, which may be an additional risk for the offspring beyond exposure to hostility or negativistic interpersonal behaviour.

Other studies have found comparable results. Frick et al. [14] reported in their study of 177 referred children, that antisocial personality disorder and/or substance abuse in one or both parents were the strongest predictors of ODD and CD in children aged 7–13. Another study of 463 children of parents diagnosed with alcoholism or antisocial personality disorder showed that parents' disorders were a strong but unspecific predictor of child mental disorder [22]. A differential effect was reported in that parental alcohol abuse and dependence were associated with increased risks for Generalised Anxiety Disorder (GAD) and CD in the offspring, whereas parental alcoholism combined with antisocial personality traits predicted ODD. Furthermore, they found that both dysfunctional parenting style and parental diagnosis of alcoholism and antisocial personality pathology were associated with increased risk for a variety of childhood psychiatric disorders.

Several other studies have also shown that parents with a personality disorder diagnosis report dysfunctional parental bonding and early adversities during their own childhood [6, 29], indicating a role of non-optimal relationships in the early years for the development of mental disorder in the offspring. Some studies have showed that maternal personality disorders in particular may have implications for the development of disruptive disorder or ODD [21, 23, 35] and impulse control disorders [41]. Maternal or parental personality disorder manifests typically as long-term interpersonal difficulties in relationships [1], thus these interpersonal difficulties should interfere seriously with adequate parenting. However, we do not know whether maternal or parental psychopathology is merely a general risk factor for developing behavioural disorders in offspring, which occurs under specific stressful circumstances, or if there exists a more specific association [2].

An important question that needs more attention concerns the potential differential role of axis I and axis II disorder may have for children with internalised behaviour disorders compared to the children with externalised behaviour disorders. ODD and GAD are among the most frequent psychiatric disorders of childhood [27, 33], representing externalised and internalised forms of childhood disorders, respectively. By using children with ODD or GAD as index variables and maternal axis I and axis II psychopathology as predictors, we were able to compare the relative importance of these predictors.

We aimed at exploring following questions in the present study: what dimensions of maternal psychopathology is linked with the offspring's disorder, and what aspects of maternal psychopathology discriminate between ODD and GAD? To our knowledge, this is the first study that has empirically explored

dimensions derived from maternal axis I and axis II pathology to discriminate between the offspring's DSM-IV GAD and ODD diagnoses. Through this we could explore which dimensions of maternal psychopathology were linked with the offspring's disorder, and also what aspects of maternal psychopathology discriminated between ODD and GAD. Thus, we collected thoroughly diagnosed and homogenous groups of children with GAD and ODD and compared them with non-patient controls (NC) on maternal axis I and axis II characteristics. We discriminated between these groups on a data driven basis using maternal scores on measures of diagnosing axis I, and axis II pathology as independent variables.

Method

Design

The design was a cross sectional comparative study of three groups of children, ODD, GAD and NC and their parents, based on data collected from self-report measures and clinical interviews. A multi-informant strategy was used in assessing children's disorders and behaviours, including ratings and information from the parents, the children, the teachers, and the clinicians.

Participants

A total of 75 children from five Child and Family Guidance Clinics were assessed for the study at the University outpatient clinic. About 32 children were excluded from the study because they either did not fulfil the criteria for primary GAD or ODD ($N = 21$), or the parents refused to participate ($N = 11$). Thus, the remaining patients in the study included 22 children with ODD, 21 children with GAD. The children in the NC were an age and sex-matched classroom-control with no symptoms of anxiety or behavioural disorders based on a screening prior to inclusion. A total of 50 children and families were asked to participate as NC, but only 42 children and their parents participated. Six families refused to participate and two families moved to another city just before the interviews commenced.

A total of 85 children and their biological mothers gave their informed consent and participated in the study. Of the client sample were 53% boys and 47% girls. Mean age overall was 10.2 years (SD = 1.3 years) and it was 9.9 years for the GAD group, 10.1 years for the ODD group, and 10.3 years for the NC. About 85% of the participants were Caucasian, the others were Asian (10.5%), African (2.3%) or Hispanic (2.3%). Family income was low for 25% and in the medium range for 34% and high for 23%. There were no significant differences between the groups in terms of age, distribution of race, parental status (married/cohabitant, divorced/single) or level of family income (high, medium, poor), although there was a non-significant tendency for lower family income in the ODD group ($P < 0.10$). It was significantly more boys in the ODD (83%) group compared to the GAD (48%) group ($U = 147.000$, $N_1 = 21$, $N_2 = 22$, $P = 0.02$, two tailed).

Assessment of children

The child in the presence of his or her mother were both interviewed, and the child's behaviour was assessed in accordance with the DSM-IV criteria for axis I diagnosis [1]. The children were asked questions about their difficulties related to friends, school, family disruption and their general adjustment. The diagnostic assessments were conducted in three different settings. First, by the child counsellor, at the Child and Family Guidance Clinic who referred the child to the University outpatient clinic. Second, the primary investigator at the University outpatient clinic assessed the children according to DSM-IV disorders. Finally, an independent assessor validated the diagnoses. The independent assessor was an experienced child psychologist, who was given videotapes of all the interviews and rated them in a paired-rater design. To evaluate the inter-rater reliability of ODD or GAD diagnoses, the external clinical diagnostician on the presence or absence of targeted disorder rated 15 GAD-interviews and 15 ODD-interviews. Kappa for the ODD and GAD diagnoses were 0.93 and 0.84, respectively.

Other inclusion criteria were developed to secure homogeneity of the diagnostic groups. First, the child should be between 8 and 13 years of age and second, the diagnosis should be the child's primary problem of referral. The exclusion criteria were presence of any other psychiatric disorder including reading and writing disabilities, mental or cognitive disabilities and ADHD.

Assessment of parents

All mothers were the biological mothers of their child, and they had raised the child themselves. The fathers were also asked to meet at the assessments. However, less than 10% of the fathers in the patient groups met, thus these data were not used in the current study. The parents were interviewed about themselves, their relationships with their children and other people,

and the primary focus was on the health of the parents and their child. All mothers completed a battery of self-report measures. These included the Personality Inventory for Children (PIC), Million Multi-Axial Clinical Inventory-II (MCMI-II), and measures of attitudes, socio-demography, and general health. In addition, they were interviewed about the clinical status of their offspring, their own and partner's health, rearing style, abnormal familial and psychosocial situations and their social network.

Instruments

Millon Multi-Axial Clinical Inventory-II [28] is a standardised self-report measure consisting of 175 items on 9 clinical syndrome scales, 10 clinical personality pattern scales, and 3 severe personality pathology scales. The MCMI-II covers most of the DSM-personality disorders and the symptom disorders. In addition, information about the individual's personality style is assessed. More specifically, the axis I scales of psychopathology are depression, dysthymia, anxiety, rigid delusional, psychotic thinking, somatic preoccupation, hypomania, alcohol abuse and drug abuse. Scales of axis II psychopathology are borderline, self-defeating, avoidant, schizotypal, negativistic, histrionic, narcissistic, dependent, antisocial, and compulsive personality traits. The reliability of the MCMI-II compares very favourably with that of other personality measures, such as the MMPI [11]. The MCMI-II is the most reliable of all personality disorder inventories with high internal consistencies ranging from 0.80 to 0.89 for the personality scales and 0.79–0.91 for the clinical symptom scales [8, 28].

Procedure

Following referral from the Child and Family Guidance Clinic both parents and the child were asked to attend an assessment of diagnosis and behaviour of the child, including an intake interview and completion of the self-report battery. The parents were asked to complete the self-report battery after the interview. Research associates collected data on all the participants from their teachers. The research associates conducted the screening of the NC and their parents at the various schools, using the same DSM-IV standardised interview, and self-report battery.

Statistics

Chi-square tests and Mann–Wittney tests were used to compare groups on demographic characteristics. Multigroup Discrimant function Analysis (MDA) was performed to compare the child groups on the maternal axis I or axis II scale variables. MDA combines independent variables that classify groups, and is appropriate to assess the factors that are the best indicators of separation between the groups of children. The statistical technique is based on factor analytic methods, that can identify sets of variables that are the most powerful in discriminating between the groups of subjects on a data-driven basis, and the results can be used to visually represent the position of groups relative to each other in a discriminant space. The MDA is typically a one-way analysis and no problems are posed by unequal sample sizes in groups. The sample size is estimated to provide adequate power for performing a MDA analysis, as the number of participants in the clinical groups exceeds by twofold the number of predictor variables [38].

Results

As shown in Table 1 there was no significant difference between the groups with regard to age, race, parent's marital status or family income. However, there were significant differences in the distribution of gender, more specifically there were more boys in the ODD group (85.7%) compared to the GAD (54.5%) and NC (47.6%) groups ($P < 0.01$). Two direct MDA were performed using maternal axis I scales and axis II scales to define membership in three groups of children, ODD, GAD and NC. There was no missing data for the MCMI-II measure and all cases were included in the analyses.

The sample variances of the nine axis I predictors and the 10 axis II predictors revealed no gross discrepancies among the three groups. In the first analysis with axis I predictors, two discriminant functions (DA) were calculated among the predictors with a combined Wilks' lambda = 0.578, $\chi^2(18) = 42.74$, $P < 0.001$. After removal of the first function, there was no longer any significant association between predictors and groups, indicating that the first function was predominantly the most informative in discriminating between the groups. Table 2 shows that depression, dysthymia and anxiety have the highest loadings on Function 1, however, rigid delusional load at the opposite end of this function. This function appears to contrast neurotic symptoms with rigid, delusional thinking. Hypomania, drug, and alcohol abuse have the highest loadings on Function 2. Function 2 contrasted an impulsive style with a somatically preoccupied and worried style. These discriminant functions (DA) classified correctly 69.4% of the cases in the three groups, in contrast to 35.9% correctly classified by chance alone.

Table 1 Demographics of the children in the ODD group, GAD group and the non-patient controls

	ODD (N = 21)		GAD (N = 22)		NC (N = 42)		
Characteristic	*n*	%	*n*	%	*n*	%	*P*
Gender							0.01
Boy	18	85.7	12	54.5	20	47.6	
Girl	3	14.3	10	45.5	22	52.4	
Age							0.79
8–9	7	33.3	9	40.9	12	28.5	
10–11	11	52.3	10	45.4	22	52.1	
12–13	3	14.4	3	13.7	9	21.4	
Race							0.22
Caucasian	16	76.2	18	81.9	38	90.4	
African	3	14.3	3	13.6	3	7.2	
Asian	0	0.0	1	4.5	1	2.4	
Hispanic	2	9.5	0	0.0	0	0.0	
Parents							
Marital status							0.63
Married/cohabitant	12	57.2	15	68.2	29	69.0	
Single	7	33.3	5	22.7	6	23.8	
No response	2	9.5	2	9.1	3	7.2	
Family income (SES)							0.10
Low (poor)	6	28.5	6	27.3	8	19.0	
Mediocre	5	23.8	6	27.3	12	28.6	
High	7	33.3	8	36.3	14	33.3	
No response	3	14.4	2	9.1	8	19.1	

ODD = Oppositional defiant disorder; GAD = Generalised anxiety disorder; NC = non-patient controls

Table 2 Discriminant functions of maternal axis I predictors for three groups of children with Generalised anxiety disorder, Oppositional defiant disorder and non-patient controls

	Discriminant functions	
Predictor variable	Function 1	Function 2
Clinical scales		
Depression	0.676*	0.217
Dysthymia	0.431*	0.371
Anxiety	0.361*	0.039
Rigid, delusional	−0.158*	0.145
Psychotic thinking	0.146*	0.076
Hypomania	−0.212	0.474*
Alcohol abuse	0.171	0.303*
Drug abuse	0.156	0.235*
Somatic preoccupation	0.159	−0.205*
Canonical R	0.595	0.325
Eigenvalue	0.547	0.118

*Largest absolute correlation between each variable and any discriminant function

The unstandardised discriminant scores on each function were used to determine which pairs of groups were different with respect to the discriminant scores on the functions. Univariate ANOVAs with Fishers LSD tests provided the following results: with respect to Function 1 (negative emotions vs. rigid, delusional thinking) the mothers of the ODD patients differed from the mothers of the GAD patients and NC ($P < 0.05$). On Function 2 the mothers of the GAD patients differed from mothers of ODD and NC on having a somatically preoccupied and worried style ($P = 0.03$).

Group centroids were plotted as a discriminant perceptual map (see Fig. 1), to provide a visual representation of group differences with respect to the two key maternal axis I dimensions.

In the second analysis of maternal axis II predictors, two functions were also obtained providing a combined chi square of $\chi^2(21) = 33.13$, $P = 0.006$. After removal of the first function, there was no longer any significant association between predictors and groups, indicating that function 2 was not significant. Table 3 shows that borderline, self-defeating and avoidant traits had the highest loadings on Function 1, whereas the lowest were narcissistic, histrionic and compulsive features. Histrionic and Narcissistic personality traits had the highest positive loadings on Function 2 and Dependent and Compulsive traits had negative loadings on this function. In this analysis Function 1 appeared to represent low to high levels of interpersonal difficulties, whereas Function 2 contrasted a neglective self-centred style with an over-controlling, protective style. The DA classified 65% of the children correctly based on the axis II pathology compared to 35.9% correctly classified by chance alone.

To determine which groups differed on the functions we conducted ANOVAs with Fishers LSD tests. It produced following results: with respect to Function 1 interpersonal difficulties the ODD patients

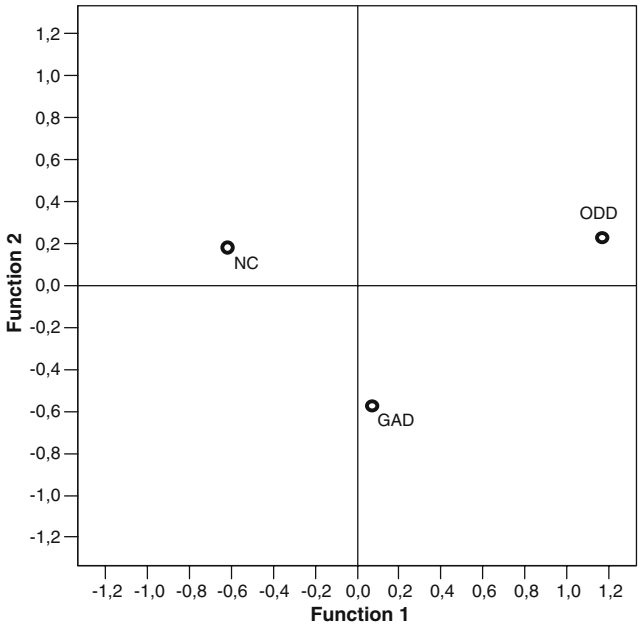

Fig. 1 Three groups centroids on two discriminant functions derived from maternal axis I predictors. Function 1 contrasts negative labile emotions in the high end with rigid thinking in the low end. Function 2 contrasts impulsivity in the high end with somatically preoccupied and worried style in the low end

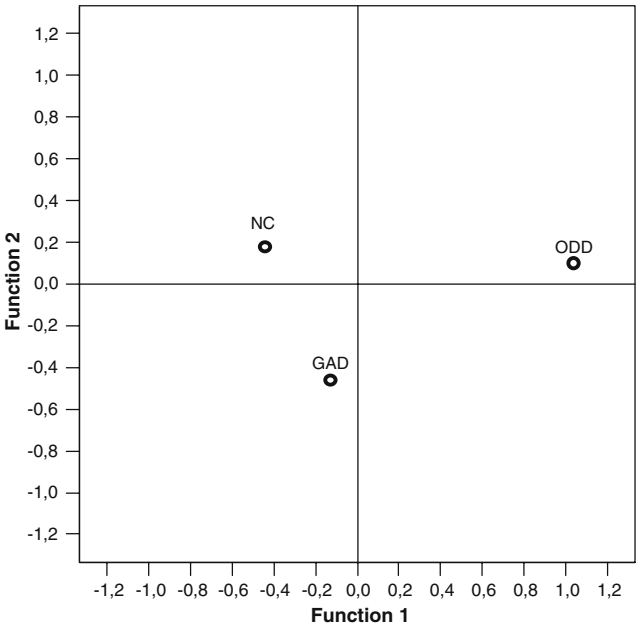

Fig. 2 Three group centroids on two discriminant functions derived from maternal axis II predictors. Function 1 represents high vs. low levels of interpersonal difficulties. Function 2 represents neglective, self-centred style in the high end and over-controlling/protective style in the low end

Table 3 Discriminant functions of maternal axis II predictors for three groups of children with Generalised anxiety disorder, Oppositional defiant disorder and non-patient controls

	Discriminant functions	
Predictor variable	Function 1	Function 2
Personality scales		
Borderline	0.649*	0.064
Self-defeating	0.599*	−0.021
Avoidant	0.527*	−0.047
Schizotypal	0.480*	0.091
Negativistic (Passive aggressive)	0.466*	0.081
Schizoid	0.308*	0.124
Histrionic	−0.062	0.472*
Narcissistic	−0.162	0.418*
Dependent	0.192	−0.374*
Antisocial	0.084	0.313*
Compulsive	−0.187	−0.210*
Canonical R	0.525	0.267
Eigenvalue	0.381	0.077

*Largest absolute correlation between each variable and any discriminant function

differed significantly from GAD and NC ($P = 0.02$). On Function 2 the GAD patients differed from ODD and NC on maternal self-centred, over-controlling and protective style ($P = 0.03$).

In summary, as depicted in Fig. 1 the analyses of axis I functions showed that the GAD group differed from the controls by having higher levels of somatically preoccupied mothers, whilst the ODD group did not differ from the NC on this function. The ODD group showed higher neurotic (depressive, anxious) symptoms amongst mothers than the GAD or NC groups. However, mothers of the control group showed more rigid thinking and emotional stability than either the GAD or ODD groups.

Figure 2 shows that the ODD group was characterised by higher levels of interpersonal difficulties in mothers compared to the mothers of the GAD and control groups. However, the GAD group was characterised by a greater over-protective and controlling maternal style when compared with the maternal style of ODD and control groups.

Discussion

The main question addressed in the present study concerned which dimensions of maternal psychopathology were differentially associated with GAD or ODD in offspring? Of particular interest was the predictive validity of maternal personality pathology for these childhood disorders. The results of the discriminant analysis revealed that above 69% of cases could be accurately classified on the basis of the functions obtained on the maternal axis I dimensions, and 65% accuracy based on the maternal axis II dimensions. Thus the relative improvement over chance (RIOC index) was rather large, and demon-

strated that the combination of the two functions of both the axis I and axis II psychopathology were powerful discriminators between GAD, ODD and NC. The GAD group had highly somatically preoccupied, over-protective and controlling mothers, whilst mothers of the ODD group showed higher neurotic (depressive, anxious), negativistic symptoms and interpersonal difficulties compared to mothers in the GAD or NC groups.

The results show some consistency with other studies. For example, these studies found negative emotions, hostility and detached maternal style was related to ODD [15, 34] whereas somatic preoccupation and over-controlling maternal style has been linked to GAD [18, 39]. An interesting but rather unexpected finding was that mothers in the non-patient group had high levels of rigid thinking and emotional stability compared to the mothers of the ODD and GAD groups. One explanation could be that rigidity, as an opposite to the labile negative emotions, reflects a dimension of stability or consistency in thinking, which to a certain degree could be a favourable or a healthy element in the mother–child relationship.

The maternal psychiatric disorders have been considered among the most potent risk factors for a negative sequel in the child's development [34]. However, several processes or pathways may determine the effects of maternal psychopathology. These include for instance genetic transmission of risk of disorder [20], parenting characteristics [2], early negative and directive parental behaviour [7], child abuse or neglect [16], marital discord [40] deviant forms of attachment [37], loss of parent [5], father absence [31]. Each of these reported risk factors may contribute to a negative developmental sequel for a child. However, it may be important to note that these are not necessarily independent entities, but may rather be correlated or confounded. For example marital discord cannot clearly be separated from parental psychiatric disorder or parental absence. Thus, these risk factors are not autonomous entities but may be various aspects of the same situation, which the child is exposed to.

Clinical research on children has historically been dominated by looking at mothers as the primary source for ill effects on children. However, now it is generally recognised that fathers may also be an important source of risk for children's mental health. Two meta-analyses of parental mental health and child internalising or externalising behaviour problems, have shown that externalising problems in children might be equally related to psychopathology in mothers as well as in fathers [9, 24]. However, for internalising problems in children, studies have demonstrated that these are more closely related to psychopathology in mothers than in fathers [9]. Although we were aware of the risk that fathers usually choose not to participate, which is a common problem in childhood research [32], we only got a small minority of them for the interview.

From the present data, it is possible only to speculate about how the maternal psychopathology has a role in offspring's development. However, the best way to conceptualise our findings could be to consider maternal psychopathology more as a marker of a pathological dialectical process in the child–mother relationship, than an effect of an essential mono-factorial cause. Mono-causal models seem to be too simplistic and explanations of the developmental pathways and risk factors based on single factors are not congruent with a developmental perspective [37].

The non-specific associations found between parental psychopathology and emotional or behavioural disorders in offspring have led many to conclude that there only exists a weak unspecific relationship. This may be an overgeneralisation, because the present data have shown that specific aspects of maternal psychopathology may be differentially related to various forms of psychopathology in children. The results have demonstrated the importance of placing emphasis on the parent's personality characteristics in parenting, which may have a critical impact on the child's development.

Some of the methodological limitations of the present study are, first, that there is no control for causal effects. Although the most prominent personality traits of the parents are present in early adulthood and in that way temporarily precedes the offspring's disorder; one should not imply that the causal arrow works only one way. The study is based on a one-way analysis of cross-sectional data and it should be considered that the causal links could go both ways, or the relationship could be carried by a third (latent) variable. Second, self-report measures of axis I and axis II disorders have been associated with type 2 errors, thus caution is warranted in evaluating the validity of the self-rated axis I and axis II disorders. A contrasting view could be, however, that there might be a tendency for the mother to under-report psychopathology in context of being a caretaker of a referred child, indicating that a potential bias could as well be in the opposite direction. Third, although the sample size is statistically adequate to perform a MDA, the sample size is at the small end. This might raise a danger of creating an over-fitting effect that could have implications for generalising the results to other samples.

In conclusion, the results suggest that there are different patterns of maternal psychopathology, which are related to childhood anxiety or behavioural disorder. Mothers of children with ODD are charac-

terised by more negative emotions and detached personality styles, whereas mothers of children with GAD seem to be described more typically as somatically preoccupied, controlling and over-protective. The results in the present study show that maternal axis I dimensions have similar predictive validity as axis II dimensions with regard to distinguishing among the three groups. While keeping in mind the various influences from both parents that may be part of a child's development of anxiety or behavioural disorders, and also the direction of causality may go both ways, the results indicate that both maternal symptomatic and personality psychopathology are differentially related to ODD and GAD in children.

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