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Temperament, parenting, and depressive symptoms in a population sample of preadolescents

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Background: Depressive symptoms can be triggered by negative social experiences and individuals' processing of these experiences. This study focuses on the interaction between temperament, perceived parenting, and gender in relation to depressive problems in a Dutch population sample of preadolescents. **Methods:** The sample consisted of 2230 ten-to-twelve-year-olds from the North of the Netherlands. Perceived parenting (overprotection, rejection, emotional warmth) was assessed by the EMBU (a Swedish acronym for My Memories of Upbringing) for Children, temperament (fearfulness and frustration) by the parent version of the Early Adolescent Temperament Questionnaire-Revised, and depressive problems by the Child Behavior Checklist (parent report) and the Youth Self-Report (child report). **Results:** All parenting and temperament factors were significantly associated with depressive problems. Frustration increased the depressogenic effect of parental overprotection and lack of emotional warmth. Fearfulness increased the effect of rejection in girls, but not in boys. Furthermore, the association between frustration and depression was stronger in boys. **Conclusions:** These findings support the hypothesis that the effect of specific parenting behaviors depends on the temperament and gender of the child. **Keywords:** Temperament, parenting, depression, preadolescence. **Abbreviations:** CBCL: Child Behavior Checklist; YSR: Youth Self-Report; EATQ-R: Early Adolescent Temperament Questionnaire-Revised; EMBU-C: Egna Minnen Beträffande Uppfostran for Children.

Depression is a major health problem, causing high societal costs and severe individual suffering and disability. The burden of disease associated with depression calls for a better understanding of its development and early predictors. In preadolescence, the prevalence of DSM-IV major depressive disorder is still low, but a large proportion of this age group starts to exhibit depressive symptoms, which are strongly predictive of a later episode of major depression (Angst, Sellaro, & Merikangas, 2000; Goodyer, Herbert, Tamplin, & Altham, 2000; Pine, Cohen, Cohen, & Brook, 1999). This makes preadolescence an excellent period to study early factors associated with the incidence of depressive disorders.

Depressive symptoms can be triggered by negative social experiences and individuals' processing of these experiences (e.g., Abramson, Metalsky, & Alloy, 1989; Hammen, 1999; Prinstein & Aikins, 2004). This study focuses on the interaction between temperament and perceived parenting. The interaction of temperament and parenting behavior is supposed to capture the complexity of developmental processes more precisely than either of the two separately (Magnusson & Stattin, 1998; Hinde, 1989). Several researchers have postulated that a difficult temperament does not always lead to psychological problems, but only in conjunction with an unfavorable environment, e.g., as reflected in adverse parent–child relationships and poor family functioning (Bates, Dodge, Pettit, & Ridge, 1998; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Maccoby, 2000; Maziade, 1989; Sanson, Oberklaid, Pedlow, & Prior, 1991). In other words, certain child traits may represent vulnerabilities for depression, particularly if occurring in the context of dysfunctional parenting.

In a previous study (Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004), we showed that negative affectivity, encompassing fearfulness and frustration, is strongly related to internalizing problems (anxiety, depression, somatic complaints) in preadolescents. Whereas fearfulness was related to internalizing problems specifically, frustration was associated with both internalizing and externalizing problems. Consistently, other studies have reported that neuroticism, a concept comparable to negative affectivity (e.g., Costa & McCrae, 1992), is a powerful indicator of vulnerability for depression (Clark, Watson, & Mineka, 1994; Jorm et al., 2000; Krueger, Caspi, Moffitt, & Silva, 1996; Oldehinkel, Bouhuys, Brilman, & Ormel, 2001). Rather than dealing with negative affectivity as a single concept, we will distinguish between fearfulness and frustration,

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because they are assumed to interact with parenting behaviors differentially.

Fearful inhibition starts in infancy, shows considerable stability across childhood and adolescence (Caspi & Silva, 1995; Kagan, 1998), and has been found to predict later depressive symptoms such as sadness (Rothbart, Ahadi, & Evans, 2000) and social withdrawal (Rubin & Asendorpf, 1993). It is a system relevant to early socialization processes, in that it is related to sensitivity to punishment and the internalization of guilt reaction (e.g., Gray, 1981, 1987; Kochanska, DeVet, Goldman, Murray, & Putnam, 1994; Rothbart & Putnam, 2002). Based on these notions, we hypothesized that temperamentally fearful preadolescents would be more likely to have depressive problems than their less fearful peers, especially when raised in an environment characterized by rejection and little warmth.

Frustration is a temperament feature characterized by negative affect related to interruption of ongoing tasks or goal blocking. In other words, children with a high level of frustration react strongly and aversively to obstacles that prevent them from doing what they want. Studies on the interaction of temperamental frustration (resistant temperament) and parenting have mainly focused on outcomes in the externalizing domain (e.g., Bates et al., 1998). Results suggest that a consistently restrictive parenting style is most effective to prevent the development of externalizing problems. On the other hand, an environment that is overly restrictive and protective may trigger depressive problems in high-frustration children, because the frequent blockade of their goals may result in persistent negative affect and apathy. Hence, we hypothesized that an overprotective parenting style would be associated with depressive problems, particularly in preadolescents with high levels of frustration.

We showed previously that preadolescent girls and boys differ in the distribution of temperament traits, in that girls have higher levels of fearfulness and lower levels of frustration (Oldehinkel et al., 2004). Furthermore, boys and girls may respond differently to similar parenting practices. Girls tend to react more strongly to stressful life-events, particularly to interpersonal events (Hoffmann & Su, 1998; Patton, Coffey, Posterino, Carlin, & Bowes; 2003; Silberg, Rutter, Neale, & Eaves, 2001; Van Os & Jones, 1999; Veijola et al., 1998). Compared to boys, girls have a greater preference for close emotional communication, intimacy, and responsiveness within interpersonal relationships. The female focus on affiliation may make girls more vulnerable to the interpersonal stress that often accompanies dysfunctional parenting practices (Cyranowski, Frank, Young, & Shear, 2000). Boys tend to foster independent activity over affiliation (Feingold, 1994; Leadbeater, Kuperminc, Blatt, & Hertzog, 1999), which was hypothesized to make them less sensitive to parental rejection and lack of emotional warmth than girls. Parental overprotection, on the other hand, jeopardizes personal autonomy and was therefore expected to be more of a bother to boys than to girls (Enns, Cox, & Larsen, 2000; Lloyd & Miller, 1997).

Interpretation of associations between family circumstances and (risk factors for) depression is hampered by potential confounders, including genetic disposition (Heath, Neale, Kessler, Eaves, & Kendler, 1992; Molenaar, Boomsma, & Dolan, 1993). Genetic risk factors may have a (direct) effect on both temperament and depression, which could mean that observed associations between the two are spurious. In addition, the effect of genetic risk can be indirect, through gene–environment correlations. In other words, what seems to be the effect of poor parenting behavior may actually be the effect of susceptibility genes, or vice versa (Kendler, 1996; Neale et al., 1994; Plomin, 1995; Rutter, 2002). To assess possible confounding, we included a proxy of genetic risk, that is, an index of parental depression, in the analyses.

Methods

Sample

TRAILS. The TRacking Adolescents' Individual Lives Survey (TRAILS) is a new prospective cohort study of Dutch preadolescents, who will be measured biennially until they are at least 25 years old. The present study involves data from the first assessment wave of TRAILS, which ran from March 2001 to July 2002. The key objective of TRAILS is to chart and explain the development of mental health from preadolescence into adulthood, both at the level of psychopathology and the levels of underlying vulnerability and environmental risk. A detailed description of the sampling procedure and methods can be sent upon request. Briefly, the TRAILS target sample involved ten-to-twelve-year-olds living in five municipalities in the North of the Netherlands, including both urban and rural areas.

Sample selection. Sample selection involved two steps. First, the municipalities selected were requested to give names and addresses of all inhabitants born between 10-01-1989 and 09-30-1990 (first two municipalities) or 10-01-1990 and 09-30-1991 (last three municipalities), yielding 3483 names. Simultaneously, primary schools (including schools for special education) within these municipalities were approached with the request to participate in TRAILS; i.e., pass on students' lists, provide information about the children's behavior and performance at school, and allow class administration of questionnaires and individual testing (neurocognitive, intelligence, and physical) at school. School participation was a prerequisite for eligible children and their parents to be approached by the TRAILS staff, with the exception of children already attending secondary schools (<1%), who were contacted without involving their schools. Of the 135 primary schools within the municipalities, 122 (90.4% of the schools accommodating 90.3% of the children) agreed to participate in the study.

If schools agreed to participate, parents (or guardians) received two brochures, one for themselves and one for their children, with information about the study; and a TRAILS staff member visited the school to inform eligible children about the study. Shortly thereafter a TRAILS interviewer contacted parents by telephone to give additional information, answer questions, and ask whether they and their son or daughter were willing to participate in the study. Respondents with an unlisted telephone number were requested by mail to pass on their number. If they reacted neither to that letter nor to a reminder letter sent a few weeks later, staff members paid personal visits to their house. Parents who refused to participate were asked for permission to call back in about two months to minimize the number of refusals due to temporary reasons. If both parents and children agreed to participate, parental written informed consent was obtained after the procedures had been fully explained. Children were excluded from the study if they were incapable of participating due to mental retardation or a serious physical illness or handicap; or if no Dutch-speaking parent or parent surrogate was available, and it was not feasible to administer part of the measurements in the parent's language. Of all children approached for enrollment in the study (i.e., selected by the municipalities and attending a school that was willing to participate, $N = 3145$), 6.7% were excluded because of incapability or language problems. Of the remaining 2935 children, 76.0% ($N = 2230$) were enrolled in the study (i.e., both child and parent agreed to participate). Responders and non-responders did not differ with respect to the prevalence of teacher-rated problem behavior. Furthermore, no differences between responders and nonresponders were found regarding associations between sociodemographic variables and mental health outcomes (De Winter et al., 2005).

The mean age of the sample was 11.09 ($SD = .56$), and 50.8% were girls. The North of the Netherlands has relatively few immigrants: only 10.6% of the children originated from a non-western country (mostly Morocco, Turkey, Surinam, the Dutch Antilles, and Indonesia). Furthermore, 15.5% of the children were raised in single-parent families. Most families (78.0%) included two or three children. Socio-economic status was low in 25.3%, intermediate in 49.5% and high in 25.2% of the cases.

Measures

Data collection. Well-trained interviewers visited one of the parents or guardians (preferably the mother, 95.6%) at their homes to administer an interview covering a wide range of topics, including the child's developmental history and somatic health, parental psychopathology and care utilization. Besides the interview, the parent was asked to fill out a self-report questionnaire. Children filled out questionnaires at school, in the classroom, under the supervision of one or more TRAILS assistants. In addition to that, intelligence and a number of biological and neurocognitive parameters were assessed individually (at school, except for saliva samples, which were collected at home). Teachers were asked to fill out a brief questionnaire for all TRAILS-children in their class. Measures that were used in the present study are described more extensively below.

Depressive symptoms. Internalizing and externalizing problem behaviors were assessed by the Child Behavior Checklist (CBCL), one of the most commonly used questionnaires in current child and adolescent psychiatric research (Achenbach, 1991a; Verhulst & Achenbach, 1995). It contains a list of 120 behavioral and emotional problems, which parents can rate as 0 = not true, 1 = somewhat or sometimes true, or 2 = very or often true in the past six months. In addition to the CBCL, we administered the self-report version of this questionnaire, the Youth Self-Report (YSR, Achenbach, 1991b). The original CBCL and YSR scales did not distinguish between anxiety and depressive problems. In order to improve the correspondence with clinical diagnostic categories, Achenbach, Dumenci, and Rescorla (2003) constructed DSM-IV scales for CBCL/YSR problem behaviors, based on international experts' ratings. The resulting CBCL/YSR Affective Problems scale consists of 13 items (Cronbach's α CBCL = .68, YSR = .72) covering depressed mood, anhedonia, loss of energy, feelings of worthlessness and guilt, suicidal ideation, as well as sleep and eating problems. The CBCL-scale had a mean of 2.47 ($SD = 2.55$, range 0–22) and the YSR-scale 3.80 ($SD = 3.21$, range 0–19), while 7.9% (CBCL) and 18.0% (YSR) of the scores were greater than 6.5 (which implies that more than half of the symptoms were rated as at least somewhat true and/or more than 25% of the symptoms as very true). Test–retest reliabilities of the DSM-IV scales have been found to be adequate (CBCL: $r = .88$; YSR: $r = .79$; Achenbach et al., 2003).

Consistent with other reports (e.g., Achenbach, McConaughty, & Howell, 1987; Jensen, Traylor, Xenakis, & Davis, 1988; Renouf & Kovacs, 1994; Verhulst & Van der Ende, 1992), the agreement between parent-reported and child-reported problems was only moderate ($r = .28$ for the depression scale). We feel that both informants perceive different aspects of problem behavior and differences between informants are meaningful. An additional advantage of using multiple informants is that it reduces the bias associated with mono-informant information (Angold & Costello, 1996; Sourander, Helstelä, & Helenius, 1999). Depressive problems that are rated as present by both parent and child are assumed to be more severe (more generalized) than problems rated by only one informant. Support for this assumption comes from preliminary analyses showing that children with depressive problems according to both their parents and themselves were more often rated as withdrawn and anxious/depressed by their teacher than children who had only depressive problems according to one informant (either parent or child). Based on these considerations, we used the mean of the standardized parent and child scores as a measure of depressive symptoms in this study. This measure correlated highly (.94) with the composite score based on the highest (standardized) score of both informants.

Temperament. Temperament was assessed by the parent version of the short form of the Early Adolescent Temperament Questionnaire-Revised (EATQ-R; Ellis, 2002; Putnam, Ellis, & Rothbart, 2001). The EATQ-R is a questionnaire based on the temperament model developed by Rothbart and coworkers (e.g., Rothbart

et al., 2000). Principal components analyses (PCA) on the parent version of the EATQ-R led to some minor alterations to the scales originally proposed by Rothbart and her group (Oldehinkel et al., 2004). Fearfulness (five items, Cronbach's $\alpha = .63$) denotes worrying and unpleasant affect related to the anticipation of distress. Frustration is a five-item scale ($\alpha = .74$), measuring negative affect related to interruption of ongoing tasks or goal blocking. Each item could be rated on a five-point scale ranging from 1 = hardly ever true to 5 = almost always true. To the best of our knowledge, no test–retest data of the EATQ-R are currently available.

Parenting. Because children are influenced by the rearing behavior of their parents through their mental representations of this behavior (Main, Kaplan, & Cassidy, 1985), it is important to capture the child's perception of the upbringing. The EMBU (a Swedish acronym for My Memories of Upbringing) for Children (EMBU-C; Markus, Lindhout, Boer, Hoogendijk, & Arrindell, 2003) has been developed to assess children's perception of parental rearing practices. We used a list of 47 items containing the factors Rejection, Overprotection, and Emotional Warmth (we omitted the factor Favoring Subject). Each item could be rated as 1 = no, never, 2 = yes, sometimes, 3 = yes, often or 4 = yes, almost always; and was asked for both the father and the mother. Rejection is characterized by hostility, punishment, derogation, and blaming of the child. Overprotection denotes fearfulness and anxiety for the child's safety, guilt engendering, and intrusiveness. Emotional Warmth refers to giving special attention, praising for approved behavior, unconditional love, and being supportive and affectionately demonstrative.

PCA mainly confirmed the original results of Markus et al. (2003), with the exception of five items of the Rejection scale, which had relatively low loadings in the original study as well. These items were excluded from further analyses. The Rejection scale contains 12 items with $\alpha = .84$ for fathers and .83 for mothers; the Overprotection scale contains 12 items with $\alpha = .70$ for fathers and .71 for mothers; and the Emotional Warmth scale contains 18 items with $\alpha = .91$ for both fathers and mothers. The answers for both parents were highly correlated ($r = .67$ for Rejection, $r = .81$ for Overprotection, $r = .79$ for Emotional Warmth), so we combined them into a single measure. The test–retest stability of a shortened version of the EMBU-C (10-item scales) over a 2-month period has been found to be satisfactory ($r = .78$ or higher; Muris, Meesters, & Van Brakel, 2003).

Parental depression. Parental psychopathology with respect to depression, anxiety, substance abuse, antisocial behavior, and psychoses was measured by means of the Brief TRAILS Family History Interview. Each syndrome was introduced by a vignette describing its main symptoms and followed by a series of questions to assess lifetime occurrence, professional treatment, and medication use. The interview assessed both biological parents, using a single informant, typically the mother. Parents were assigned to any of the categories 0 = (probably) not, 1 = (probably) yes, or 2 = (probably) yes and treatment and/or medication. The lifetime prevalences of depression as assessed with the Brief TRAILS Family History Interview were comparable with those found in adult population samples in the Netherlands (Bijl, Ravelli, & Van Zessen, 1998) and Europe (ESEMeD/MHEDEA 2000 Investigators, 2004) with Composite International Diagnostic Interviews (CIDI, World Health Organization, 1997), that is, 15.4% in males and 27.4% in females. If data were missing on one parent, missing values were imputed by group means. An index for parental depression was calculated by adding the scores of both parents. The index ranged from 0 (62.7%) to 4.

Analysis

Gender differences in depressive problems, perceived parenting, temperament, and parental depression were examined by means of *t*-tests; associations between variables by means of Pearson correlations. Main and interaction effects of gender, parenting, and temperament on depressive problems, adjusted for parental depression, were tested by multiple linear regression analyses. Parental depression and main effects of parenting and temperament were entered in a first step. After that, we tested whether inclusion of two-way interaction terms resulted in a significant improvement of the model in terms of explained variance. Three-way interactions (i.e., gender by temperament by parenting) were entered in a third step, and maintained only if the inclusion of the three-way interaction improved the model significantly. To ensure sufficient power for the interaction effects, we wanted to keep the number of interactions fairly small and hence performed separate analyses for Overprotection, Rejection, and Emotional Warmth. Subsequently, interactions that were significant in the separate analyses were included in a model encompassing all parenting variables.

About 2% of 11-year-old children suffer from a depressive disorder according to DSM-IV criteria (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). To assess whether the effects of parenting and temperament variables were the same in severely (probably clinically) depressed children compared to children with milder (subclinical) problems, we divided the sample into three groups, based on their Depression scores: (1) Severely Depressed, i.e. a score above the 98th percentile ($n = 45$), (2) Mildly Depressed, i.e. a score between the 85th and the 98th percentile ($n = 293$), and (3) Non-Depressed, i.e. a score below the 85th percentile ($n = 1884$). These groups were entered as dependent variable in a multinomial regression analyses, and coefficients for the Severely and Mildly Depressed group were compared by means of χ^2 tests.

A *p*-value smaller than .05 was considered statistically significant. Since we performed many statistical tests, the results may suffer from capitalization on chance: one would expect some 5% of the associations examined to be significant merely on the basis of chance. Hence, a statistically significant result in this context does not have the same weight as significant results in an experimental design.

To provide an impression of the size of the effects and facilitate the interpretation of the interaction effects, we wrote out multiple equations, alternating the values of the predictor variables (1 standard deviation below and above the mean for the parenting and temperament variables, 0 and 1 for girls and boys) while holding other variables to their sample means. The resulting predicted

(standardized) depression scores were calculated back to actual scores and plotted in a series of graphs.

Results

Table 1 contains means and standard deviation of depression scores, perceived parenting variables, temperament characteristics, and parental depression, separately for boys and girls. Because the Depressive Problems variable was based on standardized parent and self-report scores, the means are close to 0. All parenting and temperament means represent mean item scores (range parenting variables 1–4, temperament variables 1–5).

Except for Depressive Problems and Parental Depression, all variables showed significant gender differences. Girls perceived less Overprotection and Rejection, and more Emotional Warmth than boys. Furthermore, they scored higher on Fearfulness and lower on Frustration.

Correlations between the variables are presented in Table 2, above the diagonal for girls, below the diagonal for boys. All parenting and temperament variables were moderately associated with Depressive Problems, and weakly to moderately with each other. Parental Depression was associated with Depressive Problems and both temperament factors, but not with perceived parenting behaviors. Correlations between parenting variables and Depressive Problems tended to be higher in girls (significantly for Overprotection and Rejection), while the correlation between temperament factors (mainly Frustration) and Depressive Problems was higher in boys.

Table 3 shows the results of the analyses with respect to the interaction of temperament and, respectively, Overprotection, Rejection, and Emotional Warmth.

Main effects of gender, parenting, and temperament were consistent with the results presented in Tables 1 and 2: no gender difference in Depressive Problems, and Depressive Problems were associated with Parental Depression, parental Overprotection, Rejection, and a lack of Emotional Warmth, as well as with a temperament characterized by Fearfulness and Frustration. Table 3 further shows that the effect of Frustration was stronger in boys. The effects of Overprotection and Rejection on Depressive Problems were stronger in girls in the separate models, but these interactions failed to reach statistical significance in the simultaneous model. Frustration increased the effects of Overprotection and lack of Emotional Warmth, and Fearfulness the effect of Rejection. Finally, we found a three-way interaction of gender, Fearfulness, and Rejection,

Table 1 Depressive problems, parenting factors, temperament characteristics, and parental depression of preadolescent boys and girls

	Girls			Boys			Difference		
	Mean	*SD*	*N*	Mean	*SD*	*N*	*t*	*df*[b]	*p*
Depressive Problems[a]	.01	.81	1128	.00	.83	1094	.28	2220	.78
Parenting									
Overprotection	1.84	.37	1123	1.88	.39	1083	−2.81	2204	.005
Rejection	1.45	.29	1123	1.51	.33	1083	−5.01	2154	<.001
Emotional Warmth	3.26	.49	1124	3.16	.51	1083	4.81	2205	<.001
Temperament									
Fearfulness	2.49	.75	1012	2.35	.70	970	4.32	1980	<.001
Frustration	2.74	.64	1012	2.84	.68	971	−3.35	1981	.001
Parental depression									
Index score	.76	1.13	1113	.75	1.11	1070	.11	2181	.92

[a]Mean of standardized parent and self-report scores.
[b]Degrees of freedom deviant from $N_{girls} + N_{boys} - 2$ reflect test statistics adjusted for unequal variances.

Table 2 Correlations between depressive problems, parenting factors, temperament characteristics, and parental depression, by gender[a]

	Depress. Problems	Overprotection	Rejection	Emotional Warmth	Fearfulness	Frustration	Parental Depression
Depressive Problems	–	**.28***	**.38***	**−.21**	**.29**	**.29***	**.21**
Overprotection	**.18***	–	**.46**	**.13***	**.10**	**.07**	.05
Rejection	**.33***	**.41**	–	**−.33**	.06	**.18**	.02
Emotional Warmth	**−.16**	**.25***	**−.31**	–	.02	**−.11**	−.04
Fearfulness	**.32**	**.10**	**.10**	−.02	–	**.31**	**.11**
Frustration	**.38***	**.09**	**.16**	**−.09**	**.34**	–	**.12**
Parental Depression	**.17**	−.02	.03	−.01	**.15**	**.12**	–

[a]Girls' correlations are printed above the diagonal; boys' correlations below the diagonal.
Bold: $p < .05$.
*Significant gender difference.

Table 3 Effects (standardized coefficients) of gender, parenting, temperament, and their interactions on depressive problems; separately and simultaneously for overprotection, rejection and emotional warmth

	Model 1: Overprotection (R^2 = .22)		Model 2: Rejection (R^2 = .27)		Model 3: Em. Warmth (R^2 = .20)		Simultaneous Model (R^2 = .28)	
	β	p	β	p	β	p	β	p
Parental Depression	.12	<.001	.13	<.001	.13	<.001	.12	<.001
Gender (boys)	.01	.70	−.01	.59	.01	.81	−.02	.40
Parenting								
Overprotection	.25	<.001	–	–	–	–	.15	<.001
Rejection	–	–	.34	<.001	–	–	.23	<.001
Emotional Warmth	–	–	–	–	−.18	<.001	−.11	<.001
Temperament								
Fearfulness	.18	<.001	.21	<.001	.21	<.001	.20	<.001
Frustration	.20	<.001	.16	<.001	.20	<.001	.16	<.001
Gender × Overprotection	−.08	.009	–	–	–	–	−.04	.19
Gender × Rejection	–	–	−.08	.01	–	–	−.04	.22
Gender × Emotional Warmth	–	–	–	–	.05	.13	–	–
Gender × Fearfulness	.02	.52	−.00	.96	.01	.84	–	–
Gender × Frustration	.06	.04	.08	.01	.06	.04	.07	.02
Fearfulness × Overprotection	−.02	.47	–	–	–	–	–	–
Frustration × Overprotection	.06	.004	–	–	–	–	.05	.01
Fearfulness × Rejection	–	–	.08	.01	–	–	.07	.02
Frustration × Rejection	–	–	.03	.39	–	–	–	–
Fearfulness × Em. Warmth	–	–	–	–	−.01	.82	–	–
Frustration × Em. Warmth	–	–	–	–	−.07	.002	−.05	.01
Gender × Fear × Rejection	–	–	−.09	.004	–	–	−.06	.03
Gender × Frustr. × Rejection	–	–	.05	.11	–	–	–	–

Note: Three-way interactions did not contribute significantly to the explained variance of Overprotection and Emotional Warmth, hence were excluded from these models.

suggesting that the interaction of Fearfulness and Rejection was only present in girls.

Although the outcome variable (Depressive Problems) deviated somewhat from normality (skewness = 1.14, kurtosis = 1.82), examination of the residuals did not indicate serious violation of the model assumptions: all Durbin–Watson statistics were close to 2 and the distribution of the residuals was approximately normal. Inspection of residual outliers revealed that the models may not fit well for those with very high depression scores; their predicted scores tended to be underestimations of the observed scores.

Extreme scorers (the top 2%, referred to as the Severely Depressed) were compared with those with fewer problems (scores between the 85th and the 98th percentile, the Mildly Depressed) in a multinomial logistic regression analysis. In general, regression coefficients were larger for the Severely Depressed group, but all main effects of parenting and temperament were significant for the Mildly Depressed group as well and none of the differences were statistically significant. This supports the adequacy of the linear regression model. Interaction effects tended to be larger (but not significantly) in the Severely Depressed group as well. However, interpretations of interaction effects in models where the predictors are multiplicatively linked to the outcome variable (e.g., logistic models) differ substantially from those in additive models, precluding direct comparisons (Oldehinkel et al., 2001).

To ease interpretation of the results, predicted depression scores (based on the simultaneous model) for each combination of gender, parenting, and temperament factor were plotted in a series of graphs (Figure 1). Low and high Fearfulness and Frustration denote, respectively, 1 standard deviation below and above the mean. The graphs illustrate the Gender by Frustration interaction in that they show stronger effects (larger distances between the lines) of Frustration in boys than in girls (averaged over parenting). The interactions of Frustration with, respectively, Overprotection and Emotional Warmth are illustrated by steeper lines for high Frustration compared to low Frustration (averaged over gender). Finally, the three-way interaction of Gender, Fearfulness and Rejection is exemplified by steeper lines for high Fearfulness (compared to low Fearfulness) in girls, but not in boys. More specifically, in girls, the estimated difference in Depressive Problems between low and high parental Rejection was .8 in low-Fearfulness girls and 1.5 in high-Fearfulness girls; in boys, the differences were .9, respectively .8.

Discussion

Main findings

In this study, we investigated the interaction of gender, parenting, and temperament in relation to depressive problems in ten-to-twelve-year-old

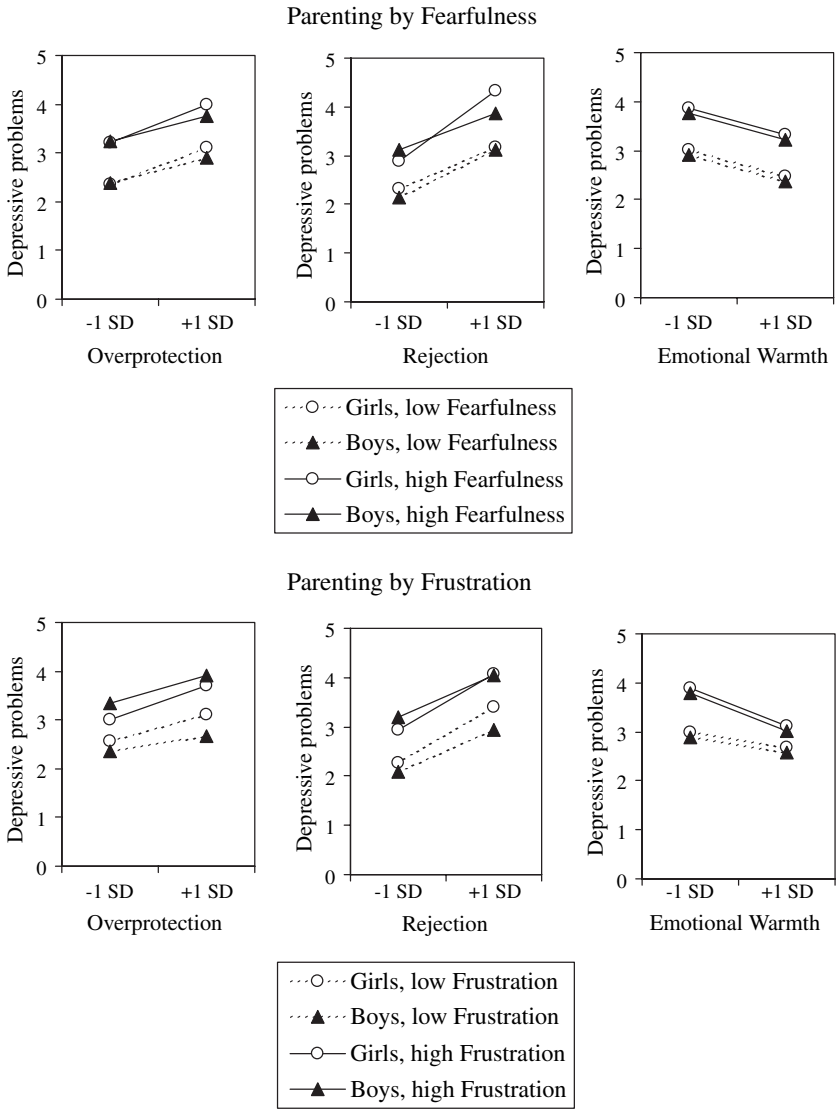

Figure 1 Graphical presentation of the interaction of gender, parenting, and temperament in relation to depressive problems

preadolescents, adjusted for parental depression. We hypothesized that (1) parental rejection and lack of emotional warmth would be associated with depressive problems particularly in temperamentally fearful preadolescents; (2) parental overprotection would be associated with depressive problems particularly in preadolescents with high levels of frustration; (3) the effects of rejection and lack of emotional warmth on depressive problems would be stronger for girls than for boys; and (4) the effects of overprotection would be stronger for boys than for girls. We found partial support for the first hypothesis, in that parental rejection increased the association between fearfulness and depressive problems indeed, but only in girls. Furthermore, emotional warmth did not interact with fearfulness, but with frustration. The second hypothesis was fully corroborated by our results: frustration increased the depressogenic effect of parental overprotection. Concerning gender effects, girls tended to be more sensitive to rejection and overprotection, but the effects did not reach statistical significance in a model including all parenting variables. Hence, the third hypothesis was only partly supported by our findings, and we did not find evidence in favor of the fourth. Finally, the association between frustration and depression was stronger in boys: highly frustrated boys were more likely to have depressive problems than highly frustrated girls.

Parental depression as proxy for genetic risk

An index of parental depression was used as a proxy for genetic risk. We included this measure because gene–environment correlations (i.e., confounding by genetic risk) can threaten the validity of inferences regarding associations between family-related factors and psychopathology. The index used is not a pure measure of genetic risk, but based on phenotypic information. Thus, effects of parental depression on offspring depressive problems can be genetically or environmentally mediated, and we

have probably been overly conservative by adjusting for both influences.

Temperament and psychopathology

The distinction between temperament and psychopathology is a complex issue, not only in terms of measurement but also notionally, and it may not have a satisfactory solution. There is a grey area between state and trait. Nevertheless, there are differences, not only with respect to the time frame used during measurement, but also conceptually. In this paper, temperament features are considered vulnerability/resilience traits, which, in the face of adversity, set in motion processes that cause the development of psychopathology, or protect against it (Shiner & Caspi, 2003). In other words, psychopathology is regarded a possible outcome of an unfavorable person–environment interaction. It should be noted, however, that the cross-sectional nature of our study precludes a test of the assumption that measures of temperament persist, while those of psychological syndromes like depressive problems fluctuate over time. In any case, whether or not temperament and psychopathology can be properly distinguished does not affect the main message of the paper, that is, that parenting behaviors act upon different children differently, depending on the child's specific sensitivities.

Interaction of temperament and parenting

Our results suggest interactions between temperament and parenting behaviors, in that easily frustrated children are overly sensitive to parental overprotection and lack of emotional warmth; and fearful children (girls) tend to be sensitive to parental rejection in particular. The interaction between parenting and temperament is interesting because it underlines that environmental influences may have differential effects, depending on an individual's temperamental make-up, and points to the potential effectiveness of integrating children's temperament in parent training programs. The finding that children with high levels of frustration were particularly sensitive to overprotection and lack of emotional warmth is in line with the before-mentioned postulation that frustration may turn into depression if goals remain outside of reach despite extra efforts (Carver, 2004). Parental overprotection is likely to reduce children's possibilities of reaching their goals and therefore induce depressive symptoms, especially in children who are easily frustrated. Emotional warmth might act as a buffer that protects frustrated children from developing depressive symptoms in situations that hinder goal attainment. The interaction of rejection and fearfulness is understandable in the light of fearful children's sensitivity to punishment (e.g., Colder, Lochman, & Wells, 1997; Gray, 1981, 1987), implying a need for a safe, supportive environment. Parental rejection threatens a child's feeling of safety, because of which they may become increasingly inhibited. Previous studies showed that the association between rejection and depressive symptoms was modified by attributions that pertain to the salience, personal relevance, or negative interpretation of the rejection (Monroe & Hadjiyannakis, 2002; Prinstein & Aikins, 2004). A fearful temperament is likely to contribute to such attributions (e.g., Chisholm & Hurley, 1994; Colder et al., 1997).

Gender differences

Boys and girls did not differ with respect to their depression scores, which is consistent with studies indicating that gender differences start to emerge only in mid-puberty (Angold, Costello, & Worthman, 1998; Hankin et al., 1998; Oldehinkel, Wittchen, & Schuster, 1999). Both perceived parenting behaviors and temperament factors showed (small, but significant) gender differences, with boys perceiving more negative parenting behaviors and having lower levels of fearfulness and higher levels of frustration. Similar gender differences have been reported previously (e.g., Feingold, 1994; Markus et al., 2003). Associations between temperament, parenting and depressive problems were modified by gender as well: boys showed a stronger association between frustration and depression and fearful girls appeared more sensitive to parental rejection than fearful boys (or non-fearful children).

Fearful girls' heightened sensitivity to rejection may be considered in the light of evidence suggesting that negative experiences in the interpersonal domain are more predictive of depression for girls than for boys (Patton et al., 2003; Rudolph & Hammen, 1999; Silberg et al., 2001), and particularly salient in vulnerable girls (Cyranowski et al., 2000). Similar findings have been reported by Prinstein and Aikins (2004). The authors contributed this gender effect to the critical developmental period associated with divergent prevalence rates of depression, mid adolescence (Angold et al., 1998; Hankin & Abramson; 2001). Our results suggest that gender differences in sensitivity to interpersonal experiences may already be apparent before puberty (see also Maccoby, 1990).

The association between frustration and depression was stronger in boys. Frustration is not only associated with depression, but also with disruptive behavior (Oldehinkel et al., 2004), which is more prevalent in boys than in girls. Tentatively, boys tend to express their frustration more in oppositional and aggressive behavior than girls do, thereby provoking negative responses in others, which in turn may increase the risk of depressive problems.

Strengths and limitations

Our study has a number of notable assets. It was based on a large population sample of preadoles-

cents, covered both parenting practices and temperament features, used multiple informants, and included an index of parental depression to adjust for possible confounding and gene–environment correlation.

There are also limitations. Predictors and outcome variable were partly based on information from the same informant. This brings along the risk of inflated associations, although it should be noted that our approach is a major advantage compared to data that are completely based on a single informant. Furthermore, depressed children may have had a negatively biased perception of their parental rearing behaviors (Stein et al., 2000). Although several studies have concluded that the impact of depressed mood on reported parental rearing practices is minimal (e.g., Duggan, Sham, Minne, Lee, & Murray, 1998; Gerlsma, Kramer, Scholing, & Emmelkamp, 1991; Gotlib, Mount, Cordy, & Whiffen, 1988; Lewinsohn & Rosenbaum, 1987; Plantes, Prusoff, Bennan, & Parker, 1988), report bias cannot be ruled out completely, but it is unlikely to have affected the interaction effects. A final limitation is that our cross-sectional design precludes inferences about the direction of the effects.

Conclusion

Adjusted for parental depression, both temperamental predisposition and perceived parenting style were associated with depressive problems in preadolescents. The effect of specific parenting behaviors depended on the nature and gender of the child. Integrating the effects of children's individual differences with parenting practices can improve our understanding of the development of depressive problems in pre- and early adolescence. It will be interesting to extend the domain of (negative) interpersonal experiences with friends and peer group members, who become increasingly important as the child enters and passes through adolescence. Second, the outcome variable could be broadened from depressive problems to a wider range of adjustment problems, including antisocial behavior and substance abuse.

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