

Maternal depressive symptoms, and not anxiety symptoms, are associated with positive mother–child reporting discrepancies of internalizing problems in children: a report on the TRAILS Study

Sonja L. M. van der Toorn · Anja C. Huizink ·
Elisabeth M. W. J. Utens · Frank C. Verhulst ·
Johan Ormel · Robert F. Ferdinand

Received: 26 February 2008 / Accepted: 5 February 2009 / Published online: 13 October 2009
© The Author(s) 2009. This article is published with open access at Springerlink.com

Abstract Maternal internalizing problems affect reporting of child's problem behavior. This study addresses the relative effects of maternal depressive symptoms versus anxiety symptoms and the association with differential reporting of mother and child on child's internalizing problems. The study sample comprised a cohort of 1,986 10- to 12-year-old children and their mothers from the Dutch general population in a cross sectional setup. Children's internalizing problems were assessed with the DSM-IV anxiety and affective problem scales of the Child Behavior Checklist (CBCL) and the Youth Self-Report (YSR). Current maternal internalizing problems were assessed with the depressive and anxiety symptom scales of the Depression Anxiety Stress Scale (DASS), while the TRAILS Family History Interview (FHI) measured lifetime maternal depression and anxiety. Results show that current and lifetime maternal depressive symptoms were associated with positive mother–child reporting discrepancies (i.e. mothers reporting more problems than their child). Considering the small amount of variance explained, we conclude that maternal depressive symptoms do not bias

maternal reporting on child's internalizing problems to a serious degree. Studies concerning long term consequences of mother–child reporting discrepancies on child's internalizing problems are few, but show a risk for adverse outcome. More prognostic research is needed.

Keywords Internalizing problems · Reporting discrepancy · General population study · Children · TRAILS Study

Introduction

Children and parents are both important informants of children's behavioral and emotional problems. It is well established that discrepancies exist between children's reports and reports by parents [3, 8, 21]. In a recent review on informant discrepancies, De Los Reyes and Kazdin [21] concluded that there is less agreement between informant's ratings of internalizing problems compared to externalizing problems [3, 24].

Since there is familial aggregation for internalizing problems, partly resulting from disorder specific genetic influences [32, 36, 48, 50], more parents from children with internalizing problems experience internalizing problems themselves, compared to other parents. The distorting effects of maternal internalizing problems on ratings of child problems have been extensively studied. There is empirical evidence suggesting that maternal depression and anxiety are associated with parent–child informant discrepancies. Inconsistencies however exist as to the source of the distortion (depression or anxiety) and the gender and age of the child in relation to the maternal informant discrepancy [21]. Most studies on informant discrepancies regarding the child's internalizing problems have included

S. L. M. van der Toorn (✉) · A. C. Huizink ·
E. M. W. J. Utens · F. C. Verhulst · R. F. Ferdinand
Department of Child and Adolescent Psychiatry,
Erasmus Medical Center Rotterdam, Sophia Children's Hospital,
Dr. Molewaterplein 60, 3015 GJ Rotterdam, The Netherlands
e-mail: s.vandertoorn@erasmusmc.nl

A. C. Huizink · J. Ormel
Department of Psychiatry,
University Medical Center Groningen,
Groningen, The Netherlands

J. Ormel
Graduate School for Experimental Psychopathology,
Groningen, The Netherlands

only mothers, although some studies have included both parents [27, 38, 46].

Results of epidemiological studies in the general population [9, 10, 51] as opposed to clinical studies [12, 26, 30, 34, 35, 37, 43, 45] show that youths tend to report more internalizing problems than parents do about them. Prevalence rates of child internalizing problems in the general population derived from parental ratings are lower compared to those derived from the child itself [18, 21]. However, when parents experience internalizing problems, they tend to report more symptoms of internalizing problems about their child, compared to the child itself [41]. Richters [44] concluded that previous studies on maternal depression distortion were not empirically validated. Recent studies with clinical samples of youths [6, 38] and general population samples [11, 15, 27, 41, 46, 53] explored the association between maternal depression and anxiety and reporting discrepancies on child internalizing problems, taking previous methodological flaws into account by comparing their ratings to teacher ratings [11, 15, 53] or using different methodology [46].

In the present study, we try to elucidate some of the inconsistencies mentioned by De Los Reyes and Kazdin [21] by analyzing the effect of maternal depressive and anxious symptoms separately on informant discrepancies for boys and girls. Furthermore statistical analyses are done, using standardized difference scores, since these scores are proven to correlate equally with both informants' ratings [22] and in this way adjust for methodological problems, mentioned by Richters [44]. We address the following research question: to what extent are maternal depression and anxiety symptoms predictors of positive mother–child reporting discrepancies on affective and anxiety problems in children? We make use of a unique large cohort from the general population, in which the effects of current and lifetime maternal internalizing problems on reporting of child internalizing problems are assessed.

Materials and methods

Instruments

Predictor variables: maternal depressive, anxiety and stress symptoms

The Depression Anxiety Stress Scale (DASS-21) [39] is a self-report questionnaire to assess anxiety, depression, and feelings of stress in adults. It contains 21 items covering the past week, rated on a four-point scale, ranging from 'not at all' (=0), to 'very much, or most of the time' (=3). By summing item scores, three syndrome scores of each

seven items can be derived: Depression, Anxiety, and Stress. The good psychometric properties of the DASS-21 [5, 16, 20, 31] were replicated for the Dutch version [7]. For the sample of respondents used in this study, Cronbach's alpha coefficients for the subscales of the DASS were: .83 for the DASS depression scale, .78 for the DASS anxiety scale and .86 for the DASS stress scale, demonstrating good internal consistency. Inter correlations between the subscales of the DASS for this sample were: .59 between DASS depression and DASS anxiety, .58 between DASS anxiety and DASS stress and .71 between DASS depression and DASS stress, using Pearson's correlations, suggesting shared method variance. Therefore the DASS stress scale was left out of the analyses.

In order to assess the number of respondents who score in a range suggestive of clinically significant depression and anxiety, DASS scores were dichotomized based on normative data for a non-clinical adult population using the percentiles indicating 'severe' and 'extremely severe' as a cut-off score. These cut off scores correspond with a DASS-21 depression score of 12 and a DASS-21 anxiety score of 8 [20].

Predictor variables: maternal lifetime depression and anxiety

Maternal lifetime depression and anxiety were assessed with the TRAILS Family History Interview (FHI) [42]. A research assistant conducted this interview at home with the mother. A vignette, describing the main characteristics, followed by a question about lifetime occurrence was used to assess both depression and anxiety disorders (generalized anxiety disorder, social phobia, specific phobia, panic disorder or obsessive compulsive disorder). The response format was 'no' (0), 'probably not' (1), 'probably so' (2), 'yes' (3) and 'I do not know' (9). For the present study the response format was dichotomized; aggregating 0–1 to 'disorder absent' and 2–3 to 'disorder present'. The Pearson's correlation coefficient between the FHI depression and anxiety disorders scale for this sample was .35, showing diversity between the scales. Since the interview was constructed specifically for TRAILS, to obtain an indication about the absence or presence of psychiatric disorders in the mothers of participants, no further information on psychometric properties is available.

Outcome variables: CBCL–YSR standardized difference scores on affective and anxiety problems

The Child Behavior Checklist (CBCL) [4] is a parent questionnaire to assess behavioral and emotional problems in 4- to 18-year-old-children. In this study the subscales

according to the Diagnostic and Statistical Manual of mental Disorders-IV, text revised [1] of the CBCL were used, reflecting: affective problems, anxiety problems, somatic problems, attention deficit hyperactivity problems, oppositional defiant problems and conduct problems. High concurrent validity was found with DSM-IV clinical diagnoses and other standardized rating scales [4]. In the sample of Achenbach et al. [2] the mean Cronbach's alpha of the DSM-oriented scales was .82 and the test–retest reliability was .85. The cross-informant agreement between parents and youths was .45.

In this study, the DSM-IV subscales affective problems and anxiety problems of the CBCL were used. The affective problems scale consists of 13 items that are consistent with the DSM-IV diagnoses of major depressive disorder and dysthymia. The subscale anxiety problems, consisting of six items, represents three DSM-IV anxiety disorders: generalized anxiety disorder (three items), separation anxiety disorder (two items) and simple phobia (one item). The scoring format is 0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true. In order to select borderline and clinical cases of affective and anxiety problems, the normative sample of Achenbach and Rescorla [4] was used. For boys the clinical cut-off score correspondents with 5 (CBCL affective problems), 4 (CBCL anxiety problems), 8 (YSR affective problems) and 6 (YSR anxiety problems) or higher. For girls the clinical cut-off score correspondents with 5 (CBCL affective problems), 5 (CBCL anxiety problems), 10 (YSR affective problems) and 7 (YSR anxiety problems) or higher. For the present sample the Cronbach's alpha coefficients were .68 for the DSM-IV scale affective problems and .66 for the DSM-IV scale anxiety problems.

The Youth Self-Report (YSR) [4] was used to obtain adolescents' self-reports. The YSR, developed for 11–18-year-olds, has roughly the same format as the CBCL, except that items are worded in the first person. In the sample of Achenbach et al. [2] the mean Cronbach's alpha coefficient of the DSM-oriented scales of the YSR was .76 and the test–retest reliability .79. In the present sample the Cronbach's alpha coefficients of the scales we used were .72 for the DSM-IV scale affective problems and .62 for the DSM-IV scale anxiety problems.

Two standardized difference scores were constructed by subtracting the YSR-scale scores from the CBCL-scale scores on affective problems and anxiety problems. Taking into account the recommendations of De Los Reyes and Kazdin [22] on measuring informant discrepancies, the raw difference scores were converted into standardized Z-scores. The Z-score has a mean of 0 and a standard deviation of 1. In this way the difference scores correlate equally with the informant's ratings used, which is in line with the comments of Richters [44] that no informant can

be considered a 'gold standard' by which to interpret another informant's rating (see the Appendix).

The standardized CBCL–YSR difference scores on (1) affective problems and (2) anxiety problems are the two outcome variables of this study. A positive difference score means that the mother reports more problems than the child. A negative difference score indicates that the child reports more problems than the mother.

Participant recruitment

This study is part of the Tracking Adolescents' Individual Lives Survey (TRAILS), which is a large longitudinal epidemiological study of Dutch pre-adolescents. The present study used data from the first assessment wave of TRAILS, which ran from March 2001 to July 2002. The target sample consisted of 10-to 12-year-olds from five municipalities in the North of the Netherlands, including both urban and rural areas. The response rate was 76.0%, resulting in 2,230 participants. Although significant differences between responders and non responders were found (56.9% of participants were boys in the non-responders vs. 49.2% of boys in responders; 44.2% of non responders had a parent with lower secondary education or less vs. 32.6% in responders; 28.4% of non responders needed additional help because of learning difficulties vs. 21.1% of responders), there were no indications of differences in the prevalence of psychopathology based on teacher ratings between responders and non responders [23].

Of the 2,230 participants, only data of mothers and children for whom complete data on both the DASS, CBCL and YSR were available, were included in the statistical analyses. Respectively 191 mothers, 186 mothers and 55 children were excluded from analyses because they did not complete the DASS, CBCL, or YSR. Due to overlap in non-response, the total number of incomplete mother–child pairs was 244. The final sample of this study consisted therefore of 1,986 participants (89%).

To test for differences between responders and non-responders on demographic characteristics, socioeconomic status (SES), Total Intelligence Quotient (TIQ) and ethnicity, χ^2 - and ANOVA tests were used. SES was based on the highest educational level of mother and father, the type of occupation of the father and mother and the family income. SES was divided into lower class (1), middle class (2) and high class (3) by means of the frequency distribution (low SES = lowest 25%, middle SES = middle 50% and high SES = highest 25%). TIQ was based on two subtests of the WISC-R; Vocabulary and Block Design [49]. Demographic characteristics of this study sample seem to be roughly comparable to those of the Dutch population in 2001 based on data of the Dutch Central Bureau of Statistics [25].

Statistical analyses

First, mean, standard deviations and the number and percentage of respondents who scored in the range, suggestive of clinical significant problems were calculated for all variables. Second, Spearman's correlation coefficients were calculated between the current and lifetime maternal internalizing problems, informants' characteristics and the standardized difference scores. Third, in order to analyze the association between the predictor variables and difference scores by the mother, linear regression analyses were conducted. Standardized affective and anxiety CBCL–YSR difference scores were used as outcome variables and the DASS depression and anxiety subscales and FHI lifetime depression and lifetime anxiety scores were used as predictors: First, every independent variable (DASS depression, DASS anxiety, FHI lifetime depression, FHI lifetime anxiety) was entered separately in the analysis with the standardized difference scores on affective and anxiety problems as outcome variables; next, DASS depression and DASS anxiety combined were entered and FHI lifetime depression and anxiety combined were entered on both outcomes. Finally, all independent variables were entered simultaneously on both outcomes. SES and TIQ were included in every model as covariates. In this way the unique and combined predictive value of the current and lifetime maternal depression and anxiety problems on both difference scores could be assessed. All statistical analyses were conducted for boys and girls separately.

Results

Demographics

The final study sample consisted of 1,986 participants: 971 boys (49%; mean age 11.1 years, SD 0.5), 1,015 girls (51%; mean age 11.1 years, SD 0.5) and 1,986 mothers (mean age 40.7 years, SD 4.6). Eighty-nine percent of the children was of Dutch origin, 11% was originally from other countries, including Turkey, Morocco, Surinam, Indonesia, Dutch Antilles or other (Dutch population: 78.3% of Dutch origin and 21.7% originally from other countries [25]). Fourteen percent of the children belonged to a one-parent family and 86% to a two-parent family (Dutch population: 16.9% single parent families and 83.1% two-parent families [25]). Fourteen percent of the families had a monthly income of less than €1134,-, 65% had an income between €1134,- and €2950,- and 14% had an income above €2950,- (7% did not know their income or did not answer the question) (Dutch population: mean income pro family = €2358.33 [25]).

Within this study sample no differences were found between responders ($N = 1,986$) and non-responders ($N = 244$) regarding age ($\chi^2 = 4.3$, $P = \text{ns}$) and sex ($\chi^2 = 0.86$, $P = \text{ns}$) of the children. Significant differences between responders and non-responders were found for SES (responders: 23% low SES, 50.6% middle SES, 26.4% high SES, vs. non-responders: 47.3% low SES, 39.5% middle SES, 13.2% high SES; $\chi^2 = 60.976$, $P < 0.0005$). Significant differences between responders and non-responders were also found for ethnicity (responders: 88.7% Dutch and 11.3% other ethnicity vs. non-responders: 65.5% Dutch and 34.5% other ethnicity, $\chi^2 = 85.352$, $P < 0.0005$). Finally, significant differences between responders and non-responders were found regarding one- versus two-parent families (responders: two parent family 85.9%, one parent family 14.1% vs. non-responders: two parent family 75.6%, one parent family 24.4%, $\chi^2 = 15.273$, $P < 0.0005$) and IQ (responder: mean IQ = 97.9 vs. non responders: mean IQ = 91.3; ES = .019, $P < 0.000$).

Descriptive statistics

Mean and standard deviations of all variables and the number and percentages of respondents with borderline or clinical significant affective and anxiety problems are presented in Table 1.

Correlations between maternal internalizing problems and the standardized difference scores

Tables 2 and 3 shows small (ranging between .06 and .15) but significant positive correlations between both current and lifetime maternal depression and anxiety scores and the standardized difference scores. Small but significant negative correlations were found between the covariate SES and all outcome variables, except the affective difference score for girls. Significant negative correlations were also found between the covariate TIQ and the anxiety difference scores for boys and girls. SES and TIQ were added as covariates in the regression analyses.

Predicting CBCL–YSR difference scores by the DASS depression and anxiety subscales and FHI lifetime anxiety and lifetime depression

All unique predictor variables were significant in the models on both difference scores for boys and girls, explaining 0.8–4.1% of the variance. Combining DASS depression and anxiety in four predictive models on both outcome scores for boys and girls separately, only DASS depression remained a significant predictor in every model. The combined scales explained 1.6 tot 4.4% of the variance. Combining FHI lifetime depression and anxiety problems in four models

Table 1 Mean (M), standard deviations (SD) and number (N) and percentages (%) of respondents with clinical significant affective and anxiety problems for boys, girls and mothers

Score (rater)	Boys			Girls			Complete sample	
	Clinical cases ^a			Clinical cases			Clinical cases	
	M	SD	N (%)	M	SD	N (%)	N (%)	Range
CBCL affective (mother)	2.58	2.63	162 (16.7)	2.37	2.49	182 (17.9)		0–26
CBCL anxiety (mother)	1.86	1.81	162 (16.7)	1.91	1.81	84 (8.3)		0–12
YSR affective (child)	3.72	3.25	125 (12.9)	3.81	3.14	57 (5.6)		0–26
YSR anxiety (child)	1.88	1.77	41 (4.2)	2.28	1.86	25 (2.5)		0–12
DASS depression (mother)	1.82	2.47	5 (0.5)	1.76	2.37	13 (1.3)	18 (0.9)	0–21
DASS anxiety (mother)	1.14	1.99	15 (1.5)	1.16	2.06	17 (1.7)	32 (1.6)	0–21
FHI life time depression (mother)	.28	.45	267 (27.5)	.27	.44	271 (26.7)	538 (27.1)	0–1
FHI life time anxiety (mother)	.15	.36	145 (14.9)	.16	.37	163 (16.1)	308 (15.5)	0–1
SES (parents)	2.03	.73		2.04	.68			1–3
TIQ (child)	98.74	14.99		97.1	14.55			45–149

CBCL affective problems boys ≥ 5 , CBCL anxiety problems boys ≥ 4 , CBCL affective problems girls ≥ 5 , CBCL anxiety problems girls ≥ 5

YSR affective problems boys ≥ 8 , YSR anxiety problems boys ≥ 6 , YSR affective problems girls ≥ 10 , YSR anxiety problems girls ≥ 7

DASS depression ≥ 12 , DASS anxiety ≥ 8

FHI depression and anxiety 1

CBCL Child Behavior Checklist, YSR Youth Self-Report, DASS Depression Anxiety Stress Scale, FHI Family History Interview, SES socio-economic status, TIQ Total Intelligence Quotient

^a Cut off scores to determine clinical cases

Table 2 Correlations between maternal current (DASS) and life time (FHI) depression and anxiety, informant characteristics and the standardized difference scores on affective and anxiety problems for boys (N = 971) and girls (N = 1,015) separately

	Boys		Girls	
	CBCL–YSR standardized difference score affective problems	CBCL–YSR standardized difference score anxiety problems	CBCL–YSR standardized difference score affective problems	CBCL–YSR standardized difference score anxiety problems
DASS depression	.11**	.10**	.12**	.15**
DASS anxiety	.10**	.08**	.09**	.15**
FHI lifetime anxiety	.08**	.13**	.08**	.06*
FHI lifetime depression	.12**	.13**	.12**	.11**
SES	-.08**	-.05*	-.03	-.08**
TIQ	-.05	-.09**	-.05	-.14**

CBCL Child Behavior Checklist, YSR Youth Self-Report, DASS Depression Anxiety Stress Scale, FHI Family History Interview, SES socio-economic status, TIQ Total Intelligence Quotient

*P < .05

**P < .01

predicting both outcome scores for boys and girls, again only FHI lifetime depression significantly predicted all outcome scores. FHI lifetime anxiety reached significance predicting the difference score on anxiety problems in boys as well. The combination of both predictors explained 1.9–3.2% of the variance. Finally, combining all predictive variables in four models on the standardized affective and anxiety difference scores for boys and girls separately, DASS depression remained significant in three models. The DASS depression

score did not significantly explain the difference score on anxiety problems in boys. FHI-lifetime depression also remained significant in three out of four models. It did not significantly predict the anxiety difference score in girls. DASS anxiety was not a significant predictor in all models. FHI lifetime anxiety remained significant in the model predicting the anxiety difference score in boys. The variance explained by the combined predictor models varied between 2.7 and 4.8%.

Table 3 Linear regression analyses of the current (DASS) and lifetime (FHI) maternal internalizing problems and the standardized CBCL–YSR affective and anxiety difference scores, for boys ($N = 971$) and girls ($N = 1,015$) separately, adjusted for SES and TIQ

	Boys						Girls					
	Affective			Anxiety			Affective			Anxiety		
	R^2	β (95% CI)	P -value	R^2	β (95% CI)	P -value	R^2	β (95% CI)	P -value	R^2	β (95% CI)	P -value
Multiple regression analyses on single predictor variables (including covariates)												
DASS depression	.023	.437 (.223 to .651)	0	.018	.327 (.113 to .541)	.003	.016	.404 (.187 to .620)	0	.041	.533 (.306 to .760)	.002
DASS anxiety	.014	.361 (.089 to .633)	.009	.013	.275 (.004 to .546)	.047	.008	.302 (.049 to .555)	.019	.038	.560 (.295 to .824)	0
FHI It depression	.018	.293 (.122 to .464)	.001	.026	.351 (.181 to .520)	0	.018	.325 (.159 to .490)	0	.031	.282 (.107 to .457)	.002
FHI It anxiety	.011	.228 (.015 to .441)	0	.023	.121 (.194 to .618)	0	.01	.272 (.074 to .471)	.007	.025	.221 (.011 to .431)	.039
Multiple regression analyses combining DASS depression and anxiety and FHI life time depression and anxiety (including covariates)												
DASS depression	.023	.398 (.141 to .655)	.002	.018	.296 (.039 to .554)	.024	.016	.391 (.117 to .994)	.005	.044	.382 (.096 to .667)	.009
DASS anxiety		.081 (–.244 to .407)	.699		.074 (–.252 to .399)	.657		.025 (–.294 to .343)	.879		.289 (–.044 to .622)	.089
FHI It depression	.019	.264 (.081 to .447)	.005	.031	.271 (.089 to .453)	.004	.02	.280 (.105 to .455)	.002	.032	.249 (.064 to –.434)	.008
FHI It anxiety		.105 (–.124 to .333)	.37		.284 (.057 to .512)	.014		.163 (–.047 to .372)	.129		.122 (–.100 to .343)	.282
Multiple regression analysis combining all predictors (including covariates)												
DASS depression	.027	.318 (.055 to .581)	.018	.034	.221 (–.041 to .483)	.098	.027	.347 (.071 to .622)	.014	.048	.346 (.057 to .636)	.019
DASS anxiety		–.008 (–.345 to .329)	.963		–.089 (–.425 to .247)	.603		–.064 (–.393 to .263)	.7		.246 (–.099 to .591)	.162
FHI It depression		.194 (.005 to .384)	.045		.234 (.045 to .423)	.016		.236 (.058 to .413)	.009		.182 (–.004 to .369)	.055
FHI It anxiety		.087 (–.147 to .321)	.456		.287 (.053 to .520)	.016		.138 (–.080 to .355)	.214		.030 (–.199 to .258)	.799

CBCL Child Behavior Checklist, YSR Youth Self-Report, DASS Depression Anxiety Stress Scale, FHI Family History Interview, SES socioeconomic status, TIQ Total Intelligence Quotient
 A bold entry indicates a significant result ($P < .05$)

Discussion

The present study investigated to what extent current and lifetime maternal depression and anxiety are related to positive reporting discrepancies between mother and child regarding the child's internalizing problems in a large general population sample. Regression analyses showed positive but small relations between current and lifetime maternal internalizing problems and the mother–child reporting difference score on affective and anxiety problems in children. This indicates that a higher level of maternal internalizing problems is associated with a larger difference score. These findings suggest that maternal internalizing problems contribute to the maternal perception of their child's problems tending to be higher in relation to their child's own appraisal. This finding is supported by most previous studies, showing that mothers with internalizing problems in the general population report more internalizing problems than youths themselves and/or another observer [11, 15, 27, 41, 53]. Mothers without internalizing problems report fewer problems compared to their child [41].

Combining maternal depression and anxiety scores as predictors of the difference score in this study, current and/or lifetime maternal depression reached significance in every model and predicted both reporting differences for boys and girls, whereas anxiety did not reach significance in all but one model. The association between maternal depression and a positive reporting discrepancy was confirmed by previous general population studies on mother–child reporting discrepancies associated with maternal internalizing problems. However, previous studies that differentiated between maternal depression and anxiety, reported an association between maternal anxiety and reporting discrepancies as well [11, 15, 27, 53]. Results of the present study show that both predictors seem to be associated with a positive reporting discrepancy but when they are adjusted for each other, maternal current and lifetime depression appears the main predictor of the mother–child reporting discrepancies.

Although significant associations were found between maternal current and lifetime depressive symptoms and positive reporting discrepancies, these associations explained three to five percent of the variance. According to Cohen [17], effects accounting for 1.0–5.9% of variance are considered small. Maternal depressive symptoms were only slightly elevated, which could explain the fact that maternal depression only accounted for a small part of the variance of the reporting discrepancy. Najman et al. [41] demonstrated that an increase in maternal internalizing symptoms coincides with mothers reporting increasingly more symptoms compared to their child. Therefore it seems that although the association between maternal depressive

symptoms and a positive mother–child reporting discrepancy has been demonstrated, in the general population this association is small and does not bias research, using maternal reports on child problems.

Moving beyond studies using questionnaires, the association between maternal depressive and anxiety symptoms and maternal reporting behavior has also been demonstrated by experimental studies. Conrad and Hammen [19] showed that depressed mothers made more negative comments in interactions with their symptomatic child (experiencing either internalizing or externalizing symptoms) during a discussion compared to non-depressed mothers. More recently, a maternal dysphoria-related bias was demonstrated [52]; mothers who experienced dysphoria (anxious and depressive symptoms) rated the negative emotions and behaviors of their own child and a control child more negative compared to independent raters. Considering children with ADHD, Chi and Hinshaw [14] demonstrated more negative ratings by mothers experiencing depression, on the problematic behaviors of their child and on their own parenting style, compared to teachers' and child's ratings. Consequently the maternal judgment distortions (and not the depressive symptoms) predicted future mother–child interaction problems like showing inadequate levels of maternal warmth.

Previous research on adult depression indicates that depressogenic cognitive affective structures form a stable underlying feature of depression-vulnerable individuals. Furthermore these cognitive structures are responsible for the occurrence of a depressive episode [33, 47]. In this way, former or current depressive symptoms may be associated with a bias in current reporting behavior. The number of mothers with a current clinical significant depression score in this study is quite small but more mothers reported a life time depression. Although depressive disorders are also associated with cognitive deficits in executive functioning (e.g. decision making), memory and attention deficits [13], these deficits are correlated with depression severity. Therefore they do not account for the reporting behavior of mothers with depressive symptoms in this study since maternal depressive symptoms were only slightly elevated and only few mothers scored in the range for clinical depression.

In this study a difference between boys and girls appeared in predicting discrepancy scores on child's anxiety symptoms. In boys, maternal lifetime depression and anxiety were associated with this positive difference score. In girls, current maternal depression and lifetime maternal depression (showing a non-significant trend) were associated. In a previous study Briggs-Gowan [11] found opposite results, demonstrating a correlation between maternal anxiety and mother–teacher difference scores in girls and maternal depression and mother–son difference scores in

boys. Krain and Kendall [38], studying a clinical population of children with anxiety disorders, found no effect of parental anxiety on positive parent–child reporting differences. Based on the outcomes of this study and previous studies, specific effects of maternal depressive or anxious symptoms on differences between reporting-discrepancies regarding boys and girls in the general population are inconsistent. This finding reflects the conclusions of De Los Reyes and Kazdin [21] based on their review study that in sum, child gender may not be related to informant discrepancies.

Studies considering the long-term implications of informant discrepancies in the general population are scarce. One prognostic study on parent–adolescent disagreement regarding behavioral and emotional problems as a risk factor for adverse outcome 4 years later showed an association between negative mother–child discrepancies on the subscales ‘withdrawn’ and ‘anxious/depressed’ of the CBCL and YSR and adverse outcome 4 years later. However, these associations did not remain significant when adjusted for CBCL and YSR scores as independent predictors [28]. Longitudinal studies on parent–child informant discrepancies regarding clinical samples of children with internalizing problems showed mixed results: a longitudinal study into parent–child diagnostic agreement on anxiety disorders in a clinical sample of children, aged 9–13 years old, showed that although parent–child agreement was poor to moderate at pre-treatment, post-treatment and 7.4 year follow-up, treatment outcome was good and improvement was maintained at follow-up [45]. Ferdinand et al. [29] demonstrated an increasing risk for future police/judicial contacts at 4 year follow up for referred adolescents who received much higher anxiety/depression scores by their parents compared to their own scores. The possible clinical implications on the long term functioning of the child/adolescent of these parent–child reporting discrepancies on child internalizing problems should be explored in further studies.

Strengths and limitations of the study

This study was conducted in a large population sample, consisting of 1,986 mothers and children. Our large population based cohort can be considered representative for the Dutch general population on demographic variables. Although this study sample consisted of 89% of the initial TRAILS sample and some significant differences on demographic variables between this research sample and the respondents who were left out because of incomplete data were found, we assume that the prevalence of internalizing problems in children is comparable to the initial sample. Research on the initial sample of 2,230 respondents showed that there were no differences in the

prevalence of psychopathology between responders and non responders despite of differences in demographic characteristics [23]. Furthermore demographic characteristics of this study sample are generally comparable to those of the Dutch population [25]. Assessment of both current and lifetime maternal internalizing problems, and of anxiety and depression in both mothers and children, further supported the strength of the study. The number of mothers reporting a life time period of depression is comparable to the original TRAILS sample and to the CIDI-DSM-IV life time rates obtained by direct interviewing in the Netherlands Mental Health Survey and Incidence Study (NEMESIS) [42]. Standardized difference scores were computed, proven to be the most consistent estimates among informant discrepancies and informant characteristics by De Los Reyes and Kazdin [22].

In this study multiple tests have been performed, which increases the risk on chance findings. However, since results of this study were all consistently heading in the same direction and several *P*-values are below .001, outcomes can be considered as representative of ‘true’ associations.

A limitation of the study could be that fathers’ reports on their children were not obtained. However, the few studies on reporting bias due to parental (internalizing) problems in the general population that included fathers [27, 46], found little differences between mothers’ and fathers’ reports of children’s internalizing problems. Considering the familial aggregation of anxiety and depression, partly explained by genetic factors [32, 50], and the co-occurrence of mental health problems in marital partners [40], the effect of paternal internalizing problems on reporting behavior should be included in future research. Furthermore lifetime anxiety and depression were not assessed with a clinically validated interview.

Conclusions

Considering inconsistencies of previous studies, regarding the relative effects of maternal depressive and maternal anxiety symptoms [21], this study clearly shows that maternal depressive symptoms are related to an increase of the reporting discrepancy on child’s internalizing problems, whereas maternal anxiety almost was not. However, since only a small percent of variance was explained it seems that maternal depressive symptoms do not bias general population research, using maternal report of child’s internalizing problems. No clear pattern regarding the gender of the child related to reporting discrepancies emerged from this study.

More research is needed on long term consequences of parent–child reporting discrepancies, regarding child’s

internalizing symptoms as a risk factor for future adverse functioning of the child, since these studies are few and show mixed results.

Open Access This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited.

Appendix

See Table 4.

Table 4 Correlations between all separate variables: CBCL anxiety problems, CBCL affective problems, YSR anxiety problems, YSR affective problems and the standardized difference score on anxiety and affective problems for boys and girls separately

	CBCL affective	CBCL anxiety	YSR affective	YSR anxiety
CBCL–YSR affective problems				
Boys	.59*	.33*	–.58*	–.35*
Girls	.61*	.32*	–.61*	–.38*
CBCL–YSR anxiety problems				
Boys	.35*	.63*	–.3*	–.59*
Girls	.30*	.62*	–.63*	–.38*

CBCL Child Behavior Checklist, YSR Youth Self-Report, CBCL–YSR affective problems standardized difference scores on affective problems, CBCL–YSR anxiety problems standardized difference scores on anxiety problems

* $P < .01$

References

- American Psychiatric Association (2000) Diagnostic and statistical manual of mental disorders (4th edn. text rev.) Washington, DC
- Achenbach TM, Dumenci L, Rescorla LA (2003) DSM-oriented and empirically based approaches to constructing scales from the same item pools. *J Clin Child Adolesc Psychol* 32:328–340
- Achenbach TM, McConaughy SH, Howell CT (1987) Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for situational specificity. *Psychol Bull* 101:213–232
- Achenbach TM, Rescorla LA (2001) Manual for the ASEBA school-age forms and profiles. University of Vermont, Research Centre for Children, Youth and Families, Burlington
- Antony MM, Bieling PJ, Cox BJ, Enns MW, Swinson RP (1998) Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychol Assess* 10:176–181
- Berg-Nielsen TS, Vika A, Dahl AA (2003) When adolescents disagree with their mothers: CBCL–YSR discrepancies related to maternal depression and adolescent self-esteem. *Child Care Health Dev* 29:207–213
- de Beurs E, van Dyck E, Marquenie LA, Lange A, Blonk RWB (2001) De DASS: een vragenlijst voor het meten van depressie, angst en stress. *Gedragstherapie* 34:35–53 (in Dutch)
- Bird HR, Gould MS, Staghezza B (1992) Aggregating data from multiple informants in child psychiatry epidemiological research. *J Am Acad Child Adolesc Psychiatry* 31:78–85
- Boyle MH, Offord DR, Racine Y, Sanford M, Szatmari P, Fleming JE, Price-Munn N (1993) Evaluation of the diagnostic interview for children and adolescents for use in general population samples. *J Abnorm Child Psychol* 21:663–681
- Braaten EB, Biederman J, DiMauro A, Mick E, Monuteaux MC, Muehl K, Faraone SV (2001) Methodological complexities in the diagnosis of major depression in youth: an analysis of mother and youth self-reports. *J Child Adolesc Psychopharmacol* 11:395–407
- Briggs-Gowan MJ, Carter AS, Schwab-Stone M (1996) Discrepancies among mother, child, and teacher reports: examining the contributions of maternal depression and anxiety. *J Abnorm Child Psychol* 24:749–765
- Cantwell DP, Lewinsohn PM, Rohde P, Seeley JR (1997) Correspondence between adolescent report and parent report of psychiatric diagnostic data. *J Am Acad Child Adolesc Psychiatry* 36:610–619
- Castaneda AE, Tuulio-Henriksson A, Marttunen M, Suvisaari J, Lonnqvist J (2008) A review on cognitive impairments in depressive and anxiety disorders with a focus on young adults. *J Affect Disord* 106:1–27
- Chi TC, Hinshaw SP (2002) Mother–child relationships of children with ADHD: the role of maternal depressive symptoms and depression-related distortions. *J Abnorm Child Psychol* 30:387–400
- Chilcoat HD, Breslau N (1997) Does psychiatric history bias mothers' reports? An application of a new analytic approach. *J Am Acad Child Adolesc Psychiatry* 36:971–979
- Clara IP, Cox BJ, Enns MW (2001) Confirmatory factor analysis of the Depression–Anxiety–Stress Scales in depressed and anxious patients. *J Psychopathol Behav Assess* 23:61–67
- Cohen J (1988) Statistical power analyses for the behavioral sciences, 2nd edn. Erlbaum, Hillsdale
- Connell AM, Goodman SH (2002) The association between psychopathology in fathers versus mothers and children's internalizing and externalizing behavior problems: a meta-analysis. *Psychol Bull* 128:746–773
- Conrad M, Hammen C (1989) Role of maternal depression in perceptions of child maladjustment. *J Consult Clin Psychol* 57:663–667
- Crawford JR, Henry JD (2003) The Depression Anxiety Stress Scales (DASS): normative data and latent structure in a large non-clinical sample. *Br J Clin Psychol* 42:111–131
- De Los Reyes A, Kazdin AE (2005) Informant discrepancies in the assessment of childhood psychopathology: a critical review, theoretical framework, and recommendations for further study. *Psychol Bull* 131:483–509
- De Los Reyes A, Kazdin AE (2004) Measuring informant discrepancies in clinical child research. *Psychol Assess* 16:330–334
- De Winter AF, Oldehinkel AJ, Veenstra R, Brunnekreef JA, Verhulst FC, Ormel J (2005) Evaluation of non-response bias in mental health determinants and outcomes in a large sample of pre-adolescents. *Eur J Epidemiol* 20:173–181
- Duhig AM, Renk K, Epstein MK, Phares V (2000) Interparental agreement on internalizing, externalizing and total behavior problems: a meta-analysis. *Clin Psychol Sci Pract* 7:435–453
- Dutch Central Bureau of Statistics (Centraal bureau voor de Statistiek) <http://www.statline.cbs.nl>
- Edelbrock C, Costello AJ, Dulcan MK, Conover NC, Kala R (1986) Parent–child agreement on child psychiatric symptoms assessed via structured interview. *J Child Psychol Psychiatry* 27:181–190
- Engel NA, Rodrigue JR, Geffken GR (1994) Parent–child agreement on ratings of anxiety in children. *Psychol Rep* 75:1251–1260

28. Ferdinand RF, van der Ende J, Verhulst FC (2004) Parent–adolescent disagreement regarding psychopathology in adolescents from the general population as a risk factor for adverse outcome. *J Abnorm Psychol* 113:198–206
29. Ferdinand RF, van der Ende J, Verhulst FC (2006) Prognostic value of parent–adolescent disagreement in a referred sample. *Eur Child Adolesc Psychiatry* 15:156–162
30. Grills AE, Ollendick TH (2003) Multiple informant agreement and the anxiety disorders interview schedule for parents and children. *J Am Acad Child Adolesc Psychiatry* 42:30–40
31. Henry JD, Crawford JR (2005) The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *Br J Clin Psychol* 44:227–239
32. Hettema JM, Neale MC, Kendler KS (2001) A review and meta-analysis of the genetic epidemiology of anxiety disorders. *Am J Psychiatry* 158:1568–1578
33. Ingram RE, Scott W, Siegle G (1999) Depression: social and cognitive aspects. In: Millon T, Blaney PH, Davis RD (eds) *Oxford textbook of psychopathology*. Oxford University Press, New York
34. Ivens C, Rehm LP (1988) Assessment of childhood depression: correspondence between reports by child, mother, and father. *J Am Acad Child Adolesc Psychiatry* 27:738–747
35. Kazdin AE, French NH, Unis AS (1983) Child, mother, and father evaluations of depression in psychiatric inpatient children. *J Abnorm Child Psychol* 11:167–179
36. Klein DN, Lewinsohn PM, Seeley JR, Rohde P (2001) A family study of major depressive disorder in a community sample of adolescents. *Arch Gen Psychiatry* 58:13–20
37. Kolko DJ, Kazdin AE (1993) Emotional/behavioral problems in clinic and nonclinic children: correspondence among child, parent and teacher reports. *J Child Psychol Psychiatry* 34:991–1006
38. Krain AL, Kendall PC (2000) The role of parental emotional distress in parent report of child anxiety. *J Clin Child Psychol* 29:328–335
39. Lovibond SH, Lovibond PF (1995) *Manual for the Depression Anxiety Stress Scales*. The Psychology Foundation of Australia, Sydney
40. Merikangas K, Brunetto W (1996) Assortative mating and psychiatric disorders. *Bailliere's Clin psychiatry* 2:175–185
41. Najman JM, Williams GM, Nikles J, Spence S, Bor W, O'Callaghan M, Le Brocque R, Andersen MJ, Shuttlewood GJ (2001) Bias influencing maternal reports of child behaviour and emotional state. *Soc Psychiatry Psychiatr Epidemiol* 36:186–194
42. Ormel J, Oldehinkel AJ, Ferdinand RF, Hartman CA, De Winter AF, Veenstra R, Vollebergh W, Minderaa RB, Buitelaar JK, Verhulst FC (2005) Internalizing and externalizing problems in adolescence: general and dimension-specific effects of familial loadings and preadolescent temperament traits. *Psychol Med* 35:1825–1835
43. Rapee RM, Barrett PM, Dadds MR, Evans L (1994) Reliability of the DSM-III-R childhood anxiety disorders using structured interview: interrater and parent–child agreement. *J Am Acad Child Adolesc Psychiatry* 33:984–992
44. Richters JE (1992) Depressed mothers as informants about their children: a critical review of the evidence for distortion. *Psychol Bull* 112:485–499
45. Safford SM, Kendall PC, Flannery-Schroeder E, Webb A, Sommer H (2005) A longitudinal look at parent–child diagnostic agreement in youth treated for anxiety disorders. *J Clin Child Adolesc Psychol* 34:747–757
46. Sawyer MG, Streiner DL, Baghurst P (1998) The influence of distress on mothers' and fathers' reports of childhood emotional and behavioral problems. *J Abnorm Child Psychol* 26:407–414
47. Scher CD, Ingram RE, Segal ZV (2005) Cognitive reactivity and vulnerability: empirical evaluation of construct activation and cognitive diatheses in unipolar depression. *Clin Psychol Rev* 25:487–510
48. Schreier A, Hofer M, Wittchen HU, Lieb R (2006) Clinical characteristics of major depressive disorder run in families—a community study of 933 mothers and their children. *J Psychiatr Res* 40:283–292
49. Silverstein AB (1975) Validity of the WISC-R short forms. *J Clin Psychol* 31:696–697
50. Sullivan PF, Neale MC, Kendler KS (2000) Genetic epidemiology of major depression: review and meta-analysis. *Am J Psychiatry* 157:1552–1562
51. Verhulst FC, van der Ende J (1992) Agreement between parents' reports and adolescents' self-reports of problem behavior. *J Child Psychol Psychiatry* 33:1011–1023
52. Youngstrom E, Izard C, Ackerman B (1999) Dysphoria-related bias in maternal ratings of children. *J Consult Clin Psychol* 67:905–916
53. Youngstrom E, Loeber R, Stouthamer-Loeber M (2000) Patterns and correlates of agreement between parent, teacher, and male adolescent ratings of externalizing and internalizing problems. *J Consult Clin Psychol* 68:1038–1050