

Maternal Anxiety and Depression, Poverty and Marital Relationship Factors During Early Childhood as Predictors of Anxiety and Depressive Symptoms in Adolescence

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Abstract

Background: This paper examines the degree to which symptoms of anxiety and depression at age 14 years are associated with early childhood experience of maternal anxiety and depression, poverty, and mother's marital relationship distress and break-up.

Methods: In a longitudinal study, 4434 families were followed-up from infancy to adolescence.

Results: Maternal anxiety and depression during early childhood were found to have small, but significant, influences upon the development of high anxiety-depression symptoms at age 14, after controlling for the effects of poverty and marital relationship factors. This effect was greater with repeated exposure to high maternal anxiety and depression. Poverty, distressed marital relationship and marital break-up during the child's first five years also produced small, but significant, increases in risk of high anxiety and depression symptoms in adolescence. Stable, single-parent status was not found to be a risk factor. There was no evidence of marked gender differences in risk factors, other than poverty, which had a stronger impact for girls than boys.

Conclusions: Overall, the results suggest that maternal anxiety and depression, poverty, parent relationship conflict and marital break-up during early childhood are associated with small, but significant, increased risk of anxiety-depression symptoms in adolescence.

Keywords: Internalising problems, anxiety, depression, longitudinal study, adolescence, maternal anxiety, maternal depression.

Abbreviations: CBCL: Child Behavior Checklist; YSR: Youth Self Report; DSSI: Delusions Symptoms-States Inventory.

Relatively little longitudinal research has been conducted into the development of internalising problems, such as anxiety and depression, in children and adolescents. This contrasts with externalising problems, such as conduct, oppositional defiant and attention deficit hyperactivity disorders for which a good deal of research is available. Contrary to widely held beliefs, internalising problems during childhood and adolescence can be regarded as significant mental health issues that are not only more stable than traditionally thought, but also result in a variety of debilitating long-term consequences if left untreated. The few longitudinal studies that have examined internalising disorders have found surprisingly stable effects over time, albeit less so than externalising disorders (Ollendick & King, 1994; Stanger, McConaughy, & Achenbach, 1992; Verhulst & van der Ende, 1992). Child and

adolescent anxiety and depression have also been shown to be associated with increased relationship, academic and vocational difficulties (Kellam, Werthamer Larsson, Dolan, Brown, et al., 1991; Messer & Beidel, 1994; Petersen et al., 1993). These findings highlight the need to identify factors that influence the development and maintenance of anxiety and depressive problems in young people. The identification of risk and protective factors for the development of internalising disorders will inform the content and direction of preventive interventions.

The present paper examines the role of maternal anxiety and depression, and family adversity (in particular poverty, and parent relationship variables), during infancy and the preschool years in the development of anxiety and depression symptoms at age 14. The paper also raises some important general issues relating to the complexities of conducting longitudinal research and the interpretation of longitudinal data. Over the past few years, research has suggested a strong association between child anxiety and/or depression and parental psychopathology. Such relationships have not generally indicated specific associations between child and parent anxiety or child and parent depression, but rather a non-specific link between parent and child psychopathology in general. Thus anxious and/or depressed children are more likely to have parents who experience some form of psychological difficulties, including anxiety, depression, and/or substance use problems. Similarly, depressed and/or anxious parents are more likely to have children who manifest emotional and behavioural difficulties, such as anxiety, depression, attention deficit hyperactivity disorder and/or conduct problems (Biederman, Rosenbaum, Hirshfeld, Faraone, et al., 1991; Weissman, Leckman, Merikangas, Gammon, & Prusoff, 1984).

Although having a depressed or anxious parent places children at increased risk of developing a range of psychological problems, many such children develop without any apparent form of psychopathology (Davies & Windle, 1997). This has led researchers to examine causal mechanisms to explain the relationship between parental anxiety or depression and child mental health outcomes. It is clear that genetic pathways provide only a partial explanation for such relationships, leading researchers to examine the role of family environment in determining the impact of parental psychopathology upon child mental health. Family environment models of transmission of psychopathology propose that parental mental health problems indirectly affect children's emotional and behavioural development, being mediated through their association with adverse family environment factors, including marital discord (Cummings & Davies, 1994, 1999). However, the research literature relating to direct versus indirect (mediational) models of the effects of parental anxiety and depression upon child and adolescent psychological adjustment have produced conflicting results.

Findings supportive of a family environment-mediation model were reported by Fergusson, Horwood, and Lynskey (1995) and Davies and Windle (1997). Both studies found a significant association between maternal depression and depressive symptoms in adolescent girls, but not boys. In addition, both studies found that maternal depressed mood was a more distal predictor of adolescent adjustment, being mediated by marital conflict. The Ferguson et al. (1995) study also found that, when the effects of negative family life events and social disadvantage were controlled for, maternal depression no longer predicted future depressive symptoms in adolescent girls. Fergusson et al. concluded that 'maternal depression is only associated with depression in adolescence insofar as maternal depression is associated with social disadvantage, marital discord or family adversity' (p. 1161).

The proposal of Ferguson et al. (1995) that the effects of maternal depression may be mediated by social disadvantage was not supported by the findings of Bor et al. (1997). These authors found that maternal depression in early childhood was the main variable mediating between persistent low family income and internalising problems, rather than low family income mediating between maternal depression and internalising problems. In relation to couple relationship conflict, Bor et al. found a strong relationship between marital conflict during the child's infancy and internalising problems at age 5. However, this study did not examine the extent to which marital problems may have mediated the impact of maternal psychopathology upon child adjustment. Clearly there is a need for further research to examine the role of parental psychopathology in the development of adolescent internalising problems.

Such research needs to take into account the complex interrelationships between family environment variables and parent and child psychopathology. Furthermore, this research needs to consider possible gender differences in causal pathways.

The association between adverse life circumstances (such as family illness, bereavement, financial problems and parent relationship problems) and child anxiety and depression is well recognised (Bor et al., 1997; Goodyer & Altham, 1991; Hess & Camara, 1979). Furthermore, the impact of negative life events has been shown to increase markedly when multiple negative life events co-occur (Rutter, 1987). Children's adjustment to adversity is also influenced by intrinsic child characteristics, such as

coping style and children's interpretation of the meaning of situations (Compas, 1987). In addition, the impact of negative life events may be mediated by other consequences of the events, such as parenting behaviour and level of social support (Conger, Patterson, & Ge, 1995; Hess & Camara, 1979; Jackson & Frick, 1998).

It is also clear that complex interactions exist between various aspects of adverse family circumstances and, in turn, with parental psychopathology. For example, financial difficulties frequently result from family break-up. In turn, parental anxiety and depression are frequent consequences of couple relationship problems, separation, divorce and financial difficulties. It has also been suggested that parental psychopathology may increase the probability of occurrence of future negative life events (Fergusson et al., 1995). Fergusson et al. (1995) reported a small but significant effect for parental depressive symptoms in predicting greater marital conflict and negative family life events three years later. Thus, the causal pathways are extremely complex and frequently bi-directional, making it difficult to determine the relative contribution of parental psychopathology, poverty and marital difficulties in the development of emotional and behavioural problems in children.

The present study examines some of the complex interrelationships between early childhood experiences and adolescent internalising problems. Specifically, it examines the impact of maternal depression and anxiety, financial adversity and parental relationship difficulties during infancy and early childhood upon the development of anxiety and depression symptoms among adolescents. The study reports a 14-year follow-up of a large, community sample of families, from birth to adolescence.

Method

Sampling and procedure

The data for this study were collected within the Mater-University of Queensland Study of Pregnancy (MUSP), a longitudinal study of 8556 women and their children born at one of two major obstetric hospitals in Brisbane, Australia. Procedural details are provided elsewhere (Keeping et al., 1989). Briefly, the pregnant women were enrolled in the study on average at 18 weeks' gestation, reinterviewed 3-5 days after the birth of their child, and again when the child was 6 months, 5 and 14 years of age. The large majority (92%) were of Caucasian ethnicity. Mothers' mean age at the time of birth was 25.4 years ($SD = 5.0$), and mean parity was 2.0 ($SD = 1.1$). In terms of highest educational achievement, 18% did not complete secondary school; 62% completed secondary school; and 17% completed professional college or university.

Extensive efforts were made to retain participants in the study. At entry to the study each respondent was asked to provide seven names of relatives and/or friends. The state-wide electoral roll, telephone book and education department list of students provided additional means of tracing respondents. At the 14-year follow-up, 5259 (69%) mothers and their children participated in the study. Data contained in the current study are taken from self-reports of mothers at 6 months and 5 years, and from mother and child at age 14 years. Complete data sets across all these occasions, for all variables, were available for 4434 (58%) of the original sample. Those who dropped out of the study by 14-year follow-up were more likely to have been younger, single parents, cohabiting rather than married, and separated or divorced at the time of pregnancy. Mothers who dropped out were less likely to have completed high school and more likely to live in low-income situations. They reported higher levels of negative life events at entry to the study and were slightly more likely to report high initial levels of anxiety and depression ($p < .001$ in all cases).

Measures

Dependent and independent variables included in the logistic regression analyses were dichotomised to reflect 'top 10%' versus 'remaining 90%' levels of the variable. This dichotomisation allows for the ready interpretation of odds ratios across variables. The 10% cut-off point was selected to reflect a sample of clinical interest, being likely to include those in distress, and who are likely to benefit from intervention and preventive efforts. The 10% cut-off is also consistent with prevalence rates for depressive and anxiety disorders reported in a recent epidemiological study of an Australian adolescent community sample (Sawyer et al., 2000). The data were also analysed using a 20% cut-off point. The results closely mirrored those reported using the 10% cut-off score, although the odds ratios were slightly smaller, as would be expected. All analyses reported here are based on the 10% cut-off points.

Maternal age. Maternal age at the time of entry to the study (first trimester of pregnancy) was included as a control variable.

Marital status. In the present study, the term 'marital status' is used to refer to the couple relationship, irrespective of whether the relationship is/was classed as a legal marriage. Couple relationship status needs to consider the type of relationship and its quality, and changes in status over time. At 6 months and 5 years it was determined whether (since the birth of the child) any change in the mother's relationship status had occurred. Each mother reported whether she had remained with her original partner, been separated or divorced, formed a new live-in relationship, or remained single. Women who had remained together with the same partner were then categorised into distressed or non-distressed status at 6 months and 5 years. Distressed status was determined from maternal report on the Dyadic Satisfaction items from the Spanier Dyadic Adjustment Scale (Spanier, 1976). Alphas on this scale were .86 at six-month and five-year follow-ups. Mothers were classified as experiencing relationship distress on a particular occasion if their score fell in the lowest 10% of dyadic satisfaction scores. Thus, 6 mutually exclusive categories were produced relating to mothers who during the 14-year period had a) remained with their original partner without reporting marital distress at any assessment occasion, b) remained with their partner but reported marital distress at one assessment, c) remained with their partner but reported marital distress at both assessments, d) remained single, e) experienced one relationship change (divorce, separation, or forming a new partnership) or f) experienced two or more such relationship changes. This categorisation enabled inclusion of all mothers in the analysis, whereas examination of couple distress in isolation would have inevitably excluded those women who were single, or separated or divorced and not with a new partner.

Poverty. At the six-month and five-year follow-ups, mothers were asked to select, from a seven-point scale, the dollar figure range closest to their total annual family income. In order to examine the impact of income in predicting high adolescent anxiety-depression symptoms, a dichotomous variable was created for each occasion. Poverty at each occasion was classified as total family income in the lowest 10%. A variable was then created for the logistic regression analyses that examined poverty in early childhood as being, or not being, in the lowest 10% at 6 months, 5 years or both 6 months and 5 years.

Maternal depressive and anxiety symptoms. Mothers were assessed at each phase using the depression sub-scale from the Delusions Symptoms-States Inventory (DSSI; Bedford & Foulds, 1977; Bedford, Foulds, & Sheffield, 1976). The DSSI was developed for detecting persons who experience clinical psychopathology and are living in the community. It is intended to detect signs and symptoms of mental illness that limit a person's ability to function and maintain relationships. In the current study, the seven-item depression sub-scale had high internal reliability (coefficient alpha = .82 at six month follow-up). There are different methods of scoring the five-point rating scale. The present study used a yes/no symptom count ('yes' = 'All the time', 'Most of the time' or 'Some of the time' to provide the depression symptom score. At each assessment occasion, the sample was dichotomised, with 'high' depression scores relating to the top 10% of scores in the sample on that occasion. Similarly, a dichotomised variable, using the seven-item anxiety scale (coefficient alpha = .76), was determined at each assessment occasion, with 'high' anxiety scores relating to the top 10% of scores in the sample on that occasion.

Adolescent anxiety-depression symptoms at 14 years. Adolescent anxiety-depression problems were assessed at 14-year follow-up using the anxiety-depression sub-scales from the Child Behaviour Checklist (CBCL) and Youth Self Report (YSR; Achenbach, 1991a, 1991b). The YSR was designed for youths aged 11 to 18 years and the problem scale consists of 102 items assessing nine sub-scales (withdrawn, somatic complaints, anxious /depressed, social problems, thought problems, attention problems, delinquent behavior, aggressive behavior and other problems). It requires respondents to rate on a three-point scale ranging from 0 (not true) to 2 (very true or often true) how true each item is for them. The present study made use solely of the anxious/ depressed sub-scale. Test-retest reliability of the anxiety-depression score was found to be .81 over 1 week (Achenbach, 1991b). The CBCL is a parent-report assessment of behaviour problems among 4-18-year-olds and examines 118 items covering the behavioural dimensions outlined above. Again, only the anxiety-depression sub-scale was included in the pre-sent study. One week test-retest reliability for this sub-scale was reported to be .86 (Achenbach, 1991a).

In the logistic regression analyses, CBCL (CBCL-Anx-Dep) and YSR (YSR-Anx-Dep) scores were dichotomised to reflect the top 10% (or not) of anxiety-depression scores at 14 years.

Child internalising problems at 5 years. Due to resource constraints, a shortened version of the CBCL had to be utilised at 5-year follow-up, which included 10 internalising items. Bor et al. (1997) demonstrated a correlation of .89 between the full CBCL internalising scale and this short form, and internal consistency of .76. For the logistic regression analyses, the presence of clinically significant internalising problems at 5 years used the top 10% cut off.

Results

Tables 1 and 2 summarise the results of the logistic regression analyses for prediction of elevated anxious-depressed symptoms (top 10% of scores) at age 14 years for mother and youth report. Maternal age and child gender were included as control variables in all logistic regression analyses. At Step 1, maternal age was not significantly related to either YSR-Anx-Dep or CBCL-Anx-Dep scores. Child gender was a significant predictor of both YSR-Anx-Dep and CBCL-Anx-Dep scores, with girls being significantly more likely to show elevated anxiety-depression symptoms at 14 years.

Marital/couple relationship status in first 5 years

When mother's relationship status over the first 5 years was entered into the regression equation, this step was statistically significant for prediction of CBCL-Anx-Dep scores at 14 years (see Table 1, step 2). The likelihood of an adolescent being regarded by their mother as showing elevated anxiety-depression symptoms increased significantly if the mother had experienced relationship conflict or relationship status changes (separation/divorce/new partner) during the child's first 5 years of life. Stable single-parent status did not significantly predict high CBCL-Anx-Dep scores at 14 years. The impact of relationship factors remained significant when poverty was entered into the equation, but was no longer significant when maternal depression and anxiety over the first 5 years were entered as predictors.

Relationship status was also a significant predictor of YSR-Anx-Dep symptoms at 14 years and remained significant even after poverty and maternal psychopathology were entered into the equation (see Table 2, step 2). Youths who experienced parent relationship break-up or a new parental partner over the first five years of life were more likely to report high anxiety-depression scores at 14 years. Interestingly, repeated marital distress among couples who remained together during the child's early years did not present a risk factor for adolescent anxiety-depression according to youth report. Again, consistent single-parent status during early childhood was not associated with increased risk for youth anxiety-depression symptoms.

Poverty in the first 5 years

Adolescents who experienced consistent poverty during both infancy and at 5 years were at significantly greater risk of elevated CBCL-Anx-Dep scores at age 14 (see Table 1, step 3) compared to those who had not experienced poverty at either occasion. This effect remained significant, even when maternal psychopathology was entered into the equation, and after controlling for marital factors. For the prediction of YSR-Anx-Dep scores, the unadjusted odds ratio also suggested that consistent poverty in early childhood increased the risk of high anxiety-depression symptoms in adolescence (see Table 2, step 3). However, once the effects of marital status, mother age and child gender were entered into the equation, the effect of poverty upon YSR-Anx-Dep scores was not significant. There was, however, a significant gender by poverty interaction in the prediction of YSR-Anx-Dep scores. Examination of genders separately indicated that, for girls but not boys, consistent poverty at 6 months and 5 years was a significant predictor of YSR-Anx-Dep scores at 14 years. This effect remained statistically significant even when marital relationship status and maternal anxiety and depression were controlled for.

Maternal depression in the first 5 years

A significant increase in risk for high CBCL-Anx-Dep symptoms at 14 years was found if the mother had experienced high levels of depression at 6 months and/or 5 years. This effect remained significant, albeit slightly attenuated, even after controlling for marital status, poverty and maternal anxiety during early childhood (see Table 1, step 4). There was also a small, but significant effect for maternal

depression at 6 months to predict increased risk of high YSR-Anx-Dep scores at 14 years (see Table 2, step 4) over and above the effects of marital status, poverty and maternal anxiety in the first 5 years.

If the order of entry of variables was changed so that maternal depression was entered into the equation before marital status and poverty, the beta values for depression remained similar to those produced when marital status and poverty were entered before depression in the prediction of both CBCL-Anx-Dep and YSR-Anx-Dep scores. Thus the effect of maternal depression upon youth anxiety-depression was not mediated by poverty and marital status.

Maternal anxiety in the first 5 years

Maternal anxiety during childhood added significantly to the prediction of elevated CBCL-Anx-Dep scores, even after depression, poverty and relationship status had been entered into the equation (see Table 1, step 5). When the order of entry of variables was changed so that maternal anxiety was entered into the equation before marital status and poverty, the beta values for anxiety did not differ from those produced when marital status and poverty were entered before anxiety in the prediction of CBCL-Anx-Dep scores. Thus the effect of maternal anxiety on mother report of youth anxiety-depression was not mediated by poverty and marital status.

For YSR-Anx-Dep scores, maternal anxiety in the first 5 years was not a significant risk factor when entered last into the equation after depression, although the unadjusted odds ratio indicated a significant increase in risk (see Table 2, step 5).

Influence of mother's anxiety and depression at 14 years

Given the discrepancy in the findings for the prediction of adolescent (YSR-Anx-Dep) versus mother (CBCL-Anx-Dep) report, it is important to consider whether the results for the CBCL could be influenced by a reporting bias associated with the mother's own depression or anxiety at the 14-year follow-up. Previous studies have suggested that mothers who are depressed or anxious tend to be more sensitive to their children's psychopathology, and are therefore more likely to report emotional and behavioural problems in their children (Najman et al., 2000). In addition, mothers who reported high depression scores at 14-year follow-up in the present study were significantly more likely to have reported high scores on this dimension when their child was aged 5 years (unadjusted odds ratio = 9.83).

In order to examine this issue further, a subsidiary logistic regression analysis was conducted in which maternal anxiety and depression at 14 years were entered as a further step. For YSR anxiety-depression scores, maternal depression at 6 months and relationship status changes over the first 5 years remained statistically significant predictors even when maternal anxiety and depression at age 14 were entered into the equation. For CBCL-Anx-Dep scores, the effects of poverty and relationship status changes remained significant, but the effects of maternal anxiety and depression in the child's first 5 years were no longer statistically significant when maternal anxiety and depression at age 14 were included as predictors. This suggests that the impact of maternal anxiety and depression during early childhood may be mediated through relationships with maternal anxiety and depression at age 14 years for CBCL-Anx-Dep but not YSR-Anx-Dep scores. In order to clarify whether maternal anxiety and depression during early childhood has an impact upon adolescent anxiety-depression symptoms over and above maternal anxiety and depression at 14 years, further analyses were therefore undertaken.

Table 3(a) shows that high maternal depression at 6 months and 5 years interacts with high maternal depression when the child is 14 years to influence youth anxiety-depression symptoms. Adolescents whose mothers experienced high levels of depression at 6 months and 5 years, but not at 14 years, were at increased risk for high CBCL-Anx-Dep scores. This risk was greater if mothers experienced high levels of depression at 14 years, irrespective of depression during their child's early childhood. However, of particular importance to the present study is the finding that adolescents whose mothers reported high levels of depression on all three occasions (6 months, 5 years, and 14 years) were even more likely to be rated as showing high anxiety-depression symptoms at 14 years. A similar pattern of results was found for the role of maternal anxiety in the prediction of high adolescent anxiety-depression scores, as shown in Table 3(b). The level of risk of high adolescent anxiety-depression scores was greater if the mother experienced high anxiety scores at all three occasions, over and above the level of risk associated with high anxiety during their child's adolescence but not early childhood.

When YSR-Anx-Dep symptoms at 14 years were considered, the impact of maternal anxiety and depression during the child's first 5 years were considerably smaller, but still statistically significant,

closely mirroring the results for prediction of CBCLAnx-Dep scores. There was also evidence of increased levels of risk with repeated exposure to maternal anxiety at 6 months, 5 and 14 years (see Table 3(a) and 3(b)).

Table 3 Maternal depression and anxiety history and risk of high adolescent anxiety and depression symptoms

Maternal depression symptoms at child age 6 months, 5 years and 14 years, and risk of high anxiety-depression symptoms at 14 years for parent report on the CBCL and youth report on the YSR

MOTHER DEPRESSION During their child's early childhood	During their child's adolescence	Risk of high CBCL anxious- depressed scores at 14 yrs Unadjusted odds ratio (95% CI)	Risk of high YSR anxious- depressed scores at 14 yrs Unadjusted odds ratio (95% CI)
NOT in top 10% at 6 months OR 5 years	NOT in top 10% at 14 years	1.00	1.00
NOT in top 10% at 6 months OR 5 years	Top 10% at 14 years	5.74*** (4.12-8.03)	1.89*** (1.38-2.59)
Top 10% at 6 months OR 5 years	NOT in top 10% at 14 years	1.37	0.97
Top 10% at 6 months OR 5 years	Top 10% at 14 years	6.10*** (4.07-8.91)	2.19*** (1.49-3.21)
Top 10% at 6 months AND 5 years	NOT in top 10% at 14 years	2.24** (1.29-3.88)	1.53
Top 10% at 6 months AND 5 years	Top 10% at 14 years	11.05*** (7.10-17.21)	2.69*** (1.65-4.39)

Maternal anxiety symptoms at child age 6 months, 5 years and 14 years, and risk of high anxiety-depression symptoms at 14 years for parent report on the CBCL and youth report on the YSR

MOTHER ANXIETY During their child's early childhood	During their child's adolescence	Risk of high CBCL anxious- depressed scores at 14 yrs Unadjusted odds ratio (95% CI)	Risk of high YSR anxious- depressed scores at 14 yrs Unadjusted odds ratio (95% CI)
NOT in top 10% at 6 months OR 5 years	NOT in top 10% at 14 years	1.00	1.00
NOT in top 10% at 6 months OR 5 years	Top 10% at 14 years	4.79*** (3.56-6.47)	1.53** (1.10-2.13)
Top 10% at 6 months OR 5 years	NOT in top 10% at 14 years	1.42* (1.02-1.96)	1.06
Top 10% at 6 months OR 5 years	Top 10% at 14 years	4.54*** (3.11-6.64)	1.98*** (1.31-2.93)
Top 10% at 6 months AND 5 years	NOT in top 10% at 14 years	2.54*** (1.72-3.75)	1.63** (1.12-2.35)
Top 10% at 6 months AND 5 years	Top 10% at 14 years	9.27*** (6.08-14.13)	2.92*** (1.81-4.71)

NOTES: * $p < .05$; ** $p < .01$; *** $p < .001$.

Impact of internalising problems at age 5

Not surprisingly, mother report of internalising problems at 5 years significantly predicted mother report of youth anxiety-depression scores at 14 years (Unadjusted odds ratio = 3.80; 95% CI: 3.06-4.73, $p < .001$). Of children who were rated in the top 10% for internalising problems at age 5, 20% were assessed by their mothers as showing CBCL-Anx-Dep scores in the top 10% at age 14. In contrast, of children who were not rated as experiencing high internalising problems at age 5, only 6.2% were subsequently rated by their mothers as showing elevated CBCL-Anx-Dep scores at age 14. The relationship between internalising problems at 5 years and YSR-Anx-Dep scores at 14 years was also statistically significant, but much weaker (Unadjusted odds ratio = 1.53; 95% CI: 1.20-1.95, $p < .001$).

It was important, therefore, to determine whether early childhood variables influence adolescent anxiety-depression scores primarily through their association with internalising problems in early childhood. A subsidiary logistic regression analysis was conducted in which the level of internalising problems at age 5 years was entered into the logistic regression equation (as outlined previously) after the early childhood predictor variables. The inclusion of mothers' ratings of their child's internalising problems at age 5 years only slightly reduced the effects of poverty, relationship status and early

childhood maternal anxiety and depression in predicting YSRAnx-Dep or CBCL-Anx-Dep scores at 14 years. This suggests that internalising problems at age 5 years have only a weak mediating effect between early childhood variables and adolescent anxiety-depression symptoms.

Gender differences

No significant interaction effects were found for gender in the logistic regression analyses in the prediction of CBCL-Anx-Dep or YSR-Anx-Dep ratings at age 14 years, other than a gender by poverty interaction in prediction of YSR-Anx-Dep scores as described above.

Discussion

This paper examines the relationship between maternal anxiety, depression, poverty and marital relationship status in early childhood and their subsequent impact upon anxiety-depression symptoms in adolescence. The results highlight the complexities involved in analysing and interpreting longitudinal data of this type. Of the control variables, only child gender significantly predicted anxiety-depression symptoms in adolescence, with girls being significantly more likely than boys to show elevated symptoms according to both parent and youth report. Maternal age was not a significant predictor of adolescent anxiety-depression symptoms.

The likelihood of elevated CBCL anxiety and depression symptoms in adolescence increased significantly if the mother had experienced relationship difficulties or marital status change (separation, divorce or new partner) during the child's first 5 years of life. This effect appeared to be additive, with the effects being strongest for repeated couple relationship distress or changes in status during the child's first 5 years. These results are consistent with those of Bor et al. (1997) and Najman et al. (1997), also using families from the Mater cohort, who found significant associations between couple relationship conflict and change in marital status during early childhood in the prediction of children's internalising problems at age 5 years. Also consistent with Najman et al. (1997) was the finding that single mothers who remained single throughout their child's first 5 years had adolescents whose rates of anxiety-depression problems were no different from those of mothers in stable, non-distressed couple relationships. Thus, single-parent status appears to be less important than marital instability and relationship distress in determining anxiety-depression problems in adolescence.

Marital factors remained significant predictors of youth anxiety and depression symptoms, even after the effects of poverty were examined. However, when maternal anxiety and depression at 6 months and 5 years were entered into the logistic regression analysis after marital factors and poverty, the effect of marital factors ceased to be statistically significant in the prediction of mothers' ratings of adolescent anxiety-depression. This suggests that, for maternal reports of adolescent anxiety-depression symptoms, the effect of marital relationship problems in early childhood is mediated by maternal anxiety and depression in the first 5 years. Thus, parental conflict, separation and divorce during childhood do not appear to have a direct effect upon mothers' reports of adolescent anxiety and depression, but may exert their influence through their impact upon maternal-mental health which, in turn, impacts upon adolescent anxiety-depression symptoms. The findings were slightly different when youth self-report of anxiety-depression was examined. For youths' own reports of their anxiety-depression symptoms, marital factors during the first 5 years remained significant predictors over and above the effects of maternal mental health in early childhood and adolescence. Thus, in terms of youth self-report of anxiety and depression, an early childhood experience of parental conflict, separation or divorce had a direct effect in the prediction of adolescent anxiety-depression symptoms that was not mediated by maternal mental health problems.

Poverty during the first 5 years also had a small, but significant influence upon the development of adolescent anxiety-depression symptoms. Again, the findings differed slightly depending upon whether the informant was the mother or the youth. Based upon maternal reports of their child's anxiety-depression symptoms, the experience of consistent poverty during early childhood (i.e., poverty at both 6 months and 5 years) significantly increased the risk of high anxiety-depression at 14 years, even after controlling for marital factors and maternal psychopathology. When the informant was the adolescent, this effect was only evident for girls, but not boys, in the prediction of self-reported anxiety-depression on the YSR. Thus it seems likely that persistent poverty in early childhood presents a particular risk factor for girls in the development of anxiety-depression problems.

The impact of early childhood poverty upon mother and youth (girls only) ratings of anxiety-depression symptoms at age 14 remained significant even after maternal anxiety and depression,

Table 1 Logistic regression analysis examining risk factors for high anxiety-depression symptoms at 14 years (CBCL-Mother Report)

Variable entered	Unadjusted odds ratio (95% CI)	Step 1 odds ratio (R ² = .01)	Step 2 odds ratio (R ² = .02)	Step 3 odds ratio (R ² = .04)	Step 4 odds ratio (R ² = .06)	Step 5 odds ratio (95% CI) (R ² = .07)
Mother age	0.97	0.96	0.97	0.97	0.97	0.97
Gender	1.23* (1.01-1.49)	1.30*	1.30*	1.30*	1.30*	1.31* (1.04-1.65)
Marital status	Significance of variable		***	**	NS	NS
	Still together – no distress	1.00	1.00	1.00	1.00	1.00
	Still together – distressed once	1.51* (1.08-2.12)	1.48*	1.47*	1.27	1.22
	Still together – distressed twice	1.78* (1.17-2.70)	1.76**	1.71*	1.26	1.12
	Single	1.28	1.18	0.96	0.87	0.86
	One change of status	1.52* (1.09-2.13)	1.56**	1.22**	0.96	0.89
	Two/+ changes of status	2.17* (1.55-3.04)	2.14***	1.72**	1.43	1.42
Poverty	Significance of variable			***	***	***
	Never in lowest 10% income	1.00		1.00	1.00	1.00
	In lowest 10% at 6mth only	1.20		0.97	0.96	0.95
	In lowest 10% at 5yrs only	1.38		1.27	1.23	1.22
	In lowest 10% at 6mth and 5yrs	2.55* (1.90-3.42)		2.24***	1.83***	2.08*** (1.49-2.92)
Mother depression	Significance of variable				***	*
	Never in top 10% of depression	1.00			1.00	1.00
	In top 10% at 6mth only	2.05* (1.42-2.97)			1.82***	1.44
	In top 10% at 5yrs only	1.95* (1.39-2.74)			1.83***	1.49* (1.17-2.80)
	In top 10% at 6mth and 5yrs	3.82* (2.80-5.21)			3.01***	1.81** (1.15-3.00)
Mother anxiety	Significance of variable					***
	Never in top 10% of anxiety	1.00				1.00
	In top 10% at 6mth only	2.53* (1.72-3.74)				1.85* (1.15-2.99)
	In top 10% at 5yrs only	2.07* (1.54-2.78)				1.52* (1.06-2.17)
	In top 10% at 6mth and 5yrs	4.93* (3.48-6.99)				2.55*** (1.55-4.15)

*** $p < .001$; ** $p < .01$; * $p < .05$, NS Not Significant.

Logistic regression equation Chi Square Goodness of Fit= 5.06 (8) $p = .75$.

Table 2 Logistic regression analysis examining risk factors for high anxiety-depression symptoms at 14 years (YSR-Youth Report)

Variable entered	Unadjusted odds ratio (95% CI)	Step 1 odds ratio (R ² = .03)	Step 2 odds ratio (R ² = .04)	Step 3 odds ratio (R ² = .043)	Step 4 odds ratio (R ² = .048)	Step 5 odds ratio (95% CI) (R ² = .050)
Mother age	0.98	0.97	0.99	0.99	0.99	0.99
Gender	2.20*** (1.79–2.68)	2.07***	2.06***	2.07***	2.07***	2.07*** (1.53–2.47)
Marital status	Significance of variable		***	**	**	*
	Married no distress	1.00	1.00			
	Married – distressed once	1.11	1.19	1.19	1.13	1.12
	Married – distressed 2–3 times	0.99	1.05	1.06	0.94	0.94
	Single	1.21	1.37	1.31	1.27	1.28
	One change of status	1.92* (1.42–2.59)	2.12***	2.01***	1.86***	1.84** (1.01–2.17)
	Two/+ changes of status	1.64* (1.16–2.33)	1.85***	1.79**	1.67**	1.67* (1.17–2.48)
Poverty	Significance of variable			NS	NS	NS
	Never in lowest 10% income	1.00		1.00		
	In lowest 10% at 6mth only	1.06		0.85	0.85	0.85
	In lowest 10% at 5yrs only	1.24		0.94	0.93	0.93
	In lowest 10% at 6mth and 5yrs	1.75* (1.28–2.38)		1.33	1.29	1.29
Mother depression	Significance of variable				*	*
	Never in top 10% of depression	1.00			1.00	
	In top 10% at 6mth only	1.67* (1.15–2.41)			1.68*	1.73* (1.12–2.70)
	In top 10% at 5yrs only	1.29			1.16	1.06
	In top 10% at 6mth and 5yrs	2.03* (1.43–2.88)			1.55*	1.58* (1.00–2.55)
Mother anxiety	Significance of variable					
	Never in top 10% of anxiety	1.00				1.00
	In top 10% at 6mth only	1.54* (1.01–2.35)				0.96
	In top 10% at 5yrs only	1.40* (1.03–1.90)				1.24
	In top 10% at 6mth and 5yrs	1.44				0.87

*** $p < .001$; ** $p < .01$; * $p < .05$, NS Not Significant.

Logistic regression equation Chi Square Goodness of Fit= 4.93 (8) $p = .76$.

marital status, and child internalising problems at age 5 years were controlled for. This suggests that early childhood poverty has a direct effect upon adolescent anxiety-depression symptoms that is not mediated by any relationship with maternal mental health. This finding differs from Bor et al. (1997), who found that although persistent low family income during early childhood predicted high internalising problems at age 5, this effect was reduced when maternal depression was controlled for.

It is interesting to speculate how we might explain the direct effects of early childhood poverty upon adolescent internalising problems found in the pre-sent study. For example, poverty may limit the child's opportunities for social, educational and recreational development. It is also possible that living in repeated exposure to impoverished circumstances could have a direct stressor effect on the biological pathways involved in stress reactions, perhaps thereby increasing children's physiological reactivity to future stressors. There are also potential mediating variables associated with the mother that were not considered in the present study. For example, it is possible that parenting style during early adolescence is associated with socio-demographic variables and could mediate the relationship between early childhood poverty and adolescent anxiety and depression problems. The present data set does not enable us to tease out these possibilities, but they remain important areas for future research.

In terms of the impact of maternal mental health, maternal depression in early childhood had a significant direct effect upon both maternal and youth reports of adolescent anxiety-depression symptoms, which remained even after the impact of poverty or marital factors had been controlled. However, early childhood exposure to maternal anxiety only showed a significant effect in the prediction of mother, but not youth, ratings of adolescent anxiety-depression. Interestingly, the influence of mothers' anxiety and depression in their child's first 5 years was mediated by maternal anxiety and depression at 14-year follow-up for maternal, but not youth, reports of adolescent anxiety-depression symptoms. For youth report on the YSR, there was evidence that maternal depression when the child was 6 months of age (but not maternal anxiety) increased the risk of elevated anxiety-depression symptoms at age 14, over and above any concurrent effects of maternal anxiety or depression at 14-year follow-up.

Given the conflicting findings relating to the impact of maternal mental health in early childhood upon youth versus maternal ratings of adolescent anxiety-depression, further analyses were conducted to examine the cumulative impact of maternal mental health. These results showed that the influence of maternal mental health during a child's first 5 years could not be explained purely through association with maternal anxiety or depression at age 14 years, nor to a reporting bias among mothers who were also depressed or anxious at the 14-year follow-up. Children whose mothers were anxious or depressed at both 6 months and 5 years, but not at 14 years, showed a small, but significant increased risk of elevated anxiety-depression problems at age 14. Maternal depression and anxiety in the early years appears to have an additive effect upon youth anxiety-depression over and above any associations with concurrent maternal depression at 14 years. The level of risk of elevated anxiety-depression scores among adolescents was greater if the mother experienced high levels of depression or anxiety at all three occasions, namely at 6 months, 5 years and 14 years, compared to 14 years alone. It seems likely therefore that repeated or prolonged exposure to maternal depression or anxiety presents a particular risk factor for the development of youth anxiety-depression symptoms.

Taken together, the results of the logistic regression suggest that early childhood experience of maternal anxiety and depression present a weak, but significant risk factor for the development of depression-anxiety symptoms in adolescence. The effects appear to be strongest when children are repeatedly exposed to maternal anxiety and depression over the first 5 years of life, with continued exposure during adolescence further increasing the risk. The impact of maternal anxiety and depression in early childhood could not be explained by mediating effects of poverty, marital factors, internalising problems at age 5 years, or maternal mental health during adolescence.

These findings contrast with those of Fergusson et al. (1995) and Davies and Windle (1997), who found that the association between maternal and adolescent depression could be explained by links to adverse life circumstances, including marital problems and social disadvantage. The present study also failed to find evidence of significant gender effects, whereas both of Fergusson et al. (1995) and Davies and Windle (1997) found that the relationship between maternal mental health problems and adolescent depression held only for girls. The reason for the differing results is not clear, but may reflect methodological variations or differences in measures and criteria used to assess depressive symptoms. The only gender interaction effect in the present study was a significant relationship between consistent poverty in early childhood and youth self-report of anxiety-depression symptoms at 14 years for girls, but not boys.

The results of the present study, although supporting a weak link between maternal and adolescent anxiety and depression, do not explain the mechanism of action. The findings could reflect a

genetic contribution to adolescent internalising problems or differences in parenting style among anxious or depressed mothers. Other possible mechanisms of action include maternal modelling of anxious behaviours, communication of an attentional bias to threat stimuli or pessimistic interpretation of life events. There is increasing evidence to suggest that anxious and/or depressed mothers tend to behave in certain ways within the family that may increase the likelihood that their children will develop emotional and behavioural difficulties. For example, Whaley, Pinto, and Sigman (1999) showed that anxious mothers granted less autonomy, displayed less warmth, and engaged in more catastrophising and criticism than did control mothers. There are undoubtedly many other possible explanations for the relationship between maternal and youth anxiety and depression that warrant examination in future studies.

An important point to consider is the extent to which the results of the present study inform us about factors that could be used to identify young people at risk for the development of anxiety and depression problems in adolescence. Through the identification of children at risk, we could target preventative interventions specifically towards these individuals. Although the findings of the present study leave a great many questions unanswered, the data suggest that we may be able to identify some children during early childhood who are at increased risk of developing high levels of anxiety-depression in adolescence. Twenty to twenty-five per cent of children whose mothers experienced high anxiety or depression symptoms at both 6 months and 5 years were assessed by their mothers as being in the top 10% of scores for anxiety-depression symptoms at age 14. This figure increased to around 30% if maternal anxiety or depression at the 14-year follow-up was also present.

It is particularly important to have identified maternal anxiety and depression as risk factors in the development of adolescent internalising problems in a community sample, using a longitudinal design. Prior research demonstrating this relationship has typically involved clinical samples or cross-sectional designs (Last, Hersen, Kazdin, Francis, & Grubb, 1987; Turner, Beidel, & Costello, 1987). The finding that maternal anxiety and depression during early childhood represent risk factors for the development of adolescent anxious and depressive symptoms suggests that these factors may be useful in identifying children who may benefit from preventive interventions. It is also encouraging to find evidence of risk factor relationships using a relatively short, screening questionnaire for the assessment of maternal anxiety and depression, rather than requiring a time-consuming, professionally administered structured clinical interview. However, although it is valuable to have found evidence of risk factors for adolescent anxiety-depression, it is important to note that the majority of young people whose mothers reported anxiety and depression during early childhood did not show elevated anxiety-depression symptoms at 14 years. Indeed, around 75% of youths whose mothers reported depression or anxiety at both 6 months and 5 years did not show high anxiety-depression symptoms at 14 years on the CBCL. Thus, further research is needed to determine cumulative patterns of interacting risk factors, in order to identify more accurately those young people who are at high risk for the development of anxiety or depression in adolescence.

A range of methodological limitations must be considered in interpreting the findings of the present study. Many of these issues reflect the problems of longitudinal research. The first concerns the problem of participant drop-out, and the generalisability of the findings to the general population. The comparison of those remaining in the study at the 14-year follow-up, with those who dropped out, suggests small, but significant differences. At the start of the study, those who would subsequently drop out tended to be higher on most risk factors, with lower average incomes, maternal education status and age at pregnancy and higher maternal depression and anxiety scores. Although these factors are characteristic of drop-outs from most longitudinal studies, it is disappointing that those at greatest hypothesised risk and for whom the strongest effects on dependent variables are likely to be shown were those who were no longer available for follow-up.

A second limitation relates to the difficulties posed by the relatively weak agreement between mothers and their adolescents in terms of reporting anxiety-depression symptoms. It is impossible in the present study to determine who was the more accurate and valid informant. Several previous studies have demonstrated greater tendency of depressed or anxious mothers to report emotional and behavioural problems in their children, compared to father, teacher and the adolescent reports (Najman et al., 2000). However, it is not clear whether this tendency reflects the depressed or anxious mother's greater sensitivity to and awareness of internalising problems in others or a negative bias towards interpretation of events. Similarly, we do not know how accurate adolescents are in reporting their anxiety and depression symptoms, and the extent to which social desirability effects may influence their ratings. Given the relatively low agreement between parent and youth report it is perhaps not surprising to find differences in the pattern of results in predicting mother versus youth reports of

adolescent anxiety-depression symptoms. However, the conflicting results illustrate the importance of obtaining data from multiple informants in this type of research.

Other methodological limitations concern measurement issues (choice of cut-off scores, use of questionnaire rather than clinical diagnostic inter-views), low frequency of data collection with several intervening years between assessments, failure to assess other dimensions of psychopathology, and failure to assess fathers' mental health. There are also many other potential predictor variables that it would have been interesting to examine. For example, it would have been valuable to obtain data relating to recent adverse life events and peer relationships at the 14-year follow-up, given evidence of an association between persistence of depression and proximal rather than distal adverse life events and friendship difficulties (Goodyer, Herbert, Tamplin, Secher, et al., 1997). To a large extent these methodological weaknesses reflect the financial limitations of the study. Longitudinal studies over 14 years, involving very large sample sizes, are very expensive and funding was not available to permit inclusion of some of these ideal design components.

Despite these methodological weaknesses, the study provides some interesting insights into the role that early childhood factors play in the development of adolescent anxiety and depression. The results of the present study suggest that early childhood family environment factors, such as marital distress, separation, divorce, poverty, and maternal anxiety and depression, play a weak but significant part in the development of anxiety-depression symptoms during adolescence. Of specific interest is the finding that maternal depression and anxiety during a child's early years have a small, but significant, influence upon the development of adolescent anxiety and depression. Such effects are over and above the influence of maternal and anxiety depression in adolescence, and the effects of marital problems and poverty during early childhood. Such findings are only partially consistent with the family context model of child and adolescent depression proposed by Cummings and Davies (1994) in that the effect of maternal anxiety and depression was found to be direct, rather than being mediated by marital functioning. Indeed, in the present study, the impact of marital conflict and status tended to be mediated by maternal anxiety and depression rather than vice versa. In reality, the interrelationships between maternal mental health, marital functioning, social disadvantage and youth mental health are likely to be extremely complex and bi-directional, making it difficult to determine exact mechanisms of action. However, the results of the present study support the proposition that maternal anxiety and depression, poverty and marital conflict/break-up during early childhood represent risk factors for adolescent anxiety and depression.

Furthermore, it appears that these risk factors have an additive effect over time, in that repeated exposure increased the level of risk over and above exposure at only one occasion. For example, children whose mothers experienced high anxiety or depression at both 6 months and 5 years were at particular risk for high anxiety-depression problems in adolescence. This effect was even greater if mothers also experienced anxiety or depression at the 14-year follow-up. The findings suggest that persistent maternal anxiety and depression place children at increased risk for future development of anxiety and depression symptoms. Children whose mother experienced repeated episodes of anxiety and depression during early childhood and adolescence may benefit from preventive interventions designed to reduce risk and enhance protective factors. Future studies should examine the impact of paternal factors, and additional risk factors, in order to increase the predictive accuracy and target preventive interventions more efficiently.

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