Parenting in long term perspectives: modelling longitudinal data.

Lindelow Ponce De Leon, Malin Kristina

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Download date: 19. Dec. 2018
PARENTING IN LONG TERM PERSPECTIVE: MODELLING LONGITUDINAL DATA

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Thesis submitted for the degree of
Doctor of Philosophy in the University of London

June 1995
ABSTRACT

This study examined the associations between adverse parenting and adjustment problems in the short and long term, exploring conceptual as well as methodological issues. Using a wide range of indicators of parent-child interaction, reflecting both parental behaviour and maternal expressed emotion (EE), it aimed to investigate the relationships between parenting on the one hand, and conduct problems, and adult self-esteem and depression on the other.

The study was based on re-analysis of two sub-groups of the Inner London Cohort, a randomly selected control group, and a random sample of those with high scores on a teacher behaviour questionnaire. Prospective data concerning parent-child interaction and the child's functioning were collected in an interview with the child's mother, and retrospective reports on parenting experiences, as well as information about adult adjustment, were obtained in a follow-up interview with the child when he or she had reached early adulthood.

Analysis focusing on the data collected in childhood confirmed a link between certain aspects of parenting and conduct problems, but only when these were reported by the mother. An examination of the reliability and validity of retrospective recall of parenting experiences, using structural equation modelling, revealed that the match between prospective and retrospective reports was unimpressive, and there was some indication that maternal criticality of the child influenced the child's later recall. This analysis also made the estimation of underlying parenting factors possible, and allowed their relationship with adult self-esteem to be investigated. Of these, maternal EE and father's positive behaviour showed a significant association with adult self-esteem in men, whereas the results for the women were inconclusive. Due to the low rate of depression in men, the association between parent-child interaction and adult depression could only be studied in women. In this last set of analyses, adult lifetime depression appeared to be linked to lack of positive interaction with the child's mother.

This study illustrates efficient methods of analysing longitudinal data, considering both complexities introduced by two-phase sampling, and by missing data.
ACKNOWLEDGEMENTS

This thesis could not have come into existence without the support of countless colleagues and friends. It would not only be an impossible task to attempt to list all those upon whom I have depended over the last few years, it would also make endless and uninspiring reading. Therefore, I will only venture to mention a few of those whose input has been of the most extensive and crucial kind. First and foremost, I would like to thank the MRC for their funding, thereby providing me with the privilege of focusing on the work leading up to this thesis. I am also indebted to Dr Andrew Pickles and Dr Barbara Maughan for selecting me to be their student, teaching, and providing inspiring examples. I am certain that many years from now I will still feel their influence on my work. Others have been instrumental in that they have provided the conditions for this study to be undertaken, or to be finalised. Sir Professor Michael Rutter and his colleagues planned and carried out the extensive data collection, creating the unique data set on which this thesis is based.

There are also contributions that have been made on a more personal level. I especially want to mention Dr Asa Rosen, whom I met during the first week of my undergraduate degree, as she was starting her PhD. She is much more than a friend, because since our first encounter in September 1987 her influence on my life has been enormous. She first made me consider research as a career, and has been immensely understanding and supportive of everything I do. This is also true for Dr Antonio Ponce de Leon, my husband, who urged me to pursue my PhD plans in the face of unexpected parenthood. He has been forced to make some difficult decisions, and has been helpful and encouraging in countless ways during all stages of the development of this thesis. Finally, there is Andreas, my son, who has given me such joy and inspiration in work and in life. To the two of them, for never doubting when I doubted, and for reminding me of the purpose of it all during months when it seemed all too easy to forget, I dedicate this thesis.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Title</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>2</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>3</td>
</tr>
<tr>
<td>Table of contents</td>
<td>4</td>
</tr>
<tr>
<td>List of Tables</td>
<td>12</td>
</tr>
<tr>
<td>List of Figures</td>
<td>16</td>
</tr>
</tbody>
</table>

## Chapter 1: Introduction

1.1 Basic objectives of the thesis 18  
1.2 Summary of the aims of this study 23  
1.3 Outline of the thesis 24

## Chapter 2: Parent-child interaction and children’s conduct disorder: Evidence and methodological issues

2.1 Introduction 26  
2.2 Conduct disorder 27  
2.3 Parent-child interaction 30  
2.4 Obtaining information in investigations of parent-child interaction 32  
2.4.1 Interviews as a method of obtaining information about parent-child interaction 33  
2.4.2 EE: Issues relating to reliability, validity and measurement 35  
2.5 Parent-child interaction and children’s adjustment 38  
2.5.1 Approaches to the study of parent-child interaction and children’s adjustment 38  
2.5.2 Behavioural aspects of parent-child interaction and children’s adjustment problems 39  
2.5.3 Affective aspects of parent-child interaction and children’s adjustment problems 40
2.5.4 Parent-child interaction and conduct disorder: A last note on the direction of causality 43

2.6 Sex differences and the relationship between parent-child interaction and children’s conduct disorder 45

2.7 Summary and implications for this study 47

Chapter 3: Experiences of parent-child interaction in childhood and adult depression and self-esteem: Evidence and methodological issues

3.1 Introduction 49

3.2 Depression 51

3.3 Self-esteem 53

3.4 Links between self-esteem and depression 54

3.5 Retrospective data
   3.5.1 The need for retrospective data 56
   3.5.2 Problems associated with retrospective recall 56
   3.5.3 Normal limitations in memory 57
   3.5.4 Deficits associated with psychopathology 58
   3.5.5 Mood-congruent memory processes 59
   3.5.6 Retrospective recall: A final note 60

3.6 Experiences of parent-child interaction and adult depression 62
   3.6.1 Early loss of parent, parent-child interaction and depression 62
   3.6.2 Experiences of adverse parent-child interaction and adult depression: Retrospective evidence 64
   3.6.3 Experiences of adverse parent-child interaction and adult depression: Prospective evidence 67
   3.6.4 Mechanisms accounting for the link between experiences of parent-child interaction and adult depression 68

3.7 Experiences of parent-child interaction and self-esteem 71

3.8 Summary and implications for this study 74
5.3.2 Structural equation modelling and reliability 102
5.3.3 The multitrait-multimethod matrix: The example continued 103
5.3.4 Writing an EQS input file 105
5.4 Reasons for using structural equation modelling 106
5.5 Multigroup analysis and missing data in structural equation modelling 107
  5.5.1 Multigroup analysis when comparing groups of subjects 108
  5.5.2 Multigroup analysis and cross-group constraints 109
  5.5.3 Multigroup analysis applied to missing data problems 109
5.6 Summary 110

Chapter 6: Prospective and retrospective indicators of parent-child interaction, ways of conceptualising parent-child interaction in this data set, and description of outcome measures
6.1 Introduction 112
6.2 Prospective measures of parent-child interaction 113
  6.2.1 The availability of prospective measures of parent-child interaction 113
  6.2.2 The conversion of the prospective indicators of parent-child interaction to a binary form 117
  6.2.3 The prevalence of prospectively reported adverse parent-child interaction 120
6.3 Interrelationships between the prospective indicators of parent-child interaction 123
  6.3.1 Correlations between the prospective indicators of parent-child interaction 123
  6.3.2 Factor analysis 125
    6.3.2.1 Reasoning behind the factor analysis 125
    6.3.2.2 Results of the factor analysis of the variables concerned with the mother 126
    6.3.2.3 Results of the factor analysis of the variables concerned with the father 127
6.4 Retrospective measures of parent-child interaction 128
6.4.1 The availability of retrospective measures of parenting
6.4.2 The conversion of the retrospective indicators of parent-child interaction to a binary form
6.4.3 The prevalence of retrospectively reported adverse parent-child interaction

6.5 Outcome measures
6.5.1 Conduct problems and conduct disorder
6.5.2 Adult lifetime depression
6.5.3 Self-esteem

6.6 Summary

Chapter 7: Maternal expressed emotion, parental behaviour, and children's conduct problems reported by mothers and teachers

7.1 Introduction
7.2 Method
7.2.1 Measures
7.2.2 Incomplete data
7.2.3 Statistical analysis
7.3 Results
7.3.1 Relationships between the individual indicators of parent-child interaction and conduct problems reported by teachers: Exploratory analysis
7.3.2 Relationships between the individual indicators of parent-child interaction and conduct problems reported by mothers: Exploratory analysis
7.3.3 Log-linear modelling
7.3.4 Parental irritability, maternal criticism, and conduct problems reported by teachers
7.3.5 Parental irritability, maternal criticism, and conduct problems reported by mothers

7.4 Summary
Chapter 8: A reliability study of mother’s prospective and subject’s retrospective accounts of parenting

8.1 Introduction 162
8.2 Method 164
  8.2.1 Measures 164
  8.2.2 Advantages of the chosen method of statistical analysis 165
  8.2.3 Missing data 166
8.3 Negative aspects of parent-child interaction 169
  8.3.1 Modelling negative aspects of parent-child interaction 169
  8.3.2 Reliability and validity of the accounts of negative aspects of parent-child interaction: The measurement model 172
8.4 Positive aspects of parent-child interaction 176
  8.4.1 Modelling positive aspects of parent-child interaction 176
  8.4.2 Reliability and validity of the accounts of positive aspects of parent-child interaction: The measurement model 178
8.5 Summary 182

Chapter 9: Underlying factors of positive and negative aspects of parent-child interaction, conduct problems and adult self-esteem

9.1 Introduction 184
9.2 Method 186
  9.2.1 Measures 186
  9.2.2 Missing data 186
  9.2.3 Outline of the statistical analysis 188
9.3 Results 188
  9.3.1 Negative aspects of parent-child interaction, conduct problems and adult self-esteem: Exploratory analysis 188
  9.3.2 Negative aspects of parent-child interaction, conduct problems and adult self-esteem: Structural equation modelling 190
  9.3.3 Positive aspects of parent-child interaction, conduct problems and adult self-esteem: Exploratory analysis 193
9.3.4 Positive aspects of parent-child interaction, conduct problems and adult self-esteem: Structural equation modelling

9.4 Summary

Chapter 10: Experiences of adverse parent-child interaction, conduct disorder, adult self-esteem, and adult lifetime depression

10.1 Introduction

10.2 Method considerations

10.2.1 Measures

10.2.2 Missing data

10.2.3 Adjustment for the multi-phase sampling design

10.2.4 Construction of the expansion weights

10.3 Results

10.3.1 Depression and conduct disorder

10.3.2 Depression and self-esteem

10.3.3 Depression and adverse aspects of parent-child interaction

10.3.3.1 Depression and adverse aspects of parent-child interaction: Exploratory analysis

10.3.3.2 Depression and adverse aspects of parent-child interaction: SUDAAN analysis

10.4 Summary

Chapter 11: Summary and conclusions

11.1 Introduction

11.2 Review of the findings

11.2.1 Conceptualising parent-child interaction

11.2.2 Reliability and validity of the accounts of parent-child interaction

11.2.3 Parent-child interaction and conduct problems

11.2.4 Parent-child interaction, adult self-esteem, and adult lifetime depression

11.2.5 Some additional issues
11.3 General implications for future work 226
11.4 Final comments 229

Appendices
1 The teacher questionnaire: Scale (B2) 231
2 Relative weight implemented in SPSS 233
3 EQS set-up for the analysis of the multitrait-multimethod correlation matrix 234
4 The Rosenberg self-esteem scale 235
5 Example of GLIM set-up 236
6 EQS four-group set-up for the analysis of the relationships between prospective and retrospective accounts of negative aspects of parenting 239
7 EQS four-group set-up for the analysis of the relationships between prospective and retrospective accounts of positive aspects of parenting 246
8 Analysis specification file for SUDAAN 253
9 Variables specification file for SUDAAN 254
10 Data file for SUDAAN 255

References 257
# LIST OF TABLES

## Chapter 5

| Table 5.1 | Correlation matrix providing the input for the multitrait-multimethod example | 100 |

## Chapter 6

| Table 6.1 | Percentages of boys and girls exposed to adverse parent-child interaction | 122 |
| Table 6.2a | Correlations between variables concerned with mother-child interaction: unadjusted data | 124 |
| Table 6.2b | Correlations between variables concerned with mother-child interaction: adjusted data | 124 |
| Table 6.3a | Correlations between variables concerned with father-child interaction: unadjusted data | 125 |
| Table 6.3b | Correlations between variables concerned with father-child interaction: adjusted data | 125 |
| Table 6.4 | Percentages of men and women retrospectively reporting exposure to adverse parent-child interaction | 133 |
| Table 6.5 | Percentages of boys and girls with conduct problems | 135 |
| Table 6.6 | Percentages of men and women having experienced adult lifetime depression | 136 |
| Table 6.7 | Means of Rosenberg self-esteem scores for men and women | 138 |

## Chapter 7

| Table 7.1 | Percentages of subjects with complete and incomplete data exposed to adverse parent-child interaction and rated as having conduct problems on the basis of teacher and maternal reports | 144 |
Table 7.2a Percentages of boys with and without conduct problems reported by teachers that were exposed to adverse parent-child interaction

Table 7.2b Percentages of girls with and without conduct problems reported by teachers that were exposed to adverse parent-child interaction

Table 7.3a Percentages of boys with and without conduct problems reported by mothers that were exposed to adverse parent-child interaction

Table 7.3b Percentages of girls with and without conduct problems reported by mothers that were exposed to adverse parent-child interaction

Table 7.4a Forwards model of parental irritability, maternal criticism and boys' conduct problems reported by teachers

Table 7.4b Forwards model of parental irritability, maternal criticism and girls' conduct problems reported by teachers

Table 7.5a Forwards model of parental irritability, maternal criticism and boys' conduct problems reported by teachers and mothers

Table 7.5b Forwards model of parental irritability, maternal criticism and girls' conduct problems reported by teachers and mothers

Chapter 8

Table 8.1 Means of the prospective indicators of parent-child interaction of subjects who were and were not included in the analysis involving negative aspects of parent-child interaction

Table 8.2 Means of the prospective indicators of parent-child interaction of subjects who were and were not included in the analysis involving positive aspects of parent-child interaction
Table 8.3 Correlations between the approximation of maternal negative expressed emotion (EE) and the retrospective indicators of parent-child interaction for men and women

Chapter 9
Table 9.1 Means of the additional variables used in the present analyses of subjects who were and were not included in the analyses involving negative aspects of parent-child interaction

Table 9.2 Means of the additional variables used in the present analyses of subjects who were and were not included in the analyses involving positive aspects of parent-child interaction

Table 9.3a Correlations between approximations of the constructs of negative aspects of parent-child interaction, conduct problems, and adult self esteem for men

Table 9.3b Correlations between approximations of the constructs of negative aspects of parent-child interaction, conduct problems, and adult self esteem for women

Table 9.4a Correlations between approximations of the constructs of positive aspects of parent-child interaction, conduct problems, and adult self esteem for men

Table 9.4b Correlations between approximations of the constructs of positive aspects of parent-child interaction, conduct problems, and adult self esteem for women

Chapter 10
Table 10.1 Percentages of women with complete and incomplete data exposed to adverse parent-child interaction

Table 10.2 Proportions of women with adult lifetime depression among those with and without a childhood diagnosis of conduct disorder (CD)
Table 10.3  Means of Rosenberg self-esteem scores of women with and without adult lifetime depression 208
Table 10.4  Percentages of women with and without adult lifetime depression exposed to adverse parent-child interaction 210
Table 10.5  Results from the SUDAAN analysis of the indicators of parent-child interaction and adult lifetime depression 212
### LIST OF FIGURES

| Chapter 5 | Figure 5.1 | Path diagram for multitrait-multimethod matrix | 104 |
| Chapter 8 | Figure 8.1 | The model for reports of negative aspects of parent-child interaction | 171 |
|           | Figure 8.2a | The model for reports of negative aspects of parent-child interaction for men | 173 |
|           | Figure 8.2b | The model for reports of negative aspects of parent-child interaction for women | 174 |
|           | Figure 8.3 | The model for reports of positive aspects of parent-child interaction | 178 |
|           | Figure 8.4a | The model for reports of positive aspects of parent-child interaction for men | 180 |
|           | Figure 8.4b | The model for reports of positive aspects of parent-child interaction for women | 181 |
| Chapter 9 | Figure 9.1 | Modelling links between parenting, conduct problems and adult self-esteem | 189 |
|           | Figure 9.2a | Links between negative aspects of parenting, conduct problems and adult self-esteem for men | 192 |
|           | Figure 9.2a | Links between negative aspects of parenting, conduct problems and adult self-esteem for women | 193 |
|           | Figure 9.3a | Links between positive aspects of parenting, conduct problems and adult self-esteem for men | 196 |
|           | Figure 9.3b | Links between positive aspects of parenting, conduct problems and adult self-esteem for women | 197 |
Chapter 10

Figure 10.1 Clarification of the structure of the sample for the construction of weights 206

Figure 10.2 Further clarification of the structure of the sample for the construction of weights 206
Chapter 1

INTRODUCTION

1.1 Basic objectives of the thesis

From the very beginning the family is central to human experience. For the overwhelming majority of children it is the predominant environment in which they begin to learn their interpersonal skills, where boundaries are set, and where they are given an understanding of themselves and the world. In this setting parents are powerful figures who love, care, and praise, and who exert control, set limits, and punish. In particular, the child's relationship with his or her mother has been accorded considerable importance. Freud (1938), in a widely quoted phrase, described it as 'unique, without parallel ... the prototype of all future love relationships' (p. 188).

It follows that the parent-child relationship has the potential for being an influential formative force in the child's behavioral and emotional development. Psychology, as a discipline, has recognised this, and a considerable amount of work has been dedicated to establishing the role that a variety of aspects of the parent-child relationship play in children's adjustment, ranging from apathy and lack of warmth to aggression and abuse (eg Mills, Puckering, Pound and Cox, 1985; Patterson, Reid and Dishion, 1992; Rutter and Quinton, 1984; Stattin and Klackenberg, 1992; Vostanis, Nicholls and Harrington, 1994). The evidence has generally suggested that negative aspects of parent-child interaction are associated with children's behaviour problems and conduct disorder (see Gardner, 1992 for a review).

However, although there is some agreement about the existence of this link in general, the particular indicators used to indicate the nature of parent-child interaction have varied greatly between studies. A number of research groups have focused on measures which reflect parental behaviour. It has, for example, been
shown that families of antisocial children are typically characterized by harsh and inconsistent discipline, little positive parental involvement with the child, neglect, and poor monitoring and supervision (see Loeber and Dishion, 1983; Robins, 1991 for reviews).

Others have been more concerned with indicators that appear to reflect emotional aspects of the parent-child relationship. In particular, expressed emotion (EE), a concept that originally emerged from the literature on schizophrenia (Brown, Carstairs and Topping, 1958; Brown, 1959; Brown, Monck, Carstairs and Wing, 1962; Brown, Birley and Wing, 1972), has been the focus of interest in the childhood literature. It combines ratings of a relative’s critical comments, hostility and emotional overinvolvement, observed in the interview situation (Brown, Birley and Wing, 1972), that are assumed to indicate the relative’s negative affect or intrusive overconcern towards the patient. There has been some evidence that disruptive behaviour diagnoses are significantly more common in children of parents expressing high levels of criticism (Stubbe, Zahner, Goldstein, and Leckman, 1993), a result which has since been replicated in a clinic sample, employing a different way of assessing EE (Vostanis, Nicholls and Harrington, 1994).

However, although it is clear that studies in the past have investigated a large number of disparate measures, with varying theoretical foundations, it is not obvious which is the best way of classifying these. Furthermore, there has been little attempt to compare their influences, and generate a more coherent understanding of the role the different aspects of parent-child interaction play in children’s adjustment. While this may be understandable in the light of the complexity of the literature on parent-child interaction, it is also unfortunate as it makes it very difficult to establish which aspects of parenting are most likely to carry principal causal roles, and therefore might be expected to be the most effective targets for intervention. Although it was not possible to take into account all strands of the parenting literature, this study, based on secondary analysis of a prospective longitudinal study of children’s difficulties and family life in an socially disadvantaged city area, represents an effort to study a wider than usual range of aspects of the parent-child relationship. Using two groups of children from the Inner London Cohort (Rutter, Cox, Tupling, Berger and Yule, 1975; Rutter, Yule, Quinton, Rowlands, Yule and Berger, 1975), a randomly
selected control group, and a random sample of those who scored highly on a teacher screening questionnaire for behaviour problems, the relative strength of the associations between different aspects of parenting and children’s conduct problems were compared.

Another set of problems which many studies in this area have not addressed are those associated with the potential bias of certain informants, and questions about the value of results that have been achieved in data sets where both the explanatory and outcome variables were derived from reports by the same individual. The latter has been a feature of the overwhelming majority of studies of expressed emotion (EE) in the childhood literature (Schwartz, Dorer, Beardslee, Lavori and Keller, 1990; Stubbe, Zahner, Goldstein, and Leckman, 1993; Vostanis and Nicholls, 1992; Vostanis, Nicholls, and Harrington, 1994), and raises questions about what conclusions can meaningfully be drawn on the basis of these findings. The data set used here provided the opportunity to compare the strength of the associations between various aspects of parent-child interaction reported by the child’s mother, and derived from interviewer’s ratings, and two different measures of children’s conduct problems, one based on maternal reports, and one on teachers’ reports.

However, interests in the effects of the parent-child relationship do not only lie with childhood adjustment, but extend to functioning in adult life. There is a substantial literature on the links between parenting experiences and a variety of adult outcomes, as varied as depression and alcoholism (e.g. Bifulco, Brown and Harris 1987; Blatt, Wein, Chevron and Quinland, 1979; Holmes, and Robins, 1987; Parker, 1979, 1983). Unfortunately there is only a limited number of prospective studies with data that meet current research interests. Consequently, most work on the long term influences of the parent-child relationship to date have relied on subjects’ retrospective reports of their parenting experiences, and issues relating to the quality of such data need to be considered. Although the problems associated with retrospective recall have been widely investigated (Brewin, Andrews and Gotlib, 1993; Robins, 1988), empirical studies of retrospective reports of parenting experiences in particular are difficult to undertake. Contrary to some other areas, such as health and growth where official and clinical records often exist, sufficiently detailed prospective data on the nature of family interaction with which subsequent recall can be compared are rarely
available. The particular data set on which this thesis is based offered a unique
opportunity to compare prospective reports by the child's mother with retrospective
reports by the studied child in adulthood on a number of aspects of the parent-child
relationship. While neither of these accounts can be assumed to be objective, the
systematic differences between them could be examined, providing some information
about an important area we at present know very little about.

Furthermore, there are conceptual questions which it is impossible to
address using retrospective data, in particular, the long term effects of parental EE.
Such investigations depend on longitudinal data, where the researchers who designed
the study had the foresight to obtain this measure at a previous point in time in a
sample which contains a sufficient amount of variance on the indicators of interest for
statistical analysis to be effective. This was one of the exciting features of the data
set on which this study is based. Here maternal EE was assessed when these children
were 10 years old, in an interview that also sought information about maternal and
paternal behaviour and reactions to the child. These children have now grown up, and
their adult functioning has recently been assessed (Champion, Goodall and Rutter, in
press). This data set, then, provides an ideal opportunity for investigating the
important question of the long-term effects of exposure to both parental adverse
behaviour and EE. The analyses here presented focus on two aspects of adult
functioning that may be expected to be of relevance in relation to the EE construct,
adult self-esteem and depression. The former is of particular interest as a consequence
of the criticality and rejection contained in the EE constructs, which may be
internalised by the individual targeted, thereby transforming into self-criticism and low
evaluation of self. Depression, in turn, has often been argued to be closely related to
low self-esteem, both on theoretical and empirical grounds (Beck, 1967; Brown,
Andrews, Harris, Adler and Bridge, 1986; Ingham, Kreitman, Miller, Sashidharan and
Surtees, 1987; Lewinsohn, Steinmetz, Larson and Franklin, 1981; Miller, Kreitman,
Ingham and Sashidharan, 1989; Rehm, 1977). Although a certain amount of work has
already been undertaken to answer the more general question of the link between early
experiences of parenting and adult self-esteem and depression, little of this has been
based on prospective longitudinal data. Consequently, the more specific associations
between parental EE, which can not be assessed retrospectively, and adult self-esteem
and depression have not been investigated. To my knowledge, the results here reported provide the first indications about these relationships, and suggest a mechanism whereby the effects of adverse aspects of parenting may be carried forward into adulthood.

A further interest was in potential sex differences in the relationship between parenting and children’s adjustment, both in the short and long term. There are substantial and well documented sex differences in the prevalence of the psychiatric disorders and adjustment problems with which this study are concerned. Conduct disorder is considerably more frequent among boys than among girls (eg Anderson, Williams, McGee and Silva, 1987; Cohen, Cohen, Kasen, Velez, Hartmark, Johnson, Rojas, Brook, Streuning, 1993; Offord, Boyle, Szatmari, Rae-Grant, Links, Cadman, Byles, Crawford, Blum, Byrne, Thomas and Woodward, 1987), and adult depression twice as common in women as in men (eg Nolen-Hoeksema, 1987, 1990; Weissman and Klerman, 1977). Evidence that women have lower self-esteem than men has also been put forward, although this is more controversial (see Skaalvik, 1986 for a review). Zahn-Waxler (1993) has discussed various socialisation practices that may contribute to sex differences in conduct disorder, some of which are discipline, educative practices, reinforcements and punishments, and imitation and identification with the same-sex parent. She notes that there is evidence that each of these is in operation, although the strength of their influence will vary with the outcome area of interest. If we want to advance our understanding of sex differences in the prevalence and aetiology of psychosocial problems, important areas of inquiry will include possible differences in the exposure to the various risk factors and variations in the associations between these and the outcome measures of interest in the two sexes. There are, therefore, compelling reasons why we should analyse data for children of the two sexes separately in this context, both in terms of their exposure to adverse parenting, and the pattern of association between the variables under examination.

However, the emphasis of this thesis is not merely theoretical, but also methodological, and this goes beyond issues concerning the quality of data, discussed above. In particular, careful attention has been paid to the areas of sampling and missing data, and to identifying appropriate statistical tools to overcome some commonly occurring problems of analysis of longitudinal data.
Multi-phase samples, selected on the basis of an initial screening variable, such as the one here used, are common in the area of developmental psychopathology as they provide an economically viable alternative to large scale general population studies, whilst containing sufficient variance for statistical analysis to be effective. The results achieved in such a sample can only be assumed to generalise to the overall population if appropriate techniques, which take details of the sampling into consideration, are used. This tends to make the analysis of multi-phase samples more complex than analysis of random samples from the general population, and finding effective and flexible methods to deal with this problem is of considerable importance.

A second set of problems was posed by attrition and missing data, both of which are virtually inevitable in longitudinal data studies. As loss of subjects typically is not completely random, but those who have more initial problems, or poorer outcomes, are lost in greater proportions than those who are better adjusted, this may result in a biased sample, with potential implications for any analysis to be undertaken and for the inferences that can meaningfully be made on the basis of achieved results. Consequently, there is a need to attempt to minimise data loss, and carefully investigate the possibility of disproportionate loss of data from particular groups. Clearly, very little can be done in terms of minimising attrition in an already existing data base. However, it is sometimes possible to employ statistical methods which are able to incorporate subjects with only partial data, thereby reducing the loss, and potential bias incurred by it, to a minimum. In this study, the application of three approaches to statistical analysis designed to address the difficulties created by multi-phase sampling or missing data are discussed and illustrated.

1.2 Summary of the aims of this study

In summary, five aims have guided the investigations here presented: first, to explore the relationships between the various prospective indicators of parenting available in the data set briefly outlined above, and to establish a meaningful way of classifying them; second, to investigate the relationships between parent-child interaction and
childhood conduct problems assessed on the basis of maternal as well as teachers’ reports; third, to investigate the concordance between maternal prospective reports, and children’s retrospective recall of parent-child interaction; fourth, to examine the relative effects of adverse dimensions of the parent-child relationship on conduct disorder and adult self-esteem for men and women; and fifth, to investigate the interrelationships between parenting, conduct disorder, and adult self-esteem and depression. In addition, there was an interest in potential sex differences in terms of exposure to adverse parenting, prevalence of psychosocial problems, and the nature of the relationship between them. Consequently, all analyses were undertaken for men and women separately, with the exception of the analysis involving adult depression, where the low prevalence rate in men made it necessary to exclude this group altogether.

1.3 Outline of the thesis

The series of analyses here presented seek to address these issues in turn. However, prior to presenting any results, Chapters 2 and 3 provide a more detailed discussion of the empirical evidence for a link between adverse parenting and children’s functioning, as well as of related methodological issues. The former focuses on the relationship between adverse parenting and childhood behaviour problems and conduct disorder, whereas the latter is concerned with adult outcomes, in particular self-esteem and depression, and methodological considerations associated with retrospective data. As the size and diversity of the literature makes it impossible to provide a comprehensive review of all the ways in which the parent-child relationship and its link with children’s adjustment have been investigated, these chapters describe only the theoretical and empirical background considered necessary to justify the empirical investigations to follow.

Chapters 4 and 5 are concerned with issues involved in the statistical analysis. Chapter 4 outlines the advantages and drawbacks of secondary data analysis and multi-phase samples, and considers the problems associated with missing data in some detail. This chapter also describes the sampling design of the sample used in
the analysis to follow, and outlines two approaches to statistical analysis with particular advantages in this context. Chapter 5 formalises the problems discussed in Chapter 3 with reference to retrospective recall, by outlining general issues surrounding reliability and validity, and discussing a way of assessing these using structural equation modelling. This form of analysis is then also linked to a specific problem raised in the preceding chapter, that of missing data.

Together, this provides the necessary background for beginning to examine the data. In Chapter 6 the available indicators of parent-child interaction and relevant outcome measures are described, and ways of conceptualising parenting in this data set are explored, using factor analysis. In Chapter 7 the links between the various prospective indicators of the parent-child relationship available and two measures of conduct problems, based on maternal and teacher's reports, respectively, are investigated. In these analyses, the individual prospective measures of parenting are used to examine the relative strength of their relationships with childhood conduct problems. In Chapter 8, these measures of parenting are compared to similar retrospective indicators in an investigation of the reliability and validity of retrospective recall of parenting, using structural equation modelling. These analyses generated latent, or underlying, parenting constructs, later to be used in the investigation of the relationship between experiences of parenting, conduct problems in childhood and adult self-esteem, discussed in Chapter 9. This study compared the relative influences of negative maternal and paternal behaviour and maternal EE on children's outcomes both in the short and long term. The last set of analyses, presented in Chapter 10, considered the link between prospectively reported parenting and adult life-time depression. Finally, in Chapter 11, the results from the various different studies are drawn together and are discussed in relation to the existing literature and their implications for future research.
Chapter 2

PARENT-CHILD INTERACTION AND CHILDREN'S CONDUCT DISORDER: EVIDENCE AND METHODOLOGICAL ISSUES

2.1 Introduction

The previous chapter was introduced by pointing out the centrality of the family and parent-child interaction in children's formative experiences. Indeed, psychologists, teachers and popular opinion all seem to agree that the nature of interaction within families has a powerful influence on children's adjustment. Almost everybody can cite their own case studies of children in their past or present lives whose problems they explain by reference to a dysfunctional father, deficient mother, or otherwise unfortunate home situation. Furthermore, when encountering a poorly adjusted child, whether psychologists or not, our first thoughts are typically concerned with the parents, and what they did, or did not, do.

As scientists, however, we want to take these thoughts further. Intuitive case studies may serve to generate ideas, but they do not provide us with systematic information to test them. And while it may be safe to say that a negative family environment, ridden by adverse parent-child interaction, is more likely to generate disturbances in children than is a harmonious one, such general statements do not address the questions of what it is about family interaction that affect children's adjustment in different domains, which kinds of malfunctioning are associated with which aspects of adverse parenting, and under what circumstances children may avoid these adverse influences and develop normally.

Conduct disorder is one of the childhood problems of particular concern to clinicians, as well as to parents, teachers and the wider society, all of whom are negatively affected by it to some extent, both in terms of the immediate disruptiveness
associated with it and the poor long-term outcomes it has been shown to be linked to. As this study as a whole is concerned with both the short and the long term outcomes of adverse family interaction, the latter of these features made it especially important in this context.

In this chapter the psychological theory and empirical evidence concerned with the relationship between adverse parent-child interaction and children's behaviour problems and conduct disorder are discussed, with the aim of providing a conceptual background from which to specify the issues to be investigated. In Section 2.2 some of the characteristics of conduct disorder that are relevant to this study are discussed. This is followed by an introduction to the ways in which parent-child interaction has been conceptualised in the past in Section 2.3, which prepares for the discussion on methodological issues related to the study of the association between parent-child interaction and children's behaviour problems and conduct disorder in Section 2.4. This section is divided into subsections, the first of which deals with approaches to the study of this association, and the second and third with the problems and advantages of two different methods of obtaining information, the use of informants, and interviewer's reports. Subsequently the evidence generated by these methodologies is discussed in Section 2.5, focusing on different aspects of parenting, and the direction of causality that can be inferred from these studies. Additional issues relating to this literature are then raised in Section 2.6, in particular the role of parental sex, and the past emphasis on mothers, rather than fathers, as exerting an influence on children, and the potential role of sex differences in socialization. Finally, in Section 2.7, the issues raised throughout this discussion are drawn together, and, against this background, some of the aims of the present study are further specified.

2.2 Conduct disorder

Conduct disorder is one of the more frequently occurring childhood disorders, and poses great problems, both on an individual and a societal level. The reasons for this become clear when considering the behavioural patterns associated with the disorder,
which are typically disruptive and antisocial, involving aggression, temper tantrums, disobedience, destructiveness, rudeness, defiance, lying, restlessness, and disruptiveness at school (Gardner, 1992). In the recently published DSM-IV (American Psychiatric Association, 1994) it was noted that the 'essential feature of Conduct Disorder is a repetative and persistent pattern of behaviour in which the basic rights of others or other major age appropriate societal norms or rules are violated' (p.85). However, the exact nature of the behaviour pattern characterising conduct disorder varies considerably with the child's age, with conduct disorder in early childhood being observed mainly in the context of family interaction, whereas later childhood provides new settings in which problem behaviour may occur, with vandalism, bullying and stealing becoming more frequent. Gardner (1992) notes that this is behaviour which typically provokes hostile, irritable, punitive or avoidant reactions from others. It is clearly disruptive to the child's social interaction and education, as well as having undesirable and costly consequences to society as a whole.

Both ICD-10 (World Health Organization, 1992) and DSM-IV (American Psychiatric Association, 1994) base the diagnosis of conduct disorder on the presence of at least three of 15 symptoms. Sub-categorizations are also made depending on the quality of peer relations, and distinctions are made on the basis of the level of severity and the number and seriousness of symptoms. Identification of the disorder is, however, greatly complicated by the low level of agreement between different informants of children's symptoms. This has been observed both in studies comparing parents', teachers', and children's own reports (eg Edelbrock, Costello, Dulcan, Conover and Kalas, 1986; Rutter, Tizard and Whitmore, 1970).

Estimates of the prevalence of conduct disorder vary considerably, depending on how assessments were made, the criteria applied, and features of the particular population being sampled. Using stringent criteria, Rutter, Cox, Tupling, Berger and Yule (1975) reported an overall rate of 4.2% in a population of 10-year old children in a rural area, with the rate for boys being about four times that for girls, 6.2% compared to 1.6%. In a more recent study, the Ontario Child Health Survey (Offord, Boyle, Szatmari, Rae-Grant, Links, Cadman, Byles, Crawford, Blum, Byrne, Thomas and Woodward, 1987), the results were similar, although the overall rate was
somewhat higher at 5.5%, and the sex difference was slightly less marked, 8.1% and 2.7% for males and females respectively.

However, also children who do not meet the diagnostic criteria for conduct disorder, but fall within the normal range of functioning, may exhibit problems of this kind, with potential consequences for their social and scholastic functioning, as well as for their families. Mothers, when asked if they considered their children to have behaviour problems, report significantly higher rates than do the studies cited above. One early example is a study by Lapouse and Monk (1957), where mothers reported rates as high as 31% for boys and 21% for girls. To date, most studies have focused on conduct disorder as a discrete category, but concern about less extreme behaviour may make it interesting to also assess conduct problems as a continuum.

There is compelling evidence that conduct disorder has a poor prognosis for a large proportion of those affected (Offord, Boyle, Racine, Fleming, Cadman, Munroe Blum, Bryne, Links, Lipman, MacMillan, Rae Grant, Sanford, Szatmari, Thomas and Woodward, 1992). In a now classic study, Robins (1966) reassessed 500 children who had previously been seen in a child guidance clinic and 100 control children in adulthood. The results were striking, with 71% of the men and 40% of the women who had been diagnosed as antisocial in childhood having been arrested for a non-traffic offence, compared to 22% of the male and none of the female controls. Further studies have been undertaken focusing on Vietnam veterans (Robins, 1974) and black men (Robins, West and Herjanic, 1975), and these have formed the basis for the argument that almost all adults showing serious antisocial behaviour have exhibited such behaviour already in childhood. Such continuity does not appear to be confined to problems that meet the criteria for disorder, but is also evident on a more general level, with a considerable consistency in aggressive behaviour over periods as long as over 20 years (Olweus, 1979; Moskowitz, Schwartzman, and Ledingham, 1985). However, many children exhibiting antisocial behaviour do not continue to do so in adulthood. Rather, it has been estimated that somewhere between one third to half of children diagnosed with conduct disorder in childhood will experience serious psychosocial difficulties of some kind in adult life (Waters and Brennan, 1989).

There is evidence that conduct disorder is associated with adverse
outcomes of a far more general nature than has often been argued in the past. In a study of young adults who spent much of their childhood in children's homes and an inner city control group, Zoccolillo, Pickles, Quinton and Rutter (1992) concluded that conduct disorder had a powerful effect on later social functioning, including not only antisocial personality disorder, but also persistent social difficulties. These authors argued that the diagnosis of antisocial personality disorder is too narrow to cover the range of adult disabilities that are the sequelae of childhood conduct disorder, and instead suggested that pervasive and persistent social dysfunction in general should be considered. Similarly, Robins and Price (1991) found that rates of virtually all disorders increased somewhat as the number of conduct problems before age 15 rose. Results from other studies indicate the existence of a link between conduct disorder and adult emotional problems. Although research in this area is relatively sparse, the available studies are consistent in concluding that a history of conduct disorder and conduct disorder symptoms is linked to an increased likelihood of panic, phobic, obsessive-compulsive and major depressive disorder in adulthood (see Zoccolillo, 1992 for a review).

It is evident that children's conduct disorder, and conduct problems, put some considerable strain on both their families and their social setting, as well as being a source of concern in terms of associated long-term outcomes. Identification of the factors that play an aetiological role may suggest methods for intervention, and would be of considerable benefit to families, as well as to society as a whole.

2.3 Parent-child interaction

Many, but by no means all, of the attempts to understand the aetiology of conduct disorder have focused on the association between the disorder and family factors, in particular parent-child interaction (see Gardner, 1992 and Robins, 1991 for reviews). However, a multitude of indicators have been used to estimate aspects of this interaction, depending on different authors' theoretical perspective. In order to assess their different contributions it is necessary to provide a meaningful way in which to conceptualize parenting and distinguish between different parenting dimensions. This
section seeks to achieve this, thereby establishing a framework for organising the empirical evidence for a link between conduct disorder and parenting to follow.

The term parenting is used here interchangeably with parent-child interaction, to denote parental behaviour to the target child, or attitudes and affect which can be reasonably assumed to translate into such behaviour, or are otherwise communicated to the child. Interest in parenting has been shared by researchers from many different theoretical vantage points. Socialization theorists taking a psychodynamic perspective have been concerned with the emotional aspects of the parent-child relationship and its influence on the child’s psychosocial, psychosexual, and personality development. Their models have usually been unidirectional, in that differences in the emotional relationship between parents and children have been attributed to parents, in particular to parental attitudes (eg Orlansky, 1949) with a particular emphasis on nurturing (Freud, 1933). The notion that parents, rather than children, shape the nature of interaction was equally advocated by researchers adopting the behaviourist perspective originally proposed by Watson (1928), although here the focus was parental practices, rather than attitudes, taking a particular interest in control. Authors aiming to describe parenting style through early empirical research came to propose underlying dimensions of noticeable similarity. Symonds (1939) described these dimensions as acceptance/rejection and dominance/submission; Baldwin (1955) as emotional warmth/hostility and detachment/involvement; Schafer (1959) as love/hostility and autonomy/control; Sears, Maccoby and Levin (1957) as warmth and permissiveness/strictness; and Becker (1964) as warmth/hostility and restrictiveness/permissiveness. Parallels may be drawn with investigations in the current literature which focus on parental hostility and criticism on the one hand (eg Schwartz, Dorer, Beardslee, Lavori, and Keller, 1990; Stubbe, Zahner, Goldstein and Leckman, 1993; Vostanis, and Nicholls, 1992; Vostanis, Nicholls and Harrington, 1993), and disciplinary practices on the other (eg Patterson, 1976, 1980, 1982; Patterson, Reid and Dishion, 1992; Susman, Trickett, Iannotti, Hollenbeck and Zahn-Waxler, 1985).

Early psychodynamic and learning theorists agreed on the importance of examining both affective and instrumental processes in the same model (see Becker, 1964 for a review). However, empirical studies have often failed to comply with this
recommendation, and have more often than not only examined one, or a very limited range, of aspects of parent-child interaction. Studies involving parental disciplinary practices have tended not included simultaneous analysis of more emotionally based indicators, such as parental lack of warmth and criticality. Similarly, the rapidly growing literature focusing on the role parental criticism may play in children’s adjustment has generally failed to also consider other, more behaviourally based measures of parent-child interaction. As a consequence, we have only limited information about the relationship between these two dimensions of parenting, and the best way of understanding their relative effects on children’s functioning. While research addressing these questions is of theoretical significance, potentially allowing us to link literatures which are currently developing independently, it also has important practical implications, as it would suggest areas where intervention is likely to be particularly effective. There are, then, good reasons to pursue these issues further.

However, when examining the empirical literature discussed below, another, less discussed, distinction emerged. It appeared that overtly negative aspects of parenting, such as hostility, aggression, and abuse, have generally been studied in separation from lack of positive interaction, such as apathy, and lack of warmth and interest, the latter of which have received relatively less attention. This tends to be done without any explicit theoretical or empirical justification, and the relationship between these two parenting dimensions, or the relative strength of their relationship with the outcome variable of interest, is rarely commented on. This is, then, another issue which empirical studies involving parenting may benefit from considering in more detail.

**2.4 Obtaining information in investigations of parent-child interaction**

Obtaining accurate information about family interaction is a difficult process, with only a limited set of methodologies available. Some of these are based on interviews with individuals either directly or indirectly involved in the relationship being studied, whereas others are derived from observations of interactions, occurring naturally, or
in more or less structured situations. Each of these methods has its own set of advantages as well as being subject to potential sources of error, and this complex area will not be reviewed here. Rather, the two particular methods used to obtain the data used in the present study will be described. Both of these were based on interview data, either using parental reports directly, or allowing interviewers to rate parental verbal and non-verbal behaviour in the interview situation, such as in the case of EE.

2.4.1 Interviews as a method of obtaining information about parent-child interaction

Perhaps the most straightforward way to obtain information about parents’ behaviour towards, and feelings for, their children is to ask them. The use of parents as informants has enormous advantages, as they have the unique opportunity to observe behaviour and patterns of interaction over extended periods of time and across a variety of situations. It therefore seems reasonable to seek to extract the necessary information by questioning them, and interviews with parents have played an important role in the past.

There are, however, different ways to use an interview situation to obtain information. Two issues are particularly important, the extent to which an interview is structured, and who makes the judgement of whether a response meets a certain criteria. That is, on one extreme interviews can be highly structured, with the interviewer essentially verbalising a series set questions to which the respondents reply in the form of determined ratings. The interviewer may for example ask if a mother finds that her child fussy, and the mother may be expected to answer yes, sometimes, or no. This has the advantage of not being subjected to the interviewers’ potentially biased judgements, or wish to produce data which is in agreement with a proposed hypothesis. Furthermore, it demands considerably less training of the interviewers, making the interview cheaper and less time-consuming to use. A major problem, however, stems from the subjectiveness of reference points for descriptive terms. Behaviour that one mother labels 'fussy' may be considered normal by another, and it is very difficult to determine if the parents’ judgement about certain characteristics
or behaviours has any bearing on clinical or other criteria. This problems tend to be accentuated when both explanatory and outcome variables are derived from one source, where there is an especially great danger that the informants' lay theories about child rearing influence their accounts (Maccoby and Martin, 1983). This is a problem which semi-structured interviewing is designed to overcome, as the interviewer will seek to confirm that the investigators' predetermined definitions are met. These are more flexible, and seek to probe the respondent's responses to allow the interviewer to determine whether the particular responses meets the investigator’s criteria. The interviewer may begin by asking if a child is fussy, but then continue to ask in what situation the parent observes this tendency, if it disrupts meals, if it imposes other restrictions on family life, and so on. This provides opportunity for exploring issues in depth, and the interviewer can guide and clarify any points of uncertainty. In addition, the potential intensity, length and complexity of the encounter, and the depth and coherence of the answers given generally allows the interviewer to estimate the degree of the respondents sincerity and truthfulness, and this provides a certain verification of the quality of the data obtained.

However, using parents as informants of their own behaviour is not unproblematic, and it has been under some attack since the 1960s (eg Brekstad, 1966; Chess, Thomas and Birch, 1966; Robbins, 1963; Wenar, 1961). Some of the objections put forward are specific to particular methodologies, others are more general. One frequently noted problem is that parents are not necessarily aware of their own behaviour. While they may be able to report reliably on some salient aspects of their behaviour, such as spanking or quarrelling, they may be unaware of more subtle, non-verbal reactions, such as withdrawal of affection following a child's misbehaviour (Maccoby and Martin, 1983). There is also a tendency for parents to give researchers 'desired' responses, either in reporting behaviour and interaction terms of what they believe to be socially desirable, or in accordance with what they assume to be the purpose of the study. In particular, parents may conceal information which is either unflattering or illegal, or which they prefer to avoid even in their own thoughts, leading to a potential underreporting of negative behaviour. These potential sources of error pose an equal threat to both structured and semi-structured interviews. The objections to the accuracy of accounts obtained using interviews here outlined all
pose serious threats to the validity of accounts obtained using interviews. Although the advantages may be judged to compensate for this, they need to be taken into consideration when considering the meaning of results obtained using such data. Furthermore, there are techniques available to examine these difficulties empirically, one of which will be discussed at some length in Chapter 5.

2.4.2 EE: Issues relating to reliability, validity and measurement

An alternative way of obtaining measures from interviews is to use the interviewer’s reports of observations made of the respondent in the interview situation. This approach has been used in particular in studies of EE, a concept which was arrived at through a series of studies aimed at identifying the aspects of family life which were associated with post-discharge relapse in schizophrenics (Brown, Carstairs and Topping, 1958; Brown, 1959; Brown, Monck, Carstairs and Wing, 1962; Brown, Birley and Wing, 1972). Using the Camberwell Family Interview (CFI), of hundreds of rating scales only three showed independent relationship with the course of schizophrenia: relative’s critical comments, hostility and emotional overinvolvement (Brown, Birley and Wing, 1972; Vaughn and Leff 1976b), each of which were based on the interviewer’s rating of the respondents’ verbal and nonverbal behaviour in the interview situation, rather than on the respondents’ own reports of affect or behaviour. Based on these empirical findings, rather than a theoretical construct, these variables were combined into an index of EE (Brown, Birley and Wing, 1972).

In spite of the fact that such data may be criticised on the basis that they are derived from a very special situation in which the respondent is only likely to find him or herself on rare occasions, these types of interviewer’s reports have been found to be effective predictors of a variety of psychiatric problems, including depressive neurosis (Vaughn and Leff, 1976a; Hooley, Orley and Teasdale, 1986), bipolar disorder (Miklowitz, Goldstein, Neuchterlein, Snyder and Mintz, 1988), and obesity in women (Fischmann-Havstad and Marston, 1984). In this situation the interviewer also acts as an observer, and while there is still scope for the interviewee to manipulate his or her behaviour, there is no awareness of what behavioural aspect,
or indeed that any behaviour, is being rated. This clearly makes it more difficult for
the interviewee to explicitly control the rating in a desired direction. Since its
development in the early seventies, numerous studies have demonstrated both the
reliability and the construct validity of EE as measured by the CFI (see Kuipers,
1987), and there are established norms for its use. The concept is now well
recognised, generating research at an astonishing rate in a range of different areas.
It has been recognised that although originally developed in an attempt to understand
schizophrenic relapse, there is nothing intrinsic to EE that should limit its relevance
to this group, and research into EE has raised important questions that go far beyond
the original field of application. It has shown that the association between expressed
emotion and schizophrenia may be generalised to other psychiatric problems, such as
neurotic depression, bipolar affective disorder (Miklowitz, Goldstein, Neuchterlein,
Snyder, Mintz, 1988), depressive disorders in children (Asarnow, Goldstein, Thompson
and Guthrie, 1993), anorexia nevrosa (Szmukler, Berkowitz, Eisler, Leff and Dare,
1987) and obesity in women (Fischman-Havstad and Marston, 1984). Jenkins and
Karno (1992) concluded that ‘although individual variability and complexity in the
salience of the association between expressed emotion and outcome exist, expressed
emotion is appropriately regarded as a major risk factor in the course of psychiatric
illness’ (p.11).

Application of the concept in the childhood literature has, however,
raised some issues about the appropriateness of assuming that the sub-scales have the
same meaning to young children as to adult patients. It seems obvious that the social
and emotional needs of young children and adults should be very different, and
therefore unlikely that we would find an identical concept to account for similar
processes in all age groups. In particular, the rate of hostility in parents of children
who have not yet reached adolescence has typically been found to be so low that it
can not be meaningfully analysed (eg Vostanis, Burnham and Harris, 1992; Vostanis,
Nicholls and Harrington, 1994), and the validity and usefulness of combining parental
criticality and overinvolvement into a single concept has been questioned. Stubbe and
colleagues (1993) noted that critical comments and emotional overinvolvement were
observed in non-overlapping sub-sets of families, and were associated with different
outcomes. While emotional overinvolvement has been shown to be a negative factor
for adults, it is not clear that the same should be true for children, especially at a very young age when a considerable level of involvement may not only be harmless, but indeed desirable. Applications of the EE construct in new contexts, then, demand sensitivity to the potential variations in exposure to and impact of the various EE subscales, and relationships observed in one given target population can not be assumed to translate to another.

There is also a growing literature on other, more time-efficient ways of assessing EE. A measure of particular interest is the Five Minute Speech Sample (FMSS), where the relative is asked to report thoughts and feelings regarding the target child during an uninterrupted five minute period (Magana, Goldstein, Karno, Miklowitz, Jenkins and Falloon, 1986). The FMSS has demonstrated relatively good reliability (Magana, Goldstein, Karno, Miklowitz, Jenkins and Falloon, 1986; Stubbe, Zahner, Goldstein and Leckman, 1993) and considerable levels of agreement with CFI ratings, although it has been noted that it appears to fail to identify some high EE subjects, rating them as low (Magana, Goldstein, Karno, Miklowitz, Jenkins and Falloon, 1986). Furthermore, recent work has found support for the utility of this measure in predicting clinical outcome both in clinic samples (Asarnow, Goldstein, Thompson, Guthrie, 1993) and in a community survey (Stubbe, Zahner, Goldstein and Leckman, 1993).

On the whole, then, there is a considerable amount of interest in appropriate ways of quantifying the nature of parent-child interaction, and a number of different methodologies have been developed, each of which have their own set of advantages and limitations. However, variations in the approaches to the study of parent-child interaction, and its implication for children’s adjustment, go beyond the area of measurement, and also relate to sampling and study design.
2.5 Parent-child interaction and children’s adjustment

2.5.1 Approaches to the study of parent-child interaction and children’s adjustment

In the past studies of impaired parenting have typically not been based on random samples from the general population, but have instead focused on specific groups thought to be at an increased risk for different kinds of disturbance. One reason for this is the need for variance, both in terms of parental practices and child outcomes, without which conclusions cannot be confidently reached. Another is the practical concern for children who are considered to be at increased risk of developing psychosocial problems, and the need to develop appropriate theories, which can be helpful in making policies and designing interventions aimed at helping them. Expectations of such risk may be derived from known characteristics of the parent as well as the child. In the past the most common approaches have been to compare children with behaviour problems to normal controls, in both case-control and cohort studies, and to study the children of parents with psychiatric disorders. While designs focusing on children with behaviour problems may be the more obvious choice, interest in the effect of parental psychiatric problems is long-standing (see Rutter and Quinton, 1984), and, judging from prevalence rates, there can be little doubt that children of parents with disorders are at a significantly greater risk of clinical symptoms and other behavioural disturbances than are children in the general population (eg Beardslee, Bemporad, Keller and Klerman, 1983; Orvaschel, Weissman and Kidd, 1989; Quinton and Rutter, 1985; Rutter and Quinton, 1984; Weissman, Leckman, Merikangas, Gammon and Prusoff 1984; Weissman, Prusoff, Gammon, Merikangas, Leckman and Kenneth 1984). Furthermore, there is abundant evidence that psychiatric problems in parents are associated with hostile, critical, rejecting behaviour (Belle, 1979; Longfellow, Zelkowitz and Saunders, 1982) emotional withdrawal (Weissman and Paykel, 1974) and expressed inconsistency in discipline and control (Susman, Trickett, Iannotti, Hollenbeck and Zahn-Waxler, 1985). Similarly, there is evidence of diminished emotional involvement and interest in their children’s daily life, impaired communication, a lack of expressed affection for the
children and a heightened degree of friction and hostility towards the children (Goodyer, 1990; Weissman and Paykel, 1974; Weissman, 1983).

Below the evidence for a relationship between parent-child interaction and children’s adjustment is discussed, using the distinction between behavioural, primarily disciplinary, and emotional aspects of parenting, established in the previous discussion of parenting.

2.5.2 Behavioural aspects of parent-child interaction and children’s adjustment problems

One of the messages that has emerged out of the literature on the children of psychiatrically ill parents is that it is the negative styles of interaction and associated psychosocial disturbance of the family, rather than the parental symptomatology per se, which affects children adversely (Quinton and Rutter, 1985; Rutter, 1990). In a widely cited study Mills, Puckering, Pound and Cox (1985) noted considerable variation in the interactions of depressed mothers and their 2-3 years old children, some of whom exhibited more controlling behaviour and lack of involvement with the child, whereas others performed well. Behaviour problems in children were mainly linked to impaired parenting. Similarly, Rutter and Quinton (1984), found that it was aggression, particularly associated with personality disorder, and the extent to which children were exposed to and involved in their parents’ abnormal behaviour that was related to the adverse outcomes in children. Parental irritability and violence were more important than affective symptoms or psychiatric manifestations (Rutter and Quinton, 1984).

Essentially the same conclusion can be drawn from studies based on other populations, which reinforce the notion that parental inconsistency and harshness is associated with children’s conduct problems. One of the most convincing illustrations of this has been provided by Patterson and his colleagues, who have focused on children with behaviour problems, or conduct disorder (see eg Patterson, 1982; Patterson, DeBaryshe and Ramsey, 1989; Patterson, Reid and Dishion, 1992). Drawing upon evidence that families of antisocial children tend to be characterized by
harsh and inconsistent discipline, little positive parental involvement with the child, and poor monitoring and supervision, (see Loeber and Dishion, 1983; Robins, 1991 for reviews) they developed a model which sought to take into account both the parental contribution, and the role played by the child's behaviour. This model is based on social learning theory (Bandura, 1977; Mischel, 1973), stressing that problem behaviour in the family is learned through modelling and reinforcement, especially from discordant family interactions. In this model child behaviours at one stage lead to predictable reactions from the child's social environment, in particular parents and caretakers, leading to yet further reactions from the child, setting in motion a chain of adverse exchanges between them. Parent and child become engaged in coercive, self-perpetuating attempts to exert control, which may escalate, and put the antisocial child at an increased risk for long-term social maladjustment (Patterson, Reid and Dishion, 1992). This notion has found extensive support, and Robins (1991) has concluded that 'Whatever the causal mechanism, one of the strongest correlates of conduct disorder is a pattern of poor parental disciplinary practices' (p.206). More specifically, she continues to state that 'Parents of children with this disorder are described as neglectful, erratic, and harsh in their punishment.' (p.206). Patterson and Yoerger (1993) have suggested that it is particularly parents' failure to positively reinforce children's prosocial behaviour, to use effective punishment for coercive behaviour, and to reinforce coercive behaviour which is thought to be destructive to children's social functioning. The suggestion that adverse parental behaviour to the child is associated with children's conduct problems therefore to some extent incorporate an a account of a mechanism whereby this relationship is mediated.

2.5.3 Affective aspects of parent-child interaction and children's adjustment problems

There is, however, also convincing evidence that the affective dimension of parenting is important. Although this literature may at first glance appear confusing, with investigators using a multitude of different variable names, obtained in a variety of ways, with more or less clearly defined meanings, there seems to be a general concern
with some parents' failure to adequately acknowledge, reward and value the child. A finding that has emerged particularly strongly is the association between parental hostility, criticality, rejection, and lack of warmth, and children's conduct problems.

Thus, in the study by Mills and colleagues (1985), described above, children showing behaviour problems did not only have mothers whose interaction with their children were characterised by controlling behaviour and lack of involvement, but also by apathy and lack of enjoyment. Similarly, the study by Rutter and Quinton (1984), found that in addition to parental irritability, aggression and violence, hostility was also related to adverse outcomes in children. An even more extreme line has been taken by scholars such as Cohen and Bromet (1992), who found that the key predictor of both development and persistence of behaviour problems was maternal hostility. It was suggested that this maternal hostility, in spite of being highly correlated with other relevant psychosocial variables, was the salient predictive dimension. Similarly, Richman, Stevenson and Graham (1982) found that criticism and lack of warmth, derived from an interview with the child's mother, but not explicitly referred to as EE, were more common in mothers of children with behaviour problems than in mothers of controls.

More recently the sub-scales of the EE construct, as measured both by the CFI and the FMSS, have been studied in relation to childhood disorders, with illuminating results. Stubbe and colleagues (1993), using the FMSS, found that disruptive behaviour diagnoses were significantly more common in children of parents who expressed high levels of criticism, while anxiety disorders were more frequent among parents who rated high on emotional over-involvement. Also other studies, using the CFI, have arrived at the conclusion that conduct and emotional disorders are associated with different maternal styles. In a study comparing matched groups of conduct disordered (CD), emotionally disordered (ED) and control children, it was found that warmth distinguished significantly between the three groups (CD < ED < Controls), whereas criticism from mothers of children with conduct disorder was higher than from mothers of children in the other two groups, and emotional over-involvement was not found to differ between any of the groups (Vostanis, Nicholls and Harrington, 1993).

There have also been attempts to study expressed emotion in the general
population, in order to establish to what extent it is related to children's behaviour when this falls within the normal range. In a pilot study of two school populations again using the CFI, it was found that mothers' expression of critical comments was significantly correlated with children's internalising and, particularly, externalising behaviour problems (Vostanis and Nicholls, 1992).

However, these studies have used measures of children's disorder and behaviour problems that are either wholly, or partly, based on parental reports, such as mother rated behaviour checklists (eg Vostanis and Nicholls, 1992), clinical ratings based on interviews with the child's primary care giver (eg Stubbe, Zahner, Goldstein, and Leckman, 1993), and different combinations of parental, teacher and child reports (eg Schwartz, Dorer, Beardslee, Lavori and Keller, 1990; Vostanis, Nicholls and Harrington, 1993). That is, both the outcome measure and the explanatory variable originated from the same source, and we must be careful when making inferences about these findings. Alternative explanations, where they are seen to either reflect a reporting effect, with some parents being more willing to yield negative information, and thereby more likely to rate their children as having problems, and to be critical of them in an interview situation, or to reflect situation-specific manifestations of a poorly functioning parent-child relationship, need to be investigated to clarify the meaning of these results.

Furthermore, the mechanisms whereby exposure to EE translates into psychological maladjustment are not well understood. A number of authors have emphasised that, whereas empirical research has been abundant, theoretical elucidation of the concept has lagged behind. Koningsberg and Handley (1986) have noted that 'care must be taken in interpreting a narrowly defined empirical construct, developed primarily on the basis of its predictive validity' (p.1361). In Vaughn's (1989) words 'questions remain about the nature and meaning of the global EE index' (p.16).

The assumption about the way in which expressed emotion influences the clinical course of psychiatric illness has been that emotional arousal constitutes a major stressor for persons with schizophrenia. Overarousal through exposure to high degrees of negative affect may result in relapse or exacerbation of florid symptoms (Brown, Birley and Wing, 1972; Vaughn and Leff, 1976a). The support for this notion has, however, been limited, with Kuipers (1987) summarising the physiological
evidence for this assertion as inconclusive. Furthermore, it is questionable if this is a feasible explanation for the association between expressed emotion and the various other problems demonstrated in the literature. There is a particular void of alternative explanations in the childhood literature, where questions about the process whereby EE influence the child are largely ignored. Intuitively it would seem that a critical and cold parent may establish a distant relationship with the child, characterised by mutual lack of positive regard, which in turn affects the child's openness to parental influence. Another possible explanation is that criticism and hostility becomes internalised, leading to poor self-esteem which, in turn, makes the individual vulnerable to a variety of psychosocial problems both in the long and short term. However, this link, here proposed, and further elaborated in Chapter 3, is not discussed in the literature, and has not yet been tested empirically.

2.5.4 Parent-child interaction and conduct disorder: A last note on the direction of causality

There are other compelling questions about the association between parent-child interaction and conduct disorder, in particular involving the direction of causality. When studying psychiatrically disordered parents we may be concerned about the effect their behaviour has on their children's adjustment, and thereby too easily assume a direction of causality where negative or inappropriate parenting practices lead to child maladjustment. However, it is beyond the scope of correlational studies to provide any evidence for this, as they merely reflect the co-existence of two indicators, and do not account for the processes which link them. Typically parents are expected to possess the authority and have greater influence on the nature of a family's functioning than do children, lending some support to the argument that the link between parenting and child outcomes is mainly driven by parental behaviour, but such expectations may not provide a complete account. It has already been noted that the behaviour characterising conduct disorder typically provokes hostile, irritable, punitive or avoidant reactions from others (Gardner, 1992). This suggests that part of the association between adverse parenting and conduct disorder can be accounted
for by provocative behaviour originating in the child, and to which the parent responds in a negative way. This notion is captured by the model developed by Patterson and his colleagues, described above, where both parent and child are seen as contributing to the nature of the interaction between them (Patterson, 1976, 1980, 1982; Patterson, DeBaryshe and Ramsey, 1989; Patterson, Reid and Dishion, 1992), although in much of the cross-sectional literature it is not discussed, even as a hypothetical possibility.

Successful intervention programs (eg Baum and Forehand, 1981; Patterson, Chamberlain and Reid, 1982), where parent training produces favourable changes in children’s behaviour would, however, seem to lend some support to the potentially leading role of parents. Indeed, there is some evidence that modification of parental management practices leads to favourable outcomes in preadolescent children, indicating that parents may have a causal role, at least younger ages (see Kazdin, 1987 for a review). The direction of effects has also been widely debated in the EE literature, where the extent to which EE is a genuine feature of the environment, originating in the carers under investigation, or provoked by the subject, has been explored in a number of studies. In a review of the literature Vaughn (1989) noted that schizophrenic patients from high and low EE households have not been found to differ on measures of premorbid adjustment, severity of psychopathology on admission or residual symptomatology after discharge, suggesting that differences in the households appear to lie in the relatives, rather than in the patients. Furthermore, various cognitive, affective and behavioural characteristics that distinguish high and low EE relatives have been identified (Vaughn, 1986; Vaughn, 1989). Low EE relatives are more likely to believe the patient is suffering from a genuine illness, to combine objective empathy with a greater tolerance of disturbed behaviour, and to use neutral or dispassionate language to describe such behaviour. Furthermore, low EE relatives’ reports of their own behaviour towards the patient suggest that they are more flexible and adaptable than their high EE counterparts, and they tend to display greater problem-solving skills. They appear to be calmer in a crisis and generally behave in less intrusive, confrontational ways (Vaughn, 1989). In summary, four factors that differentiate between relatives with low versus high EE have been identified: respect for patients’ relationship needs, attitudes toward the legitimacy of the illness, level of expectations for patients’ functioning, and emotional reaction to the patient’s illness

44
Vaughn, 1986). While these certainly leave scope for the patient to influence the relative, and more severe symptoms can reasonably be expected to evoke more intense emotional reactions, there are aspects that it seems more reasonable to think of as intrinsic to the relative.

2.6 Sex differences and the relationship between parent-child interaction and children’s conduct disorder

A further set of complications is introduced by the role of sex, that of the child, and the parent, as well as the interaction between the two. It has already been established that there are considerable sex differences in the prevalence of conduct problems, and that conduct problems are closely linked to various aspects of parent-child interaction. It then follows naturally to ask if the parent-child relationship impinge differently on boys and girls, in particular if there are systematic differences in the way children of the two sexes are treated by their parents. Intensive investigation of this question has yielded a complex answer, and the debate seems likely to continue for some time. There is little doubt that in certain situations some differences do exist. Differential treatment of children on the basis of their sex has been dramatically demonstrated in the baby X experiments (Smith, and Lloyd, 1978). Here, toddlers' sexual identity was concealed, and instead they were given names to indicate their sex, which half of the time corresponded to their true sex, and half of the time did not. The responses of adult subjects to these children were then recorded, indicating systematic variations based on sexual stereotypes both in their reactions to the children, and the inferences they made about the children's behaviour.

However, in a meta-analysis, covering a variety of aspects of socialization, Lytton and Romney (1991) concluded that the systematic differences parents make in their rearing of boys and girls are few and small, often fluctuating in direction across studies. There was, however, some indication that boys received more physical punishment, than girls, although, typically, this difference was not statistically significant. The only socialization area that displayed a significant effect was encouragement of sex-typed activities.
These apparent contradictions call our attention to the need to think critically about the possibility that parents treat boys and girls differently. The socialization areas included in Lytton and Romney's (1991) review can not be considered to be exhaustive, and it is possible that investigations of alternative indicators of parent-child interaction in the future will yield very different results. In particular, studies of sex differences in exposure to parental EE need to be undertaken. In the adult literature there has been some indication that EE impinges differently on men and women, as Hogarty (1985) has argued that EE is only predictive of relapse in the former, not the latter. This is a highly controversial position, but one that serves to highlight the need for further investigation of such potential differences, both in terms of exposure and susceptibility. There is also evidence that parental responses to children's anger differ depending on their sex, with parents being less discouraging to anger boys than in girls (Zahn-Waxler, 1993). It is, then, advisable to remain sceptical about the conclusion drawn by Lytton and Romney (1991), that parents treat boys and girls in similar ways, until all areas of parent-child interaction have been studied.

Second, parental sex is of concern as there has been a tendency to study the influence of mothering, whilst ignoring fathering. The emphasis on the mother, reflected in Freud's writing, as well as in later empirical work, are manifestations of a historical preference for focusing on the mother-child relationship in research. This was probably the consequence of at least two different sets of reasons. The first is related to the observation that mothers have traditionally had the main responsibility for children, and have tended to spent more time with them than have fathers, and the assumption that this would make them more influential in children's lives. The second is concerned with more practical considerations. Mothers have generally been, and still are, more accessible to researchers, and are therefore more convenient as subjects. There is, however, a growing body of evidence to suggest that this may be unhelpful. A series of studies indicate that fathers play an important role in a range of parenting processes and influence children's, particularly boys', socio-emotional development (e.g., Johnson and Lobitz, 1974; Lamb, Frodi, Hwang, Frodi, and Steinberg, 1982; Lewis, 1986). There is therefore a need to reconsider the focus on the mother-child relationship that has prevailed in so much work in the past, and instead study
both parents, and explore the relative impact of both mothers' and fathers' behaviour and affect on different aspects of their sons' and daughters' functioning.

2.7 Summary and implications for this study

In the light of the evidence here presented, there can be little doubt that the parent-child relationship is intimately linked with children's conduct disorder. Over the last few decades, a wide variety of parental measures have been investigated, perhaps most notably in the present context indicators of parental discipline, harshness and aggression, as well as apathy, lack of warmth, and EE, and there is now compelling evidence that these are associated with conduct disorder in children. Indeed, it would appear that the generality of the indicators of parenting which have yielded significant results is the most striking feature of this literature. A closer look, however, makes it evident that many studies in the past have examined one particular aspect of parent-child interaction, and we still know relatively little about the relative strength of their associations with children's adjustment. The different indicators of parent-child interaction can not be expected to be independent, and there is evidence that parents who differ in the way they use authority also tend to differ along other dimensions, such as warmth and communication (Baumrind, 1966, 1967), and that criticism and hostility are reflected in the amount of negative actions towards the child (Richman, Stevenson and Graham, 1982). There is, then, a need to disentangle the relative effects of these various indicators, while considering as wide as possible a range of measures of parenting, reflecting both the behavioural and emotional dimensions, and ideally taking account of both parents. Such clarification would not only be of some theoretical interest, but may suggest what methods for intervention will be most effective, and offer some clues about which mechanisms account for the observed relationships. This study represents an attempt to begin to address this issue, contrasting maternal EE with various aspects of parental behaviour.

In addition, there are some further considerations which are more specific to the EE literature. The first of these is that we know little about sex differences, both in terms of exposure to parental EE, and the pattern of associations
between the EE sub-scales and child outcomes. The second is that the child outcomes shown to be associated with EE in the past have been based, wholly or partly, on parental reports, raising doubts about the meaning of these results. It is possible that the finding that parental criticality is associated with children’s conduct problems can be explained by a reporting effect, by reference to situation-specific manifestations of a poorly functioning parent-child relationship. One approach to examine this is to compare the relationship between parental EE and conduct problems that have been assessed in different ways, in an attempt to investigate if the relationship involving conduct problems rated on the basis of parental reports can be generalised to problems that are observed by others. In this thesis this issue is addressed through a study which contrasts the association between parental behaviour, and maternal criticality and hostility, on the one hand, and children’s conduct problems, assessed on the basis of an interview with the child’s mother, as well as a teacher questionnaire, on the other. Although this cannot provide a conclusive answer to the question of the nature of the previously obtained results, it does give some indication of the generality of the proposed relationship.

Finally, in order to evaluate claims about potential sex differences exposure and susceptibility to adverse parenting, boys and girls will be consistently analysed separately.
Chapter 3

EXPERIENCES OF PARENT-CHILD INTERACTION IN CHILDHOOD AND ADULT DEPRESSION AND SELF-ESTEEM: EVIDENCE AND METHODOLOGICAL ISSUES

3.1 Introduction

The association between adverse parenting and childhood conduct problems has been discussed in the previous chapter. However, the influence of the family is not thought to end in childhood, and interest in how experiences originating in the family affect children in the long term has grown over the century. In particular, the parent-child relationship is considered to be an important marker for later adjustment, and scientists, therapists, biographers and authors alike have sought to understand the individual by reference to early emotional circumstances. Indeed, assumptions about the importance of family relationships to children's later functioning are so widely held that we may forget that the understanding they give us on an individual level is almost always post hoc. However, it lies in the nature of scientific endeavour to seek to predict, and systematic investigations of the relationship between parenting and adult adjustment have yielded some interesting results.

The present investigation takes a particular interest in the association between parent-child interaction and adult self-esteem and depression. There are a number of reasons why these outcome variables were of particular interest in this context. One of these was the availability of a measure of maternal EE in childhood. As was discussed in Chapter 2, the implicit message in parental EE, one of criticality and rejection, suggest a potential link between this construct and children's low self-esteem. This link is one of considerable interest and is further elaborated below. Self-esteem, in turn, is argued to be related to depression (Beck, 1967; Brown,
Andrews, Bifulco and Veiel, 1990; Brown, Andrews, Harris, Adler and Bridge, 1986; Ingham, Kreitman, Miller, Sashidharan and Surtees, 1987; Lewinsohn, Steinmetz, Larson and Franklin, 1981; Miller, Kreitman, Ingham and Sashidharan, 1989; Rehm, 1977). Questions then arise about the potential link between early experiences of parenting and both adult self-esteem and depression. Although this is an area in which a certain amount of research has already been undertaken (eg Bemporad and Romano, 1992; Brown, Bifulco, Veiel and Andrews, 1990; Gerlsma, Emmelkamp and Arrindell, 1990; Holmes and Robins, 1988), this has typically relied on retrospective recall of parenting, and prospective studies are needed to complement these. In addition, there are important questions about the reliability and validity of retrospective recall in the area of parent-child interaction which need to be addressed, to allow us to better assess research results generated using this methodology, and to consider the application of it in the future.

The link between adult depression and self-esteem on the one hand, and conduct disorder on the other, may be less obvious. However, the empirical evidence for a relationship between adverse parenting and conduct disorder, and the association between conduct disorder in childhood and a range of adult problems (eg Robins, 1966; Robins, 1974; Robins, West and Herjanic, 1975; Zoccolillo, 1992), has already been pointed out in Chapter 2. It was noted that conduct disorder is associated not only with antisocial adult behaviour, but also with adult functioning more generally, including affective problems (Zoccolillo, 1992). There is, therefore, now considerable evidence that focusing on homotypic continuity, where behaviours persist in a similar form, is not sufficient. Rather, more recent studies indicate that we should take a serious interest in potential heterotypic continuity, where behaviours that are different in form are linked through some underlying process. Depression may be particularly interesting in this context as childhood conduct disorder is known to show high levels of co-morbidity with childhood depression (Anderson, Williams, McGee and Silva, 1987; Fleming, Offord and Boyle, 1989; Harrington, 1989), and there is evidence that childhood depression persists into adulthood (Harrington, Fudge, Rutter, Pickles, and Hill, 1990), thus creating a potential spurious association between conduct disorder and adult depression. This potential association between conduct disorder and adult depression may also be evident when examining links between conduct disorder and
adult self-esteem, the latter of which is known to be related to depression (Brown, Andrews, Harris, Adler, and Bridge, 1986; Ingham, Kreitman, Miller, Sashidharan and Surtees, 1987; Lewinsohn, Steinmetz, Larson and Franklin, 1981; Miller, Kreitman, Ingham and Sashidharan, 1989. In addition, the relationship between conduct disorder and antisocial outcomes is a well researched area, whereas the potential heterotypic continuity between conduct disorder and affective problems is less explored, and therefore in more immediate need of scientific attention.

Although not all of the possible links outlined above will be explicitly addressed here, these considerations lend justification for the present study to focus on the relationship between parent-child interaction and later depression and self-esteem in the long term, in addition to the previously discussed interest of the relationship between such interaction and conduct disorder.

In this chapter the evidence that parent-child interaction has long term effects, in particular in relation to children's adult self-esteem and depression, and related methodological issues will be discussed. Sections 3.2 and 3.3 introduce features of the two outcome measures, depression and self-esteem, respectively, and Section 3.4 discusses the link between the two. Section 3.5 explores the need for retrospective data and problems associated with it. This qualifies the empirical evidence of an association between experiences of adverse parenting and depression, presented in Section 3.6, and adverse parenting and self-esteem, found in Section 3.7. Finally, against this background, Section 3.8 specifies further aims of this thesis.

3.2 Depression

Depression generally refers to a state of dysphoric mood, and feelings of hopelessness, which are not merely temporary, and which are different from the unhappiness in the face of adversity which is part of normal human experience. To clarify this, Harrington (1989) made the distinction between depression as a symptom and a syndrome, the latter of which represents psychiatric disorder, and implies more than an isolated symptom, 'rather, a cluster of symptoms combine to form a symptom complex' (p.13). This is a notion which has tended to form the basis for diagnostic
criteria, which generally demand that a number of predefined symptoms are present, including low self-esteem, sleep and eating disturbances, and difficulties in concentrating and making decisions.

Depression is, however, not a unitary diagnosis, and distinctions made between different sub-categories of the disorder are based on both empirical evidence and theoretical positions. This means that they are rarely undisputed, and hardly ever universal. One of the more commonly used sub-classifications, used by DSM-IV (American Psychiatric Association, 1994), distinguishes between dysthymic disorder and major depressive disorder, on the basis of severity, chronicity and persistence. Usually, dysthymic disorder is characterized by less severe, but more chronic symptoms, whereas major depressive disorder consists of a single episode, or recurrent episodes, which can be distinguished from the individual's normal functioning.

Depression is one of the most common of the psychiatric disorders, affecting approximately 3.2 percent of men, and 6.4 percent of women at any particular point in time (Paykel, 1989). The greater prevalence of depression in women compared to men is now well established, with most studies undertaken in industrialized countries finding twice as many women as men to be depressed (Boyd and Weissman, 1981; Nolen-Hoeksema, 1987, 1990). However, there is some evidence that the gender gap is narrowing, and the rates of affective disorders in young people may be increasing in general (Weissman and Klerman, 1989). While these high rates of prevalence of depression, and its impairment of the functioning of affected individuals and their families, should draw our attention to the importance of developing an adequate understanding of the disorder, the higher frequency in women suggests sex differences either in exposure or susceptibility to risk factors, indicating that there may be advantages to consider the two sexes separately.

There is a large literature on the aetiology of depression, spanning a range of social and biological factors. Most of these lie beyond the subject of this investigation, and are therefore not considered here. However, one particular area of interest is the relationship between parenting and depression, and this will be discussed below.
By contrast to depression, self-esteem is always present. Traditionally, it was thought to develop in parallel to the emergence of the self. Early differentiation of the ego produces a concept of the 'existential self', self as a subject (Lewis, 1979). In addition to the 'existential self', there is another, more objective sense of self termed the 'categorical self'. This has been discussed by James as the 'empirical self', by Cooley as the 'social self' and by Mead as the 'me' (Lewis, 1979). It has been argued to be a personal judgement of worthiness that is expressed in the attitudes held towards self' (Coopersmith, 1967). However, this comprises the attitudes of others about oneself as seen by oneself, and has a perceived objectivity due to its mostly exogenous origins (Coser, 1977). Mead’s ‘I’ is the response of the individual to these perceived attitudes, where this response is dependent on the attitude of the ego in evaluating the 'me' (social cognition) and the strength by which this function is carried out (ego strength). The overall acquisition of self is seen as dependent on a cognitive as well as a behavioural structure that arises out of interaction with and reinforcement from the environment, language playing a major part (Mead, 1934). These descriptions clearly emphasize the importance of others in the development of self and self-esteem.

As for depression, there is some evidence of sex differences in self-esteem, again to the disadvantage of women (see Skaalvik, 1986 for a review). There are a number of theoretical reasons why we might expect there to be differences in the self-esteem of men and women. These include references to women’s social and financial dependency (Thompson, 1972; Olowu, 1985), derogation of the female body and sexuality (Thompson, 1950), conflicting role expectations towards females (Burns, 1979; Hacker, 1951), and female sex role stereotypes being less valued than male sex role stereotypes (Broverman, Vogel, Broverman, Clarkson and Rosencrantz, 1972; McKee and Sheriffs, 1957). Results from empirical studies have not always been in agreement with these theoretical positions. Two widely cited reviews of the literature both failed to find any evidence for consistent sex differences (Maccoby and Jacklin, 1974; Wylie, 1979). However, Wylie concluded that the resolution of the question of sex differences in self-esteem awaits further, and methodologically sounder research.
In a more recent review, Skaalvik (1986) argues that these negative findings may be partly due to problems in the research designs and measures used in the past. He expresses particular concern about the great range of indicators of self-esteem, and the relatively limited strength of the correlations between them, the lack of consideration for possible age- and race-variations, and the failure of investigators to take into consideration the impact of psychological centrality. That is, the impact of a particular component of global self-esteem will depend on subjective appraisal of the component's importance (Rosenberg and Pearlin, 1978). For this reason, it is arguably preferable to rely on measures which are context free (Skaalvik, 1986). With these considerations in mind, Skaalvik reviewed 29 studies published between 1975 and 1985, concluding that there were indeed strong indications that males had higher self-esteem than females. Moreover, the possibility of different overall levels of self-esteem, and differences in the factors that determine these levels for the two sexes, suggest the need to study men and women separately in this context.

3.4 Links between self-esteem and depression

Conceptually, self-esteem and depression are intimately linked, with a negative view of self being one of the defining characteristics of depression (American Psychiatric Association, 1994). Furthermore, there is strong theoretical support for an important relationship between the two. In both Beck's (1967) and Rehm's (1977) models a negative view of self is one of the essential aspects of depression, and Rehm (1977) suggested that this is based on stringent standard-setting as well as being influenced by negative self-monitoring and a depressive attributional style.

Empirical studies of the possible link between self-esteem and depression have generally found low self-esteem to be positively associated with depression (Brown, Andrews, Harris, Adler, and Bridge, 1986; Ingham, Kreitman, Miller, Sashidharan and Surtees, 1987; Lewinsohn, Steinmetz, Larson and Franklin, 1981; Miller, Kreitman, Ingham and Sashidharan, 1989). There has been some evidence that low self-esteem anticipates the onset of depression, thereby essentially representing a vulnerability factor for psychiatric disorder (Miller, Kreitman, Ingham
and Sashidharan, 1989). However, evidence about the nature of the relationship and, in particular, the direction of effects has not been entirely consistent. In one study there was some indication that self-esteem falls about the time of a depressive disorder, but the results did not indicate any predictive role for low self-esteem (Lewinsohn, Steinmetz, Larson and Franklin, 1981). Similarly, Brown and colleagues (1986) did not find any predictive role of self-esteem on its own, although they concluded that there is a two-way interaction between support and negative evaluation of self, both of which may contribute to the risk for depression in the face of a provoking agent.

These ideas have since been elaborated in a series of papers based on a longitudinal study. In the first paper, concerned with the prediction of onset, it was concluded that only negative evaluation of self represented a vulnerability factor for depression, predicting onset in the face of a severe event (Brown, Bifulco, and Andrews, 1990a). This study also established the importance of self-esteem, or evaluation of self, for the course of depression. In a second paper, positive evaluation of self and absence of negative evaluations of self have been found to be related to subsequent recovery or improvement (Brown, Bifulco and Andrews, 1990b). There is, then, some evidence that self-esteem plays an important role in the aetiology of depression.

3.5 Retrospective data

To date, studies concerned with the relationship between parent-child interaction, children's depression and self-esteem in the long term have largely relied on retrospective data (e.g. Hickie, Parker, Wilhelm and Tennant, 1991; Holmes and Robins, 1988; Parker, 1979; Perris, Arrindell, Perris, Eiseman, Van der Ende and Von Knorring, 1986; Perris, Maj, Perris and Eiseman, 1985). While this is understandable from a practical perspective, it is also one which has provoked considerable criticism. This section introduces the need for retrospective data and the problems which have been argued to be associated with it in order to highlight the most serious methodological problem of this literature, before examining the empirical evidence it
has provided.

3.5.1 The need for retrospective data

In many ways retrospective recall is second best, and the superiority of prospective data in developmental psychopathology remains undisputed. Prospective data has a number of advantages, some of which have been pointed out by Rutter (1988). One of these, which deserves particular emphasis here, is the possibility of obtaining better precision of timing and measurement than is assumed to be possible with retrospective data. In Rutter’s words, 'the most obvious advantage of longitudinal data is that frequently they allow a better delineation of the hypothesized risk factor. It has been well demonstrated that some kinds of retrospective recall are open to a variety of biases created by people’s situation at the time of recall or by events and happenings during the intervening years’ (Rutter, 1988, p.3). However, prospective longitudinal studies are both costly, and time-consuming, and data from existing such studies will continue to pose problems in terms of unanticipated variables of interest, which will be dependent on retrospective recall for examination (Quinton, 1988). Moreover, the production of appropriate longitudinal data sets inevitably involve a long delay between the initial data collection and the follow-up. There is, therefore, often a need to complement prospective data with measures obtained through retrospective recall.

3.5.2 Problems associated with retrospective recall

However, at present retrospective recall does not enjoy much status in the scientific literature, a trend which may well have begun with Freud. Although there is evidence that Freud originally believed his patients accounts of abuse to be true, this view, he was made to understand, was both socially and scientifically unacceptable. Following initial adverse reaction to his work, he soon came to reject these ideas, and instead developed his theory of infantile sexuality, and his belief that many sexual experiences reported by patients were fantasies (see Masson, 1984).
We may like to think that psychologists today give more credence to patients' accounts than did the early psychoanalysts, but similar ideas have been put forward by a number of more recent scholars. Burbach and Borduin (1986) argue that 'numerous researchers have reported data which suggest that depression can severely distort memory and perception', and conclude that 'the validity of retrospective data obtained from depressed patients and their families is questionable at best' and (p. 146). Lewinsohn and Rosenbaum (1987) are more general in their criticism, when stating that 'retrospective memory should probably never be construed to represent what really occurred' (p. 618).

Indeed, there are a number of theoretical reasons why we may doubt both the reliability (referring to disturbances in an indicator which are purely chance variation, or random), and validity (the degree to which an indicator is related to the concept it purports to measure) of retrospective recall. Different authors have classified the sources of error in retrospective recall in a number of ways, emphasising different aspects of the problem. Robins (1988), for example, has described three general ways in which memory can be distorted, distinguishing between forgetting (leading to denial of outcomes or precursors that actually occurred), reversal (exchange order between precursor and outcome in memory), and invention (reporting events that did not occur or exaggerating or underplaying their seriousness). However, this does not tie specific problems to the psychological processes with which they are associated. In another classification, provided by Brewin, Andrews and Gotlib (1993), the different problems are described by reference to the psychological processes thought to give rise to them. In their recent review of the existing literature they identify three sources of error: normal limitations in memory, general deficits associated with psychopathology, and mood-congruent memory processes.

3.5.3 Normal limitations in memory

Normal limitations in memory refer to the general notion of autobiographical memories as reconstructions based on the individual’s expectations and schemas, rather than as simple copies of previous experience (e.g. Neisser, 1982). This idea is
based on Bartlett’s (1932) classic memory theory, which states that recall involves construction, which is partly based on the subject’s current state, and that the recalled material may serve to justify that state. Accordingly, all memory is potentially subject to error, and should therefore be treated with some caution.

Research on the merits of a reconstructionist view of autobiographical memory has resulted in a divided picture. There is data to indicate changes in memories over time, such as in the well-known investigation by Yarrow, Campbell and Burton (1970), comparing systematic clinic and nursery school records and mother’s reports of children’s development. Maternal reports were given up to 30 years after the children’s births, and in general their correlations with clinic records were low. Perhaps more importantly, systematic biases were found, with mothers reporting fewer problems in their children’s development and overestimating their children’s abilities in comparison to the records.

However, there is also compelling evidence that memories of significant events remain accurate over long periods of time (eg Bahrick, Bahrick and Wittinger, 1975; Sheingold and Tenney, 1982). Brewin and colleagues (1993), after reviewing the literature, concluded that when adults are asked to recall salient factual information about their own childhoods this is generally accurate, especially for experiences that were unique, consequential or unexpected, although the precise time at which certain events occurred, the sequence in which they happened and their feelings and attitudes at the time may be forgotten. This is in agreement with the positive conclusions drawn by others, that much of our autobiographical memory is reasonably free of error, provided we seek to remember the broad outline of events, rather that details (Baddeley, 1990; Neisser, 1982).

3.5.4 Deficits associated with psychopathology

Another frequently cited objection is that psychopathology affects general memory functioning. Although there are some studies concerned with this relationship in anxious and schizophrenic patients, most emphasis has been placed on deficiencies in the memories associated with depression. The majority of research in this area has
departed from Atkinson and Shiffrin's (1968) stage model where memory is described by three distinct stages: sensory memory, which refers to the encoding of information; short-term memory, in which information can be held temporarily for brief periods of time; and long-term memory, where information is thought to be stored permanently. There is a considerable literature which aims to locate at which of these stages the impairment argued to be associated with depressed individuals occurs. The results yielded can, however, at present only be described as inconsistent (see Brewin, Andrews and Gotlib, 1993). Some investigators have found deficiencies in short-term memory (Colby and Gotlieb, 1988; Sternberg and Jarvik, 1976) and long-term memory (Stromgren, 1977; Whitehead, 1974), but others have failed to detect any such impairment (Cronholm and Ottoson, 1961; Hart, Kwentus, Taylor and Harkins, 1987; Henry, Weingartner and Murphy, 1983; Weingartner, Cohen, Murphy, Martello and Gerdt, 1981). Interestingly, there are now results to indicate that problems with memory associated with depression may be non-specific, and a consequence of less effort by the depressed (Cohen, Weingartner, Smallberg, Pickar and Murphy, 1982). However, the overwhelming majority of these studies have been experimental, focusing on digit spans and word lists, to be memorised over relatively brief periods of time. It is therefore questionable to what extent they generalise to more naturalistic settings.

Thus, although there appears to be a consensus that those currently depressed suffer from a certain impairment in their cognitive functioning, the exact nature of the impairment is less certain, and its implications for research using retrospective recall appear to be in need of further investigation.

3.5.5 Mood-congruent memory processes

A more general, and therefore potentially more damaging, criticism of retrospective recall is the argument that, when memory is retrieved there seems to be a tendency for the past to be interpreted in the light of the present, making previous experiences congruent to current mood and circumstances, or fitting causal stereotypes, and provide justification for the present situation. According to Bower's network theory
of affect (eg Bower, 1981, 1987) 'arousal of an emotion by whatever means primes into readiness concepts and categories that are congruent with how one is feeling' (Bower, 1987, p. 454). This is particularly worrying, as research based on retrospective recall would be subjected to systematic biases where poor outcomes were associated with previous adverse experiences, and potentially create a false coherence between theory and empirical findings. One example of an association that has been argued to be a product of such a bias is that between psychiatric disorder and reports of adverse parenting (eg Blaney, 1986; Dalgleish and Watts, 1990; Singer and Slovey, 1988; Williams, Watts, MacLeod and Mathews, 1988). In one study, Lewisohn and Rosenbaum (1987) followed a large community sample for one year and found that currently depressed subjects differed from non-depressed subjects in their recall of parental behaviour, describing their parents in more negative terms, specifically as having been emotionally rejecting.

However, this argument has been put forward with some force in spite of the fact that the literature is not altogether consistent, and there are results to indicate that psychiatrically ill patients are as accurate reporters of their early experiences as are non-patients. Brewin and colleagues (1993) make the point that even if depressed mood does alter the relative accessibility of positive and negative experiences it is equally plausible that depressed individuals will give more accurate accounts of real adverse childhood experiences than will non-depressed individuals. Reviews of perceptual and judgemental distortion seem to suggest that it is the non-depressed, rather than the depressed, who tend to be biased, although this bias is of a positive nature (Brewin, 1988; Taylor and Brown, 1988).

3.5.6 Retrospective recall: A final note

In addition, an important point which has often been overlooked by the critics of retrospective recall is that all data collected from subjects, including that obtained in prospective investigations, requests recall of some kind. Whether the period with which enquiry is concerned is the last year or childhood events experienced decades earlier, subjects will be asked to report on aspects of their lives not perceptually
available to them. It seems reasonable to expect that all these reports are subject to the same kinds of problems, but those requiring recall of recent events will be generally less vulnerable. In particular, forgetting has been shown to increase with time, although there is little agreement about the extent of loss in accuracy (Robins, 1963; Sorenson, Brownfield and Carlson, 1987). The generality of problems of recall also over short periods of time, and their link with difficulties associated with reporting should call our attention to the need to consider also the implications of reporting biases. Perhaps the most significant of these is the self-serving bias, or the tendency to present self in a more favourable light than is realistic. Janson (1990) has pointed out that false positives, on the whole, are more prominent when socially valued and ego-enhancing actions are concerned. Similarly, questions regarding socially undesirable behaviour are expected to attract more false negatives. It is doubtful if recall referring to events occurring a long time ago is more vulnerable to this form of bias than is recall of more recent incidents.

Another set of issues is associated with differences in the reliability and validity of retrospective recall depending on the nature of the material to be recalled. There may be a meaningful distinction between factual information, which is concerned with observable facts, and evaluative information, which depends on individual perception and judgement, and personal standards. Evaluative accounts are therefore personal and may, or may not, coincide with that of others even at the time of the event. There is also some indication that they may be particularly prone to influence from later experience. It has been found that some kinds of data, such as reactions to earlier experiences, attitudes, feelings of self-worth, at earlier times, are especially unlikely to be reliably recollected (Wadsworth, 1988), whereas it is argued that experiences themselves may be usefully recalled (Robins, Helzer, Weissman, Orvaschel, Gruenberg, Burke and Regier, 1984; Robins, Schoenberg, Holmes, Ratcliff, Benham and Works, 1985).

It is therefore questionable to what extent we can draw any general conclusions about the reliability and validity of retrospective data. It appears to be better or worse broadly depending on the time that has elapsed between event and recall and the nature of the material involved. Until we have a more definite understanding of the processes which guide retrospective recall, and the areas in which
it is sufficiently reliable and valid to base research on, there is a need to view results derived wholly, or in part, from retrospective accounts with some reservation. There can only be advantages with seeking affirmation of the conclusions drawn in studies using this approach in investigations using less controversial methods, whilst continuing to examine different aspects of recall. However, regarding many areas of family life, empirical investigation of these issues present great methodological difficulties. While the studies aimed at evaluating retrospective recall discussed above have typically compared subjects’ accounts with some more objective standard, often official records, this is generally not possible when examining parent-child interaction, where alternative indicators are often lacking. Another approach is to compare the accounts of different individuals involved in a situation or series of interactions. Although not ideal for answering all questions, it does shed some light on the way in which different parties’ accounts differ systematically in a particular area, and may suggest to what extent we are justified in relying on either. It was adopted by Bifulco, Brown and Harris (1994) in a recent study comparing sisters’ recall of parenting experiences, such as parental control and indifference. The authors concluded that agreement was relatively high, thereby suggesting that retrospective recall of parent-child interaction may be adequate. This is encouraging in an area where prospective data still is sparse. However, further work is needed, both to replicate these results and establish under what circumstances reliable and valid recall can be obtained, and to compare retrospective reports to adequate prospective data.

3.6 Experiences of parent-child interaction and adult depression

3.6.1 Early loss of parent, parent-child interaction and depression

The view that adverse childhood experiences put the individual at risk for adult malfunctioning and depression has been prevalent both in the psychoanalytic and psychiatric literature for some time. Of the former, Freud has suggested that early loss of love, or a love object, may result in depression as a pathological solution, and Abraham has argued that a childhood depressive episode due to early maternal
rejection may be re-experienced in adult melancholia (see Bemporad and Romano, 1992), the latter being a suggestion which Bowlby (1951) later extended to include other disorders. These notions have given rise to a large literature on the effects of early maternal loss, and maternal separation. However, results regarding the aetiological role of loss of mother per se are inconsistent, leading some reviewers to doubt it (Crook and Eliot, 1980; Tennant, Bebbington, Hurry, 1980), while others have drawn only cautious conclusions (Finkelstein, 1988; Lloyd, 1980; Nelson, 1982; Richards and Dyson, 1982). Instead, there is evidence that it is the quality of the relationship with parents in childhood which has an influence on later depression (Munro, 1966; Abrahams and Whitlock, 1969). In his later writings, Bowlby (1969) no longer focused on the loss, but instead emphasised the disruption of the child's attachment to the parents. Rutter (1972) went even further in pointing out that separation from a parent can lead to adverse experiences far beyond the stresses of the loss of attachment, which may be of crucial importance for subsequent psychopathology.

In this tradition, in a highly influential series of epidemiological studies of women, Brown and Harris (1978) found that early loss of mother was strongly correlated with depression. It was later hypothesised that the loss of mother represented the loss of an important source of reward, and had its effect through its impact on self-esteem and mastery. This suggestion was investigated in a later study which sought to assess the nature of the impact of this loss in a group of women who had been exposed to maternal death or prolonged maternal separation (Brown, Harris and Bifulco, 1986). It was concluded that childhood loss may give rise to very different experiences, and that it was the quality of these which was associated with depression. It was particularly common among those who later became depressed to come from a lower socio-economic background, where they could not be adequately cared for by the remaining parent, and therefore had to be sent to institutions, or to be cared for by relatives who tended not to welcome the additional burden. These post-loss situations were generally recalled unfavourably, with subjects reporting that they never felt accepted, secure or acknowledged, experiences which the authors described as 'lack of care'. Such 'lack of care' was, in turn, associated with adverse adolescent and adult sequelae, where women sought to escape through early marriage,
often to an unsuitable spouse as a result of a pre-marital pregnancy. The consequences were typically a poor marriage, early burden of motherhood and lack of scholastic qualifications. In the long term these women tended to have many children, no employment outside the home, and very limited social support. Lack of care, then, seemed to set in motion events leading to a life path which made women vulnerable to depression. By contrast, women subjected to maternal loss under more favourable financial circumstances were usually kept at home and provided mother substitutes. Their quality of life was positive enough for them to remain at home in order to complete their education, selecting more appropriate spouses and facing motherhood at a more mature age. This was also true for the few economically disadvantaged girls who were kept at home and enjoyed favourable circumstances, suggesting that it was not the financial situation per se, but rather the emotional climate to which they were subjected, and the later experiences this provoked, which were influential.

3.6.2 Experiences of adverse parent-child interaction and adult depression: Retrospective evidence

The suggestion that it is not parental loss per se, but rather decline in the quality of parenting that tends to be associated with depression has led a number of researchers to focus on the long term effects of adverse parenting. A large number of studies have reported a link between parental behaviour and the mental health of children in adult life, and these have included investigations of the relationship between a multitude of aspects of parent-child interaction and a variety of indicators of children’s maladjustment (eg Andrews, Brown and Creasey, 1990; Brown, Bifulco, Veiel and Andrews, 1990; Gjerde, Block and Block, 1991; Holmes and Robins, 1988; Parker, 1979). The overwhelming majority of these studies are based on subjects' retrospective recall of their childhood circumstances, and it became necessary to develop reliable schedules to assess poor parental care, or adverse parenting. Interestingly, a number of similar schedules were developed independently in the late seventies.
The parental Bonding Instrument (PBI), designed by Parker, Tupling and Brown (1979), is one of these which has been used particularly frequently. It was designed to provide a measure of perceived parental care and overprotection during the first 16 years of life. A series of studies have demonstrated the link between low parental care, as estimated by the PBI, and affective disorders in adulthood. In one such study, Parker (1979) found that both neurotic depression and non-clinical depression in a normal group were associated with reports of low levels of parental care and high levels of parental overprotection. More recently, Hickie, Parker, Wilhelm and Tennant (1991) observed that parental affectionless control, again measured by the PBI, was associated with depression.

Another measure, the EMBU ('Egna Minnen Betraffande Uppfostran', translated as 'own memories of childhood rearing experiences') was simultaneously and independently developed in Sweden (Perris, Jacobsson, Lindstrom, Von Knorring and Perris, 1980). This inventory generates factors relating to parental warmth, rejection, and overprotection, and global judgement scores of the severity and consistency in rearing attitudes. Studies using the EMBU to assess parenting have found that depressed patients rate their parents lower than controls on emotional warmth, and as less consistent in their rearing attitudes than controls (Perris, Arrindell, Perris, Eiseman, Van der Ende and Von Knorring, 1986; Perris, Maj, Perris and Eiseman, 1985).

Other studies have employed a multitude of other measures of parenting, usually incorporated in structured or semi-structured interviewing, but have arrived at comparable conclusions. It has, for example, been shown that depressed mothers tend to describe their own mothers as having shown them less warmth and subjected them to harsher discipline than their non-depressed counterparts (Pound, Cox, Puckering and Mills, 1985). Similarly, in an intergenerational population study considering separately the impact of parenting experiences involving mothers and fathers (Andrews, Brown and Creasey, 1990), it was found that disorder in daughters related to their retrospective reports of adverse family experiences involving parental antipathy, neglect and physical and sexual abuse. Also Holmes and Robins (1988) found a strong relationship between reports of harsh or unfair punishment during childhood and the adult diagnosis of adult alcohol abuse and/or dependency, and a
major depressive episode. Jacobsen, Fasman and DiMascio (1975) compared retrospective reports of experiences of child rearing and depriving events in inpatient and outpatient groups of depressed women, and in a normal control group. They found that inpatients reported having experienced the most unfavourable child rearing practices overall, and normal subjects reported enduring the least rejection and overprotection, and the most affection in their childhoods. Hallstrom (1987) found that women suffering from a major depressive episode reported an unhappy childhood with more frequently occurring corporal punishment, feeling misunderstood by parents and a poor relationship with mother, significantly more often than did a control group of women without a history of depression. Similarly, Crook, Raskin and Eliot (1981) noted that rejection of the child and control through psychologically damaging techniques, such as withdrawal of affection and manipulation through guilt and anxiety, was more frequently reported by depressed patients than by controls.

Bemporad and Romano (1992), in a review of the literature on childhood maltreatment and depression, concluded that the great majority of studies they examined supported the hypothesis that adverse child-rearing experiences are linked with adult depression. Similar conclusions were drawn in a meta-analysis of studies concerned with the link between retrospective recall of parenting and adult anxiety and depression (Gerlsma, Emmelkamp and Arrindell, 1990). On the whole, it was concluded that depression was associated with low levels of parental affection and high levels of parental control. The results of different studies were, however, heterogeneous, and systematic differences were found for different diagnostic sub-groups. While the relationship between low parental affection and depressive status proved consistent, high parental control was only found to be significantly related to neurotic and unspecified depression. This meta analysis also suggested a sex of subject by sex of parent interaction, with effects being larger for the same sex parent. However, this conclusion was based on a relatively small number of comparisons, and the authors note that the potential importance of sex has often been ignored in the past and suggest that it should be studied routinely in the future.

There is, then, considerable support for the notion that early adverse experiences of parenting are associated with depression in adult life. Unfortunately, much of this evidence, although intuitively appealing, suffers from methodological
shortcomings. It could be argued that the variety of indicators of parent-child interaction, the diversity of the ways in which these measures have been obtained, and the consistency of findings which link them to adult affective problems leave little room for doubt as to whether or not parenting has long term implications for children’s affective status. However, the studies discussed hitherto have exclusively been based on subjects’ retrospective reports of their parenting experiences. The difficulties with this kind of data have already been discussed at some length, and, given the particular problems associated with memory processes of depressed subjects, and difficulties linked to mood-congruent recall, there can be little doubt that this is a context in which we need to be particularly alert to systematic sources of bias. Although this is a complication which many authors have failed to acknowledge, others have discussed it thoroughly, and occasionally it has, at least to an extent, been addressed in the design of their studies. Thus, Holmes and Robins (1988), used life-time diagnosis, rather than one referring to current state, which meant that their data was less likely to be influenced by mood-congruent processes, and memory deficits specifically associated with acute depression. Even so, prospective investigations, with accounts of parent-child interaction that are not contaminated by knowledge of later outcomes or potential depressive biases, are needed to affirm, or, as the case may be, cast doubt on the evidence generated by investigations based on retrospective recall of parenting experiences.

3.6.3 Experiences of adverse parent-child interaction and adult depression: Prospective evidence

To date, data sets in which such investigations are possible are not abundant, and the work undertaken has relied on surveys which were planned with intentions that were somewhat different from those here discussed. Consequently, the prospective data, when available in some form, has often not allowed authors to focus on parent-child interaction in the same way as the studies drawing on retrospective data, making the comparability of studies very limited.

One of the samples in which prospective analysis has been possible,
however, is the National Survey of Health and Development (NSHD). This is a follow-up study of a large, stratified birth sample, with data having been collected at frequent intervals, covering home and family background, health, education, employment, behaviour and attitudes (for an overview, see Wadsworth, 1987, 1991). Using this data, Rodgers (1990) examined the relationship between adult affective disorder and family factors such as parental death, parental marital separation, child’s separation from parents. Interestingly, this study also included an examination of maternal management and understanding of the child. This was rated by health visitors when the child was aged four, and was concerned with evidence of sympathy and understanding, with mothers being grouped as average, among the best and among the worst. Although there was little difference in the affective symptoms, as reflected in the Present State Examination (PSE) scores (Wing and Stuart, 1978), between those brought up by mothers who were rated average and among the best, children of the worst mothers had comparatively higher PSE scores.

In a considerably smaller study, Gjerde, Block and Block (1991) observed the interaction between 5 year old children and their mothers, and, to the extent possible with their fathers. Each parent was rated on his or her positive engagement, authoritarian control and cognitive resourcefulness, and the relationship between these variables and the child’s self-report of depressive affect 13 years later was examined. There was a significant positive correlation between dysthymia in daughters and maternal authoritarian control, lack of cognitive resourcefulness, as well as lack of positive engagement. There is, then, some suggestion that aspects of parent-child interaction are of relevance for affective symptoms also when this interaction is assessed prospectively.

3.6.4 Mechanisms accounting for the link between experiences of parent-child interaction and adult depression

However, the basis for the association between parenting and adult depression is not altogether clear, and a number of potential mechanisms accounting for it have been put forward in the past. Rutter (1986) has enumerated these as follows: first,
experiences of adverse parenting may lead to childhood disorder, which persists into adulthood; second, they may induce physiological changes which affect later functioning; third, they may lead to altered patterns of behaviour, which only some time later takes the form of disorder; fourth, they may lead to changed family circumstances which, in turn, predispose to later disorder; fifth, they may alter sensitivities to stress or modify styles of coping, which may increase vulnerability to disorder in the presence of provoking agents; sixth, they may alter the self-concept, attitudes or cognitive set in a way which predisposes the individual to later problems; and seventh, they may impact on later functioning by opening or closing opportunities.

In the context of adverse family experiences it is also necessary to consider genetic loading as a further possible way in which problematic behaviour is transmitted. Adverse family interaction and poor parenting may reflect constitutional weaknesses of the individuals involved, and children may inherit these from their parents, thereby acquiring a genetic predisposition to a variety of difficulties which may be directly related to psychiatric disorder, or may be associated with behaviour that indirectly puts the individual at risk. Clearly, it is beyond the scope of any one study to address each of these potential links simultaneously, and the present investigation is no exception. I will, therefore, only discuss further those mechanisms of direct relevance to the present study.

Perhaps the most obvious mechanism of those listed above is the possibility that the problems observed in adulthood are best understood as a continuity from problems that arose in childhood. The present study is particularly concerned with heterotypic continuity from childhood conduct disorder, which has been shown to be associated with a wide variety of poor adult outcomes, some of which are qualitatively different from the original behaviour problems. In a recent study, focusing on more general adult social functioning as an outcome, Maughan, Pickles and Quinton (in press) found that the effects of harsh parenting arouse largely through continuities from childhood disorder. Especially for men, the links from conduct disorder were strong, with a somewhat less clear pattern emerging for the women. However, not all associations between adverse parenting and children’s later adjustment problems can be understood in terms of continuity from difficulties that were already manifest in childhood, as there is evidence to indicate that aspects of
parenting are associated with adult depression also in the absence of childhood misbehaviour (Holmes and Robins, 1987), making it necessary to consider alternative explanations.

Occasionally authors have questioned the meaning of the findings here reported, viewing the relationship between parenting and later depression as an epiphenomenon, and arguing that other factors, associated with inadequate parenting, may be the real cause of poor adult adjustment. The most obvious candidate for such a role is socio-economic status (for a review, see Dohrenwend, 1990), but the evidence to date is not convincing. Rodgers (1990) reported that although low SES in childhood was found to be a weak predictor of later affective symptoms, it seemed more likely that family disruption and parental behaviour and attitudes were underlying agents of this relationship, rather than vice versa. Holmes and Robins (1987), also ruled out the third variable explanation, finding that harsh discipline was the best single predictor of adult depression and alcoholism.

Early experiences of adverse parenting may also affect children’s later outcome through influences on important aspects of the personality, including temperament, attitudes and behavioural disposition, in a way that makes the individual vulnerable to psychiatric disorder. One of the most frequently cited ways in which this may occur is through affecting the child’s self-esteem, evaluation of self, or self-concept in a negative way, thereby leaving him or her more vulnerable to later depression. Thus, Crook, Raskin and Eliot (1981) have argued that ‘the depressive’s view of himself as worthless and inferior derives, in part, from an early parent-child relationship’ (p.956-957). Similarly, Blatt and Homann (1992) concluded that patterns of caring relationships are internalised by the child as mental representations, with impaired representations, based on disturbed relationship, creating a vulnerability to depression. In particular, avoidant and insecure attachment is thought to potentially result in depression which is focused on issues surrounding self-worth and self-criticism.
There has been extensive theoretical speculation and empirical investigation about the determinants of self-esteem, and it would be over-ambitious to attempt to review this literature comprehensively. I will, therefore, limit my discussion to those factors which are of direct relevance to the present investigation, that is aspects of the parent-child relationship. The area has attracted the interest of scholars from a variety of different backgrounds, many of whom agree that parent-child interaction is an important influence on the child’s emerging evaluation of self. A number of both psychoanalytic and cognitive theorists agree that adverse early experiences may create psychological vulnerability through negative self-perceptions or self schemas, leading to an increased risk of psychopathology in adulthood. An early example of this is Beck’s (1967) formulation that negative schemata have their origins in children’s early interactions with their parents. Others have conceptualised self-esteem as a consequence of one’s criticality to oneself, itself intimately linked to parental approval. Blatt (1974) proposed that the development of self-criticism is driven by fear of losing the approval of parents who are cold, harsh, demanding and judgemental. McKay and Fanning (1992) refer to the ‘pathological critic’ to describe the negative inner voice that attacks and judges the self. This, it is argued, is largely dependent on messages one has received in childhood, ‘during the earliest experience of socialization by ... parents’ (McKay and Fanning, 1992, p. 18). McKay and Fanning (1992) identified several factors that determine the strength of the pathological critic. Two of these have direct relevance to the present discussion. The first is the degree to which parents failed to differentiate between behaviour and identity. That is, parents who are critical of their child in general, rather than just noticing the particular inappropriate acts which he or she may carry out. The other is the frequency of negative messages from the parents to the child. It then follows that we should expect parental criticality and hostility to be associated also with children’s self-esteem.

When examining the evidence presented above, it appears that a number of indicators of the parent-child interaction that have been shown to be associated with affective problems are constantly recurring. Lack of warmth, affection, or acceptance, as well as overt rejection, criticism and hostility all appear repeatedly, suggesting as
a central theme a tendency for parents to fail to acknowledge and appreciate the child. The message such parental behaviour and attitudes transmit to the child is one of depreciation, a blunt statement of the child’s lack of value and of the absence of love. If such parental attitudes are internalised by the child, they would lead to self-depreciation, or negative evaluation of self. Another aspect of parenting which has been shown to be important for later depression is harsh discipline. The meaning of such experiences, often involving physical punishment, to a young child is perhaps not completely obvious. However, they may be reasonably expected to instill fear in the child, and, if inconsistent, create a sense of lack of control, as well as being demeaning. Both these sets of variables, then, offer scope to argue for a potential process whereby depreciation, or lack of respect for the child is expressed, and may become internalized.

There is empirical evidence to support the notion that adverse parenting has a negative effect on children’s self-esteem, both in the long and short term. The results from Rosenberg’s (1965) classical study indicated that it is influences internal to the family, rather than more broadly based societal effects, that affect self-esteem (Rosenberg, 1965). Similarly, in a prospective study, maternal reports of maternal and parental warmth were observed to be significantly associated to children’s high self-concept seven years later (Sears, 1970). More recent evidence lends further support to these pioneering findings. In one study self-criticism, as measured by the Depressive Experiences Questionnaire (Blatt, D’Afflitti and Quinland, 1976) was associated with a tendency to describe parents as emphasising strict control and expressing inconsistent affection McCraine and Bass (1984). Another study found that children’s low self-esteem was associated with maternal use of affectively charged negative statements (Goodman, Adamson, Riniti, Cole, 1994). Parallel suggestions have been made by Brown and colleagues (1990), who examined this issue in a long term perspective. In their well-known series of studies on self-esteem in women, they concluded that negative evaluation of self (NES) was related to early inadequate care, involving prolonged marked or moderate indifference, or lax control on the part of the parent, or surrogate parent (Brown, Bifulco, Veiel and Andrews, 1990). They proposed a model which takes into account both early parenting experiences, and current circumstances. In this model early inadequate parenting predicts both NES,
and negative elements in close relationships, the latter of which also predicts NES. However, both this and the study by McCraine and Bass (1984) were exclusively based on female subjects, and it is questionable how far their results can be said to generalise to men. Moreover, this literature again presents the same methodological difficulties as were seen previously, in relation to depression, with accounts of parenting being retrospective, and thereby subject to all the potential errors and biases thought to plague such data.

In a study seeking to address these weaknesses Koestner, Zuroff and Powers (1991) examined the relationship between maternal reports of parenting behaviours, reflecting restrictiveness and rejection when the child was aged 5, and the child's self-criticism at age 12. Although a positive relationship was found between these measures of parenting and the development of children's self-criticism generally, the authors note that it was particularly strong when the adverse parenting originated in the same-sex parent.

On the whole, these results are clearly very similar to those discussed previously, in relation to depression, suggesting that lack of warmth or affection, as well as negligence and rejection are linked to self-esteem, echoing the central theme of parental failure to acknowledge and appreciate the child, shown to be associated with depression. Another variable which would appear to reflect this tendency, but which has not been discussed in relation to adult outcomes so far, is EE, in particular the sub-scales referring to criticism and hostility. Extending the suggestion above, where messages explicit or implicit in parental verbal and non-verbal behaviour, such as depreciation, were argued to be internalised by the child as self-depreciation, the potential importance of parental criticality and hostility follows logically. Exposure to this could, if accepted and learned, translate into self-criticality, as suggested by authors such as Blatt (1974) and McKay and Fanning (1992). However, to date no studies have examined the relationship between parental EE, measured in childhood, and adult depression and self-esteem. A prospective investigation of the relationship between different aspects of parental behaviour and EE, and later depression and self-esteem would not only clarify the potential aetiological role parenting may play in this context, but may also shed some light on the relative importance of different indicators of parenting, which, in turn, may suggest the processes whereby these factors
influence the developing child.

Moreover, we still have little prospective data to support the notion that the relationship between adverse parenting and self-criticism, or low self-esteem, persists into adulthood, and prospective studies examining the relationship between exposure to adverse aspects of parenting in childhood and adult self-esteem in general are called for.

3.8 Summary and implications for this study

There is extensive evidence supporting the general hypothesis that adverse parenting is related to both adult self-esteem and depression. However, questions remain about which aspects of parenting are the most detrimental. The results here presented suggest that behaviour implying depreciation of the child is especially damaging. This, together with the fact that the associations between cold and rejecting parenting, and self-esteem parallel those observed in relation to depression, and the aetiological role self-esteem has been argued to play in depression, suggest the possibility that such adverse parenting leads to self-depreciation, or low self-esteem, which, in turn, represents a vulnerability to depression. However, many of the studies on which these conclusions are based have relied on retrospective recall of the quality of parenting received in childhood, and are, consequently, subject to considerable methodological difficulties, which should make us cautious to accept their conclusions without further verification.

This raises two sets of issues for further study. First, there is a great interest in further empirical work on the reliability and validity of retrospective recall of adverse parenting experiences, which has been used extensively for research purposes, but about which we still know very little. In this study this was examined through a comparison of the relationships between maternal prospective reports of various aspects of adverse parent-child interaction, and subjects' retrospective recall of parenting experiences, using structural equation modelling. This method of analysis is discussed in some more detail in Chapter 5, and the results from the empirical investigation are presented in Chapter 8.
Second, there is a need for prospective studies, based on data sets containing extensive information of both the affective and behavioural nature of parent-child interaction, which examine the relationship between parenting and adult depression and self-esteem. Incorporation of parental EE would be of great interest, as this would introduce a further measure of parenting, which appears to be of great relevance, but which has not yet been studied in this context. Here, the relationships between parenting and adult self-esteem and depression are examined in a data set incorporating both prospective and retrospective accounts of parent-child interaction. There was a concern to examine a wide range of parenting, and to include indicators of parenting which have not yet been studied in this context, in particular parental EE. Finally, given the differences in prevalence of depression between men and women, possible sex differences in global self-esteem, and suggestive evidence of the greater importance of the parenting of the same-sex parent (eg Gjerde, Block and Block, 1991; Koestner Zuroff and Powers, 1991), these analyses were undertaken for men and women separately. Given the competing explanations for the association between adverse parenting and adult depression, such studies should seek to incorporate childhood maladjustment as an alternative route from exposure to adverse parenting to adult maladjustment. Conduct disorder is, perhaps, a particularly appropriate candidate here, as it has been shown to be associated with adult adjustment problems in general, and depression specifically, as well as being related to adverse parenting. The results involving self-esteem are discussed in Chapter 9, and those concerned with depression are presented in Chapter 10.
Chapter 4

SECONDARY DATA ANALYSIS, MULTI-PHASE SAMPLES, MISSING DATA AND OUTLINE OF STATISTICAL METHODS USED

4.1 Introduction

When designing and undertaking studies it is always necessary to compromise; to do what is best, rather than what is ideal. Cost and time impose constraints on any investigation, as do ethical considerations, and a variety of concerns for subjects who provide the information, those who may use the results, policy making, and long term planning of scientific programs. Owing to such constraints, all studies are subject to certain compromises, and, depending on the purpose for which the data is approached, may have particular disadvantages. In this case, it is the task of the researcher to seek to address these, and use the data in ways which diminish their impact, and explore the potential of the data set as a whole, to the greatest extent possible.

As was pointed out in Chapter 1, the empirical work here presented was based on an already existing data set, which was derived from a prospective longitudinal study, initially based on a multi-phase sample design. Although this had many advantages, there are a number of considerations that needed to be borne in mind in analysing a data set one has not been involved in designing or collecting.

In addition, there are a number of features of this data set which needed to be considered in the statistical analysis. In this chapter the implications of the multi-phase design used to generate this data set and missing data are discussed, and some statistical approaches developed to address these are outlined. That is, during the course of the analyses a variety of different statistical approaches were employed to seek to address various aspects of the data set. Consequently, each chapter presenting the results obtained in this study also illustrate a statistical method with
particular advantages to this kind of data. The aim here, therefore, was not to provide
a comprehensive review of relevant statistical methods, but rather to describe the
approaches used in this study, a discussion which is continued in Chapter 5.

The advantages and limitations of secondary data analysis in general
are discussed in Section 4.2, and Section 4.3 describes the sample which formed the
basis of the empirical work to be presented in some detail. Section 4.4 explores
aspects of the multi-phase sample design in some more depth, discussing its strengths,
alongside the difficulties it poses for statistical analysis. These difficulties are to some
extent formalised in Section 4.5, where a classification of missing data is outlined.
Sections 4.6 and 4.7 are both concerned with statistical methods designed to overcome
these problems. The final Section, 4.8 provides a brief summary of the chapter. The
discussion about missing data and statistical analysis is continued in Chapter 5, which
also focuses on issues involving data quality and structural equation modelling.

4.2 Secondary data analysis

All the empirical findings discussed in the chapters to follow are based on an already
existing data set which was initially designed several decades before the work here
presented was initiated. This study is therefore entirely based on secondary data
analysis. Although this kind analysis has advantages, it also has its own set of
difficulties and limitations, as will be discussed below.

4.2.1 Advantages of secondary data analysis

Clearly, the most obvious advantage of secondary data analysis is resource savings,
as it requires less time and personnel. With the data already collected, the only costs
involved are those in obtaining the data from the original researchers, preparing it for
analysis, and conducting the analysis. Compared to the normal amount of time
involved in planning a study and collecting the data, the time necessary to identify and
acquire an already existing appropriate data set is minute. This also means that a
researcher can work independently, without need for other staff.

Use of large surveys, such as the National Child Development Study (NCDS), the National Survey of Health and Development (NSHD), or indeed projects of a smaller dimension, such as the Inner London-Isle of Wight comparison (Berger, Yule and Rutter, 1975; Rutter, Cox, Tupling, Berger and Yule, 1975; Rutter, Cox, Tupling, Berger and Yule, 1975) has the further advantage of making reporting easier, as many people in the field will be familiar with them, and there is a multitude of other studies based on the same data to be drawn upon. In some cases the use of such data will be of reciprocal benefit, as researchers who perform secondary analysis may provide useful input for later waves of data collection.

This may seem reason enough to encourage researchers to consider the possibilities of secondary data analysis carefully before embarking on new and costly projects, but in the context of a PhD there are further advantages. Data that has been collected by a team of experienced researchers with adequate resources is likely to be superior to that which a new student under time and funding constraints could be reasonably expected to produce. This is especially obvious regarding sample sizes, where a student working alone will be forced to confine him/herself to relatively small numbers, thereby compromising the statistical power of the tests that can be carried out. The same limitations make longitudinal studies very difficult, unless the time between the two points of data collection is very short indeed. Therefore, to work on longitudinal data that spans a considerable time a PhD student's only option is to work on already existing data.

Kiecolt and Nathan (1985) list a number of potential purposes where secondary data analyses may be particularly useful. These include using already existing data for exploratory research in preparation for a new survey to identify aspects that need further elaboration, or using them in combination with other types of data to investigate a question more thoroughly, or verify a particular result. A more obvious goal with such analyses, of which the studies to follow are an example, is to explore aspects of the data that the original researchers were not concerned with, and to answer research questions which have not been addressed in a particular data set, although it is appropriate for the purpose. Furthermore, secondary analysis may examine old data with the benefit of new theory, methods, or diagnostic criteria,
thereby throwing new light on previous results. This is clearly of great value in a rapidly changing field, where psychiatric classifications are constantly being reviewed, and new ideas about aetiology emerge continuously. However, for this to be fully possible careful considerations need to be made when organising the data. In the words of Rutter and Pickles (1990): 'Unless it is possible to use earlier data to reconstruct diagnostic distinctions that become appreciated only some years after the original data collection, much of the value of a longitudinal study can be lost.' (p.35)

It should then be clear that there are a considerable number of advantages of secondary data analysis, and that these go beyond the convenience of the individual researcher to include funding bodies, as well as those designing studies and collecting data.

4.2.2 Limitations of secondary data analysis

However, although there is an apparent potential for secondary data analysis to contribute significantly to the progress of psychological and psychiatric research, there are also certain limitations that need to be taken into consideration. The first and foremost of these is data availability. It is not always the case that there are data sets which meet current research needs to a satisfactory extent. There may also be problems with availability of particular items in an otherwise appropriate data set. The original study will have been conducted with the aim of addressing certain objectives, and these are unlikely to completely overlap with those of another researcher. Unless there is an alternative way to obtain the items lacking, secondary analysis will be constrained by the information the original researchers collected. This often means that secondary analysts have to make do with variables that are slightly different from those ideally required.

In addition, the repeated use of data sets and the limited number of variables they contain run the risk of constraining creativity, by limiting the scope of scientific investigations. However, continued use of the same measures is necessary for comparability, and provided new indicators are continually being incorporated in emerging data sets, the potential for new advances remains.
Another, more concrete problem is that errors made in the original study are often not visible, and may be very difficult to appraise. For this reason, confidence in the quality of the original study is imperative. However, to use the available data in a meaningful way, researchers must have an accurate understanding of the purpose with which it was collected, and how the individual variables were operationalised. Although it is not usually a problem to locate such information in respectable academic organisations, it can sometimes be difficult to disentangle the exact meaning even with detailed and carefully prepared manuals. For the purposes of the present study, the individuals who planned and carried out the original data collection were consulted, and some of the raw data, such as interview transcripts and tapes, were examined. This was found to be of immense value for understanding of the data.

Sometimes, however, operationalisation is less of a concern, as there are multiple measures available, and these can be combined to construct indexes, generally assumed to be more reliable. Kiecolt and Nathan (1985) suggest two ways in which the contribution of individual items to dimensions measured by indexes can be tested. The first, and most commonly used is exploratory factor analysis. The other is covariance structure analytic techniques, which provide a means to test models of the relationship between items. Both of these were employed by this study, and the second will be discussed at some length in Chapter 5.

4.3 Introduction to the study and the sample

4.3.1 Sample selection

The sample used is part of a well-known epidemiological survey, known as the Inner London-Isle of Wight comparison (Rutter, Cox, Tupling, Berger and Yule, 1975; Rutter, Yule, Quinton, Rowlands, Yule and Berger, 1975), and originally designed to study children’s difficulties in a rural and an urban area. The present investigation, however, focused only on the data obtained in the urban area, part of an inner London borough. Previous studies (Wing and Hailey, 1972) had shown this borough to be
reasonably representative of the inner London area in terms of social composition. All children attending local authority schools, including special schools, within the borough, aged at least 10.0 years and less than 11.0 years on the 1 September 1970 were selected for participation in the study (n=2281). The majority of the children were Caucasian (n=1689) and, for the purposes of this study, members of ethnic minorities were excluded in order to reduce the number of confounding variables.

The original population sample was studied using a two-phase procedure, aimed at identifying children with psychiatric disorder. This involved screening the total population, and then using this data to stratify sub-samples for further investigation. The screening instrument was a teacher's questionnaire (Rutter B2) designed to identify behaviour problems (Rutter, 1967), a copy of which is provided in Appendix 1. Teachers were asked to indicate whether each of 26 common emotional and behaviour problems, chosen to cover the main areas as they may be reflected in a school setting, and reflecting overt behaviour requiring the minimum of inference by the teacher, 'does not apply', 'applies somewhat', or 'definitely applies' to the particular child. These are scored 0, 1 and 2, respectively, and the scores for the individual items are added together to produce a total score. It is also possible to differentiate between children whose scores are dominated by positive ratings on items concerned with conduct problems, and those whose scores largely reflect emotional difficulties. A rating of conduct problems, used in the subsequent analyses, was derived from items concerned with the destruction of own and others’ property, frequent fights or being extremely quarrelsome with other children, disobedience, lying, stealing, and bullying. Emotional problems, by contrast, were characterised by often being worried or worrying about many things, often appearing miserable or distressed, a tendency to be afraid of new things or new situations, having had tears on arrival at school or having refused to come into the building. The version of the scale used (B2) closely resembles a previous version (B), with the exception of the wording of some of the items, which had been modified to improve clarity. This previous version (B) had been shown to discriminate between children attending a child psychiatric clinic and children in the general population, to differentiate between the main types of psychiatric disorder, and to have a high test-retest reliability over a three month period (Rutter, 1967; Rutter, Tizard and Whitmore, 1970).
Additionally, teachers completed a social background questionnaire, providing details of the sex, date and place of birth of each child as well as both parents and the occupation of the main family breadwinner.

4.3.2 Individual assessment in childhood

Two groups of children were selected for individual study: (a) a randomly selected control group (n=106) and (b) a random sample of those with high scores (≥9) on the teacher questionnaire (n=159). As these two groups were independently sampled, a small number of children were selected for inclusion in both groups, resulting in a total second-phase sample of 249 children, the mothers of whom were approached for an interview. This made this a multi-phase, rather than multi-stage sample. The distinction between the two has sometimes been unclear in the epidemiological literature. Pickles, Dunn and Vazquez-Barquero (1995) have described multi-phase sampling as that where 'the different phases of observation relate to sample units of the same type' (p. 74). This was the case for the present sample, where the whole population of children falling within certain geographical and age boundaries were screened at the first phase, and selected sub-samples were intensively studied at a later phase. Multi-stage sampling, by contrast, more commonly refers to designs where the sampling units at each stage are different (Cochran, 1977; Pickles, Dunn and Vazquez-Barquero, 1995), such as when schools are sampled in a first stage, and individuals from these schools are selected at a second stage.

The interview used a non-scheduled standardized approach developed by Brown and Rutter (1966) and subsequently used in the Camberwell Family Interview (CFI) (Vaughn and Leff, 1976b) for studies of EE. Interviews lasted some two to three hours, and were undertaken by experienced and trained psychiatrists or social scientists, blind to the child’s selection status. This interview focused on the preceding year, asking a series of set questions, covering a wide range of behavioral and emotional problems, family interaction, relationships, style of life, attitudes, feelings, events and activities in the household (Brown and Rutter, 1966; Rutter and Brown, 1966). Parenting was assessed using systematic and standardized interview
techniques designed to evaluate attitudes, feelings, events and activities in the home. The interview served as a means of obtaining factual information, and also as a stimulus to elicit emotions. Mothers were asked about their behaviour and reactions to the target child, and about corresponding behaviours by the child's father, and attention was paid not only to their answers, but also to their tone of voice, gestures, expressions and spontaneous comments. Interviews were tape-recorded, and the criticality and hostility dimensions of EE rated from the tapes according to CFI principles.

Of the mothers of the 249 children selected, 228 were successfully interviewed, a small loss being incurred either by refusal to participate, or failure to contact the families after repeated home visits. The refusal rate tended to be higher among the families of children who scored high than among those who scored low on the screening instrument (10.7% compared to 4.4%) (Rutter, Cox, Tupling, Berger and Yule, 1975). For the purposes of the present study, some further considerations needed to be made. As the main focus was on family relationships, and these are likely to have different implications in different family forms (Kiernan, 1992), the group of children not living with both their natural parents at the time of the interview was excluded from the sample for the present analyses. This excluded a minority of subjects (n=37), allowing us to retain the great majority of the children (191). Due to lack of relevant data family breakdowns that occurred subsequently could not be taken into account. All the variables to be used in the analyses to follow are described in Chapter 6.

4.3.3 Individual assessment in adulthood

The target children were recontacted when they reached early adulthood, at a mean age of 27.7 years, ranging from 25 to 31 years, with the aim to investigate a variety of aspects of their past and present life situation. In many respects this assessment was similar to the one undertaken with the mother in childhood. Again a non-scheduled, standardized interview was used by trained social scientists, who were blind to the subjects' selection status. Questions covered the subjects' current functioning
and circumstances, as well as recollections of their childhood circumstances and experiences.

Adult data were obtained on approximately 81% (155/191) of the subjects whose families were intact at age 10, and who had been studied intensively in childhood. Although there was no tendency for subjects identified as deviant on the basis of their score on the screening instrument in childhood to be less likely to be followed up, compared to those scoring within the normal range, there was a difference between the two sexes, with more males being lost than females (23% compared to 12%).

4.4 The advantages and disadvantages of multi-phase sample designs

Two phase sample designs, involving an initial screen followed by an increased sampling fraction for those screened positive compared to those screened negative, such as the one used for the present data set, are relatively common in developmental psychopathology. They have the advantage of combining statistical and economic efficiency. The high costs of labour intensive data collection, such as interviews, put undeniable constraints on the size of the sample that can be investigated. However, there is always a concern that the sample studies should contain sufficient variance on the variables of interest within the sample to make statistical analysis possible. When studying relatively uncommon phenomena a simple random sample of moderate size can often not ensure that this requirement is met, and it is necessary to select an enriched sample that offers substantially greater statistical power.

By virtue of the selection procedure, these samples are somewhat complicated to analyse. The problems mainly arise out of concern for the generalisability of results obtained in data sets that are not based on simple random samples, and may therefore not automatically be assumed to reflect rates and relationships found in the general population. If such an assumption is to be made, it is necessary to take details of the selection procedure into account in the statistical treatment of the data. Fortunately there is a range of techniques available to achieve this. The appropriateness of different techniques typically varies with the stage of the
analysis, and often a number of different methods adjusting for sampling have to be used in any given study. Clearly, this makes the analysis of multi-phase samples more complicated and time consuming than the statistical treatment of simple random samples. However, the problems posed are generally surmountable, and samples based on two phase sampling continue to represent an efficient use of resources.

4.5 Missing data

Missing data are a serious, albeit virtually inevitable, problem in prospective longitudinal studies. Deaths, refusals, and difficulties in tracing some subjects all contribute to sample attrition. Even among those successfully approached some information may be impossible to obtain, because it seems inappropriate to request it, because it is refused, or because an interview is discontinued. In addition, data which were not collected as a consequence of sampling may also be viewed as missing. The implications of missing data, and the way they can be dealt with, depend on the assumptions that can be made about how it arose. In this section a way of classifying missing data is described, to be referred to in the subsequent discussions of statistical approaches to address both attrition through non-response and multi-phase sampling.

The mentioned distinction was described by Little and Rubin (1987), and differentiates between data missing completely at random (MCAR), where the probability that a particular observation is missing does not depend on either its own value, were it observed, or the value of any other observed variable; data missing at random (MAR), where the probability of an observation being missing may depend on the values of other observed measures, but, given the observed measures, not on those unobserved; and non-ignorable missing data, where the probability of an observation being missing depends on the values of both observed and unobserved variables. Most methods of analysis assume the missing data to be either MCAR or MAR. The latter is clearly the least demanding of the two, in that it does not assume that missing data is independent of observed values, and is therefore less likely to be wrong.

Clearly, in practice it may be very difficult to classify some of the
numerous ways in which missing data arise in longitudinal studies. However, one process to which this does not apply, and which is closely related to Little and Rubin's (1987) distinction, is sample design. Thus, a simple random sample, where the probability of being missing is constant at one minus the proportion being sampled for all members of the population, is a mechanism that will generate data MCAR from non-sampled subjects. By contrast, in a two-phase sample design, such as the one described above, a screening instrument is used to select subsets of subjects. Consequently the probability of not being selected for further examination, and thereby generating missing data, depends on the value of an observed variable, the screen score, making this data MAR.

Other sources of loss are non-response, partial response, and, in the case of longitudinal studies, sample attrition, all of which may result in a relatively large proportion of subjects with either completely or partly missing data. The loss caused by this may be more or less problematic depending on whether it is, to the extent that this can be determined, random or not. One way of examining if there has been any systematic loss of particular groups of subjects is to compare subjects with complete data with subjects with incomplete data on all variables involved in, or relevant to, the analysis to be undertaken. Clearly this can only be done to the extent that data is available for the latter group, and represents an imperfect way of investigating the nature of the loss incurred. If there is no significant difference between the two groups, the loss is usually assumed to be MCAR, and the data may be analysed in a straightforward way, using all cases with complete data, whilst excluding those with incomplete data. However, although such loss may not bias the results, it does reduce the statistical power. It is therefore important to find ways which minimise the extent of missing data through the inclusion of as many subjects as possible in the analysis.

If, on the other hand, data is MAR, adjustments may need to be made. Given the sample with which the present study was concerned, missing data as a consequence of a multi-phase sample design, and therefore MAR, was of particular concern in this context.

Below, and in Chapter 5, I will discuss some approaches which allow both these areas to be addressed. These are generally based on methods which make the inclusion of incomplete data cases possible. They can thereby address problems
of attrition and partial response that can be classified as MCAR, but where the maximum number of subjects need to be included in order to achieve reasonable levels of statistical power, as well as samples derived from multi-phase designs, where subjects who were screened, but not individually studied can seen as having partially missing data.

4.6 Approaches to analysing multi-phase samples

4.6.1 Approaches to analysing multi-phase samples using raw data

At the most basic level, there are ways in which the raw data generated by multi-phase sample designs can be used to generate findings of relatively unambiguous significance. The most obvious of these is comparison between the randomly selected control group and the group which scored positively on the screening variable. As the screen generally is selected because of its direct relevance to the topic under investigation this can be very informative. Similarly, inclusion of the screening variable in the analysis, as an explanatory, rather than an outcome variable, is a standard solution to the problem of sample bias in the same way. It is only when the screening variable is not of principal concern, or when research interest goes beyond the original purpose for which the data were collected, that the design poses problems, and more creative solutions must be sought. One possibility is to analyse the control group alone, as this represents a simple random population sample, and therefore can be studied using standard methods. However, this approach inevitably implies a failure to use all the data that is potentially available, and this may result in excessive loss of statistical power.

4.6.2 Weighting

Other techniques treat both the control and the screened positive sample as a single entity. If, however, we are to infer from sample to population, the sample design
must be an integral part of the inference process, that is, the data must be adjusted to take the sampling procedure by which they were obtained into account. One approach which aims to do this is weighting (see eg Sul Lee, Forthofer and Lorimer, 1989). Sample weights are used to give differential importance to various groups of subjects, depending on the way in which they were selected. The underlying idea is that each case is given a weight that reflects the probability it had to be selected.

There are two kinds of commonly used weights, relative and expansion weights. Expansion weights are the most basic of the two, being simply the inverse of the sampling fraction. The calculation of these is straightforward, as is shown in the example below, which uses the data set with which this study is concerned. In this sample, the overall screened sample contained 1689 children, of whom 322 scored high on the teacher questionnaire. Of the former, 106 were selected for individual assessment in the original design, and of the latter 159 were selected. Thus, the probability of being selected at random if below the screen cut-off was that of being included in the control group, 106/1689. The probability of being selected if scoring high on the teacher questionnaire was the probability of being in the control group plus the probability of being in the group of children with high scores on the screening instrument, 106/1689+159/322. The inverse of the sampling fraction for each group of subjects is 1 divided by the respective value specified above. That is, the inverse of the sampling fraction is larger than one and weight, or adjust, the sample back to the original size of all those screened in the first phase. An example of the use of expansion weights is available in Chapter 10, although that particular example is complicated by the fact that it seeks to estimate an unknown quantity.

Relative weights, by contrast, assign different weights to different individuals, but maintain the sample at the smaller size of those intensively studied. They do this by giving each case a weight that reflects the relative probability it had to be selected, that is, in proportion, but not equal, to the inverse of the sampling fraction. In order to maintain the sample size these are calculated to have an average of one. An example of how a relative weight may be formally constructed and implemented in SPSS (Norusis/SPSS, 1988) for the present sample is provided in Appendix 2. For the purposes of the present study, this is the weight which was generally used to generate descriptive results in the weighted, or adjusted, data to
complement parallel observations obtained in the raw data.

Relative weights cannot, however, be used without reservation in all procedures of standard programmes. Although it is generally agreed that such weights may be used for the estimation of prevalences and sample summary statistics, their application for purposes of fitting models, to examine the relationship between variables, is subject to debate. Some authors have found the approach to be inefficient, especially for designs with widely differing selection probabilities (Holt, Smith and Winter, 1980). Others have taken a more radical stance against. Thus, Fienberg (1980) has noted that: 'Although it is difficult to offer general advice on how to use sample-based weights in secondary multivariate analysis, we know of no justification whatsoever for applying standard multivariate methods to weighted data' (p.337). The problem essentially lies with the estimation of standard errors. The familiar formulas for this, incorporated in most statistical packages, assume simple random sampling (e.g., Sul Lee, Forthofer and Lorimer, 1989), and it is not immediately evident to what extent, or in which way, the estimation of standard errors is affected in data sets which are derived from other sample designs. Instead, there may be some justification for performing multivariate analysis on the raw data, without adjusting for the non-randomised sampling procedure. In analysis involving models the variables of interest are typically closely linked to the variables which gave rise to the sample design, and thus the sample based weights. Consequently, Fienberg (1980) suggested that, in the light of current knowledge, using unweighted counts and measurements may be the best approach to studying complex relationships between variables. This kind of analysis would, however, be subject to the potentially biasing influences of the multi-stage sample design, and the assumption above, that the link between variables in the model being tested and variables giving rise to the sample design provide sufficient adjustment for the sampling, would remain untested.

However, since Fienberg's recommendation new procedures for analysing multi-stage samples have become more readily available. Below two of these, Survey Data Analysis for Multi-stage Sample Designs (SUDAAN) (Shah, Barnwell, Hunt and LaVange, 1992) and log-linear models for doubly sampled categorical data using the EM algorithm (Dempster, Laird and Rubin, 1977; Espeland and Odoroff, 1985), later to be applied to the sample described above, are discussed.
SUDAAN was recently developed at the Research Triangle Institute (Shah, Barnwell, Hunt and LaVange, 1992). It was designed specifically for multi-stage samples, but can be usefully applied to multi-phase samples (Pickles, Dunn and Vazquez-Barquero, 1995). Whereas almost all packages have facilities allowing us to compute population estimates using relative or expansion weights, SUDAAN has the added advantage of being able to account for complex designs also when computing variance estimates and test statistics. Where other packages assume simple random sampling, thereby producing standard errors that require oversimplified assumptions, SUDAAN allows sample design effects to be included in the analysis, making the computation of correct standard errors possible. It can encompass any number of sampling stages, whether stratified or not, with or without replacement, and with equal or unequal probabilities of selection across the various phases of sampling. This means that it possible to analyse multi-stage samples, such as the one with which this study is concerned, and to generate results which can be generalised to the overall population from which the sample was originally drawn.

Variance estimation for nonlinear statistics is based on a well-known approximation for large samples, a first-order Taylor series approximation of the deviations of estimates from their expected values (see Kendall and Stuart, 1973). The general approach taken in SUDAAN is to first compute Taylor series linearisation for a particular statistic. These linearised values are then used to compute the variance of a total estimate, appropriate for the specified design option.

Later stages of this study make use of the logistic procedure in SUDAAN to fit logistic regression models to sample survey data. Design consistent estimators of the finite population regression coefficients are produced by obtaining solutions to the weighted likelihood equations. An explicit form of the variance covariance matrix of the regression coefficients is generated by an application of the Taylor series method (Binder, 1983).

In SUDAAN specifications of the analysis and the data to be analysed are provided in three different input files, one of which describes the analysis to be undertaken, the second specifies details of the variables with which the analysis is
concerned, and the third provides the data. An example of an application of SUDAAN is available in Chapter 10, and the corresponding input files are shown in Appendices 8, 9 and 10.

4.6.4 Application of non-ignorable non-response models in Generalised Linear Interactive Modelling (GLIM)

Another method appropriate for multi-phase samples has been proposed by Espeland and Odoroff (1985), fitting log-linear models for doubly sampled categorical data using the EM algorithm. This draws on the idea that data derived from double sampling can be expressed as incomplete multi-way contingency tables, thereby including those which were studied at a first phase, but who were excluded at later phases, and treating this as a missing data problem. This approach shares an important feature with other approaches to missing data (eg Marini, Olsen and Rubin, 1979; Muthen, Kaplan and Hollis, 1987), in that it divides subjects into different groups, depending on the extent of their missing data, and allows for the simultaneous analysis of subjects with complete data, and subjects with partially missing data. However, the suggestion is that methodologies grouping subjects in this manner do not only allow us to deal with missing data in general, but also provide a framework within which we can correct for multi-phase sampling, provided that the screening variable is included in the analysis. That is, the group of subjects that was selected for intensive individual examination can be thought of as a small sub-group with complete data, with the original screened sample being thought of as one with a considerable amount of missing second phase data.

This method can be implemented using GLIM (Baker and Nelder, 1978), where the group with complete data cases forms one contingency table, while the group, or groups, with a particular pattern of missing data form a supplementary table or tables. The approach estimates a log-linear model for the complete data table, together with a probability model for each subject’s pattern of non-response, using expectation-maximisation (Dempster, Laird and Rubin, 1977). Data from subjects contributing to the supplementary data tables are then distributed over cells of the
complete data table on the basis of these two models to form a 'completed' table. Following this, the log-linear and the non-response model are re-estimated and the supplementary table redistributed again, until convergence is reached. When analysing data derived from multi-phase sample designs, the supplementary table would include, at a minimum, the original screening variable. The availability of the screening variable in both the tables ensures that this vital aspect of sampling is taken into account in the allocation of subjects to cells, and, again, it is possible to produce results from a multi-phase sample that can be generalised to the overall population from which the sample was drawn.

Appropriate measures of goodness-of-fit are not the standard ones produced by the log-linear model program, and need to be separately calculated to ensure that the data from complete and incomplete data cases are properly distinguished. Rather than imputing values for incomplete cases and assuming them real, this approach thus assigns values to missing data probabilistically, and continues to recognize their uncertain nature.

With this methodology test statistics of the significance of effects can be obtained in the usual way, by comparing the goodness-of-fit of models with and without particular model terms, with the difference of fit being an asymptotically distributed chi-square statistic. The magnitude of the effects of particular terms, as measured by an odds ratio, can be obtained through the antilog of the individual estimate for the term in question, and the 95% confidence intervals may be calculated from the antilog of the estimate, plus and minus the standard error of this estimate multiplied by 1.96.

An example of this method, applied to the problem of multi-phase sampling design, is presented in Chapter 7, and details of that particular GLIM set-up are provided in Appendix 5.

4.7 Summary

In this chapter the sample, and the multi-phase sample design used to generate it, which formed the empirical basis for this study has been introduced, and a number of
issues relating to the advantages and limitations of the approach here adopted have been discussed. It has been pointed out that, whereas the use of an already existing data set has numerous advantages for studies of this kind, this is also a practice which imposes certain limitations on any work to be undertaken. In addition, the sample design introduced questions about appropriate methods of analysis, that would be able to take details of the sampling procedure into account, without compromising statistical power. Some of the issues involved in these considerations were highlighted in a discussion on missing data and its classification, proposed by Little and Rubin (1987). It was argued that the way in which data loss arises and the assumptions that can be made about it has important implications for what constitutes appropriate statistical treatment. Missing data that are MCAR create few problems, essentially only leading to a reduction of statistical power. Missing data that are MAR, however, have more serious implications, as the give rise to a non-representative sample. Finally, data sets generated through two-phase sampling, where the original screened sample was a random sample, can be viewed as population sample, for which the screening variable, and potentially some further information is available, with the remaining variables MAR for a large number of the original subjects, all those who were only screened, and not individually studied.

Drawing upon this, some statistical approaches designed to address these difficulties have been discussed, in particular weighting, SUDAAN, and the application of an E-M approach to missing data, implemented in GLIM. These make it possible perform multivariate analysis on data sets derived from multi-phase sampling, and generate accurate results which may be assumed to reflect the overall population from which the sample was originally drawn.
Chapter 5

RELIABILITY, VALIDITY, AND MISSING DATA: APPLICATIONS IN STRUCTURAL EQUATION MODELLING

5.1 Introduction

The notion that the quality of data used to test theories is fundamental to the confidence we can have in the results produced seems almost too basic to mention. However, empirical evaluation of measures used in psychology is often less than satisfactory, a fact which owes much to the lack of undisputable criteria, to which our attempts to measure particular phenomena can be compared. There are essentially two general categories of measurement problems of concern, reliability and validity. In the first part of this chapter I will discuss their definition and approaches to evaluate them in some detail, with particular reference to the use of structural equation modelling. The second part of this chapter will focus on another area in which structural equation modelling has important applications, the treatment of missing data. As was discussed in Chapter 4, this arises for a variety of reasons with different implications. In longitudinal studies both sample attrition and incomplete data on subjects who have been successfully approached may pose serious problems, in terms of reduction of sample size, and consequently statistical power, as well as in terms of concerns about the potentially disproportionate loss of subjects with certain characteristics, thereby affecting the composition of the sample in ways which may have important implications for subsequent analysis.

Thus, Section 5.2 is concerned with the definition of reliability and validity, and how these concepts translate to the context of the multitrait-multimethod approach. Section 5.3 provides a general introduction to structural equation modelling, as well as discussing its application to the study of reliability and validity more
directly. The discussion of structural equation modelling is continued in Section 5.4, where reasons for using this type of analysis are outlined, and in Section 5.5, where multigroup analysis, and its application to missing data are outlined. Finally, these methodological points are summarised in Section 5.6.

5.2. Reliability and validity

5.2.1 Reliability and validity defined

Research in the social sciences is typically based on observed responses, which are assumed to be indicators of theoretical concepts. In order for empirical results to be meaningful, these observations must be accurate. On a general level, observed measures have two principal properties which indicate this, reliability and validity, the presence of which is never absolute, but always a matter of degree. The first, reliability, or random measurement error, refers to disturbances in an indicator which are a consequence of chance variation. Fundamentally, then, reliability concerns the extent to which a measuring procedure produces the same result on repeated trials (eg Carmines and Zeller, 1979).

Put more formally, in classical reliability theory, the true score $X_i$ for an individual $i$ is conceived to be composed of a true score $T_i$ and an error component $e_i$. The error is assumed to account for all influences that prevent the observed score from matching the true score. In this framework, the reliability is simply the proportion of the total variance of the observed score that can be attributed to variance of the true score, that is:

$$\frac{\text{Var}(T)}{\text{Var}(T) + \text{Var}(e)}$$

The precision is merely the error variance, $\text{Var}(e)$

The latter, however, assumes that the error variance, $\text{Var}(e)$, is constant, for example, that it does not increase with $T$. This may be a reasonable assumption
for a questionnaire, or an interview, where the error variance is often thought to be the same for the general population, where the overall variance often is relatively, low and a clinical population where this may be considerably higher. That is, we may be prepared to assume that the accuracy with which respondents recall and report answers to questions such as how many bedrooms there were in their childhood home to be the same in groups where everyone lived in a two or three-bedroom house, as in groups where past dwellings ranged from studio flats to seven-bedroom mansions. In other instances it may be less justified, such as when measuring length, where we would probably expect the error variance to be higher when measuring long distances than when measuring relatively short lengths.

While the theoretical foundations of reliability may appear simple, they pose greater problems in practice as the true score is not available for investigation. To study reliability it is therefore generally assumed that for any two observed scores of the same individual the error is randomly distributed, and not correlated with the true score component. Given these assumptions reliability can be assessed by correlating the two observed scores, with high correlations indicating that the error variability is small relative to the common true score variability (Carmines and Zeller, 1979).

There are, broadly speaking, two methods to obtain these two scores. The first of these is based on domain sampling, which assumes that a unidimensional test can be made up of sampling items from the domain of interest. Reliability is assessed by dividing the items within one domain into two different sub-sets, such as through the split-half method, and correlating the scores obtained (eg Carmines and Zeller, 1979; Streiner and Norman, 1989). This approach is, however, complicated by the fact that it assumes, often unreasonably, uncorrelated error. This is especially problematic when, as is generally the case, the two different sets of items have been obtained under exactly the same circumstances. It does not take into account any variation from day to day, or from observer to observer, and may therefore lead to an optimistic interpretation of reliability (Streiner and Norman, 1989). The second method of assessing reliability is based on the administration of parallel forms of a given assessment at two different times. The most common version of this methodology is the test-retest procedure, where the same set of items is administered
Reliability is indicated by the correlation between the two scores obtained. With this approach, the problem of correlated error, which may pose difficulties when using the split-half method, is generally thought to be less prevalent. However, there are other factors which may affect the correlation. Carmines and Zeller (1979) pointed out that test-retest studies can both underestimate and overestimate reliability. It is possible that the true score for any given individual changes between the two points in time, leading to a reduced correlation, reflecting real change rather than poor reliability. It may also be that subjects' memory of how they responded to items at the first occasion influence their responses when retested, potentially increasing the test-retest correlation. Therefore, in order to assess reliability in practice it is probably desirable to use various approaches, and treat results obtained as tentative approximations.

The second property, validity, or non-random measurement error, describes the degree of relatedness of an indicator to the concept it purports to measure, that is, to the abstract concept as it was theoretically defined. Although the notion underlying this definition may be easily comprehended, translating it into an examinable proposition is less straightforward. In practice there are several types of validity, representing different approaches to its assessment. Thus, criterion-related validity, or predictive validity, is at issue when the purpose is to use an instrument to estimate some important form of behaviour that is external to the measuring instrument itself, the latter being referred to as the criterion (Nunnally, 1978, p.87). Thus, one may validate a screening questionnaire for depression by correlating it with subjects' actual diagnoses, and the higher the correlation, the more valid the test is for this particular criterion. The criterion, in this example the diagnosis, may exist in the present, thus indicating concurrent validity, or it may be observed at a later point in time, reflecting predictive validity. Clearly, adequate measurement of the criterion is imperative in this context, and it has been suggested that 'all validation reports carry the warning clause, in so far as the criterion is truly representative of the outcome we wish to maximize' (Cronbach, 1971, p.488). On an even more basic level, estimation of criterion validity at all depends on the availability of a criterion variable, a condition often lacking in the social sciences.

Content validity, by contrast, depends on the extent to which a measure
reflects a specific domain of content. Thus, a comprehensive measure of children's behaviour problems must not only reflect, for example, aggressive behaviour, but should include indicators of the whole range of children’s behavioural expressions of difficulties, based on an extensive review of theoretical propositions and empirical investigation in the past. However, 'inevitably content validity rests mainly on appeals to reason regarding the adequacy with which important content has been sampled and on the adequacy with which the content has been cast in the form of test items' (Nunnally, 1978, p.93), and there are no rigorous ways of assessing it.

Construct validity is concerned with the extent to which a particular measure relates to other measures that are consistent with theoretically derived hypotheses concerning the concepts being measured (Carmines and Zeller, 1979). Thus, construct validation involves three different steps: first, specification of the theoretical relationship between the concepts; second, examination of the empirical relationship between the measures of the concepts; and third, interpretation of the empirical evidence in terms of its clarification of the construct validity of the particular measure being investigated, making this an inevitably theory-laden process.

5.2.2 The multitrait-multimethod matrix

Another approach to assess reliability and validity is based on the multitrait-multimethod matrix, described by Campbell and Fiske (1959) in a now classic paper. The authors provided an alternative conceptualization of the two notions, which provides the rationale for the methodology they proposed. 'Reliability is the agreement between two efforts to measure the same trait through maximally similar methods. Validity is represented in the agreement between two attempts to measure the same trait through maximally different methods.' (p. 83)

Therefore, by moving away from using similar methodologies we can, in Campbell and Fiske's (1959) conceptualization, begin to study validity. However, a distinction is made between convergent and discriminant validity. The former describes their notion that valid measures should, even if one seeks to measure a concept, or trait, by very different methods, produce similar results. Put more
succinctly, if measures are valid, then different measurement strategies should converge in their measurement of the same trait. Discriminant validity, by contrast, refers to their notion that if the measures are valid, then they should discriminate among traits that are distinct. This means that even if we use the same method to measure two different traits, the correlation between these should not be too large (Campbell and Fiske, 1959).

5.2.3 The multitrait-multimethod matrix: An example

An example illustrating these ideas, drawn from the data set with which this study is concerned, is introduced below. The general interest of the present study has already been identified as parent-child interaction, and the data presented are concerned with two proposed constructs of parenting, mother’s and father’s negative interaction with the child. Two methods were used to obtain indicators of these parenting constructs, one of which was a prospective interview with the mother, while the other was a retrospective interview with the target child. From each of these, two variables were selected to estimate each of the underlying constructs. From the prospective interview with the child’s mother, maternal irritability to the child (variable V1), paternal irritability to the child (variable V2), maternal nagging (V3) and paternal nagging (V4) were selected, and maternal harshness when the child was aged 10 (variable V5), paternal harshness when the child was aged 10 (V6), maternal harshness when the child was at secondary school (V7), and paternal harshness when the child was at secondary school (variable V8), were chosen from the retrospective interview with the child. It was hypothesized that each of these variables could be understood in terms of underlying constructs, reflecting mother’s and father’s negative behaviour respectively. The observed correlation matrix is shown in Table 5.1.

The correlations in a multitrait-multimethod matrix can be classified into three groups, within-method and cross-trait, within-trait and cross-method, and cross-trait and cross-method correlations. High cross-method, within-trait correlations provide evidence of convergent validity (Campbell and Fiske, 1959), that is, agreement of different methods measuring the same trait. Discriminant validity is indicated by
the other correlations being low, indicating that the assumed traits are indeed distinct. In this particular example the convergent validity is reasonably high, whereas discriminant validity is fairly low.

Table 5.1. Correlation matrix providing the input for the multitrait-multimethod example

<table>
<thead>
<tr>
<th>Variable</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
<th>V7</th>
<th>V8</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2</td>
<td>.48</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V3</td>
<td>.11</td>
<td>.18</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V4</td>
<td>.01</td>
<td>.36</td>
<td>.37</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V5</td>
<td>.28</td>
<td>.05</td>
<td>.26</td>
<td>.05</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V6</td>
<td>.03</td>
<td>.19</td>
<td>.10</td>
<td>.26</td>
<td>.07</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V7</td>
<td>.27</td>
<td>.07</td>
<td>.25</td>
<td>.03</td>
<td>.91</td>
<td>.06</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>V8</td>
<td>.02</td>
<td>.22</td>
<td>.12</td>
<td>.28</td>
<td>.09</td>
<td>.94</td>
<td>.08</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Within-method, cross-trait correlations are in italics
Within-trait, cross-method correlations are in bold
Cross-trait, cross-method correlations are underlined

5.2.4 True-score models, confirmatory factor analysis and multitrait-multimethod models

Notions about the importance of taking the influence of method of measurement into consideration go beyond the rather specific study of reliability and validity, and can be applied as an integral part of empirical investigations, which also may explore concerns about the biased nature of most data based on the reports or recall of individuals. This is a potential which has largely been ignored in the past. The most commonly used model in empirical investigations, the true-score model, leaves little scope for the consideration of systematic measurement error. Rather, it assumes that the variation in observed variables can be ascribed to the causal effects of non-observed true-score and random-error variables. In psychology, however, this assumption is often unrealistic, as the process of measurement is highly imperfect and
often prone to systematic biases. Fergusson and Horwood (1988) give the example of the measurement of child behaviour, where it has been observed that measures of children obtained from different sources are often only weakly correlated. This lack of strength of correlation raises important questions about the validity and interpretation of these measures. It seems plausible that the situation may arise because the observed behaviour measures are functions of factors beyond children's actual behaviour and random error. In particular, method-specific factors, concerned with both the method used to obtain a given measure and any other systematic situational factors related to this method of measurement may be reflected in addition to the latent trait variable that the measure of behaviour purports to represent, and as random errors of measurement.

As we have seen, in structural equation modelling it is possible to take all these factors into account, and construct models that describe the relationships between observed measures and underlying factors which give rise to the variability in these measures. In confirmatory factor analysis the covariance between the observed variables is postulated to arise from their relationships to underlying latent factors. Particular observed variables are assumed to be indicators of particular factors, in contrast to exploratory factor analysis, where all observed variables are considered to load on all factors. The multitrait-multimethod model can be formulated as a particular type of confirmatory factor model in which both trait factors and method factors appear, and in which the relationships between different latent factors, or latent factors and observed outcomes, can be explored.

The difference between the true-score model, the confirmatory factor analysis, and the multitrait-multimethod model, then, lies in the way in which the distribution of error terms are conceptualised. While in the true-score model error is only thought to arise from random error, the confirmatory factor analysis model and the multitrait-multimethod model also assume a systematic variance. In confirmatory factor analysis this can be explained by the latent trait constructs, or factors, and in the multitrait-multimethod approach by the latent trait and method constructs of the model. In multitrait-multimethod models the observed variable loads only on the trait factor if the measurement of a trait is not affected by the measurement method used. However, if there is an effect of the method of measurement, then each observed
variable will load both on the trait factor and the factor for the method of measurement.

5.3 Structural Equation Modelling

5.3.1 Introduction to Structural Equation Modelling

Structural equation modelling makes it possible to explore models of this kind empirically. These are described by sets of measurement equations, specifications, and constraints. On a general level, these may be thought of as formal statements of the investigator’s beliefs about the causal structures that underlie a set of observed variables. Structural equation modelling, then, provides a method for describing some specified causal theory in terms of an explicit and solvable set of linear equations, which encapsulate and summarize the key assumptions of the theory. These causal assumptions can often not be tested directly, although there are indirect tests indicating the plausibility of a model involving goodness-of-fit methods (Fergusson and Horwood, 1988).

5.3.2 Structural equation modelling, reliability, and validity

This approach to data analysis can be used in studies of reliability and validity, to examine the extent to which indicators of a certain characteristic, obtained in different ways, agree, thereby extending Campbell and Fiske’s (1959) proposal to formal statistical analysis. Such indicators have already been argued to derive from their relationship with two underlying constructs, or factors, one of which relates to the trait they aim to measure, and another to the method used to obtain them, as well as a random error term. The relative strength of each indicator’s relationship with these two constructs indicates the extent to which they are related to the conceptual measure, the trait factor, and to what extent they are a function of the methodology employed to obtain them.
Below discussion of the multitrait-multimethod example continues, here in relation to studies of reliability and validity using structural equation modelling in general, and EQS in particular.

5.3.3 The multitrait-multimethod matrix: The example continued

A graphical way of displaying the results of the previous multitrait-multimethod example is portrayed in the path diagram shown in Figure 5.1. Two latent factors represent the true scores on the two traits, mother's and father's negative behaviour. Two additional factors represent the effects for the two methods of measurement, aimed at accounting for systematic errors in these accounts and the methods used for obtaining them. Thus, the prospective measures concerned with the mother's behaviour, maternal irritability (V1), and maternal nagging (V3), and the corresponding retrospective measure, maternal harshness when the child was aged 10 (V5), and at secondary school (V7), are predicted by an underlying construct, here referred to as maternal negative behaviour (F1). Similarly, the prospective measures referring to the father's behaviour, paternal irritability (V2), and paternal nagging, and the retrospective measures, paternal harshness when the child was aged 10 (V6), and at secondary school (V8) are predicted by paternal negative behaviour (F2). The method factor accounting for the prospective interview is modeled to predict maternal and paternal irritability, as well as maternal and paternal nagging (V1 to V4), whereas the one accounting for the retrospective interview predicts maternal and paternal harshness, both when the child was aged 10, and while at secondary school (V5 to V8). In addition, each observed variable has an error term (e) linked to it. In this particular model neither set of factors is assumed to be correlated, although, as there is often not any convincing theoretical or empirical rationale for them to be uncorrelated, this may be the first way to seek to achieve a better fit. It may not be reasonable to assume that mother’s and father’s negative behaviour are independent of each other, and that they should therefore be correlated. Regarding the method factors, this issue could probably be argued either way. We may wish to start fitting the model assuming that they are uncorrelated, as it is the accounts of two different
individuals obtained by different interviews and different interviewers. However, it is also true that they are the accounts of two individuals from the same family, both generated through semi-structured interviews undertaken by social scientist from the same research centre. In general, then, it is important to commence with carefully considered assumptions, based on sound theoretical foundations or previous empirical evidence, while remaining sensitive to indications in the data.

Figure 5.1. Path diagram for multitrait-multimethod matrix

![Path diagram for multitrait-multimethod matrix](image)
A number of software packages have been developed for this type of analysis. The one chosen for the purposes of the work to be presented is EQS (Bentler, 1989), and when specific references are made they are concerned with the workings of this particular package.

EQS is a batch program, where the fitting of a model involves setting up an input file, which contains statements and commands, and then reading this together with the data into the package, which executes the instructions and produces an output file for later inspection (Bentler, 1989; Dunn, Everitt and Pickles, 1993). The input file has a basic structure, organised by a set of key words, each of which are proceeded by a slash (/), and followed on the next line by the relevant information in the form of a statement, or series of statements, each of which are separated by semi-colons (;). The organising key words are title, specifications, labels, equations, variances, covariances, constraints, matrix, standard deviations, and means, but only specifications, equations and variances are strictly necessary for a program to run. The specifications provide information about the number of cases, input variables, and the method, or methods to be used in estimation. The program may use a correlation, or covariance, matrix, or the raw data for the analysis, and description of the form of the data and, if applicable, the name of any data file to be read may be provided. Under the labels interpretable names of the variables and the factors being analysed, otherwise referred to as V1, V2, or F1, F2 and so on, respectively, may be supplied. This is followed by the equations, which specify the model to be fitted. The dependent variables can be either observed or latent, or a combination of the two. The variance key word refer to the variance of the independent variables, which may be fixed, or estimated from the data, and the covariance heading allows for the specification of covariance between independent variables. Constraints can be of two kinds, simple equality constraints or general linear constraints. They may specify that certain parameters should be equal to each other, or that a given parameter should be equal in multiple groups, a point which will be returned to below. The matrix is only needed when the data is provided in the form of a correlation or a covariance matrix, not when raw data is used. Standard deviations need to be supplied if a correlation,
rather than covariance, matrix is used, as the correlations are usually transformed to covariances before analysis. Finally, the means of the observed variables can be specified under a separate key word, if necessary.

An EQS input file specifying the model described in section 5.2.2 is provided in Appendix 3. In this example complete data on all 8 variables was available for 108 subjects, and the covariance matrix of the observed measures was analysed. The labels specify the names of variables, and the equations describe their relationship with the four factors, maternal negative behaviour (F1), paternal negative behaviour (F1), the prospective method factor (F3), and the retrospective method factor (F4). The variances for the factors are fixed, whereas those of the error terms are estimated, as indicated by the star (*). Finally, the data is presented in the form of a correlation matrix.

5.4 Reasons for using structural equation modelling

This approach is complex to use, and its advantages over traditional methods may not be obvious. However, there is a strong case for using models of this kind in psychiatric epidemiology. Statistical models take us beyond simple significance tests and allow us to study patterns of human illness and psychological problems. This is particularly important in areas where outcomes are thought of as having a multifactorial aetiology. By constructing and testing the appropriate models we can examine the joint effects of these factors and investigate to what extent the effect of one of the factors of interest can be explained by that of another, or a collection of others.

Fergusson and Horwood (1988) list three further justifications for choosing this type of approach. The first of these is the explicitness of model formulation, where all assumptions necessary to impose a particular causal interpretation of a data set are clearly stated. When using less complex methods these assumptions are often implicit. Second, structural equation modelling allows us to study the effects of latent, rather than simply observed variables. This is especially desirable in the social sciences, where most theoretical thinking is based on
hypothetical formulations, or latent constructs, describing characteristics of observations such as temperament, social class, or inadequate parental care. Many less complex methods of analysis study the relationships between a number of observed variables, thought to reflect latent variables, assuming that these will reflect the relationships between the latent constructs. The foundation of this assumption is, however, questionable and seldom available for testing. By contrast, structural equation modelling links the observed variables to the latent constructs, and makes estimation of the relationships between the latent constructs possible. Perhaps even more importantly, the generation of these latent constructs also makes it possible to examine causal relationships, having removed the effect of measurement error. This is of enormous value, as such error may not only weaken the relationships being studied, but may also spuriously inflate them. Third, the plausibility of a given model can be examined through the testable predictions which follow from its specifications, in a way which is typically more detailed and inclusive than in causal analysis based on more traditional methods of data analysis. Furthermore, current approaches to modelling can also be useful in dealing with other problems that are frequently encountered in longitudinal analysis, perhaps most strikingly those associated with missing data, discussed below.

5.5 Multigroup analysis and missing data in structural equation modelling

Within the framework of structural equation modelling, it is possible to analyse several groups simultaneously. This approach has at least two different applications, in that it may be employed when comparing different groups of subjects, such as men and women, or it may be used to incorporate subjects with partial missing data into the analysis. Here I will discuss both of these, the latter with reference to Little and Rubin's (1987) classification of missing data, described in Chapter 4.
5.5.1 Multigroup analysis when comparing groups of subjects

The purpose of pursuing a multigroup set up in EQS will to some extent affect details of the input file. In general, when analysing more than one group in EQS, the input file is similar to the one described for single group analysis, with the exception that it specifies the number of groups to be analysed, and provides a separate set of specifications, labels, equations, variances and data for each of them, and the constraints are often stated together at the very end. When several groups are analysed simultaneously in order to investigate differences between the groups, the equations referring to variables for which data is available must be identical for each group. The groups are constrained to be the same on all estimated coefficients, means and variances which are assumed to be the same. For example, when comparing boys and girls, we might assume the mean of exposure to parental discord to be the same, although we would not expect similar levels of conduct disorder. Here, the former would be constrained to be the same across the groups of boys and girls, whereas the latter would not. Similarly, we may expect the same measure of adverse parenting to have the same precision, and thereby constrain the error term to be the same in both groups, in spite of the fact that exploratory analysis may have indicated that the means of the variable is relatively different for the two groups.

Differences between groups regarding a particular term can be examined in two different ways. First, the model can be estimated without constraining the term to be the same for the two groups. The program then estimates this separately for the different groups, and their relative values give some indication of their comparability. A further way to test differences between groups is to compare the overall goodness-of-fit of the model with the parameter under investigation constrained to be the same for all groups, to that of the model when this is estimated separately for the different groups. If allowing the parameter to be estimated separately improves the fit significantly it may be concluded that there are significant differences between the groups.
5.5.2 Multigroup analysis and cross-group constraints

When fitting multigroup models, these can be made more stable, and the number of degrees of freedom can be reduced, by imposing a series of different cross-group constraints. These may involve constraining the error variances of manifest variables, or the loadings of manifest variables on the corresponding trait and method factor to be the same across groups. That is to say that the degree of non-systematic error, and, provided the factors have the same variance in the different groups, the relative proportion of the variance of these variables which is accounted for by their loading on a specified latent variable, is equal across groups. On a more conceptual level these constraints imply that the manifest variables in question behave in similar ways for each group of subjects. Examples of cross-group constraints are available in the EQS set-ups presented in Chapter 8, and in the corresponding Appendices 6 and 7.

5.5.3 Multigroup analysis applied to missing data problems

When multigroup procedures are applied to problems of missing data other considerations need to be taken into account. Although EQS normally demands that data are available on all variables for all cases that are included in the analysis, missing data can be dealt with through the simultaneous analysis of groups of subjects with complete data on the one hand, and with particular patterns of missing measures on the other. As before, the number of groups to be analysed needs to be specified, a separate set of specifications, labels, equations, variances and data must be provided for each group, and the constraints are all provided together at the very end. However, for the groups with incomplete data, all terms from the original set-up of the complete data group that relate to variables for which data are missing are excluded from the additional specifications made for those groups.

Certain details of the set-up depend on the assumptions that are made about the missing data, essentially whether it is thought to be MCAR or MAR. If the data is assumed to be MCAR, all groups are constrained to be the same on all estimated coefficients, means and variances. This excludes any systematic relationship
between the values of any of the variables and the probability of an observation being missing. If, on the other hand, the data is assumed to be MAR, the model needs to be extended to analyse the means, as well as the covariances, while constraining all parameters to be equal across groups, including those concerned with the means (Dunn, Everitt and Pickles, 1993). The incomplete data sample can now differ systematically from the complete data group, but only in ways that are directly dependent on observed variables. This procedure also provides an opportunity to test whether or not the data is MCAR or MAR. That is, if the model being fitted is the correct one, the chi-squared goodness-of-fit statistic is informative of the nature of the missing data. If the model incorporating the means fits well, and their associated constraints, this indicates that the missing data is MCAR.

Multigroup analysis, using EQS, was employed by the present study for both of the reasons outlined above, that is, to retain subjects with partial missing data, here assumed to be MAR, within the analysis, and to compare groups of subjects, in this case men and women. Details of this analysis, and examples of the EQS set-up, is provided in Chapter 8, and in Appendices 6 and 7. These set-ups clearly specify which particular constraints are necessary for assumptions that data are MCAR, as well as MAR.

5.6 Summary

This chapter has been concerned with reliability, validity and missing data, the problems they pose to empirical research, and discussion of some methods to examine and seek to take into account their influence, if not overcome them completely.

It is evident that the quality of the data used to generate empirical results is of paramount importance. However, this is an area which has caused some worry in recent times, particularly with respect to retrospective recall, as was discussed in Chapter 3. While conventional methods to assess data, particularly with respect to validity, often demand conditions which can not be met, such as the availability of criterion variables, there are alternative approaches which may be used. The multitrait-multimethod matrix is especially interesting, as its application in
structural equation modelling not only generates results which are informative about data quality, but which can also be applied to empirical investigations of the interrelationship between latent constructs, and between latent constructs and observed variables. Such investigations have particular advantages as they avoid the often unrealistic assumption made by true-score models, that the variation in observed variables can be ascribed to the causal effects of non-observed true-score and random-error variables, which most studies in psychology make.

Equally great difficulties are posed by the unavoidable problem of missing data. As was outlined in Chapter 4, the way in which data loss arises and the assumptions that can be made about it has important implications for what constitutes appropriate statistical treatment. Data that is MCAR creates few problems, essentially only leading to a reduction of statistical power. Data that is MAR, however, has more serious implications, as it gives rise to a non-representative sample. Within the framework of structural equation modelling, there are methodologies that allow subjects with only partial information to be included in the analysis through the simultaneous processing of multiple groups, one of which will have complete data, whereas the remaining will each show a particular pattern of missing data. Missing data may be assumed to be either MCAR or MAR, and this is specified in details of the particular set-up. This approach makes it possible to retain the maximum number of subjects, thereby minimising the problem of missing data and associated loss of statistical power.
Chapter 6

PROSPECTIVE AND RETROSPECTIVE INDICATORS OF PARENT-CHILD INTERACTION, WAYS OF CONCEPTUALISING PARENT-CHILD INTERACTION IN THIS DATA SET, AND DESCRIPTION OF OUTCOME MEASURES

6.1 Introduction

As the main interest of the present study was in the relationship between parenting and children's short and long term adjustment, one of the first tasks was to identify measures indicating relevant parental behaviour and affect within the data set, and find a meaningful way of conceptualising these. There was a particular concern to find indicators referring to both parents' interaction with the child that reflected a wide range of aspects of parenting. The review in Chapter 2 discussed the apparent consensus about the general dimensions of parent-child interaction. In particular, numerous authors have highlighted the distinction between affective and instrumental, or behavioural, processes. Additionally, when examining the empirical literature another distinction emerged. It appears that overtly negative aspects of parenting, such as hostility, aggression, and abuse, have been considered separately from lack of positive interaction, such as apathy, and lack of warmth.

This chapter aims to describe the process of identifying relevant parenting variables in the present data set, to define these variables, to provide some information about their prevalence, and to explore the interrelationships between them. In so doing, there was a concern to address two conceptual questions: whether the prospective measures of parenting, obtained from the children's mothers in childhood, indicated that the distinction between affective and behavioural processes (Baldwin, 1955; Schafer, 1959; Sears, Maccoby and Levin, 1957; Symonds, 1939) was a
meaningful one in the context of the present data set, and whether indicators of overtly negative interaction should be distinguished from those which are concerned with lack of positive interaction.

Thus, this chapter begins with a description of the way in which prospective measures of parenting were identified, their meaning, how they were converted to binary variables for later descriptive analysis, and their prevalence, presented in Section 6.2. Section 6.3 describes the interrelationships between these variables and suggests a possible way of classifying them, based on results of factor analysis, thereby addressing the two conceptual questions outlined above. Section 6.4 describes the parallel search for parenting variables in the retrospective data, obtained from the subjects’ in adulthood, here with a concern to match the prospective variables already identified, and provides an account of how these variables were converted into a binary form, as well as the prevalence of these. Finally, the outcome variables selected for the study are described in Section 6.5. The chapter is concluded by a summary in Section 6.6.

6.2 Prospective measures of parent-child interaction

A careful study of the interview manual from the original 1970 study allowed any measure whose description indicated that it was concerned with mother’s or father’s behaviour or affect to the child to be identified. The description of their meaning was derived from the manual as well as from discussions with researchers involved in the original data collection.

6.2.1 The availability of prospective measures of parent-child interaction

There were four indicators of overtly negative parental behaviours, based on mothers’ accounts of the frequency with which specified behaviours had occurred between themselves and the child, and separately for their husband and the child, focusing on the prior three months.
(a) *Mother's and father's irritability.* This was a rating of the frequency with which irritability from the parent towards the child was reported to occur. Behavioural episodes thought to indicate irritability should involve some element of loss of control, and examples included snapping or shouting at the child, picking on the child, 'flying off the handle', quarrelling, and bickering and tiffs. Irritability was rated on a five-point scale, from once per month or less, to more than daily.

(b) *Exposure to maternal aggression.* This was a rating of behaviour reported by the respondent, concerned with the frequency and extent with which the child was exposed to the mother’s aggressive behaviour, directed to the child or other family members, involving instances such as family discord, scape-goating, and behavioural hostility. It was rated on a four-point scale, ranging from none to frequent.

(c) *Father's nagging.* This was a rating of the frequency with which the father grumbled at the child. However, by contrast to the irritability rating, the behaviours rated here did not reflect loss of self-control. Typical instances would be frequent exhortations or grumbles about aspects of the child, such as tidiness, hair, clothes or friends. The tendency to complain about something long after the stimulus was presented, to complain when no misdemeanour has been committed, and to see the child as a trial or nuisance were particularly relevant. It was rated on a four-point scale, ranging from rarely to constant.

In addition, three prospective indicators of positive aspects of parental behaviour were identified, designed to index the level of closeness between parent and child:

(d) *Activities with mother and father.* This was a rating of the frequency of activities that were performed jointly by the mother and the child. Interaction that was merely incidental to child care activities, interaction only in the sense of physical proximity, contacts which were clearly punitive, which the mother sought to discourage, or which only consisted of communication, were excluded. Activities with mother were rated on a six-point scale, ranging from no to a great deal of activities.
(e) **Communication with mother and father.** This was a rating of the frequency with which conversation occurred between the parent and the child. In this context communication referred to any interchange which was more than merely a perfunctory question and answer. It was rated on a five-point scale, ranging from none to daily.

There were also four interviewer rated indicators of negative parenting, based on comments about and affect towards the child expressed during the course of the interview. These indicators were rated from the tape recordings of the interviews, according to CFI principles, with attention to tone of voice and spontaneous comments.

(f) **Mother’s criticism.** This was a rating of the frequency of critical comments about the child made by the mother during the interview. Particular attention was paid to spontaneous comments with a negative or critical content, indicating that the respondent either disliked or disapproved of particular aspects of the child, or, when specifically asked about negative emotions involving the child, responses which were critical both in terms of their content and the tone of voice in which they were delivered. There were two versions of this indicator, one global rating based on the interviewer's overall impression of the level of criticism, making adjustment for the amount of time spent discussing the child, and one count of the actual number of critical comments made during the course of the interview. The global rating was made on a five-point scale, ranging from no criticism to a lot of criticism throughout much of the interview. Most of the EE literature, described in Chapter 2, is based on the version involving the count, rather than an overall rating. However, in this data set the count version of this variable showed considerably higher levels of missing data than the overall rating, and the present study used the overall rating instead, with the only exception of a comparison presented later in this chapter. Although unconventional, this was not thought to create any serious problem of comparability with other studies, as the two versions of this indicator were closely related, showing a correlation of .80. In addition, all mothers who produced four or more critical comments fell into the three most adverse out of five available categories on the global rating.

115
(g) *Mother's hostility.* This was a rating of the extent to which the mother
generalised her negative feeling towards the child in such a way that it was expressed
against the person, rather than against particular attributes or actions, attacking the
child for what he or she was, rather than what he or she did. Hostility, then, can be
seen as a generalisation of negative feeling, indicated by ordinary everyday matters
being described in a critical tone, in a condescending manner, implying that there were
few things the child could do right, or as criticism of the child being generalised.
Hostility was rated on a four-point scale, ranging from no hostility to hostility present
both as generalisation and rejection.

(h) *Mother's positive remarks.* As with criticism, this was a rating of the
frequency with which a certain kind of remarks were made about the child during the
course of the interview. However, in this case it was those with an explicitly positive
content, and comments made with a positive tone of voice which were rated. Again
two versions were available, one of which was a global rating of the interviewer's
overall impression making adjustment for the amount of time spent discussing the
child, whereas the other was a count of the number of positive remarks made during
the interview. Again, the global rating was made on a five-point scale, ranging from
no positive remarks to a lot of positive remarks throughout much of the interview.
As before, the overall rating, rather than the count, was used due to the lower levels
of missing data of the former. Again this was considered to be of secondary
importance as the correlation between the two versions was high, in this case .76.

(i) *Mother's warmth.* This was a rating of the warmth expressed by the mother
about the child in the interview situation, based on the mother's tone of voice,
expression, and gesture when speaking about the child. Particular attention was paid
to warmth that was expressed spontaneously, and failure to express warmth when
direct opportunities for this were provided. Importance was also given to the extent
to which the mother expressed interest and enthusiasm in the child's activities and
achievements, as well as empathy, and the degree to which the mother showed
understanding of and sympathetic interest in the child's responses. The latter was
especially emphasised when the mother described the child's symptoms. Warmth was
rated on a six-point scale, ranging from no demonstration of warmth to demonstratively very warm, and was not allowed to be contaminated by the presence or absence of criticism and hostility.

6.2.2 The conversion of the prospective indicators of parent-child interaction to a binary form

The prospective parenting variables were to be used both in their original, and in a binary form. In the analyses, the original form will sometimes be referred to as continuous. This is done with reservation, as it is clearly not continuous in a strict statistical sense. It does, however, serve to contrast the original form of the parenting indicators with the binary form.

The conversion of the indicators of parenting to the latter rested on two considerations. First, the criteria for scoring each variable were examined, and the point at which each indicator surpassed the point of what could intuitively be assumed to be acceptable in non-deviant parent-child interaction was determined. Second, the distribution of each individual variable was examined, in order to establish if the estimation of what level of adversity was commonplace appeared to be reasonable, and to what extent this suggested any particular cut-off points. These two judgements were then combined, generating a binary variable which, judging from the frequencies produced, appeared to differentiate between children who were exposed to rather extreme levels of adverse parenting, and children whose interaction with their parents was only negative to the extent that may be assumed normal, or at least reasonably common, under the stresses of a generally socially disadvantaged everyday life. The following paragraphs give a more detailed account of this process for each individual variable in turn:

Mother’s and father’s irritability. On the variables reflecting parental irritability the two most extreme ratings were reported by a very small number of mothers, while as many as a third reported parental loss of temper with the child one to four times a week. Although this refers to regular, and relatively frequent, discord between parent
and child, it was also not necessarily severe, and very common, and therefore on these measures the delineation was between children who were reported to be exposed to parental irritability less than, and more than, four times a week.

Exposure to maternal aggression. The great majority of mothers reported that their children were never exposed to her aggressive behaviour, and a large proportion of the remainder said that this happened only rarely. A somewhat smaller number reported that such exposure occurred occasionally, but only a handful of mothers fell into the frequent category. The binary variable differentiated between those whose mothers reported that exposure to her aggressive behaviour never occurred, or occurred only rarely, making this kind of behaviour an exception, and those whose mothers reported that this happened occasionally or frequently, implying a greater degree of tolerance, or lesser ability to self-control, in relation to aggressive behaviour in the child’s presence.

Father’s nagging. Very few fathers were reported to constantly nag at the child, but a somewhat larger proportion did so frequently. By comparison, the large majority seemed to fall in the two least disadvantaged categories, where only rare or occasional nagging may have occurred. The binary version of this variable then contrasted the former two groups, where nagging was frequent or constant, with these latter two, where it was occasional or rare.

Activities with mother and father. The distribution of this variable was reasonably even, with all categories containing approximately 15-20% of subjects. As the concern was to distinguish between those children who were severely disadvantaged, and those who experienced more normal, although not ideal, circumstances, the most extreme category, containing children whose mothers reported that they had not undertaken any activities with the child over the last week, was contrasted with the remaining categories, ranging from some, albeit few, to a great deal of such activities.

Communication with mother and father. The distribution of this variable was very similar for mothers and fathers, with a small number of children falling into the two
most adverse categories, where communication with the respective parent occurred less than weekly, and a considerably larger proportion being reported as having conversations with their parents weekly, or more. This suggested a distinction between the two least fortunate groups, with very low frequencies indeed, and the remaining three groups.

Mother's criticism. Categorising maternal criticality was complicated as this is a variable which has since been used extensively by others, and for which there are norms established in the adult literature, but whose applicability in childhood investigations remain to be confirmed. However, as outlined earlier, this study used the global ratings, rather than the counts, as the counts suffered from a higher level of missing data. The global rating ranged from 'none' to 'considerable', with the two most severely critical categories showing markedly lower frequencies than the remaining three. Children whose mothers were rated as showing moderate, or a lot of criticism throughout the interview were thus contrasted with children whose mothers were thought to only show some, very little, or no criticism.

Maternal hostility. This was perhaps the most obvious categorisation of all, as the distribution suggested that the overwhelming majority of mothers expressed no hostility towards their children. The very small number who did so were categorised as exhibiting this 'as generalisation', 'as rejection', or 'as generalisation and rejection'. In constructing a binary variable for maternal hostility these three groups were collapsed into one, contrasting mothers showing no hostility with mothers showing hostility as generalisation, rejection, or both.

Positive remarks. Here the distribution suggested a distinction between those whose mothers made no positive comments at all during the course of the interview, and those making one and more. About 10% fell into the first of these categories, but more than a third made only one positive comment, making the former a relatively rare, and apparently extreme group.
Warmth. Again, the distribution suggested a particular delineation, with the three least favourable categories all having relatively low frequencies, whereas those of the remaining three were all considerably higher. The binary version of this variable, then, distinguished between children whose mothers showed no, very little, or only some warmth, and children whose mothers showed warmth at a level which was thought to be either moderate, marked, or very demonstrative throughout the interview.

6.2.3 The prevalence of prospectively reported adverse parent-child interaction

As has been pointed out previously, the analysis was designed to examine potential differences between the sexes, both in terms of the prevalence of particular problems, and the pattern of relationships between indicators. For this reason, the prevalence of the variables concerned with prospectively reported adverse parenting was examined for boys and girls separately. Table 6.1 shows the percentages of children who were reported to be exposed to adverse ratings on the prospective variables reflecting aspects of the parent-child relationship, and the associated p-values indicating if there was a significant difference between the two sexes, derived from Chi-square or, when appropriate due to low expected frequencies, Fisher-Exact tests. Results from both the unadjusted and adjusted data are presented, the adjusted data being generated using the weight described in Chapter 4, and shown in Appendix 3. Already at this stage there were partially missing data, although the extent of this varied considerably between variables, ranging from none to 58 subjects without information. The results are based on all cases for whom there was complete data on any one particular variable.

According to maternal reports, a considerable proportion of the children were exposed to some degree of negative parenting. There was little indication of sex differences on any of these measures with the exception of exposure to maternal aggression, which boys experienced significantly more than girls. Furthermore, in the adjusted data, there was a tendency for boys to be more likely to have no or irregular activities with their mother than girls. As these are measures which have not been used to any great extent in studies of this kind it is difficult to say how the rates
observed in this sample compare with other populations. However, the frequencies
of the interviewer-rated variables, contributing to the EE sub-scales, appeared to be
comparable to those reported in other childhood investigations. In accord with a
number of other studies, very few mothers were rated as expressing hostility towards
their children (e.g., Vostanis, Burnham, and Harris, 1992; Vostanis, Nicholls, and
Harrington, 1994). Although the difference was not formally statistically signifi-
cant, there was a tendency for hostility to be rated more frequently towards boys
than towards girls, with seven of 102 mothers of boys expressing hostility, compared to
only one of 63 mothers of girls. Critical comments about the child were expressed
more frequently, but here there was a tendency towards higher levels in girls. The
rate of critical comments appeared to be slightly higher in this sample than that
reported in other studies. Vostanis and colleagues (1994) reported that the mean
number of such comments was 2.3 for the mothers of children who had been referred
for either conduct or emotional disorder, while it was 1.8 for the mothers of controls.
The corresponding figures in this sample, using counts rather than overall ratings in
order to achieve comparability, were 3.4 for mothers of children scoring high on the
teacher questionnaire, and 2.5 in the control group. There were no differences in the
proportion of boys and girls exposed to lack of positive remarks or warmth.
Furthermore, the extent to which mothers expressed these appeared to be similar to
levels observed in other studies. Here, Vostanis and colleagues (1994) cite mean
numbers of positive remarks of 1.9 and 4.3, and maternal warmth of 2.8 and 4.0, in
their group of mothers of disordered and control children, respectively. The
corresponding figures for this sample were 2.6 and 3.0 for positive remarks in the
mothers of children scoring high on the teacher behaviour questionnaire and in the
mothers of the control children, respectively, and 3.7 for maternal warmth in both
groups. It is difficult to compare these two data sets, as there are differences between
the samples. Perhaps most significantly they stem from different decades, the present
sample being less recent. Secular trends in parenting practices may both have had an
overall effect, and may have altered differences between groups. Clearly, it is
impossible to resolve this here, although it is worth noting that the general level of
critical comments appeared somewhat higher in the present sample.
Table 6.1. Percentages of boys and girls exposed to adverse parent-child interaction

<table>
<thead>
<tr>
<th>Indicators of negative behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Mother's irritability four times a week or more</td>
<td>26%</td>
<td>16%</td>
</tr>
<tr>
<td>Father's irritability four times a week or more</td>
<td>6%</td>
<td>11%</td>
</tr>
<tr>
<td>Exposure to maternal aggression</td>
<td>22%</td>
<td>10%</td>
</tr>
<tr>
<td>Father's frequent nagging</td>
<td>21%</td>
<td>14%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of positive behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or irregular activities with mother</td>
<td>19%</td>
<td>10%</td>
</tr>
<tr>
<td>No or irregular activities with father</td>
<td>30%</td>
<td>26%</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>12%</td>
<td>13%</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>10%</td>
<td>18%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of maternal negative expressed emotion</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four or more critical comments by mother</td>
<td>12%</td>
<td>18%</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>7%</td>
<td>2%</td>
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</table>

<table>
<thead>
<tr>
<th>Indicators of lack of maternal positive expressed emotion</th>
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<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>No positive remarks</td>
<td>15%</td>
<td>13%</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>18%</td>
<td>16%</td>
</tr>
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</table>

* p-values greater than .10 are reported as not significant (ns)
6.3 Interrelationships between the prospective indicators of parent-child interaction

The next step was to examine the interrelationships between these variables. Initially a simple correlation matrix was computed, using the original version of the variables, to suggest relationships between individual variables. These relationships were then further investigated in a factor analysis. At both these stages, the variables reflecting the mother-child relationship and the father child relationship were considered separately. This was done in spite of an awareness that there would be considerable intercorrelations between these two sets of variables, as there was an explicit interest in comparing and contrasting the influences of mothers and fathers on children's functioning, and thereby a need to treat these relationships as separate entities. The association between maternal and paternal interaction with the child was, however, addressed in the modelling to follow, in particular that discussed in Chapter 8.

6.3.1 Correlations between the prospective indicators of parent-child interaction

The correlations between the indicators of mother-child interaction in the unadjusted and adjusted data are shown in Table 6.2a and 6.2b respectively, and the corresponding tables for father-child interaction are 6.3a and 6.3b. These revealed that the observed pattern of interrelationships appeared to be very similar in both sets of data. Concerning the mother-child relationship relatively high, and certainly significant, intercorrelations between the overtly negative variables, reflecting maternal irritability, exposure to aggression, criticism, and hostility were found. There was also a significant correlation between mother-child activities and communication, and a remarkably high correlation between the positive EE sub-scales, positive remarks and warmth. Although maternal warmth was also significantly correlated with mother-child activities and communication, these correlations were not as high as those mentioned previously.

The correlations between the variables concerned with father-child interaction also seemed to distinguish between indicators of negative parenting, and
those reflecting positive, or lack of positive, exchanges. Thus, there were two
significant correlations, one between fathers’ irritability and nagging, and one between
father-child activities and communication.

Table 6.2a. Correlations between variables concerned with mother-child interaction: unadjusted data

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<tr>
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<td>.22*</td>
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<td>-.02</td>
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* p < .01
** p < .001

Table 6.2b. Correlations between variables concerned with mother-child interaction: adjusted data

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* p < .01
** p < .001

124
Table 6.3a. Correlations between variables concerned with father-child interaction: unadjusted data

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<tr>
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<td>.03</td>
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* p < .01
** p < .001

Table 6.3b. Correlations between variables concerned with father-child interaction: adjusted data

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<td>-.02</td>
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<td>4. Communication</td>
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<td>.18</td>
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</table>

* p < .01
** p < .001

6.3.2 Factor analysis

6.3.2.1 Reasoning behind the factor analysis

One approach to studying the relationship between a collection of variables more formally is through factor analysis, which is based on the assumption that the observed variables are linear combinations of some underlying factors. Some of these factors are shared between different variables, and such common factors contribute to the covariance among them. Factor analysis aims to identify these common factors from the covariance structure of the observed variables. Here it was used at an early stage to identify a meaningful set of dimensions of parenting from the manifest variables. Although the factors generated by this procedure were not used formally in any of the analyses presented, they provided a useful guidance for the structuring of the
The specification of the rotation in factor analysis involves essentially two options, the orthogonal and the oblique, although there are many variants on these. For the present purposes an oblique factor analysis, direct oblimin, implemented in SPSS (Norusis/SPSS, 1988), was selected. This allows the various factors to be correlated, and was considered to be appropriate for two reasons. First, most of the variables were based on reports from one source, and there is a well known tendency towards consistency in accounts. Second, different aspects of parenting, although conceptually distinct, would not be expected to be entirely independent from each other. This appeared to be confirmed by the correlations, presented above, which indicated a certain degree of interrelationship also between some of the variables thought to belong to different dimensions. However, orthogonal factor analysis was also performed for comparative purposes, and this yielded virtually identical results. Two parallel actor analyses were performed on the adjusted data, one using variables indicative of the mother-child relationship, and another performed on the variables concerned with the father-child relationship.

6.3.2.2 Results of the factor analysis of the variables concerned with the mother

The factor analysis of the variables reflecting the mother-child relationship generated three factors, which together accounted for 63.5% of the variance and were meaningfully grouped around different aspects of parent-child interaction:

(1) *Mother's negativity to the child*, involving maternal irritability, exposure of the child to the mother's aggression, maternal hostility, and overall ratings of maternal criticism, the latter two of which reflected behaviour expressed in the interview situation and were rated by the interviewer (accounting for 26.7% of the variance).

(2) *Mother's positivity to the child*, to which mother's activities, communication, warmth and positive remarks all contributed, the former two of which were maternal
reports of her own behaviour, whereas the latter two were based on interviewer's ratings (accounting for 22.1% of the variance).

(3) **Mother's positive affect (EE) for the child**, as indicated by maternal warmth and overall positive comments expressed during the interview and rated by the interviewer (accounting for 14.6% of the variance).

These results were compatible with the observations made on the basis of the correlation matrices above. There was some evidence that the variables reflecting overtly negative parent-child interaction, and those concerned with positive aspects of parenting loaded on separate factors, and were therefore best seen as separate dimensions. There was also limited support for the notion that affective and behavioural processes are meaningfully distinguished. Although there were two factors reflecting maternal negativity and positivity to the child, incorporating both behavioural and interviewer rated affective aspects of the relationship, there was also a third factor, which incorporated only variables thought to reflect positive maternal affect, warmth and positive remarks.

6.3.2.3 Results of the factor analysis of the variables concerned with the father

As the informant for the prospective variables concerned with father-child interaction was the mother, their coverage was more limited than above. In particular the data were constrained so that there was little reference to the father's feelings for the child, while there was a focus on more easily observed aspects of behaviour. Again, an oblique factor analysis was performed on the adjusted data, yielding two factors which accounted for 71.1% of the variance, and were found to be theoretically meaningful and comparable with factors concerned with the mothers:

(1) **Father's positive behaviour to the child**, based on the mother's perception of the frequency of the father's activities and communication with the child (accounting for 41.7% of the variance).
(2) *Father's negative behaviour to the child*, combining the mother's perception of the father's irritability and nagging to the child (accounting for 29.4% of the variance).

Again these results were compatible with the correlations presented above, which suggested a relationship between variables reflecting positive and negative interaction.

### 6.4 Retrospective measures of parenting

The next step was to identify a further set of parenting variables, derived from the subjects' retrospective recall of their parenting experiences, reported in the adult interview. However, at this stage there was a concern to find variables that, to the greatest extent possible, matched those obtained from the childhood data. The availability of retrospective measures of parenting was more limited than for the prospective measures, imposing some limitations on the present study.

#### 6.4.1 The availability of retrospective measures of parenting

There were essentially four indicators of the nature of parent-child interaction, as recalled by the subject in early adulthood. These were assessed for each parent separately, focusing first on the time when they were ten years of age, the age at which the original childhood study was undertaken, and second on the time during which they attended secondary school. Two of these were concerned with overtly negative aspects of parental behaviour:

(a) *Mother's and father's harshness of discipline.* This was a rating of the extent to which the parent was over-restrictive and punitive, used physical punishment, or was heavy-handed. It was rated on a seven-point scale, but this was not continuous in the sense of indicating increasing levels of severity. Rather it ranged from lax discipline,
referring to situations where the parent reportedly made little attempt to control the child, to harsh, aggressive and overindulgent discipline, meaning firm to the extent of being over-restrictive, and frequently physically punitive. Harsh parents were cold and aggressive, frequently hitting the child hard, and often inclined to be rejecting. This also included parents whose behaviour was extremely inconsistent. The intermediate points referred to attempts to maintain discipline which were often unsuccessful; intermediate, between lax and firm; firm; and hard, heavy-handed, or over-restrictive. For the purposes of the present study, this variable was recoded to contrast one group, including all categories where severe physical punishment was not prevalent, with the hard, heavy-handed, or over-restrictive; harsh; and aggressive and overindulgent discipline.

(b) Abuse by mother and father. This was a rating of the physical harm done to the child by the parent in disciplinary, or other contexts. A positive rating could only be made if details about injuries the child sustained, such as bruises or broken limbs, could be obtained. It was rated on a three-point scale of no; possible; and definite abuse.

There were also two sets of retrospectively assessed measures of positive aspects of parental behaviour. Their match with the prospective variables was more exact than those concerned with negative aspects of parenting. Focusing on the period when the child was ten years old, and on each parent in turn, subjects' were asked about the frequency of:

(c) Mother's and father's activities with the child. This was an overall rating, designed to reflect various aspects of shared parent-child activities, their frequency and regularity, the extent to which they focused on the child's interests and needs, and the extent to which they involved one-to-one interaction with the parent, or were predominantly family or group-based. It was rated on a seven-point scale, ranging from no to regular one-to-one activities.
(d) *Mother's and father's communication with the child.* This scale reflected the overall expectations and pattern of communication between parent and child, with the aim of differentiating between those children who had regular communication with their parents, and those whose pattern was uncertain or poor. It was rated on a four-point scale, again ranging from no to regular communication.

**6.4.2 The conversion of the retrospective indicators of parent-child interaction to a binary form**

Like the prospective variables, the retrospective variables of parenting were recoded into a binary form, following the principles discussed above.

*Mother's and father's harshness of discipline.* The recoding of this variable depended on judgements already made about the most appropriate way to use it in its original form. That is, a decision had already been made to contrast one group, including all categories where severe physical punishment was not prevalent, with the various categories where parents frequently resorted to such measures. The prevalence of severe physical punishment was, however, relatively low, and the binary version of this variable contrasts parents who did not employ this disciplinary strategy with parents who did.

*Abuse by mother and father.* Extremely few subjects reported any form of abuse by either parent, whether considering only definite cases of abuse, or also including those where abuse was judged to have been possible, although the evidence for it was not judged to merit a definite rating. In constructing a binary version of this variable, both these categories, referring to possible or definite abuse, were contrasted with the large majority who reported no abuse.

*Mother's and father's activities with the child.* Here there was clearly a concern to create a binary indicator which, to the greatest extent possible, was similar to the parallel prospective indicator. As with the latter, this retrospective indicator
differentiated between the most extreme category, containing children who did not enjoy any activities with their mothers, and those who had shared some, or more, such activities.

*Mother's and father's communication with the child.* A similar attempt was made to make the retrospective measure of the frequency of parent-child communication comparable to the prospective indicator. The latter distinguished between the two least fortunate groups, with very low frequencies indeed, and the remaining three groups, showing a different level of prevalence. The retrospective variable, however, was not rated on a five-, but a four-point scale, which showed an even distribution across all the categories for the fathers, although a very small numbers of mothers were reported not to communicate with the child, with the remainder falling into the other three categories in equal numbers. For the purposes of this variable the single most adverse group, where children reported that no communication took place between themselves and the parent, was contrasted with the remainder, where at least some communication was present.

**6.4.3 The prevalence of retrospectively reported adverse parent-child interaction**

There was additional missing data on the indicators of parent-child interaction obtained in the adult interview, as a consequence both of attrition and partial response. This was in part a consequence of the fact that the follow-up was conducted by two teams. The original intention was that both teams should see each subject. Towards the end, however, this became unrealistic, and the remaining subjects were only interviewed once, by either of the teams, one of which did not ask the questions concerned with parent-child interaction. As for the prospective indicators of parenting, the number of subjects with missing data varied between the different indicators, ranging from 64 to 72.

The percentages of men and women retrospectively reporting adverse parenting in the unadjusted and adjusted data is shown in Table 6.4, with the
associated p-values, generated by Chi-square or Fisher-Exact tests, indicating if there
was a significant difference between the two sexes. As before, all subjects for whom
information on any one particular variable was available were used in this analysis.
Furthermore, as the rates reported with reference to age ten and to the time during
which the child attended secondary school were very similar, only the former are
presented here.

Again there were few indications of any consistent sex differences,
although men reported having experienced a lack of activities with their mother more
often than women. This difference was only significant in the adjusted data, where
men generally were found to report slightly more exposure to lack of maternal as well
as paternal attention, as reflected in the rating of both activities and communication.
On the whole, however, both men and women reported having experienced adverse
parenting relatively rarely, the only exception being communication with father, which
nearly a quarter of the subjects reported to have lacked. It is difficult to compare
these rates with those observed in the prospective data, as harshness of discipline and
abuse reflect different constructs from the negative behavioural indicators reported in
the maternal interview. Furthermore, the exact criteria for rating activities and
communication differed at the two occasions, and the cut-off points may not be
comparable in spite of every attempt to make them so. On a very general level,
however, it appeared that the prevalence of difficulties in parent-child relationships of
around 10%, excluding abuse, was somewhat lower than that was observed in
childhood, where mothers reported rates of difficulties in the order of 15%.
Table 6.4. Percentages of men and women retrospectively reporting exposure to adverse parent-child interaction

<table>
<thead>
<tr>
<th>Indicators of lack of positive behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women (p)*</td>
</tr>
<tr>
<td>No activities with mother</td>
<td>7%</td>
<td>4% (ns)</td>
</tr>
<tr>
<td>No activities with father</td>
<td>8%</td>
<td>11% (ns)</td>
</tr>
<tr>
<td>No communication with mother</td>
<td>5%</td>
<td>7% (ns)</td>
</tr>
<tr>
<td>No communication with father</td>
<td>21%</td>
<td>23% (ns)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of negative behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women (p)*</td>
</tr>
<tr>
<td>Harsh discipline by mother</td>
<td>5%</td>
<td>7% (ns)</td>
</tr>
<tr>
<td>Harsh discipline by father</td>
<td>11%</td>
<td>10% (ns)</td>
</tr>
<tr>
<td>Abuse by mother</td>
<td>2%</td>
<td>2% (ns)</td>
</tr>
<tr>
<td>Abuse by father</td>
<td>3%</td>
<td>4% (ns)</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)

6.5 Outcome measures

In addition to the various indicators of parenting, which were used in this study as explanatory variables, there was a set of outcome variables. Chapters 2 and 3 provided the theoretical background for an interest in the interrelationships between parenting, conduct disorder, and adult self-esteem and depression. The ratings of these variables spanned various different sources of data, from the teacher questionnaire, through the maternal interview, the adult interview with the subject, and a self-completion inventory administered to the subjects in adulthood.
Conduct problems and conduct disorder were rated in two different ways, one based on teacher reports, the other derived from the maternal interview. The teachers' questionnaire, described in Chapter 4, identified children with either emotional, conduct or mixed problems. The score created is originally continuous, although a conventional cut-off at nine (≥9) is applied to create a binary version of the scale, distinguishing between children with high and low rates of teacher rated behaviour problems. For the purposes of this study children with conduct problems alone and mixed conduct and emotional problems were included in the group with conduct problems.

The maternal interview module was developed within the department (Rutter, Cox, Tupling, Berger and Yule, 1975), and was designed to provide systematic coverage of major areas of psychiatric symptomatology. Using a brief structured approach, a series of set questions concerning a wide range of possible emotional or behavioural problems, covering 33 symptomatic behaviours, were asked. For all items of clinical importance information was collected about the onset, severity, frequency, situation specificity and developmental course. The answers were rated for the degree of handicap caused in the child's social relationships and development. The focus was on difficulties that were marked, pervasive and persistent enough to lead to impaired functioning and warrant treatment of some kind. A psychiatrist provided overall ratings of emotional, conduct and mixed disorder, using a four-point scale, referring to no, dubious, definite, and severe disorder. The convention here was to distinguish between children who had either had no, or a dubious level of disorder, and children who had definite or severe disorder. Again both children with conduct problems alone and comorbid conduct and emotional problems were included.

The percentages of children's conduct problems are shown in Table 6.5. In the unadjusted data just over one third of the children were reported to have conduct problems by their teachers at age 10. By contrast, slightly more than one tenth were rated as having conduct problems based on the maternal report. In the adjusted data the rates were, as would be expected, drastically reduced. While there
was a slight tendency for conduct problems to be more frequent in boys than in girls in the unadjusted data, neither of these differences was significant, and this trend was dramatically reversed regarding conduct problems reported by mothers in the adjusted data. These particular figures should, however, be viewed with some caution, as they are a consequence of the differential relationship between the screening instrument and the measure of conduct problems derived from maternal reports for the two sexes on the one hand, and the dependency of the weight on the screening instrument on the other. It was noted when the sample was originally studied that the relationship between the two indicators of conduct problems was different for the two sexes (Rutter, Cox, Tupling, Berger and Yule, 1975). In particular, it appeared that the teacher questionnaire was more effective in identifying boys who would also be rated as having conduct problems based on the maternal reports than it was for girls. Boys whose mothers reported them to have conduct problems were, with only four exceptions, also reported to have conduct problems by their teachers. For girls, however, the two measures appeared to be unrelated.

Table 6.5. Percentages of boys and girls with conduct problems

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Conduct problems reported by teachers</td>
<td>40%</td>
<td>33%</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>Conduct problems reported by mothers</td>
<td>13%</td>
<td>10%</td>
<td>3%</td>
<td>9%</td>
</tr>
</tbody>
</table>
6.5.2 Adult lifetime depression

The rating adult lifetime depression was based on self-reports of symptoms made during the interview with the subject. Again a brief structured approach was used, covering major areas of psychiatric symptomatology in order to obtain details about both past and present psychiatric contacts and episodes. On the basis of this information, the interviewers prepared vignettes, and these were used by a clinicians to make final diagnostic assessment of the type and severity of psychiatric disorder. An episode of depression was rated if symptoms had been present for at least a period of two weeks at any point in the subject's adult life, and/or had involved help seeking, and had involved some impairment of social functioning, or were noticeable to others in the subject's household or social circle.

The rates of adult lifetime depression in men and women were compared using Chi-square analysis in both the unadjusted and the adjusted data, for all subjects for whom information was available, here 147 subjects. The percentages of men and women with depression, and the associated p-values, generated by Chi-square analysis, are shown in Table 6.6. In agreement with other studies, the rates observed in the women were considerably higher than those in the men. In the unadjusted data the proportion of women with depression was more than twice that found in the men, and in the unadjusted data the difference was even more marked. Both comparisons were significant on a 5% level, indicating that adult lifetime depression indeed was more frequent in women than in men in this sample.

Table 6.6. Percentages of men and women having experienced adult lifetime depression

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women (p)</td>
<td>Men</td>
<td>Women (p)</td>
</tr>
<tr>
<td>Depression</td>
<td>12%</td>
<td>28% (.02)</td>
<td>6%</td>
<td>22% (.01)</td>
</tr>
</tbody>
</table>

136
Various instruments to assess self-esteem have been developed over the years, reflecting different theoretical perspectives and target populations. One which has been widely employed, and was used for the present investigation, is the Rosenberg self-esteem inventory (Rosenberg, 1965). Rosenberg has argued for the phenomenological experience of general self-worth, above one's evaluations of more detailed attributes. It was in order to tap this global perception that he developed his unidimensional measure of self-esteem, designed for adolescents and adults. It is a 10-item Guttman scale, reproduced in Appendix 4, concerned with the degree to which the respondent is satisfied with him or herself, has a positive attitude to him or herself, feels he or she has a number of good qualities, feels useless, desires more self respect, and considers him or herself a failure. Total scores range from 10 to 40, with higher scores indicating higher self-esteem. The instrument has an impressive reliability, and has yielded numerous relationships that support its construct validity (Rosenberg, 1965; Wylie, 1974).

The means for men and women in the unadjusted and adjusted data, to the extent that scores were available, in this case for 133 subjects, are shown in Table 6.7. There was some evidence that men scored higher than women, as indicated by one way analysis of variance, although the difference was only significant in the adjusted data.

There is a final important point to note about the two adult indicators. By contrast to depression, which referred to an adult lifetime diagnosis, the self-esteem score reflected the subject's current state. Onset of depression would therefore necessarily have been prior to administering the self-esteem inventory, and in many cases symptoms of the disorder would already have subsided. This put some constraints on the subsequent analysis, in that low self-esteem could not be argued to be a predecessor of depression, and modelling it to be a predictor or correlate of depression would have been inappropriate. Both depression and self-esteem could, however, be studied as outcomes in their own right, and to some extent the relationship between them was considered.
Table 6.7. Means of Rosenberg self-esteem scores for men and women

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>(p*)</td>
<td>Men</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>31.17</td>
<td>30.11</td>
<td>(ns)</td>
<td>31.56</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)

6.6 Summary

In this chapter the process of identifying relevant parenting variables in the present data set has been described, these variables have been defined, and the interrelationships between them explored. It has been shown that there was a considerable range of indicators of parenting, both in the prospective and the retrospective data. In particular, in the prospective data, there were both reports of parental behaviour, and interviewer rated variables, reflecting all the sub-scales of EE, with the exception of emotional overinvolvement. Unfortunately, however, the EE-measures were only available for the mother, and no indicator of paternal EE could be obtained.

The interrelationships between the various indicators were explored, both through simple correlations between the individual variables, and through factor analysis. This investigation sought to address two conceptual questions, one concerned with the extent to which these prospective indicators of parenting conformed to the previously discussed distinction between affective and behavioural processes, while the second asked if the indicators of overtly negative interaction should be distinguished from those that are concerned with lack of positive interaction.

The answer to the second of these questions was consistent both in the exploration of the variables reflecting the mother-child relationship, and the father-child relationship. There were strong associations between variables reflecting overtly negative interaction, as well as between indicators of lack of positive interaction, while
the relationships across this distinction were considerably weaker. The answer to the first question was, however, less clear-cut. The distinction between an affective and a behavioural dimension was only confirmed among the variables indicating positive, not among those reflecting overtly negative aspects of the mother-child relationship. The indication in this data set, then, is that whereas parental affect and behaviour to the child may be meaningfully distinguished on a conceptual level, in practice they may be intimately linked.

This classification then guided the search for appropriate indicators of parenting in the retrospective data. Although there is not any available methodology to assess EE retrospectively, there were behavioural indicators for both positive and negative aspects of mothers’, as well as fathers’, behaviour, making it possible to study the relationship between prospective maternal and retrospective subject’s reports of parenting.

The results that emerged were consistent with much of the prevailing literature. In agreement with earlier reports (eg Holmes and Robins, 1987; Lytton and Romney, 1991) the data did not, on the whole, suggest differential exposure to adverse parental behaviour or maternal EE dependent on the child’s sex. However, there was some indication that boys were exposed to more maternal aggression, and a tendency for mothers to express more hostility concerning sons compared to daughters, whereas the reverse was true for criticism. The majority of the comparisons, however, suggested similar rates of exposure for children of both sexes, suggesting that parents did not distinguish significantly between sons and daughter with respect to the measures here tested. Regarding the outcome measures, there was some indication the conduct problems were more common in boys than in girls, although complications involving the weight in this particular context made this difficult to ascertain this in the adjusted data. It also seems likely that the sample design, where a disproportionate amount of children scoring high on a teacher questionnaire of behaviour problems were selected, has affected the distribution of the rates of conduct problems to a larger extent than any of the remaining variables, and has had implications for the sex ratio which it was difficult to foresee. Depression, by contrast was significantly more common in women than in men, and the self-esteem of women appeared to be lower than that of men. Both of these findings are in
agreement with previous findings, as was discussed in Chapter 3 (Boyd and Weissman, 1981; Judd and Burrows, 1989; Skaalvik, 1986; Weissman, 1985).

As would be expected in any prospective longitudinal study there were missing data, arising from sample attrition as well as partial response. The extent of this varied considerably between variables. Consequently, the number of subjects that could be included in the subsequent analyses depended on the indicators used at any particular stage.
Chapter 7

MATERNAL EXPRESSED EMOTION, PARENTAL BEHAVIOUR, AND CHILDREN'S CONDUCT PROBLEMS REPORTED BY MOTHERS AND TEACHERS

7.1 Introduction

This chapter examines the associations between aspects of the parent-child relationship and children's conduct problems, discussed in Chapter 2. Some of this work has focused on parental behaviour (e.g., Loeber and Dishion, 1983; Patterson, 1982; Patterson, DeBaryshe and Ramsey, 1989; Patterson, Reid and Dishion, 1992; Robins, 1991), whereas more recent developments have been concerned with EE, in particular the criticism and hostility sub-scales (e.g., Stubbe, Zahner, Goldstein, and Leckman, 1993; Vostanis and Nicholls, 1992; Vostanis, Nicholls and Harrington, 1993). To date, however, most of these studies have only examined one dimension in isolation, not taking into account other, potentially relevant, parental measures, and we know little about the relative importance of behavioral and affective indicators of parenting.

Furthermore, investigations involving the EE sub-scales have typically not distinguished between effects for boys and girls. This is unfortunate, as there are known sex differences in the prevalence of conduct problems, with boys generally showing considerably higher rates than girls. However, exposure to adverse parenting does not appear to show a similar trend, as previous literature, as well as evidence presented in Chapter 6, indicates that boys and girls experience very similar rates of such adversity. The higher prevalence of conduct disorder in boys may arise from differential susceptibility to risk factors, and the role of parental EE, as well as other aspects of parent-child interaction, needs to be investigated here.

Another issue of some interest relates to the meaning of the observed
link between parental EE and children's problems. As most studies in the past have used measures of children's disorder and behaviour problems that are wholly, or partly, based on parental reports, such as mother rated behaviour checklists (eg Vostanis and Nicholls, 1992), clinical ratings based on interviews with the child's primary care giver (eg Stubbe, Zahner, Goldstein and Leckman, 1993), and different combinations of parental, teacher and child reports (eg Schwartz, Dorer, Beardslee, Lavori and Keller, 1990; Vostanis, Nicholls and Harrington, 1994) we must be careful when making inferences. We do not know to what extent previous findings reflect a reporting effect, where some parents are both more likely to rate their children as having problems, and to be critical of them in an interview situation, and to what extent they reflect situation-specific manifestations of a poorly functioning parent-child relationship. One approach to examine this would be to compare the relationship between parental EE and conduct problems that have been assessed in different ways, in an attempt to investigate if the relationship involving conduct problems rated on the basis of parental reports can be generalised to problems that are observed by others.

With these issues in mind, two aims were formulated for the present investigation. First, to examine which of the parental indicators were associated with conduct problems rated on the basis of reports by the child's teacher and mother. This allowed both the relationships between conduct problems and parental behaviour and EE, and the links between parental EE and conduct problems reported by teachers and mothers to be investigated. Second, to compare the associations found for boys and girls, and examine if there appeared to be any sex differences in these associations.

A description of the method and statistical analysis here used is provided in Section 7.2. This is followed by a presentation of the results in Section 7.3. Finally, these results are then summarised in Section 7.4.

7.2 Method

7.2.1 Measures

The measures have been described in Chapter 6. Here, nine prospective indicators of
parenting were used, reflecting negative and lack of positive, as well as behavioural aspects and EE. These included mother’s and father’s irritability, activities with mother, communication with mother and father, and maternal criticism, hostility, positive remarks, and warmth. Additionally, two measures of conduct problems, the score on the teacher questionnaire, and the disorder rating derived from the maternal interview were selected. All variables were used in their binary forms.

7.2.2 Incomplete data

In this set of analyses two kinds of missing data were considered, arising from both the sample design and from non-response among cases selected for intensive individual examination. These issues have been discussed in Chapter 4, in conjunction with their implication for statistical analysis. The way in which the present analysis addressed missing data arising from the sample design is discussed below, in Section 7.2.3. Regarding the problems posed by partial response, the main concern was to determine if the loss incurred changed the constitution of the sample in any significant way that might bias the results, and therefore needed to be taken into consideration in the analysis. Approximately 81% (155/191) of the subjects selected for intensive individual examination had complete data on all the variables of interest here. Of these, 97 were boys and 58 were girls. In order to determine the representativeness of this group, the 155 subjects for whom there was complete data were compared with the remaining 36 on all variables that were to be used in this analysis, to the extent that data were available, using Chi-square or, when the expected frequencies fell below five, Fisher-Exact tests. The results of these analyses, presented in Table 7.1, indicated that no variable showed a difference between the two groups of subjects that was significant at a 5% level, although there was a trend for lack or irregular communication between the child and the child’s fathers to be more common in the incomplete data group. From this it was concluded that the data of the 36 cases could be assumed to be missing completely at random (MCAR), and that the complete data group was sufficiently representative of the initial group of 191 subjects for all further analysis to exclude the 36 subjects without making adjustments for this loss.
Table 7.1. Percentages of subjects with complete and incomplete data exposed to adverse parent-child interaction and rated as having conduct problems on the basis of teacher and maternal reports

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incomplete data</th>
<th>Complete data</th>
<th>(p)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s irritability four times a week or more</td>
<td>28%</td>
<td>22%</td>
<td>(ns)</td>
</tr>
<tr>
<td>Father’s irritability four times a week or more</td>
<td>13%</td>
<td>8%</td>
<td>(ns)</td>
</tr>
<tr>
<td>No or irregular activities with mother</td>
<td>17%</td>
<td>14%</td>
<td>(ns)</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>12%</td>
<td>11%</td>
<td>(ns)</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>24%</td>
<td>10%</td>
<td>(.06)</td>
</tr>
<tr>
<td>Four or more critical comments by mother</td>
<td>7%</td>
<td>14%</td>
<td>(ns)</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>0%</td>
<td>5%</td>
<td>(ns)</td>
</tr>
<tr>
<td>No positive remarks</td>
<td>14%</td>
<td>13%</td>
<td>(ns)</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>10%</td>
<td>17%</td>
<td>(ns)</td>
</tr>
<tr>
<td>Conduct problems reported by mothers</td>
<td>14%</td>
<td>12%</td>
<td>(ns)</td>
</tr>
<tr>
<td>Conduct problems reported by teachers</td>
<td>36%</td>
<td>37%</td>
<td>(ns)</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)

7.2.3 Statistical analysis

Statistical analysis was undertaken in two stages. The first involved exploratory analysis of the relationships between the various individual parenting variables and the two measures of conduct problems, reported by the teacher and the mother respectively, for boys and girls. In the second stage these findings were incorporated.
into log-linear models, again constructed for boys and girls separately.

At both these stages corrections were made for the multi-phase sampling. In comparing the prevalence of adverse parenting in children with, and without, conduct problems the sample was adjusted, using the relative weight, outlined in Chapter 4 and Appendix 2, and previously employed when estimating prevalences in Chapter 6. The results of the analyses of both the unadjusted and adjusted data are presented below.

However, as noted previously, for purposes of fitting models to examine the relationship between variables, adjusting the data is not thought to be entirely satisfactory. Therefore, in fitting the log-linear models a different approach had to be used. In this particular investigation an E-M algorithm for incomplete contingency tables, described in Chapter 4, was used. As already outlined, this allows for the simultaneous analysis of subjects with complete and incomplete data, by dividing subjects into different groups: one group of complete data cases form one contingency table, while the other group, or groups, with a particular pattern of missing data form a supplementary table or tables. This provides a framework for the analysis of stratified samples, such as the one with which this study was concerned, selected on the basis of a screening measure. In the present set of analyses, the group of subjects selected for intensive individual examination were treated as a small sub-group with complete data, and the original screened only community sample with a considerable amount of missing data provided a supplementary table. Here, the complete data group included the 155 children identified above, while the supplementary table included the other 1461 cases with screening data only at age 10. The sexes were analysed separately, yielding two sets of two group set-ups: for the boys a complete data group of 97 subjects and a screened-only group of 733 subjects, and for the girls a complete data group of 58 subjects, and a screened-only group of 728 subjects. The analyses were implemented in a set of GLIM (Baker and Nelder, 1978) macros provided in Appendix 5.

As discussed in Chapter 4, test statistics of the significance of effects are obtained by comparing the goodness of fit of models with and without particular model terms, with the difference in fit being an asymptotically distributed Chi-square statistic. The magnitude of the effects of particular terms are obtained through the
antilog of the individual estimate for the term in question.

7.3 Results

7.3.1 Relationships between the individual indicators of parent-child interaction and conduct problems reported by teachers: Exploratory analysis

In the exploratory analysis all the individual indicators of parental behaviour and maternal EE were cross-tabulated with conduct problems reported by teachers and mothers, and Chi-square analysis, or, when appropriate Fisher Exact tests, were performed in the unadjusted and the adjusted data. The results involving conduct problems reported by teachers in boys, shown in Table 7.2a, indicated that none of the parental variables were significantly related to this measure, either in the adjusted or the unadjusted data. Even so, some of the differences observed in the adjusted data appeared to be relatively large. Their failure to reach statistical significance was a consequence of the lower prevalence rate of conduct problems in the adjusted than the unadjusted data set, 12% compared to 40%. By contrast, the results for girls, presented in Table 7.2b, revealed that those rated as having conduct problems on the basis of teacher's reports more frequently had mothers and fathers who lost their temper with them, as reflected in their irritability ratings, although the differences were only significant on a 5% level in the adjusted data. The results in the unadjusted data, on the other hand, suggested that they had more irregular communication with their parents.
<table>
<thead>
<tr>
<th>Indicators of negative behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s irritability four times a week or more</td>
<td>21% 36% (.10)</td>
<td>14% 30% (ns)</td>
</tr>
<tr>
<td>Father’s irritability four times a week or more</td>
<td>5% 8% (ns)</td>
<td>3% 6% (ns)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of positive behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or irregular activities with mother</td>
<td>15% 20% (ns)</td>
<td>16% 34% (ns)</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>12% 10% (ns)</td>
<td>11% 8% (ns)</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>10% 5% (ns)</td>
<td>8% 4% (ns)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of maternal negative expressed emotion</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four or more critical comments by mother</td>
<td>12% 13% (ns)</td>
<td>6% 11% (ns)</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>7% 8% (ns)</td>
<td>3% 6% (ns)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of maternal positive expressed emotion</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>No positive remarks</td>
<td>12% 15% (ns)</td>
<td>11% 13% (ns)</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>17% 18% (ns)</td>
<td>18% 15% (ns)</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
Table 7.2b. Percentages of girls with and without conduct problems reported by teachers that were exposed to adverse ratings of parent-child interaction

<table>
<thead>
<tr>
<th>Indicators of negative behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conduct problems reported by teachers</td>
<td>Conduct problems reported by teachers</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mother’s irritability four times a week or more</td>
<td>10%</td>
<td>21%</td>
</tr>
<tr>
<td>Father’s irritability four times a week or more</td>
<td>5%</td>
<td>21%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of positive behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conduct problems reported by teachers</td>
<td>Conduct problems reported by teachers</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>No or irregular activities with mother</td>
<td>5%</td>
<td>16%</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>5%</td>
<td>21%</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>8%</td>
<td>26%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of maternal negative expressed emotion</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conduct problems reported by teachers</td>
<td>Conduct problems reported by teachers</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Four or more critical comments by mother</td>
<td>13%</td>
<td>26%</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>0%</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of maternal positive expressed emotion</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conduct problems reported by teachers</td>
<td>Conduct problems reported by teachers</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>No positive remarks</td>
<td>13%</td>
<td>16%</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>13%</td>
<td>21%</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
7.3.2 Relationships between the individual indicators of parent-child interaction and conduct problems reported by mothers: Exploratory analysis

The results for conduct problems reported by mothers, presented in Tables 7.3a and 7.3b, were more marked. In the boys’ unadjusted data, conduct problems rated on the basis of maternal reports were positively associated with both of the indicators of negative parental behaviour, mother’s and father’s frequent irritability, and both of the indicators of negative maternal EE, criticism and hostility. In addition, there were positive relationships between boys’ conduct problems reported by mothers and maternal warmth, and irregular communication with both parents. In the adjusted data, the direction of the relationships persisted, although they failed to reach statistical significance on a 5% level. This is not surprising, since the prevalence rate of conduct problems reported by mothers, as that reported by teachers, was markedly lower in the adjusted than in the unadjusted data. Here, only 3 boys were rated as having conduct problems based on maternal reports in the adjusted data.

In the girls, the results obtained in the adjusted and unadjusted data were similar, with links between conduct problems reported by mothers and parental negative behaviour and negative maternal EE through mother’s frequent irritability and criticism. There was also an additional significant relationship between conduct problems reported by mothers in girls and lack of regular communication with mother.
Table 7.3a. Percentages of boys with and without conduct problems reported by mothers that were exposed to adverse parent-child interaction

<table>
<thead>
<tr>
<th>Indicators of negative behaviour</th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conduct problems reported by mothers</td>
<td></td>
<td>Conduct problems reported by mothers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>(p)*</td>
<td>No</td>
</tr>
<tr>
<td>Mother’s irritability four times a week or more</td>
<td>21%</td>
<td>62%</td>
<td>(.005)</td>
<td>15%</td>
</tr>
<tr>
<td>Father’s irritability four times a week or more</td>
<td>4%</td>
<td>23%</td>
<td>(.03)</td>
<td>3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of positive behaviour</th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No or irregular activities with mother</td>
<td>14%</td>
<td>38%</td>
<td>(.05)</td>
<td>17%</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>8%</td>
<td>31%</td>
<td>(.06)</td>
<td>10%</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>10%</td>
<td>0%</td>
<td>(ns)</td>
<td>8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of maternal negative expressed emotion</th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Four or more critical comments by mother</td>
<td>6%</td>
<td>54%</td>
<td>(.000)</td>
<td>5%</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>2%</td>
<td>38%</td>
<td>(.000)</td>
<td>2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of maternal positive expressed emotion</th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No positive remarks</td>
<td>12%</td>
<td>23%</td>
<td>(ns)</td>
<td>11%</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>13%</td>
<td>46%</td>
<td>(.01)</td>
<td>17%</td>
</tr>
</tbody>
</table>

*All p-values greater than .10 are reported as not significant (ns)
Table 7.3b. Percentages of girls with and without conduct problems reported by mothers that were exposed to adverse parent-child interaction

<table>
<thead>
<tr>
<th>Indicators of negative behaviour</th>
<th>Unadjusted Conduct problems reported by mothers</th>
<th>Adjusted Conduct problems reported by mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mother's irritability four times a week or more</td>
<td>10%</td>
<td>50%</td>
</tr>
<tr>
<td>Father's irritability four times a week or more</td>
<td>8%</td>
<td>33%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of positive behaviour</th>
<th>Unadjusted Conduct problems reported by mothers</th>
<th>Adjusted Conduct problems reported by mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or irregular activities with mother</td>
<td>8%</td>
<td>17%</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>10%</td>
<td>17%</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>14%</td>
<td>17%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of maternal negative expressed emotion</th>
<th>Unadjusted Conduct problems reported by mothers</th>
<th>Adjusted Conduct problems reported by mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four or more critical comments by mother</td>
<td>12%</td>
<td>67%</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>2%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of maternal positive expressed emotion</th>
<th>Unadjusted Conduct problems reported by mothers</th>
<th>Adjusted Conduct problems reported by mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>No positive remarks</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>14%</td>
<td>33%</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
7.3.3 Log-linear modelling

Based on this exploratory analysis parenting variables thought to be related to conduct problems were identified. The aim was to establish a set of variables that would take into account the results for both boys and girls, allowing us to use the same initial models for both sexes. However, due to the relatively small sample size there was a limit to the number of variables that could be included in this stage of the analysis. In spite of some apparent sex differences and certain discrepancies between the adjusted and unadjusted data, the findings presented above suggested that paternal and maternal irritability, and mother's critical comments were the variables most strongly related to conduct problems. This particular choice of variables was attractive because it allowed a comparison of the influences of paternal and maternal negative behaviour, as well as maternal behaviour and criticism, the latter being a sub-scale of the EE construct.

A number of variables that had showed a significant relationship with children's conduct problems were, then, excluded from further analysis. These were irregular communication with mother, warmth, and maternal hostility. However, the results involving irregular communication and warmth had been less consistent than those involving parental irritability and maternal criticism, and only a very small number of the children had been exposed to maternal hostility (7 boys and 1 girl), making this variable less meaningful for further analysis.

The models involving the remaining variables were explored both 'backwards', commencing with all main effects and two-way interactions, followed by the successive removal of the two-way interactions, and 'forwards', starting with the main effects only, and building up the model until its fit could no longer be improved. Both processes arrived at the exactly the same results in all cases, and for that reason only the results from the 'forward' analysis are presented here.
7.3.4 Parental irritability, maternal criticism, and conduct problems reported by teachers

The first set of models were concerned with the relationships between parental irritability, maternal criticism and conduct problems reported by teachers. The initial model containing the main effects only (model A) had a poor fit, as is shown in Tables 7.4a and 7.4b for boys and girls, respectively. This was hypothesised to be partly due to inter-relationships between the various parental measures. These were expected to be related for three reasons. First, they were all derived from one source; second, it seems reasonable to expect mother’s and father’s irritability, or mother’s irritability and criticism to be associated; third, the examination of the interrelationships between different indicators of parenting, presented in Chapter 6, indicated considerable associations between many of them.

The model was first developed by adding each of the relevant two-way interactions between the parental measures in turn. In the first instance, a two-way interaction between maternal and paternal irritability was incorporated (model B), and the inclusion of this term improved the fit of the model significantly. Second, a two-way interaction between maternal criticism and irritability was included (model C), and again the fit improved significantly. Finally, a two-way interaction between maternal criticism and paternal irritability was added (model D), also resulting in a significant improvement of the model for the boys, but not for the girls. All these relationships were positive, with high levels of maternal irritability being associated with high levels of maternal criticism and paternal irritability, and high levels of maternal criticism being associated with high levels of paternal irritability.

Of these, the best fitting model, in both cases model C, that included the interaction between maternal criticism and irritability, was selected, and the remaining two-way interactions relating to the interrelationships between the parenting variables were consecutively added to this, starting with the most significant. However, only the first of these, involving maternal and paternal irritability (model E) resulted in a significant improvement in the fit, indicating that having taken these two interactions into consideration, there was no need for an additional interaction between maternal criticism and paternal irritability.
Having established the interrelationships between the parental measures, the relationships between these and children's conduct problems reported by teachers were investigated through adding two-way interactions between this particular measure of conduct problems and maternal criticism, maternal irritability and paternal irritability in turn. None of these resulted in a significant improvement of fit for either of the sexes, indicating that of the three parental measures, none was significantly associated with this measure of conduct problems. However, the largest change in Chi-square was found for the positive association between girls conduct problems reported by teachers and paternal irritability. Given the small numbers involved in this set of analyses we may want to interpret this as approaching significance, which would be in agreement with the exploratory analysis.

7.3.5 Parental irritability, maternal criticism, and conduct problems reported by mothers

These analyses were then repeated with the measures of conduct problems as reported by mothers, and the results are shown in Tables 7.5a for boys and 7.5b for girls. The results from entering the two-way interactions between the parental indicators were identical to those found previously, and will therefore not be repeated. Having established a model incorporating these and the main effects of conduct problems reported by teachers and by mothers (model B), the two-way interaction between these two measures of conduct problems was added (model C). This resulted in a significant improvement in fit for boys, but not for girls, indicating that the relationship between the screening instrument and conduct problems reported by mothers was different for the two sexes. This is exactly what would be expected following the observation in the original study, discussed in Chapter 6, that while boys' whose mothers reported them as having conduct problems almost exclusively had conduct problems reported by teachers as well, the overlap for girls was more limited (Rutter, Cox, Tupling, Berger and Yule, 1975). Consequently, this term, suggesting a positive association between conduct problems reported by teachers and mothers at this age, was retained for the boys, but not for the girls. In the subsequent
step, the two-way interactions concerned with the relationships between conduct problems reported by mothers and the indicators of parenting were added to the model already incorporating both the inter-relationships between the parenting variables and, for the boys, between the two measures of conduct problems.

When the two-way interactions between the parental measures and conduct problems reported by mothers were entered independently, each of them resulted in significant reductions in the Chi-square for the boys, and the interactions involving maternal criticism and maternal irritability were significant for the girls, where high levels of criticism and irritability were associated with boys' and girls' conduct problems reported by mothers. The best fitting of these models (model D) was then selected, and the remaining two-way interactions relating to the relationships between this indicator of conduct problems and the parental measures were added to this. For both sexes this process did not yield any further significant improvements in fit, indicating that having taken maternal criticism, and the interrelationships between the parental measures, into account there was no need for any further interactions between the indicators of parental behaviour and conduct problems reported by mothers. Furthermore, the odds ratios indicated that the magnitude of the effect of maternal criticism on conduct problems reported by mothers was extremely large. These were 16.67 for the boys, and 12.86.
Table 7.4a. Forwards model of parental irritability, maternal criticism, and boys' conduct problems reported by teachers*

<table>
<thead>
<tr>
<th></th>
<th>Chi-square (df)</th>
<th>Change in model</th>
<th>Change in Chi-square (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contingency table model</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Main effects only</td>
<td>29.57 (11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Two-way interactions relating to the inter-relationships between the parental measures were added to model A in turn</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Maternal and paternal irritability</td>
<td>20.60 (10)</td>
<td>A-B</td>
<td>8.97 (1)</td>
</tr>
<tr>
<td>C. Maternal criticism and irritability</td>
<td>15.38 (10)</td>
<td>A-C</td>
<td>14.19 (1)</td>
</tr>
<tr>
<td>D. Maternal criticism and paternal irritability</td>
<td>23.98 (10)</td>
<td>A-D</td>
<td>5.59 (1)</td>
</tr>
<tr>
<td><strong>The best fitting model (C) was selected, and the remaining two-way interactions relating to the inter-relationships between the parental measures were consecutively added to this, starting with the most significant</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Maternal and paternal irritability</td>
<td>6.41 (9)</td>
<td>C-E</td>
<td>8.97 (1)</td>
</tr>
<tr>
<td>F. Maternal criticism and paternal irritability</td>
<td>4.91 (8)</td>
<td>E-F</td>
<td>1.50 (1)</td>
</tr>
<tr>
<td><strong>The best fitting model (E) was selected, and the two-way interactions relating to the relationships between conduct problems reported by teachers and the parental measures were each added to this in turn</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Conduct problems reported by teachers and maternal criticism</td>
<td>6.40 (8)</td>
<td>E-G</td>
<td>0.01 (1)</td>
</tr>
<tr>
<td>H. Conduct problems reported by teachers and maternal irritability</td>
<td>3.70 (8)</td>
<td>E-H</td>
<td>2.71 (1)</td>
</tr>
<tr>
<td>I. Conduct problems reported by teachers and paternal irritability</td>
<td>6.16 (8)</td>
<td>E-I</td>
<td>0.25 (1)</td>
</tr>
</tbody>
</table>

* Analysis was based on 97 boys with complete data, and 733 boys with the screening variable only, where the response/sampling model was specified by conduct problems reported by teachers.

156
Table 7.4b. Forwards model of parental irritability, maternal criticism, and girls' conduct problems reported by teachers*

<table>
<thead>
<tr>
<th>Contingency table model</th>
<th>Chi-square (df)</th>
<th>Change in model</th>
<th>Change in Chi-square (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Main effects only</strong></td>
<td>17.98 (11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B. Maternal and paternal irritability</strong></td>
<td>12.65 (10)</td>
<td>A-B</td>
<td>5.33 (1)</td>
</tr>
<tr>
<td><strong>C. Maternal criticism and irritability</strong></td>
<td>12.42 (10)</td>
<td>A-C</td>
<td>5.56 (1)</td>
</tr>
<tr>
<td><strong>D. Maternal criticism and paternal irritability</strong></td>
<td>16.93 (10)</td>
<td>A-D</td>
<td>1.05 (1)</td>
</tr>
<tr>
<td><strong>E. Maternal and paternal irritability</strong></td>
<td>7.09 (9)</td>
<td>C-E</td>
<td>5.33 (1)</td>
</tr>
<tr>
<td><strong>F. Maternal criticism and paternal irritability</strong></td>
<td>7.07 (9)</td>
<td>E-F</td>
<td>0.02 (1)</td>
</tr>
<tr>
<td><strong>G. Conduct problems reported by teachers and maternal criticism</strong></td>
<td>5.53 (8)</td>
<td>E-G</td>
<td>1.56 (1)</td>
</tr>
<tr>
<td><strong>H. Conduct problems reported by teachers and maternal irritability</strong></td>
<td>5.90 (8)</td>
<td>E-H</td>
<td>1.19 (1)</td>
</tr>
<tr>
<td><strong>I. Conduct problems reported by teachers and paternal irritability</strong></td>
<td>3.85 (8)</td>
<td>E-I</td>
<td>3.24 (1)</td>
</tr>
</tbody>
</table>

* Analysis was based on 57 girls with complete data, and 728 girls with the screening variable only, where the response/sampling model was specified by conduct problems reported by teachers
Table 7.5a. Forwards model of parental irritability, maternal criticism, boys’ conduct problems reported by teachers and mothers*

<table>
<thead>
<tr>
<th>Model Description</th>
<th>Chi-square (df)</th>
<th>Change in model</th>
<th>Change in Chi-square (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contingency table model</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Main effects only</td>
<td>64.52 (26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Two-way interactions relating to the interrelationships between the parental measures as previously established</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Maternal criticism and irritability and paternal irritability</td>
<td>41.37 (24)</td>
<td>A-B</td>
<td>23.15 (2)</td>
</tr>
<tr>
<td>C. Conduct problems reported by teachers and mothers</td>
<td>32.98 (23)</td>
<td>B-C</td>
<td>8.39 (1)</td>
</tr>
<tr>
<td><strong>The best fitting model (C) was selected and the two-way interactions relating to the relationships between conduct problems reported by mothers and the parental measures were each added to this in turn</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Conduct problems reported by mothers and maternal criticism</td>
<td>16.22 (22)</td>
<td>C-D</td>
<td>16.76 (1)</td>
</tr>
<tr>
<td>E. Conduct problems reported by mothers and maternal irritability</td>
<td>23.82 (22)</td>
<td>C-E</td>
<td>9.16 (1)</td>
</tr>
<tr>
<td>F. Conduct problems reported by mothers and paternal irritability</td>
<td>27.87 (22)</td>
<td>C-F</td>
<td>5.11 (1)</td>
</tr>
<tr>
<td><strong>The best fitting model (D) was selected, and the remaining two-way interactions relating to the relationships between conduct problems reported by mothers and the parental measures were each added to this in turn</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Conduct problems reported by mothers and maternal irritability</td>
<td>14.70 (21)</td>
<td>D-G</td>
<td>1.52 (1)</td>
</tr>
<tr>
<td>H. Conduct problems reported by mothers and paternal irritability</td>
<td>13.51 (21)</td>
<td>D-H</td>
<td>2.71 (1)</td>
</tr>
</tbody>
</table>

* Analysis was based on 97 boys with complete data, and 733 boys with the screening variable only, where the response/sampling model was specified by conduct problems reported by teachers
Table 7.5b. Forwards model of parental irritability, maternal criticism, girls' conduct problems reported by teachers and mothers*

<table>
<thead>
<tr>
<th>Model Description</th>
<th>Chi-square (df)</th>
<th>Change in model</th>
<th>Change in Chi-square (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contingency table model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Main effects only</td>
<td>37.61 (26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-way interactions relating to the interrelationships between the parental measures as previously established</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Maternal criticism and irritability and maternal and paternal irritability</td>
<td>26.72 (24)</td>
<td>A-B</td>
<td>10.89 (2)</td>
</tr>
<tr>
<td>Two-way interaction relating to the relationship between conduct problems reported by teachers and mothers added to the model incorporating the inter-relationships between the parenting variables (B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Conduct problems reported by teachers and mothers</td>
<td>26.72 (23)</td>
<td>B-C</td>
<td>0.00 (1)</td>
</tr>
<tr>
<td>The best fitting model (B) was selected, and the two-way interactions relating to the relationships between conduct problems reported by mothers and the parental measures were each added to this in turn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Conduct problems reported by mothers and maternal criticism</td>
<td>18.22 (23)</td>
<td>B-D</td>
<td>8.50 (1)</td>
</tr>
<tr>
<td>E. Conduct problems reported by mothers and maternal irritability</td>
<td>21.38 (23)</td>
<td>B-E</td>
<td>5.34 (1)</td>
</tr>
<tr>
<td>F. Conduct problems reported by mothers and paternal irritability</td>
<td>23.94 (23)</td>
<td>B-F</td>
<td>2.78 (1)</td>
</tr>
<tr>
<td>The best fitting model (D) was selected, and the remaining two-way interactions relating to the relationships between conduct problems reported by mothers and the parental measures were each added to this in turn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Conduct problems reported by mothers and maternal irritability</td>
<td>16.25 (22)</td>
<td>D-G</td>
<td>1.97 (1)</td>
</tr>
<tr>
<td>H. Conduct problems reported by mothers and paternal irritability</td>
<td>16.58 (22)</td>
<td>D-H</td>
<td>1.64 (1)</td>
</tr>
</tbody>
</table>

* Analysis was based on 57 girls with complete data, and 728 girls with the screening variable only, where the response/sampling model was specified by conduct problems reported by teachers.
The analyses presented in this chapter were designed to examine the interrelationships between maternal EE, parental behaviour and children's conduct problems, separately reported by mothers and teachers. Incorporating an interest in potential sex differences, the aim was to establish which particular parental indicators were associated with the two different measures of conduct problems, and if the observed pattern of associations appeared to be different for boys and girls.

It was noted in Chapter 6 that there was little indication of any sex differences in the prevalence of adverse parenting, and conduct problems were only somewhat more common in boys than in girls, although mothers reported such problems less frequently than did teachers. The results here presented, however, support the previously discussed notion that the relationship between the two indicators of conduct problems was different for the two sexes, being significant for the boys, but not for the girls.

The exploratory analysis of the associations between the parental indicators and the measures of conduct problems identified those involving paternal and maternal irritability, and mother's criticism as the strongest and most consistent, allowing for an explicit comparison between the influences of paternal and maternal negative behaviour, as well as maternal behaviour and criticism.

In fitting the log-linear models involving the links between the parental measures, it was revealed that these were strongly interrelated. This finding confirmed that maternal criticism was closely linked to maternal behaviour and supported the need, discussed in Chapter 2, to consider parental EE and behaviour simultaneously. These analyses, in turn, indicated that maternal criticism was more strongly associated with conduct disorder than were the indicators of parental irritability. Furthermore, while the results linking high levels of maternal criticism and conduct problems reported by mothers were similar to those found in other studies (Stubbe, Zahner, Goldstein and Leckman, 1993; Vostanis, Nicholls and Harrington, 1994), neither of the parental measures was significantly related to conduct problems reported by teachers, although there was some indication of a positive association between paternal irritability and conduct problems reported by teachers in girls. On the whole, this
suggests that maternal criticism is more strongly related to children's conduct problems when these are reported by mothers than by teachers. There are various factors which may contribute to this finding. Importantly, there were substantial differences in the way the two accounts were obtained, with maternal reports originating in an interview, while teachers responded to a questionnaire. Even so, the results were in agreement with the suggestion that the link between maternal criticism and conduct problems reported by mothers may to some extent represent a reporting effect. These issues are discussed in more detail in Chapter 11.
Chapter 8

A RELIABILITY STUDY OF MOTHER’S PROSPECTIVE AND SUBJECT’S RETROSPECTIVE ACCOUNTS OF PARENTING

8.1 Introduction

The relationship between experiences of parenting and childhood functioning, in terms of conduct problems, has been discussed in Chapter 2, and explored in the present data set in the preceding Chapter 7. However, as was noted in Chapter 3, the implications of parent-child interaction in terms of the child’s adjustment are not thought to be confined to the childhood period. Rather, they have been argued to play an important role in the development of a variety of adult adjustment problems, ranging from alcoholism to emotional disorder (Bifulco, Brown and Harris, 1987; Blatt, Wein, Chevron and Quinland, 1979; Holmes and Robins, 1987; Parker, 1979, 1983). The latter in particular has been argued to be of interest in the context of this study. The principal reason for this was the existence of a measure of maternal EE, most significantly criticism and hostility, and its proposed relationship with the child’s emerging self-concept and later self-esteem, with potential implications for depression (e.g. Beck, 1967; Brown, Andrews, Harris, Adler and Bridge, 1986; Rehm, 1977). More generally, there was the opportunity to examine the relationship between a range of prospective indicators of parent-child interaction on the one hand, and adult self-esteem and depression on the other, and thereby explore associations which had previously been suggested by a literature which has relied heavily on retrospective evidence.

However, previous evidence has also indicated a considerable continuity in problems that were manifest already in childhood. Particular emphasis has been placed on conduct disorder, which has been shown to be associated with a multitude
of later problems, including adult depression (eg Robins, 1966; Robins, 1974; Robins, West and Herjanic, 1975; Zoccolillo, 1992). Such childhood problems have, in turn, been shown to be related to adverse parenting (Gardner, 1992; Loeber and Dishion, 1983; Robins, 1991). Therefore, in order to determine whether adult difficulties represented a continuity of problems which had developed earlier, or if they showed an independent relationship with parenting experiences, childhood conduct problems were retained in the analysis involving the adult outcome variables.

But before embarking on examination of these more substantial conceptual issues in Chapters 9 and 10, there was a need to address a major methodological problem that confronts research in the area of parent-child interaction and adult functioning. The background to this was presented in Chapter 3, where the importance of retrospective recall in psychological research, and the nature of the data generated were discussed. Although opinion about the quality of retrospective recall is divided, empirical research involving accounts of parenting experiences has been sparse. The evaluation of one account demands the existence of another, not subjected to the same source of potential error, and this is a demand that it has proven very difficult to meet in the area of parent-child relationships. However, the present data-set provided information of this kind. The combination of contemporaneous maternal and interviewer reports in childhood, together with the subjects' own recollections in adulthood, provided an opportunity to apply a multimethod-multitrait approach, outlined in Chapter 5, to study the reliability and validity of this recall. This approach has been recommended and has proved effective in other studies of childhood psychopathology involving multiple reports (eg Fergusson and Horwood, 1988), allowing questions concerning the reliability of measures to be addressed, as well as their discriminant and convergent validity. This makes it possible for issues about exactly what individual measures are reflecting to be examined in more detail than usual. A more detailed description of the methodology used is provided in Section 8.2, which lists the measures used in this analysis, as well as the extent of missing data, and the way in which the effect of this was minimised. Section 8.3 outlines how the model involving negative aspects of parent-child interaction was set up, and the results generated for men and women, while Section 8.4 provides parallel details for the model concerned with positive aspects of parent-child interaction. These results
are summarised in Section 8.5.

8.2 Method

8.2.1 Measures

Four prospective indicators of negative parental behaviour were used in the present analyses, along with two sub-scales of EE, mother's irritability, exposure to mother's aggression, father's irritability, father's nagging, and maternal criticism and hostility. However, due to the low variance of hostility among the girls, pointed out in Chapter 6, this indicator could not be usefully included in the latent variable model for them. It was, however, retained for the analysis involving boys. Three prospective indicators of positive parental behaviour, the child's activities with the mother, and communication with the mother and father, and two interviewer rated positive indicators corresponding to the negative sub-scales of EE, mother's positive remarks, and warmth were selected. The prospective measure of father's activities with the child, although available, was excluded from the analysis due to high levels of missing data. In addition, four retrospective measures of negative aspects of parenting were used. These were derived from parental harshness of discipline and abuse, which were rated for the subjects' experiences at age 10, when the prospective measures were collected, and during secondary school. From these, two measures of parental harshness were created for each parent, adding harshness of discipline and abuse at each age period. The rationale for this was that both these indicators were concerned with parental harshness, or heavy-handedness, albeit under different circumstances. Identical procedures were followed for the measures focusing on maternal and paternal behaviour, generating measures of maternal and paternal harshness experienced at age 10 and during secondary school. Finally, the retrospectively assessed measures of positive parental behaviour, focusing on each parent's activities and communication with the child were chosen.

For the purposes of the statistical modelling described in the next section these variables were maintained in their original form, standardized to unit
variance and transformed to approximate normality, using square roots or logarithms, depending on the extent of their skewness.

8.2.2 Advantages of the chosen method of statistical analysis

The principal method of analysis was structural equation modelling, using the EQS (Bentler, 1989). This method was chosen for four reasons. First, it provided a means of combining information from our imperfect measures of each theoretical construct. On the assumption that the model specification was correct, this allowed the empirical relationships of those constructs to each other, and, in the following chapter, to other variables, to be examined without being obscured by measurement error.

Second, by specifying sets of measurement equations, the relationships among measures of the same or related constructs could be examined and constrained. The particular structure of measurement equations that was fitted represented a form of a multimethod-multitrait design, outlined in Chapter 5, where a set of constructs, or traits, are each measured by more than one method, and within each method by more than one measure. The variance of each measure is considered to be made up of three components, the first associated with the underlying construct, the second with the method of measurement, and the third with independent random measurement error. In this study, the constructs represented different aspects of parenting, while the prospective and retrospective reports constituted the different methods of measurement.

Third, the latent variable approach was appropriate for minimising the effects of missing data. This became of particular concern when using the information collected at the adult follow-up. Although the overall rate of attrition could not be said to be remarkable, many of the subjects who were followed up only supplied partial data, as a consequence of the fact that the interview module focusing on retrospectively reported parenting was not used with all subjects, while others did not complete the Rosenberg self-esteem inventory. Therefore, when performing analysis involving a relatively large number of variables, further substantial losses were invariably incurred. By grouping cases according to the completeness of their data,
then analysing these groups simultaneously within a multigroup analysis, as was discussed in Chapter 5, it was possible to incorporate more cases into the analysis than more routine methods that make use only of complete data cases. Furthermore, the inclusion of across-group constraints on the means, variances and covariances of each available variable allowed weaker assumptions - those of data MAR rather than MCAR, discussed in Chapter 4 (Little and Rubin, 1987; Muthen, Kaplan, and Hollis, 1987) - to be made concerning potential attrition biases. In this way, the effects of any systematic loss at follow-up of cases with particular childhood characteristics could be accounted for.

The final advantage of this approach also involved the use of the multigroup procedure, but here as a means for exploring sex differences. Men and women may be separated into different data groups, and this kind of set up allows detailed investigation of potential differences between the two.

8.2.3 Missing data

The advantages of structural equation modelling in data sets which suffer from sample attrition and partially missing data, noted above, and details about how such analysis is set up, have already been discussed at some length in Chapter 5. The most effective approach for grouping cases in the present data set proved to be to have one complete data group, and one incomplete data group of subjects who only had complete childhood data. Subjects with incomplete childhood data were excluded from the analysis. As the indicators of overtly negative parent-child interaction were to be analysed separately from those concerned with positive, or lack of positive, parent-child interaction, two different sets of data groups were established for each of these, in order to maximise the number of subjects that could be included in each set of analyses.

For the variables concerned with negative parent-child interaction, complete data on all childhood variables included in the analysis were available for 170 children, 104 boys and 66 girls. Of these, complete adult data were obtained in a sub-sample of 83 subjects. Thus, the analysis involving negative aspects of parent-
child interaction was based on four data groups. The first group was men with complete data on all variables (n=45), the second was men with data on the childhood variables only (n=59), and the third and fourth were the corresponding groups for women (n=38 and 28 respectively). In the structural equation modelling all four data groups were analysed simultaneously. In order to examine the representativeness of the subjects included in the analysis, the means of all the prospective parenting variables used in the present analysis of the 170 subjects with complete childhood data were compared to the remaining 21 subjects who could not be included in this investigation due to incomplete childhood data, using one way analysis of variance. Means were considered appropriate as all variables were analysed in their original, rather than binary form in this investigation. The results, shown in Table 8.1 indicated that maternal warmth was significantly higher among the subjects who could not be included in the analysis compared to those included. However, in the absence of any further significant differences, it was concluded that the 170 subjects included in the analysis were reasonably representative of the original 191.

The pattern of missing data for the indicators of positive aspects of parenting was slightly different from that of the negative measures. Most significantly, complete data was available for somewhat more subjects. Complete childhood data was available for 175 subjects, of whom 100 also had complete data on all variables for which data was collected in adulthood. As above, the four data groups to be analysed simultaneously were men with complete data on all variables (n=53), men with complete data on the childhood variables alone (n=54), and the corresponding groups for women (n=47 and n=21 respectively). Again, the subjects included in the analysis were compared with the subjects who could not be included into the analysis due to incomplete childhood data on the means of all prospective parenting variables used in this study, to the extent that these were available, using one way analysis of variance. The results, presented in Table 8.2, revealed that there were no significant differences, although there was a relatively weak trend for mother and child activities to occur more frequently in the group with incomplete data. This led to the conclusion that the 175 subjects who were included in the analysis were representative of the original 191 for the present purposes.
Table 8.1. Means of the prospective indicators of parent-child interaction of subjects who were and were not included in the analysis involving negative aspects of parent-child interaction

<table>
<thead>
<tr>
<th></th>
<th>Included (n=170)</th>
<th>Not included (n=21)</th>
<th>(p)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean  sd</td>
<td>mean   sd</td>
<td></td>
</tr>
<tr>
<td>Mother's irritability</td>
<td>1.63 1.18</td>
<td>1.50 1.27</td>
<td>(ns)</td>
</tr>
<tr>
<td>Father's irritability</td>
<td>1.00 1.00</td>
<td>1.25 1.58</td>
<td>(ns)</td>
</tr>
<tr>
<td>Exposure to maternal aggression</td>
<td>.57  .86</td>
<td>.38   .96</td>
<td>(ns)</td>
</tr>
<tr>
<td>Father's nagging</td>
<td>.68  .82</td>
<td>.50   .84</td>
<td>(ns)</td>
</tr>
<tr>
<td>Activities with mother</td>
<td>2.19 1.34</td>
<td>2.38 1.47</td>
<td>(ns)</td>
</tr>
<tr>
<td>Communication with mother</td>
<td>3.04 1.27</td>
<td>3.33  .90</td>
<td>(ns)</td>
</tr>
<tr>
<td>Communication with father</td>
<td>2.87 1.28</td>
<td>3.07 1.22</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal criticism</td>
<td>1.21 1.11</td>
<td>.67   .98</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal hostility</td>
<td>.08  .41</td>
<td>.00   .00</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal positive remarks</td>
<td>1.63 1.09</td>
<td>2.00 1.08</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal warmth</td>
<td>3.64 1.13</td>
<td>4.47  .92</td>
<td>(.006)</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
Table 8.2. Means of the prospective indicators parent-child interaction of subjects who were and were not included in the analysis involving positive aspects of parent-child interaction

<table>
<thead>
<tr>
<th></th>
<th>Included (n=175)</th>
<th>Not included (n=16)</th>
<th>(p)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means   sd</td>
<td>Means   sd</td>
<td></td>
</tr>
<tr>
<td>Mother's irritability</td>
<td>1.60    1.17</td>
<td>2.00    1.34</td>
<td>(ns)</td>
</tr>
<tr>
<td>Father's irritability</td>
<td>1.01    1.01</td>
<td>1.00    1.41</td>
<td>(ns)</td>
</tr>
<tr>
<td>Exposure to maternal aggression</td>
<td>.56     .86</td>
<td>.54     1.05</td>
<td>(ns)</td>
</tr>
<tr>
<td>Father's nagging</td>
<td>.69     .82</td>
<td>.30     .67</td>
<td>(ns)</td>
</tr>
<tr>
<td>Activities with mother</td>
<td>2.17    1.31</td>
<td>2.75    1.69</td>
<td>(.10)</td>
</tr>
<tr>
<td>Communication with mother</td>
<td>3.06    1.25</td>
<td>3.40    .89</td>
<td>(ns)</td>
</tr>
<tr>
<td>Communication with father</td>
<td>2.87    1.28</td>
<td>3.40    .89</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal criticism</td>
<td>1.20    1.11</td>
<td>.62     1.06</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal hostility</td>
<td>.08     .41</td>
<td>.00     .00</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal positive remarks</td>
<td>1.67    1.08</td>
<td>1.25    1.28</td>
<td>(ns)</td>
</tr>
<tr>
<td>Maternal warmth</td>
<td>3.68    1.14</td>
<td>4.10    .99</td>
<td>(ns)</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)

8.3 Negative aspects of parent-child interaction

8.3.1 Modelling negative aspects of parent-child interaction

The initial model for negative aspects of parenting is shown in Figure 8.1. Three latent constructs of parenting behaviour and affect were measured by six prospective variables, derived from the interview with the mother, and four retrospective variables, based on retrospective accounts by the subject. The latent construct of mother's negative behaviour was related to prospective maternal reports of the frequency of her
irritability to the child and the extent to which the child was exposed to her aggression, and to subjects' retrospective reports of maternal harshness and abuse at age 10 and during secondary school. The latent construct of father's negative behaviour was related to maternal prospective accounts of the frequency of father's nagging and irritability towards the child, and to retrospective accounts of father's harshness at 10 and during secondary school. Negative maternal EE was measured by the two prospective interviewer ratings of criticism and hostility for boys, but due to extremely low rates of hostility in the girls' mothers, only criticality for girls. In addition, method factors were included in order to attempt to account for systematic errors, or biases, in these accounts arising from the methods used to obtain them, that is, the prospective maternal report and the retrospective reports generated by the subjects in adulthood. As the different aspects of parenting were not expected to be independent from each other, all the latent parenting constructs were allowed to correlate with each other.

The latent constructs of mother's and father's negative behaviour were each modeled to predict a pair of prospective and a pair of retrospective manifest variables, whereas maternal EE only involved a pair of prospective manifest variables. The model was set up to allow the two sexes to differ in the means of all manifest variables and also in the variances and correlations of the EE and negative behaviour latent variables.

The measurement models that were fitted began with a simple form, with each manifest variable within each pair being constrained to have the same error variance, the same unstandardized method factor loading and the same unstandardized construct factor loading. These constraints were also applied across data for the two sexes. The assumptions underlying these initial restrictions were that the measures behaved in a similar way for each group of subjects, so that, for example, maternal responses in relation to boys were no more or less precise than those for girls. Each of these constraints was tested, using Lagrange multiplier or score tests (see Bentler, 1989) in order to determine whether the model would fit better were it removed. This information was then used to fit a sequence of progressively less constrained models until a model was obtained for which none of the tests of the remaining constraints was significant at the 5% level. At this point a further examination of the pattern of
residuals was made to find any other systematic effects not identified by the examination of tests on the constraints. An example of the EQS set up for this analysis is provided in Appendix 6.

Figure 8.1. The model for reports of negative aspects of parent-child interaction
8.3.2 Reliability and validity of the accounts of negative aspects of parent-child interaction: The measurement model

Starting with the fully constrained model, tests indicated that it was necessary to relax the constraints on the error variances on all the retrospective measures (unconstrained within each pair of measures, and between sexes), the error variances of the prospective mother’s negative behaviour measures (constrained between sexes but not within the pair), and, for women only, the loading of the mother’s method factor for father’s negative behaviour. This model fitted reasonably well ($\chi^2=178.17$, 110 d.f. and Comparative Fit Index of 0.90), especially as these measures reflected not only potential lack-of-fit of the model but also the extent of attrition bias, or systematic differences between the complete and incomplete data group.

The fully standardized solutions of the estimated measurement models are shown in Figure 8.2a for men, and Figure 8.2b for women. Looking first at the parenting constructs, there were substantial inter-correlations among all the parenting constructs. It would seem clear that examining the effect of any of these parenting constructs must be done in conjunction with the others. Another set of parameters of interest were the estimated variances for the parenting constructs (not shown in the Figures). These were set at 1.0 for the men for reasons of identifiability, but estimated for the women, in order to allow for comparison between the sexes. Fixing the variance for the men in this way may be understood as a way of defining a scale, where the values of the fixed and the estimated construct variance are meaningful in relation to each other. In this model, the variances for the parenting constructs were similar for both men and women, in the case of mother’s EE, 1.0 and 1.14 respectively, and father’s negative behaviour, 1.0 and .95 respectively. For mother’s negative behaviour the variance for men appeared larger than that for women, being 1.0 and 0.43 respectively.
Figure 8.2a. The model for reports of negative aspects of parent-child interaction for men
Looking at the measurement equations for the prospective variables, the results showed the expected pattern for the importance of the mother's method factor. This was only slight for the EE measures (obtained by interviewer rating, rather than maternal report as such), but very substantial for the reports of father’s behaviour, which appeared to be accounted for almost entirely method and error variance. Little variation of father’s negative behaviour, as reported by mothers, could be attributed to differences in behaviour subsequently confirmed by retrospective report.
More curiously, the figures also showed that for the retrospective variables the subject's method variance was more dominant in the case of reports of mother's than father's behaviour. Furthermore, a detailed examination of the residuals from the fitted model suggested a more active association between the ratings of EE and the retrospectively reported measures of parenting than the simple passive correlation of the parenting constructs allowed by the model. The inclusion of a path between the maternal EE construct and the subject retrospective method factor improved the model fit substantially ($\chi^2=16.55$, 2 d.f., $p<0.001$), but with standardized coefficients of 0.82 for men ($t=6.18$, $p<0.001$) and 0.11 ($t=0.54$, $p=0.6$) for women, the effect appeared considerably clearer for men. The measurement equations for all the prospective variables and the retrospective reports about father variables changed little on adding this path. Those for the retrospective reporting of mother behaviour became still more dominated by the subject's method factor variance.

This suggested that exposure to maternal EE in childhood had a marked influence on the subject's later reports of mother's negative behaviour. To examine this in more detail, the maternal criticism and hostility measures were added to form a simple manifest EE scale. Table 8.3 shows the correlations of this scale with each of the retrospective negative parenting variables. The correlations were all positive and significant for the men, whereas for the women only those involving father's harshness reached significance. This indicated that experiences of high levels of negative maternal EE in childhood were associated with more recall of parental harshness in early adulthood.

In very general terms, the manifest variables concerned with parental behaviour appeared to show strong relationships with both trait and method factors, indicating that they were driven both by the construct of parent-child interaction which they are commonly assumed to reflect, and by the method used to obtain them. The manifest variables that represent sub-scales of the EE construct were comparatively more strongly related to the trait factor, showing only a very weak association with the relevant method factor.
Table 8.3. Correlations between the approximation of maternal negative expressed emotion (EE) and the retrospective indicators of parent-child interaction for men and women

<table>
<thead>
<tr>
<th>Retrospective reports of parenting</th>
<th>Negative maternal EE assessed in childhood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
</tr>
<tr>
<td>Mother's harshness at age 10</td>
<td>.49**</td>
</tr>
<tr>
<td>Mother's harshness during secondary school</td>
<td>.57**</td>
</tr>
<tr>
<td>Father's harshness at age 10</td>
<td>.38*</td>
</tr>
<tr>
<td>Father's harshness during secondary school</td>
<td>.40*</td>
</tr>
</tbody>
</table>

* p<.01
** p<.001

8.4 Positive aspects of parent-child interaction

8.4.1 Modelling positive aspects of parent-child interaction

The aim of the modelling of positive aspects of parenting was to mirror the previous analysis that explored negative aspects of parenting. Again the initial model was set up as a variation of the standard multimethod-multitrait model, parallel to that described above. This model is shown in Figure 8.4. As before, three common factors were modeled to predict mothers' prospective and subjects' retrospective accounts. Positive maternal EE was modeled to predict the prospective interviewer ratings of mother's positive remarks and mother's warmth alone. Mother's positive behaviour was modeled to predict prospective maternal reports of the frequency of the mother's activities and communication with the child on the one hand, and subject's retrospective reports of the frequency of the mother's activities and communication with him or her on the other. Similarly, father's positive behaviour was modeled to predict prospective maternal reports of the frequency of the father's communication with the child, as well as subject's retrospective reports of the frequency of the
father's activities and communication with him or her. In addition, method factors were modeled to predict all the prospective and retrospective accounts respectively, in order to attempt to account for systematic errors, or biases, in these accounts and the methods used for obtaining them. Thus, again the latent constructs of mother's and father's positive behaviour were each measured by a pair of prospective and a pair of retrospective manifest variables, and maternal EE by a single pair of prospective manifest variables. The latent parenting constructs were allowed to correlate with each other.

As with the negative model, the two sexes were allowed to differ in the means of all manifest variables and also in the variances and correlations of the EE and positive behaviour latent variables, and the measurement models that were fitted, beginning with a simple form, with each manifest variable within each pair being constrained to have the same error variance, the same unstandardized method factor loading and the same unstandardized construct factor loading. These were each tested as above, and a sequence of progressively less constrained models was fitted until none of the tests of the remaining constraints was significant at the 5% level. Again, the pattern of residuals was further examined to search for any other systematic effects not identified previously.

As above, an example of the EQS set up for this analysis is provided, this time in Appendix 7.
8.4.2 Reliability and validity of the accounts of positive aspects of parent-child interaction: The measurement model

As for the model concerned with negative aspects of parenting, it was necessary to relax some of the constraints for the model concerned with positive aspects of parenting. The initial approach to improve the fit of this model was parallel to that used previously, concentrating on relaxing the error variances within the prospective
pairs of measures. However, only some of these resulted in an improvement of fit, and the effect was not sufficient to achieve an adequately fitting model. The changes that were necessary were somewhat more extensive than before, involving relaxation of the loading of the two prospective manifest parenting variables reflecting maternal behaviour on the mother’s method factor (unconstrained between the sexes in the original set-up, and now additionally unconstrained within the sexes), and, only for the women, the loading on the factor for father’s positive behaviour of the two retrospective manifest variables. This model had a satisfactory fit ($\chi^2=155.05, 135$ d.f. and Comparative Fit Index of 0.94), again with these measures reflecting the extent of attrition bias, or differences between subjects with complete and incomplete data, as well as lack-of-fit of the model.

Figures 8.4a and 8.4b show the fully standardized solutions of the estimated measurement models for men and women, respectively. As for the model concerned with negative aspects of parenting, there were considerable intercorrelations between the two behavioural parenting constructs, mother’s and father’s positive behaviour. For the men, there was also a significant correlation between the two constructs concerned with the mother, mother’s positive EE and behaviour. However, positive maternal EE and father’s positive behaviour were unrelated for both the sexes. The estimated variances for the maternal parenting constructs were very slightly smaller for the women than for the men. For the positive maternal EE they were 1.0 for the men and .88 for the women, and for mother’s positive behaviour they were 1.0 and .82, respectively. For father’s positive behaviour the variance was somewhat larger for the women, 1.49 compared to 1.0 for the men.
Figure 8.4a. The model for reports of positive aspects of parent-child interaction for men
As before, the measurement equations for the prospective variables indicated the importance of the mother's method factor. This was only weak for the variables loading on the positive maternal EE, based on interviewer's reports, but substantial on the reports of parental behaviour. For the retrospective variables the subject's method factor was important for the recall of father's, but not mother's behaviour. This is contrary to what was found when developing the model for negative parenting, where the subject's method factor was more dominant in the
reports of mother’s behaviour.

The model of negative parenting included a correlation between the negative maternal EE construct and the subject’s method factor, which improved the fit significantly, suggesting an influence of maternal criticality and hostility in childhood on later reports of mother’s negative behaviour. For exploratory purposes, a similar path was included in the present model, to determine if there was a parallel effect of positive maternal EE on retrospective recall of positive behaviour. In this analysis, however, it was not found to be significant and did not improve the overall fit of the model, indicating that maternal positive remarks and warmth did not influence subjects’ retrospective reports of their parents positive behaviour in the same way as previous analysis revealed that maternal criticality and hostility colour subjects’ recall of their parents negative behaviour.

As for the indicators of negative aspects of parenting, the manifest variables concerned with parental behaviour showed strong relationships with both trait and method factors, suggesting that they were related both to the construct of parent-child interaction they are generally thought to measure, and to the method with which they were obtained. Maternal positive comments and warmth, the interviewer rated positive measures corresponding to the negative sub-scales of the EE construct, were, by contrast, only weakly related to the method factor, whilst being strongly related the trait factor.

8.5 Summary

These analyses were designed to explore the nature of the associations between prospective measures of parenting, assessed in childhood on the basis of an interview with the child’s mother, and subjects’ own reports of their experience many years later. Modelling was made more complex by the incomplete follow-up of the sample on the variables relevant to this analysis.

The model linking prospective maternal and retrospective subject accounts to underlying constructs of negative aspects of parent-child interaction raised a series of issues. On the whole, the agreement between prospective and retrospective
accounts of parental negative behaviour was not impressive. Examination of the individual path coefficients revealed that mothers' accounts of fathers' parenting behaviours loaded more strongly on the mother's method factor than on the relevant parenting construct, suggesting that a reliance on one parent's account of the other's behaviour is not desirable. Perhaps most important, however, the model suggested that exposure to high levels of maternal criticality and hostility in childhood colours retrospective recall of parenting in adulthood. This effect emerged very strongly for men, and needs to be explored further. Clearly, this must raise concerns about the discriminant validity of retrospective reports.

The parallel model concerned with positive aspects of parent-child interaction did not find any similar effect of mother's positive comments and warmth on subject's subsequent recall of positive parental behaviour. However, both models had in common that the manifest variables concerned with parental behaviour showed strong relationships with both trait and method factors, whereas the interviewer rated sub-scales of EE were only weakly related to the method factor, while being strongly related the trait factor. Although this would seem to indicate that indicators of parental behaviour reflect the method used to obtain them, as well as the characteristic of parenting they purport to measure, it is not clear what the implication is for EE. Clearly, one possibility is that EE is less contaminated by the method used to estimate it. It may, however, equally be a consequence of the fact that this latent variable was estimated by two indicators derived from the same method of measurement, as opposed to four indicators originating in two different contexts. This should be expected to make measurement error less predominant.
Chapter 9

UNDERLYING FACTORS OF POSITIVE AND NEGATIVE ASPECTS OF PARENT-CHILD INTERACTION, CONDUCT PROBLEMS AND ADULT SELF-ESTEEM

9.1 Introduction

Having explored some of the methodological issues linked to retrospective recall of parenting experiences, further analyses were undertaken to address a number of the conceptual issues discussed in Chapters 2 and 3, and again briefly summarised in Chapter 8. That is, there is some evidence of long-term links between harsh parenting and poor adult outcomes, in particular adult depression and self-esteem, both of which have been shown to be linked to experiences of little care and affection and high levels of control (Bemporad and Romano, 1992; Brown, Bifulco and Andrews, 1990; Gerlsma, Emmelkamp and Arrindell, 1990; Holmes and Robins, 1988; Parker, 1979; Perris, Maj, Perris and Eisenman, 1985; Rodgers, 1990; Sears, 1970). However, as noted previously, the overwhelming majority of this evidence rests on retrospective recall. In the light of the criticism of such data, also discussed in Chapter 3, and the findings presented in the previous chapter, there is a need to explore these relationships under circumstances that do not succumb to this methodological limitation.

The analyses here presented are concerned with self-esteem, whereas the results discussed in Chapter 10 focus on depression. The justification for first exploring self-esteem is partly methodological and partly conceptual. These analyses drew upon the multimethod-multitrait models developed in the previous chapter, which identified underlying parenting constructs, and made it possible to examine the
relationship between these and adult functioning within the framework of structural equation modelling. EQS, however, only allows continuous variables to be analysed, thereby making this analysis more appropriate for self-esteem than for depression. Self-esteem, on the other hand, has already been argued to be related to depression (e.g., Beck, 1967; Brown, Andrews, Harris, Adler, and Bridge, 1986; Brown, Bifulco, and Andrews, 1990a; Lewinsohn, Steinmetz, Larson, and Franklin, 1981; Miller, Kreitman, Ingham, and Sashidharan, 1989; Rehm, 1977), as well as being of particular interest in relation to the EE construct, as this is essentially a reflection of another individual’s, in this case the mother’s, evaluation of the target child, which may be expected to become internalised, and thereby contribute to the child’s subsequent self-esteem. The long-term outcomes of exposure to high parental EE, and, more specifically, the link between exposure to maternal EE and adult self-esteem, has however, not yet been examined empirically, and the present analyses represents a first effort in this area. Furthermore, as pointed out previously, one of the pathways linking experiences of adverse parent-child interaction to later functioning is thought to run through conduct problems, already evident in childhood, making it necessary to include this as a potential intervening variable in order to seek to disentangle to what extent parenting affects later adjustment independently from its link with childhood functioning.

The purpose of this investigation, then, was to determine how the latent constructs of parenting related to childhood conduct problems in boys and girls, and to assess how they, and childhood conduct problems related to adult self-esteem in men and women. Thus, Section 9.2 describes the method used, including an account of the measures, the implications of missing data, and an outline of the statistical analysis. Section 9.3 provides the results involving the negative parenting constructs, and Section 9.4 is concerned with those of the corresponding positive factors. Finally, Section 9.5 gives a summary of the findings.
9.2 Method

9.2.1 Measures

These analyses took as their point of departure the estimated multimethod-multitrait models developed in the preceding chapter, and therefore all the indicators of parenting specified for that investigation. In addition, they involved two outcome measures, childhood conduct problems and adult self-esteem. For the present purposes the measure of conduct problems derived from the interview with the child's mother was selected. This was thought to be more appropriate, as the results of the analyses presented in Chapter 7 indicated that conduct problems reported by the mother were more closely linked to measures of parent-child interaction than were conduct problems reported by teachers. However, here the measure was kept in its original four-point form, described in Chapter 6, referring to no, dubious, definite and severe disorder, rather than the binary form used previously. To estimate adult self-esteem, the Rosenberg Self-esteem Inventory, described in Chapter 6 was used. Similarly to the parenting variables, these measures were standardized to unit variance and transformed to approximate normality for the purposes of modelling.

In addition, approximations of the parenting constructs identified in Chapter 8 were computed for initial exploratory analysis. In order to include all those with complete childhood data in this stage of the analysis, these were based on the manifest prospective parenting variables alone, and were generated through adding together the indicators which were specified by the models to contribute to common underlying parenting constructs.

9.2.2 Missing data

The pattern of missing data of the two outcome variables had already been taken into consideration when identifying the data groups used to establish the measurement models in Chapter 8, thereby making it possible to maintain these also for the purposes of the present enquiry. The comparison between the subjects used in the
analysis, either in the incomplete or the complete data groups, with those who had to be excluded as a consequence of incomplete childhood data has already been discussed in relation to the measures of parent-child interaction. Tables 9.1 and 9.2 complement this by comparing the means of conduct problems and self-esteem of subjects who were, and were not, included in the analysis, involving negative and positive aspects of parenting respectively. In both cases, the results indicated that there were no significant differences in the conduct problems and self-esteem of these two groups, although there was a tendency for those not included in the analysis to have lower self-esteem than the those included.

Table 9.1. Means of the additional variables used in the present analyses of subjects who were and were not included in the analyses involving negative aspects of parent-child interaction

<table>
<thead>
<tr>
<th></th>
<th>Included</th>
<th>Not included</th>
<th>(p)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>sd</td>
<td>Means</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>30.88</td>
<td>3.82</td>
<td>29.13</td>
</tr>
<tr>
<td>Conduct problems</td>
<td>.33</td>
<td>.78</td>
<td>.33</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)

Table 9.2. Means of the additional variables used in the present analyses of subjects who were and were not included in the analyses involving positive aspects of parent-child interaction

<table>
<thead>
<tr>
<th></th>
<th>Included</th>
<th>Not included</th>
<th>(p)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>sd</td>
<td>Means</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>30.84</td>
<td>3.81</td>
<td>28.80</td>
</tr>
<tr>
<td>Conduct problems</td>
<td>.33</td>
<td>.78</td>
<td>.38</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
9.2.3 Outline of the statistical analysis

The interrelationships between the parenting constructs, conduct problems, and adult self-esteem were examined in two stages. Initially, the correlations between the approximations of the parenting constructs, conduct problems and adult self-esteem were examined to provide some descriptive information. Later, the measurement models, established in Chapter 8, were extended to examine the interrelationships of the parenting constructs with the measure of conduct problems, and their influence on adult self-esteem. Conduct problems and self-esteem were added into the models as shown in Figure 9.1. As the prospective parenting measures and the reports of conduct problems were contemporaneous, all three parenting constructs were allowed to correlate with conduct problems in childhood, and the three parenting constructs and conduct problems were used to predict adult self-esteem. This made the examination of a variety of issues possible, in particular, the extent to which the three different parenting constructs showed independent links with conduct problems in childhood and self-esteem in early adulthood, and how far subjects' assessment of their self-worth was associated with earlier expressions of disruptive behaviour.

The terms specifying these links in the EQS set-up are marked by exclamation marks in Appendices 6 and 7, which specified the original measurement models.

9.3 Results

9.3.1 Negative aspects of parent-child interaction, conduct problems and adult self-esteem: Exploratory analysis

The results from the exploratory analysis, based on correlations between approximations derived from addition of the contributing prospective indicators, conduct problems, and adult self-esteem, are shown in Tables 9.3a and 9.3b for men and women respectively. These revealed that childhood conduct problems were positively correlated with all the parenting constructs, especially those involving the
mother. The correlations between parenting and adult self-esteem were considerably smaller, although maternal EE and self-esteem showed a consistent correlation of approximately -0.2 across the sexes.

Figure 9.1. Modelling links between parenting, conduct problems and adult self-esteem
Table 9.3a. Correlations between approximations of the constructs of negative aspects of parent-child interaction, conduct problems, and adult self-esteem for men

<table>
<thead>
<tr>
<th></th>
<th>Conduct problems</th>
<th>Self-esteem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative maternal EE</td>
<td>.68**</td>
<td>-.21</td>
</tr>
<tr>
<td>Negative maternal behaviour</td>
<td>.63**</td>
<td>-.12</td>
</tr>
<tr>
<td>Negative paternal behaviour</td>
<td>.31*</td>
<td>-.04</td>
</tr>
</tbody>
</table>

* p<.01  
** p<.001

Table 9.3b. Correlations between approximations of the constructs of negative aspects of parent-child interaction, conduct problems, and adult self-esteem for women

<table>
<thead>
<tr>
<th></th>
<th>Conduct problems</th>
<th>Self-esteem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative maternal EE</td>
<td>.44**</td>
<td>-.18</td>
</tr>
<tr>
<td>Negative maternal behaviour</td>
<td>.37*</td>
<td>-.09</td>
</tr>
<tr>
<td>Negative paternal behaviour</td>
<td>.16</td>
<td>.04</td>
</tr>
</tbody>
</table>

* p<.01  
** p<.001

9.3.2 Negative aspects of parent-child interaction, conduct problems and adult self-esteem: Structural equation modelling

Figures 9.2a and 9.2b show these relationships, estimated using structural equation modelling, for men and women respectively. As in earlier stages of the analyses, the findings were more clearly differentiated for men than for women. In terms of links with childhood conduct problems, there were significant correlations with mother's negative behaviour and maternal EE. Father's negative behaviour, while associated
with maternal EE, was more weakly related to her negative behaviour and with the measure of conduct problems. For self-esteem, however, a more distinct picture could be seen. Of all the negative parenting constructs and conduct problems, only mother’s EE showed a significant independent effect on adult self-esteem, high maternal EE being associated with lower levels of the subjects’ self-esteem some fifteen years later. In addition, there was some indication that conduct problems were associated with adult self-esteem, although this was not significant on a 5% level. On the basis of this analysis the predominant influence on adult self-esteem for men in the sample seemed to reflect exposure to maternal criticality and hostility in childhood.

For the women, all the parenting constructs were significantly associated with each other. Their rather higher levels of inter-correlation made the task of determining which among them were independently associated with adult self-esteem more difficult. Although all the negative parenting constructs were significantly correlated with conduct problems, neither of these, nor childhood conduct problems showed any significant independent relationship with adult self-esteem.
Figure 9.2a. Links between negative aspects of parenting, conduct problems and adult self-esteem for men

- .84 (.008)
- .69 (<.001)
- .22 (.2)
- .07 (.8)
- .34 (.1)
- .16 (.3)
- .50 (<.001)
- .17 (.3)
- .45 (.02)

Note: numbers represent standardized path coefficients with associated p-values in brackets.
9.3.3 Positive aspects of parent-child interaction, conduct problems and adult self-esteem: Exploratory analysis

As for the analysis involving the negative constructs of parenting, the relationships between the positive constructs of parenting, conduct problems and self-esteem were explored using approximations derived from addition of the contributing prospective indicators specified by the models established in Chapter 8. The correlations between
these, shown in Tables 9.4a for men and 9.4b for women, indicated that, although childhood conduct problems were negatively correlated with all the positive constructs of parenting, these generally failed to reach statistical significance, and were, on the whole, considerably less impressive than those involving the negative parenting constructs. Similarly, their correlations with adult self-esteem were relatively small, with the exception of paternal positive behaviour, which showed a consistent significant correlation approaching 0.4 in both the sexes.

Table 9.4a. Correlations between approximations of the constructs of positive aspects of parent-child interaction, conduct problems, and adult self-esteem for men

<table>
<thead>
<tr>
<th></th>
<th>Conduct problems</th>
<th>Self-esteem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive maternal EE</td>
<td>-.26</td>
<td>-.01</td>
</tr>
<tr>
<td>Positive maternal behaviour</td>
<td>-.14</td>
<td>.06</td>
</tr>
<tr>
<td>Positive paternal behaviour</td>
<td>-.04</td>
<td>.39**</td>
</tr>
</tbody>
</table>

* p<.01  
** p<.001

Table 9.4b. Correlations between approximations of the constructs of positive aspects of parent-child interaction, conduct problems, and adult self-esteem for women

<table>
<thead>
<tr>
<th></th>
<th>Conduct problems</th>
<th>Self-esteem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive maternal EE</td>
<td>-.25</td>
<td>-.05</td>
</tr>
<tr>
<td>Positive maternal behaviour</td>
<td>-.30</td>
<td>.30</td>
</tr>
<tr>
<td>Positive paternal behaviour</td>
<td>-.34*</td>
<td>.37*</td>
</tr>
</tbody>
</table>

* p<.01  
** p<.001
9.3.4 Positive aspects of parent-child interaction, conduct problems and adult self-esteem: Structural equation modelling

Figures 9.3a and 9.3b show the estimated relationships for men and women, generated by the more formal analysis based on structural equation modelling. Again the findings emerged more clearly for the men than for the women. For the former, maternal positive EE and positive behaviour was found to be significantly negatively correlated with conduct problems, although neither was significantly related to self-esteem. By contrast, father's positive behaviour was significantly positively associated with self-esteem, while it showed no association with conduct problems. Conduct problems were, however, significantly negatively associated with adult self-esteem. This is a reversal of the non-significant positive relationship found when examining the links between negative aspects of parenting, conduct problems and adult self-esteem. It is difficult to determine the exact reason for this, but it would seem plausible that it is related to differences in the strength in the relationship between adult self-esteem, and positive and negative EE. Both these measures of EE were significantly associated with conduct problems, whereas only the negative showed a significant relationship with adult self-esteem. It would appear that the constancy in the relationship between EE and conduct problems, and the contrast between the considerable strength of the relationship between negative EE and adult self-esteem and the apparent lack of relationship between positive EE and adult self-esteem affected the link between childhood conduct problems and adult self-esteem. Put differently, these various relationships are interdependent, and the long term effects of conduct problems on adult self-esteem observed in the model involving positive aspects of parent-child interaction seem to have arisen from the association between conduct problems and negative EE.
For the women, only mother's positive EE was significantly negatively correlated with childhood conduct problems, although there was an additional trend involving father's positive behaviour. However, neither of the positive parenting constructs, nor conduct problems showed a significant relationship with adult self-esteem.
9.4 Summary

The purpose of this investigation was to examine how the latent parenting constructs established in Chapter 8 related to conduct problems in boys and girls, and if they, and childhood conduct problems, were associated with adult self-esteem in men and women. The results here presented appeared to be clearly differentiated for the men, whereas the data for the women may have been insufficient in terms of sample size.
and variance to provide evidence of significant relationships. Thus, for the men, there
were significant correlations between conduct problems and mother's negative
behaviour and negative EE, on the one hand, and mother's positive behaviour and
positive EE, on the other. Furthermore, mother's negative EE, father's positive
behaviour, and, to some extent, conduct problems were predictive of adult self-esteem,
with an additional trend involving mother's positive behaviour. For the women, all
the constructs of negative parent-child interaction, as well as maternal positive EE
were significantly correlated with conduct problems, although neither of the parenting
constructs, or conduct problems, was predictive of adult self-esteem.

There was, then, some evidence of both independent effects of parent-
child interaction on adult self-esteem, and of a mediating role played by conduct
problems manifest in middle childhood, which was associated both with a range of
aspects of mother-child interaction and with adult self-esteem.
Chapter 10

EXPERIENCES OF ADVERSE PARENT-CHILD INTERACTION, CONDUCT DISORDER, AND ADULT SELF-ESTEEM, AND ADULT LIFETIME DEPRESSION

10.1 Introduction

This last set of analyses were designed to complement those presented in the previous chapter, involving the interrelationships between parent-child interaction, conduct problems and adult self-esteem, by considering the place of adult depression within this pattern of associations. Existing evidence, discussed in some detail in Chapter 3, suggests an important association between a combination of lacking parental affection and stringent control, and adult depression (Bemporad and Romano, 1992; Gerlsma, Emmelkamp and Arrindell, 1990; Holmes and Robins, 1988; Parker, 1979; Perris, Maj, Perris and Eisenman, 1985). Although the overwhelming majority of this evidence is based on retrospective data, the very small number of prospective studies that have been undertaken in this area have tentatively indicated that the results obtained in investigations based on retrospective recall may be more than a consequence of the reporting effects the critics of this methodology warn us of, and have provided some indication that adult affective symptoms are associated with maternal affect and behaviour (Gjerde, Block and Block, 1991; Rodgers, 1990). These prospective studies have, however, typically been limited by data collected for other purposes, and consequently have only examined a narrow range of indicators of parent-child interaction. There are therefore few results which can be said to suggest which aspects of parenting that are the most detrimental to children's later affective state. In particular, the very wide variety of psychological malfunctioning shown to be associated with the EE construct (Brown, Carstairs and Topping, 1958; Brown,
1959; Brown, Monck, Carstairs and Wing, 1962; Brown, Birley and Wing, 1972), and arguments here put forward about its particular importance to self-esteem, which is thought to be linked to depression (e.g., Beck, 1967; Brown, Andrews, Harris, Adler and Bridge, 1986; Brown, Bifulco and Andrews, 1990a; Lewinsohn, Steinmetz, Larson and Franklin, 1981; Miller, Kreitman, Ingham and Sashidharan, 1989; Rehm, 1977), raise questions about its long term effects on depression. However, data allowing the impact of exposure to parental EE on adult emotional problems to be investigated has not been available until now, and, as was the case in Chapter 9, the results of the analyses here presented provide initial information about this relationship.

In this context, two further issues, intimately linked to the results already discussed, were considered. First, the association between depression and self-esteem needed to be explored to some extent, particularly as the relationship between parenting and self-esteem has already been examined, allowing inferences to be made about the pattern of interrelationships between self-esteem, depression and parent-child interaction. Second, the proposed relationship between childhood conduct disorder and adult affective disorders (Zoccolillo, 1992) needed to be considered. It is possible that the association between conduct disorder and adverse parenting, and conduct disorder and adult depression together create an association between adverse parenting and depression. As it is advisable that investigations of this kind seek to take into consideration as many alternative explanations as possible for any proposed relationship, the association between conduct disorder and depression was considered here as a potential competing explanation.

Thus, this study sought to answer the following questions: first, whether adult lifetime depression was linked with childhood conduct disorder; second, whether adult lifetime depression was associated with current self-esteem, and; third, whether adult lifetime depression was related to prospectively reported adverse aspects of parent-child interaction. As before, there was a concern to contrast a wide range of indicators of parent-child interaction, reflecting both the affective and behavioural dimensions of mothering, some indicators of father's behaviour, as well as both measures characterised by overtly negative and lack of positive interaction. Although the original intention was to, as before, study men and women separately, the low rates of depression in men, only nine out of 76 men, compared to 15 of 54 women,
made statistical analysis very difficult. This series of analyses therefore focused on women alone. However, in order to create expansion weights that could be used for the whole sample in analyses not presented here, these were calculated on the basis of the complete sample. The reader should be advised that due to the small number of subjects involved and the temporal relationship between the indicators of adult self-esteem and depression, the analyses here may not be considered to be ideal.

The methods used are described in section 10.2, which also includes a detailed account of how the weights were constructed. Section 10.3 outlines the results, and section 10.4 provides a brief summary of the findings.

10.2 Method

10.2.1 Measures

This study used all the prospective parenting variables introduced in Chapter 6, with the exception of father's activities and nagging. The first of these was excluded due to the high levels of missing data, whereas the second was assumed not to contribute anything in addition to father's irritability. These variables were used in the binary form, established in Chapter 6. Additionally, the indicator of conduct problems derived from the interview with the child's mother, the Rosenberg self-esteem inventory, and the lifetime diagnosis of depression made on the basis of information supplied in the adult interview were used.

10.2.2 Missing data

In this case, subjects with complete data on all variables to be used in this series of analyses were selected. For the construction of expansion weights, this procedure resulted in a sub-sample with complete data of 76 men and 54 women (68% of the original sample of 191 subjects), of whom only the latter were used in the subsequent analyses. This meant that the present study incurred some further loss, partly
depending on the inclusion of adult psychiatric diagnosis for which information was available for only 65 of the 75 women. The remainder of the loss resulted from missing data on a combination of the parenting variables, and the Rosenberg self-esteem inventory.

In order to examine the representativeness of the group of women to be analysed, the 54 women with complete data were compared on all variables used in the present analyses to the 21 women who were excluded due to incomplete data, using Chi-square analysis, or, when appropriate, Fisher-Exact test. As the proportion of subjects that were excluded was larger than previously, the results of these explorations were of some concern. However, only one of these comparisons, presented in Table 10.1, generated a trend that suggested that the two groups were systematically different from each other. That is, lack of maternal positive remarks appeared to be more common in the incomplete data group than in the complete data group. A similar tendency was found for maternal warmth, which seemed to be lacking in considerably more of subjects with incomplete data. Given the small numbers involved, however, this failed to approach statistical significance. Even so, the majority of the comparisons revealed relatively comparable levels of parental adversity, conduct disorder, and depression for both groups of women. Consequently, this loss, although relatively extensive, was thought to be ignorable, and no further attempts were made to adjust for it. For the purposes of the remaining analysis, the 54 women were treated as if they were representative of the original 75 women.
Table 10.1. Percentages of women with complete and incomplete data exposed to adverse parent-child interaction

<table>
<thead>
<tr>
<th>Variable</th>
<th>Complete data group</th>
<th>Incomplete data group</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or irregular activities with mother</td>
<td>9%</td>
<td>5%</td>
<td>ns</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>11%</td>
<td>13%</td>
<td>ns</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>17%</td>
<td>13%</td>
<td>ns</td>
</tr>
<tr>
<td>Mother’s irritability four times a week or more</td>
<td>15%</td>
<td>25%</td>
<td>ns</td>
</tr>
<tr>
<td>Father’s irritability four times a week or more</td>
<td>11%</td>
<td>13%</td>
<td>ns</td>
</tr>
<tr>
<td>No positive remarks</td>
<td>9%</td>
<td>29%</td>
<td>.06</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>11%</td>
<td>24%</td>
<td>ns</td>
</tr>
<tr>
<td>Four or more critical comments by mother</td>
<td>18%</td>
<td>6%</td>
<td>ns</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>2%</td>
<td>0%</td>
<td>ns</td>
</tr>
<tr>
<td>Conduct disorder</td>
<td>9%</td>
<td>9%</td>
<td>ns</td>
</tr>
<tr>
<td>Depression</td>
<td>28%</td>
<td>22%</td>
<td>ns</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)

10.2.3 Adjustment for the multi-phase sampling design

In this investigation, as in the study presented in Chapter 7, the multi-phase sampling, selecting proportionally more children with high scores on the teacher behaviour questionnaire than were present in the original screened sample, was addressed, with the aim of generating results that could be generalised to the overall population. The approach here illustrated was a statistical program specifically developed for multi-stage designs, SUDAAN. The strengths of this package, in terms of being able to account for complex designs also when computing variance estimates and test statistics were outlined, in Chapter 4. Essentially, SUDAAN allows sample design parameters, in the form of expansion weights, to be included in the analysis, making the
computation of correct standard errors possible. Thus, while relative weights had previously been used for descriptive purposes, the method of analysis proposed for the present purposes also depended on expansion weights.

10.2.4 Construction of the expansion weights

As the weights used in this set of analyses were incorporated in the final SUDAAN analyses, rather than being employed for exploratory purposes, it was considered necessary to make them somewhat more sophisticated than those previously employed. Here they were not only on based on the proportion of subjects scoring high and low on the screening instrument, but also on the proportions of subjects living with both their natural parents at the time of the interview. However, although the former of these quantities was known, the latter had to be estimated on the basis of the observed proportion of subjects living with both their natural parents in the intensively studied sub-samples, taking into consideration their screening status. The way in which this was done is clarified by Figures 10.1a and 10.1b, the second of which provides an outline of the selection procedure as it applies to the present study, where all children who did not live with both their natural parents at the time of the interview were excluded, and the remainder were stratified on the basis of the screening instrument, with a proportion of those with low scores, and a relatively larger proportion of those with high scores being selected for intensive individual examination.

By contrast, the first, Figure 10.1a, is a graphical depiction of the sample selection which is a true to the way in which the data collection was carried out, where the total number of subjects were screened, independently of whether they lived with both their natural parents or not, and a proportion of children were selected from the group scoring low on the teacher behaviour checklist, and another from those scoring high. Subsequently, for the purposes of the present study, those who were reported not to live with both their natural parents at the time of the interview with the child's mother were excluded from the analysis. Thus, the data arose through two steps, selection on the basis of scores on the screening instrument, and selection on the basis of the presence of both natural parents. The total population, in this case the
screened sample \((n=1689)\), initially is divided into subjects who scored high \((B+)\) and low \((B-)\) in the screening instrument, and were then further sub-divided into subjects who came from intact families \((P+)\) as well as from other family forms \((P-)\). The frequencies attached to the possibilities of receiving high versus low scores on the screening instrument are known \((n_1=322, n_2=1367)\). Both those who scored high and low on the screening instrument came from intact families \((P+)\) as well as from other family forms \((P-)\). However, the proportions of subjects living with both their natural parents at the time of the childhood interview \((m_1 \text{ and } o_1)\), or found in other situations \((m_2 \text{ and } o_2)\), given their status on the screening variable were not known, and had to be estimated on the basis of the proportions found in the intensively studies sub-sample:

\[
\frac{m_1}{m_1 + m_2} \text{ can be estimated from the sample proportion of subjects who scored high on the screening variable and lived with both their natural parents at the time of the interview } = r_+.
\]

\[
\frac{o_1}{o_1 + o_2} \text{ can be estimated from the sample proportion of subjects who scored low on the screening variable and lived with both their natural parents at the time of the interview } = r_-
\]

Thus,

\[
\hat{m}_1 = \hat{r}_+ n_1, \text{ since } m_1 + m_2 \text{ must equal } n_1
\]

Similarly,

\[
\hat{o}_1 = \hat{r}_- n_2, \text{ since } o_1 + o_2 \text{ must equal } n_2
\]

Figure 10.1b turns the two steps in which data was selected around, first presenting a division between subjects from intact families, and subjects living in other family arrangements. These groups were then further sub-divided by their status on the screening variable, and from these some subjects were selected for intensive study, while others were not. Subjects found in the lower half of this figure, those who did not live with both their natural parents at the time of the interview, were excluded from the present analysis, and need consequently not be discussed further.

The sampling fractions, provided subjects came from intact families, are \(q_1/m_1\) and \(s_1/o_1\) for subjects scoring high and low on the screening variable.
respectively. Of these, \( q_1 \) and \( s_1 \) are known quantities, whereas \( m_1 \) and \( o_1 \) are estimated from the intensively studied sub-sample.

Figure 10.1a. Clarification of the structure of the sample for the construction of weights

\[
\begin{align*}
\text{Total population} & \quad \rightarrow \quad B^+ \\
& \quad \rightarrow \quad m_1 \quad P_{+i} \\
& \quad \rightarrow \quad n_1 \quad B^+ \quad m_2 \\
& \quad \rightarrow \quad P_{-i} \\
& \quad \rightarrow \quad n_2 \quad B^- \\
& \quad \rightarrow \quad o_1 \quad P_{+ii} \\
& \quad \rightarrow \quad o_2 \quad P_{-ii}
\end{align*}
\]

Figure 10.1b. Further clarification of the structure of the sample for the construction of weights

\[
\begin{align*}
\text{Total population} & \quad \rightarrow \quad P^+ \\
& \quad \rightarrow \quad m_1 + o_1 \quad P_{+} \\
& \quad \rightarrow \quad m_1 \quad B^+ \quad s_1 \quad \text{selected} \\
& \quad \rightarrow \quad m_1-q_1 \quad \text{not selected} \\
& \quad \rightarrow \quad o_1 \quad B^+ \\
& \quad \rightarrow \quad o_1-s_1 \quad \text{selected} \\
& \quad \rightarrow \quad \text{not selected} \\
& \quad \rightarrow \quad P^- \\
& \quad \rightarrow \quad B^- \\
& \quad \rightarrow \quad B^-_{ii}
\end{align*}
\]

B+ denotes a high score on the screening instrument
B- denotes a low score on the screening instrument
P+ denotes the presence of both natural parents at the time of the interview
P- denotes the lack of presence of both natural parents at the time of the interview
10.3.2 Depression and self-esteem

A further question concerned the link between adult lifetime depression and self-esteem. This was investigated through a comparison of the means on the Rosenberg self-esteem inventory of women who had, and had not, experienced adult lifetime depression, and the difference between them was assessed by one way analysis of variance, the results of which are presented in Table 10.3. This shows that although those with a diagnosis appeared to have considerably lower self-esteem scores than those without depression, these differences fell short of statistical significance on a 5% level both in the unadjusted and adjusted data.

For reasons summarised in Chapter 6, the relationship between depression and self-esteem was not pursued further. That is, depression here refers to an adult lifetime diagnosis, whereas the self-esteem scores were obtained at the time of the interview, subsequent to onset of depression, and often in the absence of current symptoms. It would, consequently, be difficult to argue that low self-esteem was a predecessor of depression in this data set, and it was considered inappropriate to model it to be a predictor or correlate of depression in the logistic analysis.

Table 10.3. Means of Rosenberg self-esteem scores of women with and without adult lifetime depression

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>31.0</td>
<td>30.50</td>
</tr>
<tr>
<td>Yes</td>
<td>28.58</td>
<td>27.93</td>
</tr>
<tr>
<td>p*</td>
<td>.07</td>
<td>ns</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
The expansion weights, then, are
\[ m1/q1 \] for subjects scoring high on the screening variable
\[ o1/s1 \] for subjects scoring low on the screening variable

The relative weight equals
\[ \text{expansion weight} \times \text{sample size (here 130)}/\text{estimated total sample (here 1415)} \]

10.3 Results

10.3.1 Depression and conduct disorder

The association between adult lifetime depression and conduct disorder in childhood was explored through cross tabulations in both the unadjusted and the adjusted data, and then examined using Fisher-Exact tests. The proportions of women with adult depression among those with and without childhood conduct disorder are shown in Table 10.2. Although there was a tendency for depression to occur more frequently among subjects who were rated as having conduct disorder in childhood in the adjusted data, the numbers are very small indeed, and were not convincing enough to yield statistically significant results, or to form the basis for any inferences. It was, therefore, concluded that there was no evidence of a significant association between childhood conduct disorder and adult lifetime depression in this sample, and this association was not pursued further in the subsequent analysis.

Table 10.2. Proportions of women with adult lifetime depression among those with and without a diagnosis of conduct disorder (CD)

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CD</td>
<td>No CD</td>
</tr>
<tr>
<td>Women with depression</td>
<td>1/5 (20%)</td>
<td>14/49 (29%)</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
10.3.3 Depression and adverse aspects of parent-child interaction

Finally, the relationship between adverse parent-child interaction in childhood and adult lifetime depression was examined. This was done in two steps, the first of which was exploratory. The results of this analysis were then used in logistic regression performed using SUDAAN, discussed above, and in Chapter 4.

10.3.3.1 Depression and adverse aspects of parent-child interaction: Exploratory analysis

The results of the exploratory analysis, examining the proportions of women with, and without, a diagnosis of adult lifetime depression that were exposed to adverse ratings of parenting, and the associated p-values obtained from Chi-square, or Fisher-Exact tests, are presented in Table 10.4. These indicated that it was variables reflecting lack of positive interaction, rather than overtly negative interaction, that appeared to carry importance. No or irregular communication with both mother and father, and lack of maternal positive remarks were significantly more common among women with a lifetime diagnosis, compared to those never depressed, in the unadjusted data. In the adjusted data only the variables concerned with the mother, no or irregular communication with mother, and no positive remarks, emerged as significant, with an additional trend for no or irregular activities with mother. More than a quarter of the depressed women had mothers who had reported lack of such positive interaction, compared to virtually none of those who were not depressed.
Table 10.4. Percentages of women with and without adult lifetime depression exposed to adverse parent-child interaction

<table>
<thead>
<tr>
<th>Indicators of lack of positive behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or irregular activities with mother</td>
<td>5% 20% (ns)</td>
<td>5% 20% (.07)</td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>3% 33% (.005)</td>
<td>1% 25% (.01)</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>10% 33% (.05)</td>
<td>6% 25% (ns)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of negative behaviour</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s irritability four times a week or more</td>
<td>15% 13% (ns)</td>
<td>8% 5% (ns)</td>
</tr>
<tr>
<td>Father’s irritability four times a week or more</td>
<td>8% 20% (ns)</td>
<td>2% 8% (ns)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of lack of maternal positive expressed emotion</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>No positive remarks</td>
<td>3% 27% (.02)</td>
<td>4% 35% (.01)</td>
</tr>
<tr>
<td>Little or no warmth</td>
<td>10% 13% (ns)</td>
<td>10% 5% (ns)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators of maternal negative expressed emotion</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four or more critical comments by mother</td>
<td>20% 13% (ns)</td>
<td>20% 5% (ns)</td>
</tr>
<tr>
<td>Any maternal hostility</td>
<td>0% 7% (ns)</td>
<td>0% 0% (ns)</td>
</tr>
</tbody>
</table>

* p-values greater than .10 are reported as not significant (ns)
10.3.3.2 Depression and adverse aspects of parent-child interaction: SUDAAN analysis

These results were further explored through logistic regression using SUDAAN. This analysis included all indicators of parenting which had previously been shown to be significantly associated with depression on a 5% level in either the unadjusted or the adjusted data. Thus, no or irregular communication with mother and father, and lack of maternal positive remarks were all potential predictors of adult lifetime depression. As was explained previously, conduct disorder in childhood and adult self-esteem were not included as predictors of depression in the logistic analysis.

Initially separate SUDAAN models were run for each of the parenting variables in order to establish if they were significant when analysed in isolation, with the aim, if appropriate in the light of the results obtained, to develop this most simple form of model to one including two, and eventually all the significant explanatory variables. Examples of the input files in are provided in Appendices 8, 9 and 10.

The results generated by the SUDAAN analysis were, as would be expected, similar to those obtained in the exploratory analysis, particularly in the adjusted data. As is shown in Table 10.5, no or irregular communication with mother was significantly related to depression, and no positive remarks fell just short of significance on a 5% level. However, no or irregular communication with father was not significantly related to depression, and was therefore not considered for inclusion in further models. The direction of these effects can be interpreted by the sign of the respective beta coefficients. In this example, both the coefficients associated with no or irregular communication with mother and lack of positive remarks were positive, indicating that depression was more frequent in those whose interaction with their mother was characterised by lack of, or irregular, communication, and in those whose mothers expressed no positive remarks in the interview situation. These results, then, are in the expected direction, and are in agreement with tendencies suggested by the exploratory analysis.

The two variables relating to mother-child interaction were then included together in a final model, in order to contrast their relative relationships with depression. However, these two variables suffered from extensive co-linearity, with
47 of 54 subjects, or 87%, having the same score on both variables. This resulted in a failure to produce meaningful results, and no conclusions could be drawn about the relative strengths of the associations between lack of maternal communication and lack of positive comments by mother, on the one hand, and depression, on the other.

Table 10.5. Results from the SUDAAN analysis of the indicators of parent-child interaction and adult lifetime depression

<table>
<thead>
<tr>
<th>Model</th>
<th>Beta coefficient</th>
<th>SE Beta</th>
<th>t-statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Models including only one parenting variable:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No or irregular communication with mother</td>
<td>3.80</td>
<td>1.27</td>
<td>3.00</td>
<td>.00</td>
</tr>
<tr>
<td>No or irregular communication with father</td>
<td>1.57</td>
<td>1.04</td>
<td>1.51</td>
<td>.14</td>
</tr>
<tr>
<td>No positive remarks</td>
<td>2.48</td>
<td>1.27</td>
<td>1.95</td>
<td>.06</td>
</tr>
</tbody>
</table>

10.4 Summary

The aim of this investigation was to establish if adult lifetime depression was associated with childhood conduct disorder, adult self-esteem, and prospectively reported adverse parenting, reflecting both affective and behavioural dimensions of mothering, and some indicators of father’s behaviour. When examining the prevalence rates of depression in Chapter 6, it was found to be significantly more common in women than in men, and due to the very low rates in men they had to be excluded from analysis. These analyses therefore focused on 54 women, resulting in a relatively limited statistical power.

The results here discussed found no significant relationship between childhood conduct disorder and adult depression in women, although a trend indicated that women diagnosed with depression had lower self-esteem than those who were not.
It is possible that this relationship would have emerged more strongly if the two measures had reflected the same time periods, instead of the measure of self-esteem being current, whereas depression referred to a life-time diagnosis. Unfortunately the temporal relationship between the two also made it impossible to include self-esteem in the logistic regression as a predictor of depression.

The observed relationship between parenting and adult depression in women suggested some interesting associations, highlighting indicators of parent-child interaction which had not appeared to be important in the previous analysis. While the results presented in Chapters 7 and 9 seemed to emphasise maternal negative EE, the indicators of parenting found to be the most effective predictors of depression were those reflecting a lack of positive interaction, most notably lack of communication with mother, and lack of positive remarks by mother in the interview situation. Their relative importance could, however, not be determined, as very substantial co-linearity between them made such analysis impossible.
Chapter 11

SUMMARY AND CONCLUSIONS

11.1 Introduction

This study was guided by a general interest in the short and long term effects of parenting on children's psychosocial adjustment. This was made more specific by the formulation of five research questions. The first of these was concerned with the relationships between the various indicators of parenting, and sought to find a meaningful way of classifying these. The second considered the relationships between parent-child interaction and childhood conduct problems, assessed on the basis of maternal and teacher's reports. The third question was related to issues about the reliability and validity of retrospective recall, and examined the concordance between maternal prospective reports, and subject's retrospective recall of parent-child interaction in adulthood, using structural equation modelling. The latent variables identified in this analysis were then used to explore the fourth question, concerned with the association between adverse dimensions of the parent-child relationship and subjects' adult self-esteem, taking into consideration childhood conduct problems as a potential mediating variable. Finally, the fifth question considered the relationship between parenting and adult lifetime depression, while also incorporating links with childhood conduct problems, and, to some extent, adult self-esteem. Throughout the study questions about differential exposure and susceptibility to risk factors of boys and girls, or men and women, were considered. The analyses were either undertaken for the two sexes separately, or, as was the case in the EQS analysis, examined differences between them. These investigations also served to provide examples of different methods of analysing complex longitudinal data, in particular different techniques for addressing the multi-phase sampling design used to generate the data.
set with which this study was concerned, and the virtually inevitable problems associated with missing data.

In this chapter, the results obtained in the analyses previously presented are summarised and discussed. Section 11.2 provides a review and discussion of the findings, while Section 11.3 discusses the general implications of these findings for further work, and some final comments are made in Section 11.4.

11.2 Review and discussion of the findings

11.2.1 Conceptualising parent-child interaction

The examination of the interrelationships between the various prospective indicators of parenting, and attempt to find a meaningful way of conceptualising parenting, led to some important conclusions. In particular, they addressed two issues which had previously been identified in the literature review as of some concern. That is, whether the measures available in this data set conformed to the distinction between affective and behavioural aspects of parent-child interaction (Baldwin, 1955; Becker, 1964; Schafer, 1959; Sears, Maccoby and Levin, 1957), and if the indicators of overtly negative interaction reflected a different dimension from those concerned with lack of positive interaction.

The indications from the correlation matrix were that the various individual measures of parenting were highly interrelated, although a certain pattern in these relationships was clearly discernible. Particularly strong associations were found between variables indicating overtly negative interaction on the one hand, and measures of lack of positive interaction on the other, while the relationships across this distinction were much less convincing. The subsequent factor analysis further suggested a differentiation between an affective and a behavioural dimension, although this could only be demonstrated among the variables indicating positive, or lack of positive interaction, not among those reflecting overtly negative aspects of the mother-child relationship. It is possible that this is a consequence of the structure of this particular data set, where the collection of indicators of parenting may have been
either incomplete or inappropriate to examine this distinction. A greater number of indicators of both parental behaviour and affect might have yielded results more similar to the literature as a whole. On the other hand, it is also possible that the single factor for negative interaction reflected the closeness of the relationship between negative maternal affect to the child, as indicated by criticism and hostility, and negative behaviour.

Comparison of the exposure of boys and girls to adverse aspects of parenting indicated that, on the whole, there was little evidence of any significant sex difference in this respect, making these findings largely in agreement with other reports (eg Holmes and Robins, 1987; Lytton and Romney, 1991). Even so, there were some exceptions. In particular, there was a tendency for boys to be exposed to more maternal aggression than girls, and a certain indication that mothers expressed more hostility concerning sons compared to daughters, although the reverse was true for criticism. These findings therefore indicated that it is important to remain cautious, especially since studies in the past have not covered all aspects of parent-child interaction. This is most notable for the EE sub-scales, regarding which we have relatively little systematic information about exposure in children in general, and even less about differential exposure of boys and girls. Interestingly, it was precisely in two of these sub-scales that this study noted some evidence of sex differences.

11.2.2 Reliability and validity of the accounts of parent-child interaction

The analyses presented in Chapter 8 were designed to explore the nature of the associations between prospective measures of parenting, based on maternal reports, and subjects’ own recollections of their experience many years later. Empirical studies of the accuracy of retrospective recall of parent-child interaction have been relatively sparse, although such data has been used extensively, in particular in studies of the long-term effects of parenting (eg Gerlsma, Emmelkamp and Arrindell, 1990; Jacobsen, Fasman and DiMascio, 1975; Parker, 1979; Perris, Arrindell, Perris, Eiseman, Van der Ende and Von Knorring, 1986; Perris, Maj, Perris and Eiseman, 1985). Analysis was undertaken, using structural equation modelling, linking
prospective maternal and retrospective subjects’ reports to underlying, or latent variables.

In general the results indicated that the agreement between prospective and retrospective accounts of parental negative behaviour was relatively poor. However, the conclusions that can be drawn on the basis of this investigation go well beyond this general statement. The path coefficients of the model linking prospective maternal and retrospective subjects’ accounts to underlying constructs of negative aspects of parent-child interaction, revealed that mothers’ accounts of fathers’ parenting behaviours loaded more strongly on the mother method factor than on the relevant parenting construct, indicating that it may be inappropriate to rely on one parent’s account of the other's behaviour. Perhaps most important, however, the model suggested that high levels of maternal criticality and hostility in childhood is systematically linked to subjects’ retrospective recall of parenting in adulthood. This is an entirely novel suggestion which emerged very strongly for men, although it did not approach significance in the women, and should raise some concern about the discriminant validity of retrospective reports, and add further reservations against the reliance on retrospective accounts as accurate reflections of past events. It also interestingly suggests that a tendency towards negativity, or negative reporting, as reflected in negative maternal EE, and reporting of high levels of adverse parenting experiences, may be passed on from one generation to the next. Although this finding remains to be replicated, it stands out from most of the literature on retrospective recall in terms of its very specific suggestions, which go beyond concordance rates and investigate and describe what may reflect processes that influence reporting over time.

No parallel effect for mother’s positive comments and warmth on subject’s subsequent recall of positive parental behaviour was observed when fitting the model concerned with positive aspects of parent-child interaction. There was, however, an important similarity between the two models, in that the manifest variables concerned with parental behaviour showed strong relationships with both trait and method factors, and the interviewer rated sub-scales of EE were only weakly related to the method factor, although being strongly related to the trait factor. This may indicate that the measures of parental behaviour reflect the method used to obtain
them, as well as the characteristic of the parenting they purport to measure, while the EE sub-scales may be purer indicators, more influenced by the underlying facet of parent-child interaction which they seek to estimate, and less by systematic biases which originate in the method used to measure them. This is, however, an optimistic view, and it is also possible that it arose as a consequence of the lack of comparable retrospective measures, whose introduction might have compromised them. The evidence for the notion that EE is less influenced by methodological biases than are interviewees reports of parental behaviour is therefore better viewed as suggestive, rather than conclusive.

11.2.3 Parent-child interaction and conduct problems

The link between parenting and conduct problems was explored in two different ways. One examined the relationship between maternal prospective accounts of parenting and estimates of conduct problems based on maternal, as well as teachers', reports. The other used the latent parenting constructs, identified using structural equation modelling, to investigate associations between these and conduct problems reported by mothers.

The results of the former, presented in Chapter 7, sought to establish which particular parental indicators were associated with the two different measures of conduct problems, and if there was any indication that the pattern of associations was different for boys and girls. Although it had previously been noted that there was little indication of any sex differences in the prevalence of adverse parenting or conduct problems in this data set, the relationship between the two measures of conduct problems was known to be different for boys and girls. That is, boys whose mothers reported them to have conduct problems were almost without exception also reported to have conduct problems by their teachers, whereas for girls the two measures were unrelated (Rutter, Cox, Tupling, Berger and Yule, 1975). This difference was again confirmed when fitting the log-linear models, where the relationship between children's conduct problems reported by teachers and mothers was significant for the boys, but not for the girls.
The exploratory analysis focusing on the relationship between parent-child interaction and conduct problems indicated that parental irritability, and mother's criticality played the most important roles, thus making possible the contrasting of the influences of paternal and maternal negative behaviour, as well as maternal behaviour and criticism on the other. These comparisons were made when fitting the log-linear models, which sought to adjust for the multi-phase sampling procedure. Initially they revealed that the different indicators of parent-child interaction were strongly interrelated, in particular that maternal criticism was closely linked to maternal behaviour. These analyses also indicated that maternal criticism was more strongly associated with conduct disorder than were the indicators of parental irritability. Furthermore, while the results linking high levels of maternal criticism and conduct problems reported by mothers were similar to those found in other studies (Stubbe, Zahner, Goldstein and Leckman, 1993; Vostanis and Nicholls, 1992; Vostanis, Nicholls and Harrington, 1994), neither of the parental measures was related to conduct problems reported by teachers.

Clearly, there is a limit to the inferences that can be made on the basis of this analysis. A case could be argued that it was not the source of information, but the quality of the measure, that accounted for the stronger association between maternal criticism and conduct problems reported by mothers, compared to conduct problems reported by teachers. The former was derived from an interview covering a larger number of symptoms, rated in a setting where questions concerning individual symptoms could be clarified by the interviewer, and subsequently reviewed by a psychiatrist for an overall rating. By contrast, the latter was administered as a questionnaire, and the overall score was generated mechanically, without specialist examination. It could also be argued that the two indicators of conduct problems represent different levels of severity, with the teacher ratings being derived from a screening procedure, whereas the maternal reports were subjected to a clinical review, which identified proportionally fewer children as having conduct problems.

However, if we accept these findings, in spite of potential methodological shortcomings, the question still remains what they mean. One possibility would be that the association between maternal criticism and conduct problems reported by mothers reflects situation specific difficulties, which originate
in a negative parent-child relationship, ridden by ineffective parenting practices and behaviour difficulties which are not necessarily expressed in other settings. Given the pervasive nature of conduct problems in boys this would appear to be an unlikely explanation for them, although it may be plausible for the girls. It would seem more probable that the results are a consequence of a reporting effect, with some mothers yielding more negative information, and thereby being both more critical and reporting more problems in their children.

On the whole, then, the results from this investigation suggest a need to view the relationship between maternal criticism and children's conduct problems observed in other investigations with some reservations (eg Stubbe, Zahner, Goldstein, and Leckman, 1993; Vostanis and Nicholls, 1992; Vostanis, Nicholls and Harrington, 1994), and urge to caution when interpreting studies in which both indicators of parent-child interaction and conduct problems were obtained from the mother. However, they also indicate that criticism takes precedence over some measures of parental behaviour in terms of the strength of its relationship with conduct problems rated on the basis of maternal reports.

The results from the second study, which used latent parenting constructs to investigate associations between these and conduct problems reported by mothers, presented in Chapter 9, arrived at comparable results concerning negative aspects of parenting, although here also the indicators of positive aspects of parenting emerged as significant. More specifically, for the boys, there were significant correlations between conduct problems and mother's negative behaviour and negative EE, as well as between conduct problems and mother's positive behaviour and positive EE. For the girls, all the constructs of negative parent-child interaction, as well as positive maternal EE were significantly correlated with conduct problems. This is a broader range of aspects of parent-child interaction than was identified by the investigation described in Chapter 7. There are various factors which may account for this difference, particularly as the two investigations were not designed to be comparable. Perhaps the most appealing explanation is that the strength of the relationships observed should, on the whole, increase when employing latent variables, as these are subject to less error of measurement.

However, differences may also partly be a consequence of the form in
which the measure of conduct problems was used. In the structural equation modelling it was kept in its original four-point form, whereas the previous study used the binary version of this measure. It is therefore possible that the differences observed reflect a comparison between dimensional and categorical indicators of conduct problems. Additionally, some differences may have emerged between the two analyses as there were discrepancies in the extent to which the two sets of analyses addressed the sample design. In the former of the two, discussed in Chapter 7, careful adjustments were made for the non-random nature of the sample by application of non-ignorable non-response models, outlined in Chapters 4 and 7. However, when analysing the data using structural equation modelling, such adjustments could not be implemented. Without further analysis, addressing each of these issues in turn, it extremely difficult to say to what extent they may have affected the results. That is, identical analysis of conduct problems in the binary and original form, as well as modelling with and without taking the sampling into account would be needed.

11.2.4 Parent-child interaction, adult self-esteem, and adult lifetime depression

The final sets of analyses provided some evidence of a link between parenting and adult outcomes. The results from the structural equation modelling, linking the latent parenting factors and conduct problems to adult self-esteem, presented in Chapter 9, indicated that maternal negative EE, combining maternal criticism and hostility, was associated with low self-esteem in adulthood in men. However, there was little indication of any substantial influence of conduct problems.

The traditional assumption about the way in which EE influences the course of schizophrenia has been that exposure to high degrees of negative affect leads to emotional arousal, which is thought to constitute a major stressor for the disorder (Brown, Birley and Wing, 1972; Vaughn and Leff, 1976a). However, the physiological evidence for this explanation have been concluded to be inconclusive (Kuipers, 1987). Furthermore, it remains questionable to what extent this is a feasible explanation for the associations between EE and the variety of problems which have been demonstrated, as emotional arousal is not assumed to a major risk factor in all
cases. Interestingly, the large literature on EE has offered little else in terms of alternative hypotheses. However, a possible explanation, proposed in Chapter 3, is that criticism and hostility by a significant other, perhaps in particular a parent, becomes internalised by the target individual. This, in turn, leads to poor self-esteem, which may be thought of as a risk factor for a variety of different psychosocial problems, perhaps most significantly depression (Brown, Andrews, Bifulco and Veiel, 1990). The idea that self-esteem is influenced by family interaction is supported by classic evidence, indicating that the determinants of self-esteem tend to be internal to the family, rather than more broadly based societal effects (Rosenberg, 1965). A more recent study has found that children's self-criticism at age 12 was related to maternal reports of parenting behaviours reflecting restrictiveness and rejection when the child was aged five (Koestner, Zuroff and Powers, 1991). However, the long-term effects of parental EE, which appears to reflect low regard and negative evaluation of the target individual, and would therefore be of particular interest in this context, has not been examined extensively. The results presented, where maternal EE at age 10 is predictive of adult self-esteem in men, lends some credibility to the first step of the formulation discussed above.

The results from the final series of analyses, presented in Chapter 10, involving the pattern of relationships between parenting, childhood conduct disorder, self-esteem and depression, focused only on women as the low rates of depression in men made meaningful statistical analysis impossible. No relationship was observed between childhood conduct disorder and adult lifetime depression, and only a non-significant trend indicated that women received a diagnosis of depression had lower self-esteem than those who did not. This latter finding must be viewed with some caution as the measure of self-esteem was current, whereas depression referred to a life-time diagnosis, making expectations about this relationship considerably less firm than they would have been had the depression score referred to their current status.

However, the main concern of these analyses was the examination of the association between prospectively reported aspects of parent-child interaction and adult depression. This is an area of considerable theoretical interest, although the current literature is largely based on retrospectively reported parenting. The present study is not only part of a very small collection of studies based on measures of
parent-child interaction raising somewhat less methodological concern, it is also rare
in that it investigates the long term effect of maternal EE on adult lifetime
depression. In this study, the observed relationship between parenting and depression
suggested associations between the indicators of parenting reflecting a lack of positive
interaction, most notably lack of communication with mother, and lack of positive
remarks by mother in the interview situation, and depression. A very substantial level
of co-linearity between these two variables made it impossible to determine their
relative importance.

This is partly in agreement with the existing literature, in that lack of
positive parent-child interaction has been found to be associated with depression,
although previous studies have also highlighted the relevance of negative interaction.
For example, Gjerde, Block and Block (1991) found lack of positive maternal
engagement to be related to children's dysthymia 13 years later, but this study also
found similar relationships involving maternal authoritarian control. Similarly, in a
meta-analysis based on retrospective evidence, Gerlsma, Emmelkamp and Arrindell
(1990) concluded that low levels of parental affection and high levels of control were
both linked to depression. It is difficult to say why this study did not find any
relationship between parental irritability or criticism and adult depression, particularly
since these variables seemed to play an important role in relation to self-esteem. It
should be clear, however, that the result involving depression was obtained in the
women, while the analysis yielding the significant association between maternal
negative EE and adult self-esteem involved the men. It is therefore possible that there
are some sex differences in which aspects of parent-child interaction are important for
later functioning, potentially as a consequence of subtle differences in exposure. It
may, for example, be that maternal hostility, which was virtually absent in the mothers
of girls, although occasionally present in mothers of boys made an important
difference. Alternatively, or additionally, men and women may respond differently
to experiences of parenting in ways yet to be understood.
11.2.5 Some additional issues

The analyses raised a series of additional issues, relating to details of the data set used, its implications for statistical analysis, and the separate analysis for the two sexes. A feature of particular importance in this context was the multi-phase sample design, where a proportionally larger proportion of children scoring high on a teacher questionnaire for behaviour problems were selected for intensive individual examination, compared to those with low scores. Although this is a relatively common approach, adopted to reduce costs while retaining variance, it is also one which posed considerable problems for statistical analysis. As was pointed out in Chapter 4, unless using a simple random population sample, adjustments need to be made if the results produced are to be generalised to the population as a whole. Often, as was sometimes the case during the course of this study, such adjustments may be considered to be too complicated to implement. It is therefore important to know what effect appropriate analyses, designed to take details of the sample design into account, have in practice. This is to some extent indicated by a comparison of the unadjusted exploratory results, and those obtained in the final analyses. In Chapter 7 there was considerable agreement between the two. The unadjusted Chi-square analyses, or when appropriate Fisher-Exact tests, indicated that none of the parenting variables was associated with conduct problems reported by teachers in boys, although there was some indication that parental communication and paternal irritability played a certain role in girls. When performing log-linear modelling which adjusted for the sample design this lack of association between parenting and conduct problems reported by teachers was again confirmed for the boys, although for the girls paternal irritability - the only variable identified in the exploratory analysis which was tested at this stage - approached significance. By contrast, in the unadjusted analyses involving conduct problems reported by mothers, maternal criticism, and irritability appeared to be important for both the boys and the girls, with some further significant results for the boys. In the log-linear modelling maternal criticism emerged as the most significant for both sexes. In Chapter 10, the unadjusted exploratory analysis indicated that maternal communication was the indicator most strongly associated with adult lifetime depression in women, with additional significant results for maternal
positive remarks and father's communication. These results were virtually identical to those obtained in the more sophisticated SUDAAN analysis. To some extent this is reassuring, as it lends some confidence to the stability of the results obtained. However, it also raises the question if these advanced statistical procedures contribute substantially to our understanding of data. This debate is probably an extremely important one, as complex data analysis is not only time consuming, but may also make published results difficult to access for readers without advanced statistical knowledge.

Another important feature of this data set was its prospective longitudinal design, where data were collected from the children's mother in middle childhood, and children were subsequently interviewed when grown up, in early adulthood. One of the consequences of this was that the prospective indicators of parenting were selected over 20 years ago, and may not necessarily match those which would be chosen today. In particular, it would have been advantageous to have more detailed information about disciplinary practices, as a much of the literature on conduct disorder has focused on these (see Robins, 1991). Even without this, however, the data set offered a unique opportunity to compare interviewer rated affective aspects of the mother, as reflected in the EE sub-scales, with behavioural aspects reported by the mother.

A further issue relates to the examination of systematic differences between the sexes. The interest in this was mainly derived from the differing base rates or means in the psychosocial problems here discussed as outcome variables, most significantly the higher rate of conduct disorder in boys compared to girls (eg Offord, Boyle, Szatmari, Rae-Grant, Links, Cadman, Byles, Crawford, Blum, Byrne, Thomas and Woodward, 1987; Rutter, Cox, Tupling, Berger and Yule, 1975), and the more frequent occurrence of depression in women than in men (eg Boyd and Weissman, 1981; Judd and Burrows, 1989; Weissman and Klerman, 1989), but also suggestions about higher rates of self-esteem in men than in women (Skaalvik, 1986). Clearly, such differences raise questions about corresponding differences in exposure, or susceptibility, to risk factors. In addition, there has been some suggestion that adverse behaviour by the child's same sex parent has greater impact than does behaviour by the other sex parent (eg Maughan, Pickles and Quinton, in press), making sex a
particular concern when investigating the role family interaction plays in the emergence of children's adjustment problems. In practice, this study found little in terms of consistent, or convincing, differences between the sexes regarding the links between specific aspects of parent-child interaction and either of the outcome measures, and analysing the sexes separately invariably resulted in a certain loss of statistical power. Even so, this could only be concluded following systematic statistical analysis, and the arguments outlined above were considered to be sufficiently strong to maintain this approach throughout the study.

11.3 General implications for future work

The more general implications of the findings discussed above are both methodological and conceptual. One of the problems raised at several points throughout this study, although most notably in the last set of analyses presented in Chapter 10, is that of co-linearity of different indicators of parenting. Part of the original aim of this thesis was to seek to disentangle the relative strength of the associations between different aspects of parenting, contrasting parental behaviour and affect, and a range of outcomes. However, the strong correlations between different aspects of parenting occasionally made this ambition difficult to realise. This may be thought of as a data problem, but it is probably also informative about real issues not currently addressed in the parenting literature. Different parental indicators are strongly related, particularly when reflecting the same general dimension of the same parent, and attempts to discriminate them may not always be realistic.

Furthermore, the difference in the pattern of associations that may be obtained depending on the source of information has been highlighted in the study presented in Chapter 7, and discussed in Section 11.2.3. It has also been pointed out that this is a complication which has not always been taken into account in the past. Future work would doubtlessly benefit considering the evidence from this study, and carefully examine associations between parenting, parental EE in particular, and children's adjustment measured in different ways. More generally, it is necessary to remain attentive to biases which may be a consequence of particular methodologies,
both when planning research and interpreting results.

Additional concern about reporting biases was raised by the poor agreement between maternal prospective and subjects' retrospective reports of parent-child interaction, urging further caution when interpreting empirical results based on what can only be described as imperfect estimates of events. Retrospective reports have received particular attention in this context, but this study highlights that similar problems may be associated with prospective reports, which may be less prone to forgetting, but which may suffer from other biases of reporting to an equally great extent. Again, the solution seems to be a greater readiness to acknowledge the potential biases existing in our data, to address these both in study design and data analysis in order to minimise the effects of any particular methodology for obtaining information, and to consider potential implications when interpreting the results obtained. A specific recommendation is the increased use of multiple informants, as different methods with face validity may contribute important information, although assumptions about concordance between them would be somewhat naive. One approach when seeking to estimate the actual quality of parent-child interaction, or other indicators of interest, may be the use of multiple sources, possibly in structural equation modelling which generates latent variables, as illustrated in Chapters 8 and 9. Furthermore, although retrospective recall may continue to yield valuable findings, such accounts of parenting are probably best viewed as current representations of past circumstances, rather than as reflections of real events.

Another set of issues concern our limited theoretical understanding of EE. Much remains to be known about the meaning of the EE sub-scales and the mechanisms through which they operate. A number of authors have emphasised that, while empirical research has been abundant, theoretical elucidation of the concept has lagged behind. Koningsberg and Handley (1986) have noted that 'care must be taken in interpreting a narrowly defined empirical construct, developed primarily on the basis of its predictive validity' (p.1361), and further investigations into the exact way in which parental criticism, and other sub-scales of the EE construct, impinge on the child are urgently needed. This study suggested that parental EE is linked to children's conduct problems, and that this link is stronger than many involving behavioural indicators of parent-child interaction. The results presented indicated that
the stronger relationships found involving EE compared to other indicators may be a consequence of its lesser contamination of measurement error. This study has also provided some interesting suggestions about the long term effects of maternal EE, both in relation to retrospective recall and self-esteem. It seemed as if exposure to maternal criticality, and, to some extent hostility, fostered a negative, or critical, view of both one's experiences and one's self, as reflected in global self-esteem. These are notions which may have far reaching implications for our understanding of parent-child relationships, and their consequences for later life. Before arguing this point too strongly, however, this result needs to be replicated in other data sets. All in all, this appears to offer justification to the growing interest in the EE construct, and its application in an ever increasing number of areas.

By contrast, it was the indicators of positive, or lack of positive, mother-child interaction which were shown to be related to depression. However, neither depression, nor self-esteem appeared to be significantly and consistently related to conduct problems after taking the effect of parent-child interaction into account. Further studies are clearly needed to examine these relationships in greater detail. Again, replication is necessary to establish that findings are not specific to a particular data set, or specific method for obtaining data.

There was little indication of any sex differences in the relationships between parenting and either of the three outcome measures, although the pattern of association was typically clearer for the men than for the women. The relatively smaller number of girls in the intensively studied sample, combined the somewhat lower level of variance in the variables of interest in this group compared to the boys, resulted in a less satisfactory statistical power, and thereby less convincing results. A similar problem was encountered in the analyses involving adult depression for the men, where low frequencies made meaningful statistical analysis impossible. This made direct comparisons of the patterns of associations of the two sexes somewhat difficult at times, and is regrettable in a data set which had so many other advantages. However, differences in the results involving self-esteem for the men and depression for women, already pointed out, may suggest that different aspects of parent-child interaction have different long-term effects on men and women.

The low profile of fathers in this study, with no significant relationship
between father's negative behaviour and either conduct problems, adult self-esteem, or depression need not indicate a lack of importance. Rather, it may be a reflection of the lower quality of the data available to reflect the father-child relationship. In the prospective accounts it was mothers who reported on both their own and the child's father's behaviour. This meant that there were no interviewer-rated variables for the fathers that could be used to estimate paternal EE. The available measures may also be less accurate as the mother can not be expected to be as familiar with the father's interaction with the child as she is with her own. This highlight the need to undertake studies which pay equal attention to both parents, in order to allow their relative influence as well as the effect of their combined impact to be examined. This is becoming increasingly important, as changing legislation and social organisation make it possible for an increasing proportion of fathers to share the parenting function with their female counterparts. It also carries some weight due to questions about the roles mothers and fathers play in the gender jigsaw, and their potential differential impact on boys and girls. However, further work is needed to confirm these findings, and to explore the role of EE in this context.

11.4 Final comments

As is the case in most investigations, the work here presented has raised more questions than it has answered, partly as a consequence of shortcomings in the data set, and partly due to limitations in the level of complexity that can be incorporated in any investigation. It would be easy to write a further volume on all the related questions which have not been addressed, concerning genetic factors, intervening life events, and current social support, to mention a few. But to produce meaningful results we must ask answerable questions, and, whether we like it or not, this usually signifies a simplicity we may not consider theoretically justified. In many ways my final concerns are much closer to home, and are related to the need to understand the processes which mediate the associations here demonstrated. More detailed investigations of the mechanisms linking parent-child interaction to later psychosocial adjustment are needed to further our understanding about the development of poor
self-esteem as well as the aetiology of depression. Such investigations would need to take into consideration factors which were not available in this data set, such as childhood self-esteem, its determinants and potential continuity into later life, as well as the impact of poor parent-child interaction on the child's subsequent ability to negotiate relationships in other settings. No doubt the pattern to be unfolded is a complex one, involving change as well as continuity, resilience alongside vulnerability, and protective factors in addition to risk elements. So far we have only begun to establish the crudest of outlines.
Appendix 1

THE TEACHER QUESTIONNAIRE

SCALE B(2)
TO BE COMPLETED BY TEACHERS

<table>
<thead>
<tr>
<th>Name of Child:</th>
<th>Boy</th>
<th>Girl</th>
<th>School:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address of Child:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of Birth:</td>
<td></td>
<td></td>
<td>Form:</td>
</tr>
</tbody>
</table>

Below are a series of descriptions of behaviour often shown by children. After each statement are three columns: "Doesn't Apply", "Applies Somewhat" and "Certainly Applies". If the child definitely shows the behaviour described by the statement place a cross in the box under Column 2 "Certainly Applies". If the child shows the behaviour described by the statement but to a lesser degree or less often place a cross in the box under Column 1 "Applies Somewhat". If, as far as you are aware, the child does not show the behaviour, place a cross in the box under Column 0 "Doesn't Apply".

Please complete on basis of child's behaviour IN THE PAST 12 MONTHS.

Put ONE cross against EACH statement. Thank you.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>0 Doesn't Apply</th>
<th>1 Applies Somewhat</th>
<th>2 Certainly Applies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Very restless, has difficulty staying seated for long</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Truants from school</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Squirmy, fidgety child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Often destroys or damages own or others' property</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Frequently fights or is extremely quarrelsome with other children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Not much liked by other children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Often worried, worries about many things</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Tends to be on own—rather solitary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Irritable, touchy, is quick to 'fly off the handle'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Often appears miserable, unhappy, tearful or distressed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Has twitches, mannerisms, or tic of the face or body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Frequently sucks thumb or finger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Frequently bites nails or fingers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

231
<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>0 Doesn't Apply</th>
<th>1 Applies Somewhat</th>
<th>2 Certainly Applies</th>
<th>FOR OFFICE USE ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Tends to be absent from school for trivial reasons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Is often disobedient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Cannot settle to anything for more than a few moments</td>
<td></td>
<td></td>
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<tr>
<td>17. Tends to be fearful or afraid of new things or new situations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Fussy or over-particular child</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>19. Often tells lies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Has stolen things on one or more occasions in the past 12 months</td>
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<td></td>
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</tr>
<tr>
<td>21. Unresponsive, inert or apathetic</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Often complains of aches or pains</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>23. Has had tears on arrival at school or has refused to come into the</td>
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<tr>
<td>building in the past 12 months</td>
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<tr>
<td>24. Has a stutter or stammer</td>
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<td></td>
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</tr>
<tr>
<td>25. Resentful or aggressive when corrected</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Bullies other children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is there anything else unusual about this child's behaviour?—or are there any other comments you would like to make?

Signature: Mr./Mrs./Miss

Date:

THANK YOU VERY MUCH FOR YOUR HELP
Appendix 2

RELATIVE WEIGHT IMPLEMENTED IN SPSS

get file='basic.sys'.
comp n=$casenum.
sort by n.
comp prs=106/1689.
if (totb70 gt 9) prs=prs+(159/322).
comp wg=1/prs.
comp wgtot=wg.
if (n ne 1) wgtot=lag(wgtot)+wg.
process if ($casenum lt 10).
list totb70 prs wg wgtot.
sort by n (d).
if (wgtot lt lag(wgtot)) wgtot=lag(wgtot).
if (n lt lag(n)) n=lag(n).
comp weight=wg*n/wgtot.
weight by weight.
Appendix 3

EQS SET-UP FOR THE ANALYSIS OF THE MULTITRAIT-MULTIMETHOD CORRELATION MATRIX

/title
analysis of multitrait-multimethod correlation matrix
/specifications
cases=108; variables=8; method=ML; matrix=corr; analysis=corr;
/lables
v1=maternal irritability; v2=paternal irritability; v3=maternal nagging; v4=paternal nagging; v5=maternal harshness at age 10; v6=paternal harshness at age 10; v7=maternal harshness at secondary school; v8=paternal harshness at secondary school;
/equations
v1=1.0*f1+1.0*f3+e1;
v2=1.0*f2+1.0*f3+e2;
v3=1.0*f1+1.0*f3+e3;
v4=1.0*f2+1.0*f3+e4;
v5=1.0*f1+1.0*f4+e5;
v6=1.0*f2+1.0*f4+e6;
v7=1.0*f1+1.0*f4+e7;
v8=1.0*f2+1.0*f4+e8;
/variances
f1 to f4=1.0;
e1 to e8=0.5*;
/matrix
1.0
.48 .10 .01 .28 .03 .27 .02
.11 .36 .37 .05 .19 .07 .22
.18 .37 .37 .05 .10 .91 .12
1.0 .05 .05 .10 .07 .91 .28
1.0 .05 .05 .26 .07 .06 .94
1.0 .05 .05 .26 .07 .06 .08
/end
Appendix 4

THE ROSENBERG SELF-ESTEEM SCALE

Respondents are asked to strongly agree, agree, disagree, or strongly disagree with the following items. The asterisks represent low self-esteem responses, and are not included on scales administered to respondents.

1. On the whole, I am satisfied with myself  
   SA  A  D*  SD*

2. At times I think I am no good at all  
   SA*  A*  D  SD

3. I feel I have a number of good qualities  
   SA  A  D*  SD*

4. I am able to do things as well as most other people  
   SA  A  D*  SD*

5. I feel I do not have much to be proud of  
   SA*  A*  D  SD

6. I certainly feel useless at times  
   SA*  A*  D  SD

7. I feel that I am a person of worth, at least on an equal plane with others  
   SA  A  D*  SD*

8. I wish I could have more respect for myself  
   SA*  A*  D  SD

9. All in all, I am inclined to feel that I am a failure  
   SA*  A*  D  SD

10. I take a positive attitude toward myself  
    SA  A  D*  SD*
EXAMPLE OF GLIM SET-UP


YAB are the completely observed observations for table with \( t \) cells
YAI are missing time 2 i.e. column length \( c \) (or number of rows)
YBJ are missing time 1 i.e. row length \( r \) (or number of cols)
Total frequency \( f \) is calculated from the data

\[
\begin{align*}
&\text{\$calc \( t=8 \) : \( r=2 \) : \( c=4 \) ! \( r \times c \) should equal \( t \)} \\
&\text{\$units \%t \$look \%nu} \\
&\text{\$data yab} \\
&\text{\$read 37 55 15 36 2343} \\
&\text{\$cal a74=%gl(2,4) : b70=%gl(2,2) : sex=%gl(2,1)} \\
&\text{\$factor b70 2 sex 2 a74 2} \\
&\text{\$calc i=%gl(\%c,1) : j=%gl(\%r,\%c)} \\
&\text{\$vars \%c yai shtb shts : \%r ybj} \\
&\text{\$data ybj !1 2 3 4 3 of length \%r} \\
&\text{\$read 1 1} \\
&\text{\$data yai !1 2 3 4 3 of length \%c} \\
&\text{\$read 702 651 26 82} \\
&\text{\$factor i \%c j \%r} \\
&\text{\$vars \%t theta eta den3 exab} \\
&\text{\$vars \%c yabp yap ybp exa exay y2 den2} \\
&\text{\$vars \%r exb exby} \\
&\text{\$cal exb=0 : exby=0 : exa=0 : exay=0} \\
\end{align*}
\]

\[
\text{\$mac start} \\
\text{\$cal \%z1=\%cu(yab) : \%z2=\%cu(yai) : \%z3=\%cu(ybj) : \%f=\%z1+\%z2+\%z3} \\
\text{\$cal \%z=\%z1/\%z2 : eta=\%z(1+\%z) : \%z=(\%z1+\%z2)/\%z3 : theta=\%z/(1+\%z)} \\
\text{\$Specify the margins to which the supplementary tables apply} \\
\text{\$For example we know the row \( i \) of each YA but not the column \( j \)} \\
\text{\$Switches \%a for non-response at time 2 i.e. \%a=1 if YAI data present} \\
\text{\$and \%b for non-response at time 1 i.e. \%b=1 if YBJ data present} \\
\text{\$cal a=i : b=j : \%a=1 : \%b=0 \$pr 'vector a' \$} \\
\text{\$pr 'Preliminary estimates of resp. probs Theta (time 1) and Eta (time 2)'} \\
\text{\$look 1 1 theta eta}
!Fits loglinear model to completed data
$pr 'Model fitted to Completed Table'
scal y1=yab+ya+yb
syvar y1 $err p $fit #table $dis e $
$calc fv=%fv : p=%fv/%f : %k=%r
$while %k sum $
$$endm
$macro sum
scal yabp(%k)=%cu(%eq(a,%k)*yab) :
  yap(%k)=%cu(%eq(a,%k)*ya) :
ybp(%k)=%cu(%eq(a,%k)*yb) :
  %k=%k-1
$$endm
$macro fit2 !Fits logit model for time 1 non-response
$pr 'Model fitted to time 1 response/non-response'
$units %c $calc y2=yabp+yap : den2=y2+ybp
$yvar y2 $err b den2 $fit #nrl $dis e $
$calc theta=%fv(i)/den2(i)
$$endm
$macro fit3 !Fits logit model for time 2 non-response
$pr 'Model fitted to time 2 response/non-response'
$units %t $calc y3=yab : den3=y3+ya : wt=%ne(den3,0) : den3=den3+(1-wt)
$yvar y3 $err b den3 $weight wt $fit #nr2 $dis e $weight
$calc eta=%fv/den3
$$endm

$macro do
$use fit1 $
$scal theta=1 $swi %b fit2 $
$scal eta=1 $swi %a fit3 $
$swi %a expa $
$swi %b expb $
$ass o=yab,yai,ybj : e=exab,exa,exb $cal w_=%eq(o,0)*%eq(e,0)
$cal %l=2*%cu(o*%l)log((o+w_)/(e+w_)) : %p=%cu((o-e)**2/(e+w_))
  : %d=%o-%l : %o=%l : %n=(%n-1)*%gt(%d**2,0.00000001) : %i=%i+1
$tran o
$output 2
$pr 'Iteration: ' %i 'Change in Deviance ' %d
$pr 'Incomplete Data LR Deviance: ' %l 'Pearson Chi-square ' %p
$tran
$output
$$endm

$macro EXPA
$cal exab=p*p%f*theta*eta : %k=%c*%a
$while %k suma
$cal ya=exay(a)*p*p%f*theta*(1-eta)/exa(a)
$$endm

$macro EXPB
$cal exab=p*p%f*theta*eta : %k=%r*%b
$while %k sumb
$cal yb=exby(b)*p*p%f*(1-theta)/exb(b)
$$endmac

$macro suma
$calc exay(%k)=%cu(%eq(a,%k)*ya)
  : exa(%k)=%cu(%eq(a,%k)*p*p%f*theta*(1-eta)) : %k=%k-1
$$endmac

$macro sumb
$calc exby(%k)=%cu(%eq(b,%k)*yb)
$calc exb(%k)=%cu(%eq(b,%k)*p*p%f*(1-theta)) : %k=%k-1
$$endmac

$mac go
$calc %n=200 $output $tran $
$while %n do
$output 2 $tran i w f h o $use do $tran i w f h o
$output 2 $look p theta eta yl fv $acc 2 $
$look yab exab $
$look yai exa $
$look ybj exb $
$$endm

$mac nr1 $$endm
$mac nr2 b70 $$endm
$mac table a74*b70+a74*sex+b70*sex
$$endm

$return
Appendix 6

EQS FOUR-GROUP SET-UP FOR THE ANALYSIS OF THE RELATIONSHIPS BETWEEN PROSPECTIVE AND RETROSPECTIVE ACCOUNTS OF NEGATIVE ASPECTS OF PARENTING

/title
four group set-up for the analysis of the relationships between prospective and retrospective accounts of negative aspects of parenting
/spec
cases=59; vars=12; matrix=raw; data='4mchist.asc'; anal=moment; groups=4;
/technical
iter=100;
/labels
v1=exposure to maternal aggression;
v2=mother's irritability;
v3=mother's criticism;
v4=mother's hostility;
v5=father's irritability;
v6=father's nagging;
v12=conduct problems reported by mothers;
/equations
v1=0.7*v999+0.6*f1+0.4*f20+e1;
v2=1.7*v999+0.6*f1+0.4*f20+e2;
v3=1.2*v999+0.8*f19+0.2*f20+e3;
v4=0.3*v999+0.8*f19+0.2*f20+e4;
v5=1.0*v999+0.4*f5+0.5*f20+e5;
v6=0.8*v999+0.4*f5+0.5*f20+e6;
v12=0.5*v999+e12;
/variances
e1=0.5*;
e2=0.5*;
e3=0.5*;
e4=0.5*;
e5=0.5*;
e6=0.5*;
e12=1.0*;
f1=1.0;
f5=1.0;
f19=1.0;
f20=1.0;
/covariance
fl, f5=0.1*;
f1, f19=0.4*;
f5, f19=0.4*;
e12, f1=0.5*;
e12, f5=0.1*;
e12, f19=0.1*;
/end
/title
blobap.eqs, men complete
/spec
cases=45; vars=21; matrix=raw; data='4mcomst.asc'; anal=moment;
/labels
v1=exposure to maternal aggression;
v2=mother's irritability;
v3=mother's criticism;
v4=mother's hostility;
v5=father's irritability;
v6=father's nagging;
v12=conduct problems reported by mothers;
v13=mother's harshness at age 10;
v14=mother's harshness during secondary school;
v15=father's harshness at age 10;
v16=father's harshness during secondary school;
v21=rosenberg self-esteem score;
/equations
v1=0.7*v999+0.6*f1+0.4*f20+el;
v2=1.7*v999+0.6*f1+0.4*f20+e2;
v3=1.2*v999+0.8*f19+0.2*f20+e3;
v4=0.3*v999+0.8*f19+0.2*f20+e4;
v5=1.0*v999+0.4*f5+0.5*f20+e5;
v6=0.8*v999+0.4*f5+0.5*f20+e6;
! v12=0.5*v999+e12;
v13=4.4*v999+0.3*f1+f21+e13;
v14=4.4*v999+0.3*f1+f21+e14;
v15=3.7*v999+0.9*f5+0.3*f21+e15;
v16=3.7*v999+0.9*f5+0.3*f21+e16;
v21=8.2*v999-0.0*v12-0.1*f1+0.2*f5-0.4*f19+e21;
f21=0.1*f19+d21;
/variances
e1=0.5*;
e2=0.5*;
e3=0.5*;
e4=0.5*;
e5=0.5*;
e6=0.5*;
e12=1.0*;
e13 to e16=0.2*;
e21=0.7*;
fl=1.0;
f5=1.0;
f19=1.0;
f20=1.0;
d21=0.5*;
/covariance
  f1,f5=0.1*;
f1,f19=0.4*;
f5,f19=0.4*;
e12,f1=0.5*;
e12,f5=0.1*;
e12,f19=0.1*;
/ineq
  (v1,f1) gt 0.001;
  (v1,f20) gt 0.001;
  (v2,f1) gt 0.001;
  (v2,f20) gt 0.001;
  (v3,f19) gt 0.001;
  (v3,f20) gt 0.001;
  (v4,f19) gt 0.001;
  (v4,f20) gt 0.001;
  (v5,f5) gt 0.001;
  (v5,f20) gt 0.001;
  (v6,f5) gt 0.001;
  (v6,f20) gt 0.001;
  (v13,f1) gt 0.001;
  (v13,f21) gt 0.001;
  (v14,f1) gt 0.001;
  (v14,f21) gt 0.001;
  (v15,f5) gt 0.001;
  (v15,f21) gt 0.001;
  (v16,f5) gt 0.001;
  (v16,f21) gt 0.001;
/end
/title
  blobap.eqs, women, sb mediates rosenb
/spec
  cases=28; vars=12; matrix=raw; data='4wchist.asc'; anal=moment;
/labels
/equations
  v1=0.5*v999+0.6*f1+0.4*f20+e1;
  v2=1.5*v999+0.6*f1+0.4*f20+e2;
  v3=1.1*v999+0.8*f19+0.2*f20+e3;
  v4=0.2*v999+0.8*f19+0.2*f20+e4;
  v5=1.0*v999+0.4*f5+0.5*f20+e5;
  v6=0.6*v999+0.4*f5+0.5*f20+e6;
  v12=0.3*v999+e12;
/variances
el=0.5*;
e2=0.5*;
e3=0.5*;
e4=0.5*;
e5=0.5*;
e6=0.5*;
e12=1.0*;
f1=1.0*;
f5=1.0*;
f19=1.0*;
f20=1.0*;
/covariance
f1,f5=0.5*;
f1,f19=0.6*;
f5,f19=0.8*;
e12,f1=0.5*;
e12,f5=0.1*;
e12,f19=0.1*;
/end
/title
blobap.eqs, men complete
/spec
cases=38; vars=21; matrix=raw; data='4wcomst.asc'; anal=moment;
/labels
/equations
v1=0.5*v999+0.6*f1+0.4*f20+e1;
v2=1.5*v999+0.6*f1+0.4*f20+e2;
v3=1.1*v999+0.8*f19+0.2*f20+e3;
v4=0.2*v999+0.8*f19+0.2*f20+e4;
v5=1.0*v999+0.4*f5+0.5*f20+e5;
v6=0.6*v999+0.4*f5+0.5*f20+e6;
v12=0.3*v999+e12;
v13=4.4*v999+0.3*f1+f21+e13;
v14=4.4*v999+0.3*f1+f21+e14;
v15=3.7*v999+0.9*f5+0.3*f21+e15;
v16=3.7*v999+0.9*f5+0.3*f21+e16;
v21=8*v999-0.0*v12-0.1*f1+0.2*f5-0.4*f19+e21;
f21=0.1*f19+d21;
/variances
e1=0.5*;
e2=0.5*;
e3=0.5*;
e4=0.5*;
e5=0.5*;
e6=0.5*;
e12=1.0*;
e13 to e16=0.2*;
e21=0.7*;
f1=1.0*;
f5=1.0*;
f19=1.0*;
f20=1.0*;
d21=0.5*;
/covariance
  f1,f5=0.4*;
  f1,f19=0.4*;
  f5,f19=0.4*;
  !e12,f1=0.5*;
  !e12,f5=0.1*;
  !e12,f19=0.1*;
/ineq
  (v1,f1) gt 0.001;
  (v1,f20) gt 0.001;
  (v2,f1) gt 0.001;
  (v2,f20) gt 0.001;
  (v3,f19) gt 0.001;
  (v3,f20) gt 0.001;
  (v5,f5) gt 0.001;
  (v5,f20) gt 0.001;
  (v6,f5) gt 0.001;
  (v6,f20) gt 0.001;
  (v13,f1) gt 0.001;
  (v14,f1) gt 0.001;
  (v15,f5) gt 0.001;
  (v15,f21) gt 0.001;
  (v16,f5) gt 0.001;
  (v16,f21) gt 0.001;
/constraints
!constraints on measurement model BOYS
  !(2,e1,e1)=(2,e2,e2);
  !(2,e3,e3)=(2,e4,e4);
  !(2,e5,e5)=(2,e6,e6);
  !(2,e13,e13)=(2,e14,e14);
  !(2,e15,e15)=(2,e16,e16);
  !(2,v1,f1)=(2,v2,f1);
  !(2,v1,f20)=(2,v2,f20);
  !(2,v3,f19)=(2,v4,f19);
  !(2,v3,f20)=(2,v4,f20);
  !(2,v5,f5)=(2,v6,f5);
  !(2,v5,f20)=(2,v6,f20);
  !(2,v13,f1)=(2,v14,f1);
  !(2,v15,f5)=(2,v16,f5);
  !(2,v15,f21)=(2,v16,f21);
! constraints on measurement model GIRLS
  !(4,e1,e1)=(4,e2,e2);
  !(4,e5,e5)=(4,e6,e6);
(4, e13, e13) = (4, e14, e14);
(4, e15, e15) = (4, e16, e16);
(4, v1, f1) = (4, v2, f1);
(4, v1, f20) = (4, v2, f20);
(4, v5, f5) = (4, v6, f5);
(4, v13, f1) = (4, v14, f1);
(4, v15, f5) = (4, v16, f5);
(4, v15, f21) = (4, v16, f21);

! constraints on measurement model between BOYS and GIRLS
(2, e1, e1) = (4, e1, e1);
(2, e3, e3) = (4, e3, e3);
(2, e5, e5) = (4, e5, e5);
(2, e13, e13) = (4, e13, e13);
(2, e15, e15) = (4, e15, e15);
(2, v1, f1) = (4, v1, f1);
(2, v1, f20) = (4, v1, f20);
(2, v5, f5) = (4, v5, f5);
(2, v13, f1) = (4, v13, f1);
(2, v15, f5) = (4, v15, f5);
(2, v15, f21) = (4, v15, f21);

! These constraints are required for MAR data on boys
(1, e1, e1) = (2, e1, e1);
(1, e2, e2) = (2, e2, e2);
(1, e3, e3) = (2, e3, e3);
(1, e4, e4) = (2, e4, e4);
(1, e5, e5) = (2, e5, e5);
(1, e6, e6) = (2, e6, e6);
(1, v1, v999) = (2, v1, v999);
(1, v1, f1) = (2, v1, f1);
(1, v1, f20) = (2, v1, f20);
(1, v2, v999) = (2, v2, v999);
(1, v2, f1) = (2, v2, f1);
(1, v2, f20) = (2, v2, f20);
(1, v3, v999) = (2, v3, v999);
(1, v3, f19) = (2, v3, f19);
(1, v3, f20) = (2, v3, f20);
(1, v4, v999) = (2, v4, v999);
(1, v4, f19) = (2, v4, f19);
(1, v4, f20) = (2, v4, f20);
(1, v5, v999) = (2, v5, v999);
(1, v5, f5) = (2, v5, f5);
(1, v5, f20) = (2, v5, f20);
(1, v6, v999) = (2, v6, v999);
(1, v6, f5) = (2, v6, f5);
(1, v6, f20) = (2, v6, f20);

!(1, v12, v999) = (2, v12, v999);
! (1, e12, f1) = (2, e12, f1);
!(1, e12, f5) = (2, e12, f5);
!(1, e12, f19) = (2, e12, f19);
!(1, e12, e12) = (2, e12, e12);
(1, f1, f5) = (2, f1, f5);
(1, f1, f19) = (2, f1, f19);
(1, f5, f19) = (2, f5, f19);

! These constraints are required for MAR data on girls
(3, e1, e1) = (4, e1, e1);
(3, e2, e2) = (4, e2, e2);
(3, e3, e3) = (4, e3, e3);
(3, e5, e5) = (4, e5, e5);
(3, e6, e6) = (4, e6, e6);
(3, v1, v999) = (4, v1, v999);
(3, v1, f1) = (4, v1, f1);
(3, v1, f20) = (4, v1, f20);
(3, v2, v999) = (4, v2, v999);
(3, v2, f1) = (4, v2, f1);
(3, v2, f20) = (4, v2, f20);
(3, v3, v999) = (4, v3, v999);
(3, v3, f19) = (4, v3, f19);
(3, v3, f20) = (4, v3, f20);
(3, v5, v999) = (4, v5, v999);
(3, v5, f5) = (4, v5, f5);
(3, v5, f20) = (4, v5, f20);
(3, v6, v999) = (4, v6, v999);
(3, v6, f5) = (4, v6, f5);
(3, v6, f20) = (4, v6, f20);
!(3, v12, v999) = (4, v12, v999);
!(3, e12, f1) = (4, e12, f1);
!(3, e12, f5) = (4, e12, f5);
!(3, e12, f19) = (4, e12, f19);
!(3, e12, e12) = (4, e12, e12);
(3, f1, f5) = (4, f1, f5);
(3, f1, f19) = (4, f1, f19);
(3, f5, f19) = (4, f5, f19);
(3, f1, f1) = (4, f1, f1);
(3, f5, f5) = (4, f5, f5);
(3, f19, f19) = (4, f19, f19);
(3, f20, f20) = (4, f20, f20);
/Imtest
/print
/end
Appendix 7

EQS FOUR-GROUP SET-UP FOR THE ANALYSIS OF THE RELATIONSHIPS BETWEEN PROSPECTIVE AND RETROSPECTIVE ACCOUNTS OF POSITIVE ASPECTS OF PARENTING

/title
four group set-up for the analysis of the relationships between prospective and retrospective accounts of positive aspects of parenting pos
/spec
  cases=54; vars=6; matrix=raw; data='bpinc.asc'; anal=moment; groups=4;
/technical
  iter=100;
/labels
  v1=warmth;
  v2=mother's positive remarks;
  v3=activities with mother;
  v4=communication with mother;
  v5=communication with father;
  v6=conduct problems reported by mothers;
/equations
  v1=0.0*v999+0.6*f1+0.2*f10+e1;
  v2=0.0*v999+0.6*f1+0.2*f10+e2;
  v3=0.0*v999+0.3*f3+0.5*f10+e3;
  v4=0.0*v999+0.3*f3+0.5*f10+e4;
  v5=0.0*v999+0.6*f5+0.4*f10+e5;
  !v6=0.1*v999+e6;
/variances
  e1=0.5*;
  e2=0.5*;
  e3=0.5*;
  e4=0.5*;
  e5=0.1*;
  !e6=0.5*;
  f1=1.0;
  f3=1.0;
  f5=1.0;
  f10=1.0;
/covariance
  f1,f3=0.3*;
  f1,f5=0.1*;

246
f3, f5 = 0.7 *;
! e6, f1 = 0.1 *;
! e6, f3 = 0.1 *;
! e6, f5 = 0.1 *;
/constraints
/ineq
(v3, f10) gt 0.001;
!(f1, f5) gt 0.001;
/end
/title
   complete data group, men
/spec
   cases = 53; vars = 11; matrix = raw; data = 'bpcomp.asc'; anal = moment; groups = 4;
/technical
   iter = 100;
/labels
v1 = warmth;
v2 = mother's positive remarks;
v3 = prospectively reported activities with mother;
v4 = prospectively reported communication with mother;
v5 = prospectively reported communication with father;
v6 = conduct problems reported by mothers;
v7 = retrospectively reported activities with mother;
v8 = retrospectively reported communication with mother;
v9 = retrospectively reported activities with father;
v10 = retrospectively reported communication with father;
v11 = rosenberg self-esteem score;
/equations
v1 = 0.0 * v999 + 0.6 * f1 + 0.2 * f10 + e1;
v2 = 0.0 * v999 + 0.6 * f1 + 0.2 * f10 + e2;
v3 = 0.0 * v999 + 0.3 * f3 + 0.5 * f10 + e3;
v4 = 0.0 * v999 + 0.3 * f3 + 0.5 * f10 + e4;
v5 = 0.0 * v999 + 0.6 * f5 + 0.4 * f10 + e5;
! v6 = 0.1 * v999 + e6;
v7 = 0.0 * v999 + 0.5 * f3 + 0.5 * f12 + e7;
v8 = 0.0 * v999 + 0.5 * f3 + 0.5 * f12 + e8;
v9 = 0.0 * v999 + 0.4 * f5 + 0.5 * f12 + e9;
v10 = 0.0 * v999 + 0.4 * f5 + 0.5 * f12 + e10;
! v11 = 30.0 * v999 + 0.1 * v6 + 0.2 * f1 + 0.2 * f3 + 0.2 * f5 + e11;
/variances
   e1 = 0.5 *;
e2 = 0.5 *;
e3 = 0.5 *;
e4 = 0.5 *;
e5 = 0.1 *;
! e6 = 0.5 *;
e7 = 0.3 *;
e8 = 0.3 *;
\[ e_9 = 0.4 \cdot ; \]
\[ e_{10} = 0.4 \cdot ; \]
\[ e_{11} = 0.5 \cdot ; \]
\[ f_1 = 1.0; \]
\[ f_3 = 1.0; \]
\[ f_5 = 1.0; \]
\[ f_{10} = 1.0; \]
\[ f_{12} = 1.0; \]
\[ /covariance \]
\[ f_1, f_3 = 0.3 \cdot ; \]
\[ f_1, f_5 = 0.1 \cdot ; \]
\[ f_3, f_5 = 0.7 \cdot ; \]
\[ e_{6}, f_1 = 0.1 \cdot ; \]
\[ e_{6}, f_3 = 0.1 \cdot ; \]
\[ e_{6}, f_5 = 0.1 \cdot ; \]
\[ /ineq \]
\[ (v_3, f_{10}) > 0.001; \]
\[ !(f_1, f_5) > 0.001; \]
\[ /ineq \]
\[ /end \]
\[ /title \]

positive, incomplete data group, women

/spec

cases=21; vars=6; matrix=raw; data='gpinc.asc'; anal=moment; groups=4;

/technical

iter=100;

/labels

equations

\[ v_1 = 0.1 \cdot v_{999} + 0.6 \cdot f_1 + 0.2 \cdot f_{10} + e_1; \]
\[ v_2 = 0.1 \cdot v_{999} + 0.6 \cdot f_1 + 0.2 \cdot f_{10} + e_2; \]
\[ v_3 = 0.1 \cdot v_{999} + 0.3 \cdot f_3 + 0.5 \cdot f_{10} + e_3; \]
\[ v_4 = 0.1 \cdot v_{999} + 0.3 \cdot f_3 + 0.5 \cdot f_{10} + e_4; \]
\[ v_5 = 0.1 \cdot v_{999} + 0.6 \cdot f_5 + 0.4 \cdot f_{10} + e_5; \]
\[ !v_6 = 0.1 \cdot v_{999} + e_6; \]

/variances

\[ e_1 = 0.5 \cdot ; \]
\[ e_2 = 0.5 \cdot ; \]
\[ e_3 = 0.5 \cdot ; \]
\[ e_4 = 0.5 \cdot ; \]
\[ e_5 = 0.1 \cdot ; \]
\[ e_{6} = 0.5 \cdot ; \]
\[ f_1 = 0.8 \cdot ; \]
\[ f_3 = 0.9 \cdot ; \]
\[ f_5 = 0.9 \cdot ; \]
\[ f_{10} = 1.0; \]

/covariance

\[ f_1, f_3 = 0.3 \cdot ; \]
\[ f_1, f_5 = 0.3 \cdot ; \]
f3,f5=0.7*;
e6,f1=0.1*;
e6,f3=0.1*;
e6,f5=0.1*;
/constraints
/ineq
  (f3,f5) gt 0.001;
/end
/title
  complete data group, women
/spec
  cases=47; vars=11; matrix=raw; data='gpcomp.asc'; anal=moment; groups=4;
/technical
  iter=100;
/labels
/equations
  v1=0.1*v999+0.6*f1+0.2*f10+e1;
v2=0.1*v999+0.6*f1+0.2*f10+e2;
v3=0.1*v999+0.3*f3+0.5*f10+e3;
v4=0.1*v999+0.3*f3+0.5*f10+e4;
v5=0.1*v999+0.6*f5+0.4*f10+e5;
v6=0.1*v999+e6;
v7=0.1*v999+0.5*f3+0.5*f12+e7;
v8=0.1*v999+0.5*f3+0.5*f12+e8;
v9=0.1*v999+0.4*f5+0.5*f12+e9;
v10=0.1*v999+0.4*f5+0.5*f12+e10;
v11=30.0*v999+0.1*v6+0.1*f1+0.1*f3+0.1*f5+e11;
/variances
  e1=0.5*;
e2=0.5*;
e3=0.5*;
e4=0.4*;
e5=0.1*;
e6=0.5*;
e7=0.3*;
e8=0.3*;
e9=0.4*;
e10=0.4*;
e11=0.5*;
f1=0.8*;
f3=0.9*;
f5=0.9*;
f10=1.0;
f12=1.0;
/covariance
  f1,f3=0.3*;
f1,f5=0.3*;
f3,f5=0.7*;
! e6, f1=0.1 *;
! e6, f3=0.1 *;
! e6, f5=0.1 *;
/ineq
(v7, f12) gt 0.001;
(v8, f12) gt 0.001;
(v9, f12) gt 0.001;
(v10, f12) gt 0.001;
!(f3, f5) gt 0.001;
/constraints
/constraints
! constraints on measurement model for boys
(2, v1, f1)=(2, v2, f1);
(2, v1, f10)=(2, v2, f10);
(2, e1, e1)=(2, e2, e2);
(2, v3, f3)=(2, v4, f3);
!(2, v3, f10)=(2, v4, f10);
!(2, e3, e3)=(2, e4, e4);
(2, v7, f3)=(2, v8, f3);
(2, v7, f12)=(2, v8, f12);
(2, e7, e7)=(2, e8, e8);
(2, v9, f5)=(2, v10, f5);
(2, v9, f12)=(2, v10, f12);
(2, e9, e9)=(2, e10, e10);
! constraints on measurement model for girls
(4, v1, f1)=(4, v2, f1);
(4, v1, f10)=(4, v2, f10);
(4, e1, e1)=(4, e2, e2);
(4, v3, f3)=(4, v4, f3);
!(4, v3, f10)=(4, v4, f10);
!(4, e3, e3)=(4, e4, e4);
(4, v7, f3)=(4, v8, f3);
(4, e7, e7)=(4, e8, e8);
!(4, v9, f5)=(4, v10, f5);
(4, v9, f12)=(4, v10, f12);
(4, e9, e9)=(4, e10, e10);
! constraints on measurement model between boys and girls
(2, v1, f1)=(4, v1, f1);
(2, v1, f10)=(4, v1, f10);
(2, e1, e1)=(4, e1, e1);
(2, v2, f1)=(4, v2, f1);
(2, v2, f10)=(4, v2, f10);
(2, e2, e2)=(4, e2, e2);
(2, v4, f3)=(4, v4, f3);
(2, v4, f10)=(4, v4, f10);
(2, e4, e4)=(4, e4, e4);
(2, v7, f3)=(4, v7, f3);
(2, v7, f12)=(4, v7, f12);
(2,e7,e7)=(4,e7,e7);
(2,v9,f5)=(4,v9,f5);
(2,v9,f12)=(4,v9,f12);
(2,e9,e9)=(4,e9,e9);
!(2,f1,f3)=(4,f1,f3);
!(2,f1,f5)=(4,f1,f5);
!(2,f3,f5)=(4,f5,f3);
! constraints required for MAR data for boys
(1,v1,v999)=(2,v1,v999);
(1,v1,f1)=(2,v1,f1);
(1,v1,f10)=(2,v1,f10);
(1,v2,v999)=(2,v2,v999);
(1,v2,f1)=(2,v2,f1);
(1,v2,f10)=(2,v2,f10);
(1,v3,v999)=(2,v3,v999);
(1,v3,f3)=(2,v3,f3);
(1,v3,f10)=(2,v3,f10);
(1,v4,v999)=(2,v4,v999);
(1,v4,f3)=(2,v4,f3);
(1,v4,f10)=(2,v4,f10);
(1,v5,v999)=(2,v5,v999);
(1,v5,f5)=(2,v5,f5);
(1,v5,f10)=(2,v5,f10);
!(1,v6,v999)=(2,v6,v999);
(1,e1,e1)=(2,e1,e1);
(1,e2,e2)=(2,e2,e2);
(1,e3,e3)=(2,e3,e3);
(1,e4,e4)=(2,e4,e4);
(1,e5,e5)=(2,e5,e5);
!(1,e6,e6)=(2,e6,e6);
(1,f1,f3)=(2,f1,f3);
(1,f1,f5)=(2,f1,f5);
(1,f3,f5)=(2,f3,f5);
!(1,e6,f1)=(2,e6,f1);
!(1,e6,f3)=(2,e6,f3);
!(1,e6,f5)=(2,e6,f5);
! constraints required for MAR data for girls
(3,v1,v999)=(4,v1,v999);
(3,v1,f1)=(4,v1,f1);
(3,v1,f10)=(4,v1,f10);
(3,v2,v999)=(4,v2,v999);
(3,v2,f1)=(4,v2,f1);
(3,v2,f10)=(4,v2,f10);
(3,v3,v999)=(4,v3,v999);
(3,v3,f3)=(4,v3,f3);
(3,v3,f10)=(4,v3,f10);
(3,v4,v999)=(4,v4,v999);
(3,v4,f3)=(4,v4,f3);
(3,v4,f10)=(4,v4,f10);
(3,v5,v999)=(4,v5,v999);
(3,v5,f5)=(4,v5,f5);
(3,v5,f10)=(4,v5,f10);
!(3,v6,v999)=(4,v6,v999);
(3,f1,f1)=(4,f1,f1);
(3,f3,f3)=(4,f3,f3);
(3,f5,f5)=(4,f5,f5);
(3,e1,e1)=(4,e1,e1);
(3,e2,e2)=(4,e2,e2);
(3,e3,e3)=(4,e3,e3);
(3,e4,e4)=(4,e4,e4);
(3,e5,e5)=(4,e5,e5);
!(3,e6,e6)=(4,e6,e6);
(3,f1,f3)=(4,f1,f3);
(3,f1,f5)=(4,f1,f5);
(3,f3,f5)=(4,f3,f5);
!(3,e6,f1)=(4,e6,f1);
!(3,e6,f3)=(4,e6,f3);
!(3,e6,f5)=(4,e6,f5);
//lmttest
//end
Appendix 8

ANALYSIS SPECIFICATION FILE FOR SUDAAN

PROC LOGISTIC DATA=DEPR FILETYPE=ASCII DESIGN=WR;

WEIGHT EWEIGHT;
NEST _ONE_;
SUBGROUP A505 A515;
LEVELS 2 2;
MODEL DEP = A505 A515;
TEST WALDCHI ADJWALDF;

PRINT;

TITLE "LOGISTIC EXAMPLE";
Appendix 9

VARIABLES SPECIFICATION FILE FOR SUDAAN

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Appendix 10

DATA FILE FOR SUDAAN

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257


263


276


