



ILONA LUOMA

From Pregnancy to Middle Childhood

What Predicts a Child's Socio-Emotional Well-Being?



ACADEMIC DISSERTATION

To be presented, with the permission of
the Faculty of Medicine of the University of Tampere,
for public discussion in the main auditorium of Building K,
Medical School of the University of Tampere,
Teiskontie 35, Tampere, on April 24th, 2004, at 12 o'clock.

Acta Universitatis Tampereensis 1002

ACADEMIC DISSERTATION

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<http://granum.uta.fi>

Cover design by
Juha Siro

Printed dissertation
Acta Universitatis Tamperensis 1002
ISBN 951-44-5946-6
ISSN 1455-1616

Electronic dissertation
Acta Electronica Universitatis Tamperensis 335
ISBN 951-44-5947-4
ISSN 1456-954X
<http://acta.uta.fi>

Tampereen yliopistopaino Oy Juvenes Print
Tampere 2004

To my family

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ORIGINAL COMMUNICATIONS	

List of original communications

This review is based on original communications referred to in the text by their Roman numerals I-V.

- I. Luoma I, Puura K, Tamminen T, Kaukonen P, Piha J, Räsänen E, Kumpulainen K, Moilanen I, Koivisto A-M, Almqvist F (1999): Emotional and behavioural symptoms in 8-9-year-old children in relation to family structure. *Eur Child Adolesc Psychiatry* 8: IV/29-IV/40.
- II. Luoma I, Koivisto A-M, Tamminen T (2004): Fathers' and mothers' perceptions of their child and maternal depressive symptoms. *Nord J Psychiatry*. In press.
- III. Luoma I, Tamminen T, Kaukonen P, Laippala P, Puura K, Salmelin R, Almqvist F (2001): Longitudinal study of maternal depressive symptoms and child well-being. *J Am Acad Child Adolesc Psychiatry* 40:1367-1374.
- IV. Luoma I, Tamminen T: Maternal depressive and anxiety-related symptoms during child development: associations with child's emotional/behavioural problems. Submitted.
- V. Luoma I, Kaukonen P, Mäntymaa M, Puura K, Salmelin R, Tamminen T (2004): A longitudinal study of maternal depressive symptoms, negative expectations and perceptions of child problems. *Child Psychiatry Hum Dev*. In press.

In addition, this thesis contains unpublished data.

Abbreviations

ADHD	Attention deficit and hyperactivity disorder
BDI	Beck Depression Inventory
CBCL	Child Behavior Checklist
CDI	Children's Depression Inventory
CI	Confidence interval
d.f.	Degrees of freedom
EPDS	Edinburgh Postnatal Depression Scale
HPA axis	Hypothalamus-pituitary-adrenocortical axis
MDD	Major depressive disorder
NPI	Neonatal Perception Inventory
OR	Odds ratio
PFC	Prefrontal cortex
PSE	Present State Examination
RA2	Rutter Parent Questionnaire
RB2	Rutter Teacher Questionnaire
RDC	Research Diagnostic Criteria
SD	Standard deviation
SES	Socio-economic status
TRF	Teacher's Report Form

Abstract

Child development is a multidimensional phenomenon comprising the continuous interactions between biological, psychological and social processes over time. The framework of developmental psychopathology stresses the importance of the continuity and discontinuity of adaptive and maladaptive mechanisms during the developmental course, and the occurrence of both dimensional and categorical characteristics in psychopathology. Epidemiological studies are needed to examine the prevalence of disorders, but longitudinal designs are essential for the research of developmental processes.

In the present study, family factors and prenatal, postnatal and concurrent maternal factors predicting the socio-emotional well-being and symptoms of children aged 8 to 9 were examined. The associations between family structure and child's emotional and behavioural problems were studied in a national epidemiological sample (n = 5813, Study I). The impact of prenatal, postnatal and subsequent factors on child outcome at 8-9 years was explored as part of a prospective longitudinal study. The longitudinal sample was gathered from maternal health clinics in Tampere 1989-1990 and consisted of 188 mothers and their firstborn children. The main issues studied were the mothers' and fathers' perceptions of the child and the influence of maternal depressive symptoms on parental ratings (n = 122, Study II); the impact of mothers' depressive symptoms and high scores on the depressive and anxiety-related subscales of the screening instrument at different time points on child adjustment (n = 147, Studies III and IV), and the continuity of maternal problem perceptions (n = 119 and 165, Study V).

In the epidemiological setting Rutter Parent Questionnaires (RA2) and Rutter Teacher Questionnaires (RB2) were used. In the longitudinal setting mothers' prenatal, postnatal and concurrent symptoms were screened by the Edinburgh Postnatal Depression Scale (EPDS). Mothers' ratings of prenatally anticipated and postnatally perceived infant problems were assessed by the Neonatal Perception Inventory (NPI). Parental evaluations of child adjustment at 4-5 years and at 8-9 years were measured by the Child Behavior Checklist (CBCL). Teachers completed the Teachers' Report Forms (TRF).

The highest problem prevalence was detected among children living in foster care and the lowest among children living with both biological parents. Parents reported highest problem prevalence in their firstborn and teachers among only children. Fathers reported lower emotional and behavioural problem levels in

firstborns than mothers did. Maternal depressive symptoms were associated with high level of child's behavioural problems according to both parents' reports. Low adaptive functioning in school was detected among children whose mothers had depressive symptoms. Maternal postnatal depressive symptoms, single motherhood, higher maternal age, and male gender of the child predicted child's low social competence. High level of maternal prenatal depressive symptoms predicted child's high level of externalising problems and total emotional and behavioural problems. Maternal prenatal and concurrent anxiety-related symptoms and postnatal and concurrent depressive symptoms on the EPDS subscales were associated with child's high problem level. The presence of negative NPI reports both pre- and postnatally predicted high level of problems at the age of 8 to 9 years.

Mother's depressive and anxiety-related symptoms at any time during child development, already during pregnancy, constitute a risk for child well-being through interacting biological, social and psychological mechanisms. Early negative trajectory in maternal perceptions of her child is also a risk factor for subsequent child's mental health. The associations between family structure and child's problems reflect various underlying family processes. Family transitions are challenges for child adjustment, but may also be life events that enhance adaptability in other contexts or developmental stages. A multi-informant approach in child assessment is needed to gain a comprehensive view of child's functioning and problems in different relationships and contexts.

Key words: developmental psychopathology, family structure, sibship size, birth order, maternal depression, prenatal depression, postnatal depression

Tiivistelmä

Lapsen kehitys on moniulotteinen ilmiö, joka sisältää biologisten, psykologisten ja sosiaalisten prosessien jatkuvan vuorovaikutuksen ajan kuluessa. Kehityspsykopatologian viitekehyksessä painottuvat sopeutumisen ja sopeutumattomuuden mekanismien jatkuvuus ja epäjatkuvuus kehityksen myötä. Psykopatologiaa voidaan määritellä sekä luokittelemalla että arvioimalla vaikeusastetta. Häiriöiden yleisyyden määrittämiseksi tarvitaan epidemiologisia tutkimuksia, mutta pitkäaikaiset asetelmat ovat välttämättömiä kehityksellisten prosessien tarkastelussa.

Tutkimuksessa selvitettiin perheeseen ja äitiin liittyvien tekijöiden yhteyksiä 8-9 -vuotiaiden lasten sosioemotionaaliseen hyvinvointiin ja oireiluun vanhempien ja opettajien arvioimana. Perheen rakenteen yhteyksiä lapsen käytöksen ja tunne-elämän ongelmiin tutkittiin valtakunnallisessa epidemiologisessa aineistossa (n = 5813, osatyö I). Raskaudenaikaisten, synnytyksenjälkeisten ja ajankohtaisten tekijöiden vaikutuksia 8-9 -vuotiaiden lasten hyvinvointiin tutkittiin prospektiivisessä pitkäaikäistutkimuksessa. Pitkäikäisaineisto oli koottu Tampereen äitiysneuvoloista vuosina 1989-1990 ja koostui 188 äidistä ja heidän esikoislapsistaan. Osatöissä tarkasteltiin äitien ja isien havaintoja lapsestaan ja äidin masennusoireiden yhteyttä näihin havaintoihin (n = 122, osatyö II); äidin eri ajankohtina esiintyneiden masennus- ja ahdistuneisuusoireiden yhteyksiä lapsen hyvinvointiin (n = 147, osatyöt III ja IV); sekä äidin ongelmahavaintojen jatkuvuutta (n = 119 ja 165, osatyö V).

Epidemiologisessa tutkimuksessa käytettiin Rutterin vanhempien ja opettajien kyselylomakkeita (RA2, RB2). Pitkäikäistutkimuksessa äidin oireistoa seulottiin Edinburgh Postnatal Depression Scale (EPDS) -lomakkeella. Äidin raskaudenaikaisia odotuksia ja synnytyksenjälkeisiä havaintoja vauvan ongelmien esiintymisestä arvioitiin Neonatal Perception Inventory (NPI)-lomakkeilla. Vanhempien havaintoja lapsen sopeutumisesta ja ongelmien esiintyvyydestä mitattiin Child Behavior Checklist (CBCL) -lomakkeilla. Opettajat täyttivät Teachers' Report Form (TRF) -kyselylomakkeet.

Epidemiologisessa tutkimuksessa eniten ongelmia havaittiin sijaishuollossa olevilla lapsilla ja vähiten molempien biologisten vanhempiensa kanssa asuvilla lapsilla. Vanhemmat ilmoittivat oireita esiintyvän eniten sisarusarjan vanhimmilla lapsilla ja opettajat ainoilla lapsilla. Pitkäikäisaineistossa isien arviot käytöksen ja tunne-elämän ongelmien esiintyvyydestä esikoislapsilla olivat

matalammat kuin äitien arviot. Äitien masennusoireiden esiintyminen oli yhteydessä lapsen käyttäytymisongelmiin molempien vanhempien arvioiden mukaan. Äidin masennusoireiden todettiin olevan yhteydessä myös lapsen matalaan adaptiiviseen toimintatasoon koulussa. Äidin synnytyksenjälkeiset masennusoireet, yksinhuoltajuus, korkeampi ikä ja lapsen sukupuoli (poika) ennustivat lapsen matalaa sosiaalista kompetenssia. Äidin raskaudenaikaiset masennusoireet ennustivat lapsen eksternalisoivien (ulospäin suuntautuvien) oireiden ja käytös- ja tunne-elämän kokonaisuoreiden esiintymistä. Äidin raskaudenaikaiset ja erityisesti ajankohtaiset ahdistuneisuusoireet sekä synnytyksenjälkeiset masennusoireet EPDS:n kysymyksistä muodostetuilla osapistemäärillä mitattuina ennustivat lapsen käytöksen ja tunne-elämän ongelmien esiintymistä. Äidin ongelma-arviota lapsesta kouluiässä ennusti myös se, että äidin raskaudenaikaiset negatiiviset ongelmaodotukset NPI:n mukaan jatkuivat negatiivisina synnytyksenjälkeisinä havaintoina vauvasta.

Äidin masennus- ja ahdistuneisuusoireet vaikuttavat lapsen hyvinvointiin kehityksen jokaisessa vaiheessa, jo raskauden aikana. Tätä vaikutusta välittävät erilaiset biologiset, sosiaaliset ja psykologiset mekanismit. Äidin lasta koskevien odotusten ja havaintojen varhainen negatiivinen kehityskaari on myös riskitekijä lapsen myöhemmän mielenterveyden kannalta. Perheen rakenteen ja lasten oireiden väliset yhteydet heijastavat taustalla olevia perheen prosesseja. Perheen rakennetta muokkaavat muutokset ovat lapsen kehityksen haasteita, mutta voivat olla myös sopeutumiskykyä lisääviä elämäntapahtumia eri yhteyksissä tai kehitysvaiheissa tarkasteltuna. Lasta arvioitaessa on tarpeen käyttää monia tietolähteitä, jotta saataisiin kattava kuva lapsen toimintakyvystä ja ongelmista erilaisissa tilanteissa ja ihmissuhteissa.

Avainsanat: kehityspsykologia, perheen rakenne, syntymäjärjestys, sisarusarja, äidin masennus, raskaudenaikainen masennus, synnytyksenjälkeinen masennus

Introduction

Child development involves both stability and change. The findings from longitudinal studies and the framework of developmental psychopathology have increased our knowledge about the chains of processes leading to adjustment or maladjustment (Achenbach 1990). The cumulative and interactive effects of risk and protective factors working on the individual, family and community level, and many possible pathways of development are of central importance (Rutter 1987, Rutter 1989; Rutter and Sroufe 2000). Longitudinal research is necessary in examining these processes because it covers the issues of onset, desistance, continuity, and prediction of developmental or psychopathological phenomena (Farrington 1991, Verhulst and Koot 1991).

Family is the central context of child development. Family factors, together with the child's individual characteristics, previous symptoms and life events, have been documented to predict the emergence of maladaptive developmental path and psychopathology (Achenbach et al. 1995b, Rutter and Sroufe 2000). Family structure is one of the risk or protective factors for child adjustment, although factors like family cohesion or the quality of the parent-child relationship are likely to mediate this effect (Stocker et al. 1989, Garrison et al. 1997). Even though family type is often taken into account in child psychiatric studies, the role of siblings and birth order in child adjustment has rarely been studied in large epidemiological samples.

Mother's depression has been found to be a significant risk factor for child adjustment (Cummings and Davies 1994, Beardslee et al. 1998). The impact of postnatal depression on the child's cognitive and socio-emotional development has been much in the focus in child psychiatric research in recent years (e.g. Murray 1992, Field 1995, Sharp et al. 1995, Murray et al. 1996a, Murray et al. 1996b, Murray et al. 1999, Hay et al. 2001). However, prospective longitudinal data on the long-term consequences of postnatal depression for child socio-emotional development is still scarce. Until recently, the possible impact of prenatal depression on child development has rarely been taken into consideration in longitudinal studies of maternal depression (O'Connor et al. 2002). Depression is often comorbid with anxiety (Wilhelm et al. 1997). Distress associated with prenatal depression or anxiety may affect on the unborn child by physiological mechanisms (Glover 1997, Kofman 2002, Mulder et al. 2002). Maternal prenatal depression may also have an impact on the forming of attachment beginning during pregnancy (Benoit et al. 1997, Condon and Corkindale 1997).

In middle childhood children's cognitive and social skills expand (Piaget and Inhelder 1977) and, although both the structures of personality and the relations among these structures already are to a moderate extent determined, many important changes also occur (Tyson and Tyson 1990, Shiner 2001). The beginning of school is a life transition which expands the proximal environment of children and presents socio-emotional and cognitive challenges at this developmental stage.

This study aimed at examining the associations between family structure, including family type, birth order and sibship size, and children's emotional and behavioural symptoms, and the impact of maternal depressive symptoms during prenatal, postnatal and subsequent stages on child adjustment in middle childhood as observed by parents and teachers.

Review of the literature

Developmental context

Theoretical perspectives of developmental psychopathology

What is developmental psychopathology?

In recent years there has been a growing consensus among researchers that development is a complex phenomenon and, in order to formulate more extensive and accurate developmental and psychopathological theories, it is essential to link together data from various theoretical perspectives (Kandel 1998, Kandel 1999, Horowitz 2003). Developmental psychopathology is a discipline that integrates a diversity of theories on human development and psychopathology. According to Achenbach (1990) developmental psychopathology can be defined as a macroparadigm covering many microparadigms, such as biomedical, behavioural, psychodynamic, sociological, family systems, cognitive, and goodness of fit, and including many theories under these microparadigms. Such a macroparadigm is needed to provide integrative concepts and common reference points (Achenbach 1990).

Developmental psychopathology emerged in the 1970's on the basis of fundamental preceding developmental theories including organismic developmental approaches, psychoanalytic theory and Piagetian structural theory (Cicchetti 1990). The findings of risk research and longitudinal studies showing the complexity of normality and psychopathology over time, reporting many possible pathways to adult outcome and documenting both quantitative and qualitative continuities and discontinuities in disorders contributed to the emergence of developmental psychopathology (Rutter 1989, Rutter and Sroufe 2000).

In the context of developmental psychopathology, development is seen as an active, dynamic process, in which biology influences how individuals respond to

their experiences and are reciprocally shaped by experiences (Rutter and Sroufe 2000). During development the child actively participates in constructing his or her experiences (Sroufe et al. 2003). According to the transactional model of development, child development is a product of the continuous dynamic interactions of the child and the experience provided by his or her family and social context (Sameroff and Fiese 2000). Timing of life events and experiences influences their impact on development because an individual's neural system, psychological processes and social context are changing over time and are differently sensitive at different time points (Rutter 1989).

In this perspective deviancy is determined as a dynamic relation between individuals and their internal and external contexts; i.e. disturbances are not static but dynamically changing states (Sameroff 2000). Causes and effects are not deterministic but probabilistic interactions between changing individuals and changing contexts (Rutter 1989, Sameroff 2000). Even in the same feature both continuity and discontinuity may be present: for example, intelligence quotient or depression can be seen as dimensional measures spanning normality and disorder, or as categorical entities showing a clear distinction between normal and deviant (Rutter and Sroufe 2000). *Multifinality* and *equifinality* are central concepts in developmental psychopathology. Multifinality means that there may be many possible outcomes from one starting point or a single risk factor may have various consequences, and equifinality suggests that there are many possible pathways to one outcome, or that a single disorder may arise by diverse routes (Rutter and Sroufe 2000).

On the basis of longitudinal studies it has been well documented that the cumulative influence of several risk factors is more predictive for the developmental outcome than any single risk factor alone (e.g. Sameroff and Fiese 2000). Neither genetic nor environmental factors alone provide any simple or deterministic predictions of developmental outcomes because in most cases both genetics and environment have impact on the outcome (Rutter and Sroufe 2000). Therefore the understanding of *risk and protective mechanisms* over time is essential in studies of developmental psychopathology (Rutter and Sroufe 2000). Risk and protective factors operate through direct and indirect chain effects (Rutter 1989). The research on development therefore requires the assessment of an individual and the environment over time (Sameroff and Fiese 2000).

Longitudinal studies have also shown marked individual variations in people's responses to adversity (Rutter 1989, Werner 1989). The notion that some individuals adapt well in the face of stress and adversity created the concept of *resilience* (Rutter 1987, Luthar and Zigler 1991). Rutter (1987) characterised resilience as the positive pole of individual differences in people's responses to stress and adversity. According to the present definition resilience refers to a dynamic developmental process comprising positive adaptation in the

face of significant adversity (Luthar et al. 2000). The concepts of *competence* and *protective mechanisms* are often used in studies of resilience. Competence is defined in terms of effective functioning in important environments (Masten et al. 1990), or observable behaviours that represent success in meeting the expectations of society (Luthar and Zigler 1991). Competence can be measured for example by academic achievement, classroom behavioural competence and interpersonal social competence (Garmezy et al. 1984). The dimensions in competence may vary during development: for example, in middle childhood competence has the dimensions of academic achievement, social competence and conduct, and in adolescence the additional tasks of romantic and job competence (Masten et al. 1995). Protective mechanisms are defined as processes that ameliorate people's reactions to stress factors that are generally risks for maladaptive outcomes; vulnerability mechanisms in turn intensify the reactions (Rutter 1987). Risk and protective mechanisms in general operate on three broad levels: the level of individual child, the level of family and the level of community (Werner 1989, Luthar et al. 2000).

Given that development is a continuous, dynamic process, in studies of both normal development and developmental psychopathology a life span perspective is necessary (Rutter 1989). Concepts of human development are not limited to infancy or childhood, but apply to processes throughout the life span (Elder 1998). The life course can be seen as a path with straight, continuous parts and changes in direction. A *trajectory* is the stable component of a direction towards a life destination, whereas *life transitions* define points in the life course when roles are transformed, re-defined, or rejected for new roles (Wheaton and Gotlib 1997). A *turning point* is a change in direction in the life course, and has the long-term impact of altering the trajectory (Rutter 1987, Wheaton and Gotlib 1997).

Developmental psychopathology and neuroscience

In recent decades both the understanding of child development and the research tools for examining the structure and function of the developing brain have expanded (Nelson and Bloom 1997). Empirical observations of brain plasticity and the consequences of early maternal deprivation or other traumatic experiences for the brain have stimulated increasing interest in the neurophysiological correlates of experiences, emotions and behaviour (Nelson and Bloom 1997, Nelson and Bosquet 2000). However, the disciplines of neuroscience and developmental psychopathology are still rather separate and the knowledge of the neurobiological forces associated with emotional and behavioural development is still limited (Nelson and Bloom 1997; Kandel 1998, Kandel 1999).

Brain development begins within a few weeks after conception (Nelson and Bosquet 2000). Intense synapse formation with overproduction of synapses begins before birth, peaks postnatally and is followed by selective pruning of synapses and a plateau phase, synaptic density decreasing during childhood and into adulthood (Nelson and Bloom 1997, Casey et al. 2000). The most rapid period of brain development regarding the formation of neuronal connections thus occurs during the last trimester of pregnancy and during the first two postnatal years, suggesting that this may be the most sensitive period of brain development, but much of the development also occurs before and after this time period (Nelson and Bloom 1997, Casey et al. 2000, Nelson and Bosquet 2000).

Neural plasticity refers among other things to the role of experience in shaping the developing brain (Nelson and Bosquet 2000). Two kinds of plasticity have been defined: *experience-expectant* and *experience-dependent* plasticity (Black 1998). For experience-expectant plasticity development implies a certain kind of experience during a certain critical time period, whereas experience-dependent processes are associated with experiences that are more individual, not predictable in timing or quality, and relate to learning and memory (Black 1998). Traumatic experiences may induce pathology in brain structure, which in turn may distort the child's experience, with consequent alterations in cognition or interactions, leading to additional pathological experience and additional brain pathology (Black 1998). However, due to the prolonged plasticity of the human brain (Singer 1995), accumulation of corrective experiences may help regain the adaptive developmental path of brain development (Black 1998).

The role of corticosterones and the hypothalamic-pituitary-adrenocortical (HPA) axis has gained much attention in literature in recent years (Gunnar 1998, Goodyer et al. 2001). In animal studies it has been documented that variation in early maternal care has an impact on the development of HPA axis responses to stress (Liu et al. 1997). In the study conducted by Liu and colleagues (1997) rat pups were handled during the first 10 days of life. The mothers of the young rats which were handled showed increased levels of grooming and licking behaviour towards their pups compared with mothers of non-handled young rats. As adults, the offspring of the mothers that exhibited more active care behaviour showed reduced HPA responses to acute stress.

In humans, studies have shown reduced cortisol levels and lower autonomic nervous system activation both in adults (Vitiello and Stoff 1997) and children (Scerbo and Kolko 1994, McBurnett et al, 2000, van Goozen et al. 2000) who have aggressive or disruptive problem behaviours, suggesting that deviations in HPA axis functioning and stress responses may be associated with aggression and antisocial behaviour. This phenomenon may result from either genetics or stressful experiences in pre- or postnatal life (van Goozen et al. 2000). Autonomic reactivity is also documented to be different in school-aged children with internalising and externalising behaviour problems: in a study conducted by

Boyce and colleagues (2001) internalisers showed high reactivity principally in the parasympathetic branch, while externalisers showed low reactivity in both sympathetic and parasympathetic branches.

Gender differences in emotional and behavioural development are usually seen as socially mediated, but probably arise from a mixture of both biological and social factors (Kraemer 2000). Studies on prepubertal children have shown gender differences in vulnerability to developmental and behavioural difficulties at each age period, usually showing resilience in girls and vulnerability in boys with only few exceptions (Cantwell and Rutter 1994, Kraemer 2000).

Developmental psychopathology and attachment theory

Attachment theory (Bowlby 1969) is an example of a theoretical construct integrating biological and psychological aspects of development. Attachment theory is derived from several preceding theories including psychoanalytic theory, ethology, and developmental psychology (Bretherton 1992, Holmes 1993). In his seminal work John Bowlby investigated the processes by which an infant formed the attachment bond with the mother, which was essential to survival. He determined the formation of the development of attachments as an intrinsic, biologically based feature of human development (Bretherton 1992, Holmes 1993, Rutter 1995). According to attachment theory, an infant's emerging social, psychological and biological capacities can be understood only in the context of the caregiving relationship with the mother (Bowlby 1969, Rutter 1995).

Schore (2001) specified that attachment theory is essentially a regulatory theory: in a secure attachment a mother intuitively and continuously regulates the infant's shifting arousal levels and emotional states. The same dyadic regulatory interactions that are involved in the attachment relationship formation also influence the development of the infant's regulatory mechanisms involved in coping with stress, and therefore these regulatory interactions are essential to organism's survival (Schore 2001). Attachment relationship in infancy has been documented to contribute to subsequent behavioural and physiological functioning in children: in a study conducted by Burgess et al. (2003) children's attachment classification at 14 months predicted the measures of physiological regulation at the age of four years. Insecure-avoidant children had significantly lower heart rate and higher respiratory sinus arrhythmia than children with previous secure or insecure-ambivalent classifications (Burgess et al. 2003). Autonomic underarousal in turn may be linked with the development of externalising disorders, as mentioned in the previous chapter (van Goozen et al. 2000, Boyce et al. 2001).

Attachment theory is a theory of both normal development and psychopathology: it includes specific proposals on the significance of early experiences, present context and the nature of the developmental processes predisposing to psychopathology (Sroufe et al. 2003). In these processes early experience shapes, but also is shaped by later experience (Sroufe et al. 2003). The key ideas in attachment theory, as in developmental psychopathology generally, are that 1) there is a wide variety in normality, 2) there is a large branch of possible outcomes from one starting point, and 3) psychopathology is a result of series of adaptations and maladaptations (Sroufe et al. 2003).

Studies on continuity and change during child development

Studies on continuity and change during development can be categorised into those examining 1) the child's early neurophysiological or temperamental indicators as predictors of later development, 2) early parental expectations, perceptions or psychological representations as predictors of child development, 3) continuity of psychopathology, and 4) continuity of protective mechanisms, competence or resilience.

Several studies have documented that early neurophysiological indicators, such as stress reactivity (Gunnar et al. 1995), salivary cortisol (Smider et al. 2002), emotional dysregulation (Morrell and Murray 2003) and neurobehavioural disinhibition (Tarter et al. 2003) predict subsequent temperamental features or the onset of emotional or behavioural problems. Early temperamental indicators predict subsequent behavioural problems (Caspi et al. 1995, Burgess et al. 2003). Children with perinatal biological risk factors show more vulnerability to psychosocial adversity (Laucht et al. 2000). Neurobehavioural characteristics in childhood have also been shown to predict the onset of adult disorders (e.g. Isohanni et al. 2000, Tarter et al. 2003). Developmental trajectories have been documented to show gender specificity and differences between sexes in vulnerability to environmental factors, such as parenting (Morrel and Murray 2003). In the study conducted by Morrel and Murray (2003) rejecting and coercive parenting predicted emotional dysregulation in boys at the age of 9 months whereas in girls only continuity from earlier infant behaviour at 2 months was detected. Emotional dysregulation at 9 months predicted symptoms of conduct disorder at the ages of 5 and 8 years. This continuity was partially mediated by parenting: maternal hostile parenting in boys and coercive parenting in girls (Morrel and Murray 2003).

Parental expectations, early perceptions and representations of attachment have also been shown to have continuity and to predict subsequent child temperament or adjustment (Broussard and Hartner 1971, Fonagy et al. 1991, Diener et al. 1995, Pauli-Pott et al. 2003). The transmission mechanisms are probably transactional (Sameroff and Fiese 2000).

The longitudinal research on the continuity of child psychopathology and developmental trajectories of disorders has been continuously advancing (Verhulst et al. 1990, Verhulst and van der Ende 1992, Offord et al. 1992, Achenbach et al. 1995a and 1995b, Feehan et al. 1995, Borge 1996, August et al. 1999, Spieker et al. 1999, Hofstra et al. 2000, Kumpulainen et al. 2000, Hofstra et al. 2001, Brame et al. 2001, Mesman et al. 2001, Stevenson and Goodman 2001). Externalising symptoms and disorders, such as conduct disorder (Offord et al. 1992), disruptive behavioural problems (Spieker et al. 1999, Stevenson and Goodman 2001), oppositional defiant disorder (August et al. 1999), and aggression (Brame et al. 2001) have been shown to be particularly persistent, but may also show diverse developmental trajectories (Brame et al. 2001, Mesman et al. 2001).

Some of the longitudinal studies on child development have examined competence (Masten et al. 1995), protective factors (Seifer et al. 1992), and resilience (Werner 1989). In the study conducted by Masten and colleagues (1995), on competence dimensions, rule-abiding conduct was documented to show strong continuity from middle childhood to adolescence, whereas academic achievement and social competence showed moderate continuity. Factors ameliorating risk in middle childhood in a study conducted by Seifer and colleagues (1992) included child characteristics, such as good self-esteem and locus of control; family characteristics such as parental values, good teaching strategies, and low rates of parental criticism and maternal depressive symptoms; and contextual characteristics of good social support and few life events. The relative impact of risk as well as protective factors seems to change throughout the developmental stages (Werner 1989).

The developmental stage of middle childhood

In the literature middle childhood refers to the age of 6 to 12 years (Shiner 2001). Biologically the cognitive and emotional advances occurring around 6 to 10 years are related to neurological changes, which are reflected in a variety of neurophysiological indices (Somsen et al. 1997, Chugani 1998, Casey et al. 2000). Continuous brain maturation and more sudden growth spurts are demonstrated in background EEG power spectra showing changes between 6 and 7 years and between 9, 10 and 11 years (Somsen et al. 1997). Very high rates of glucose consumption in the brain are still maintained during this age period, demonstrating high functional activity, and only after 10 years is there a gradual decline of glucose metabolic rates to reach adult rates by age 16-18 years (Chugani 1998). Brain imaging studies indicate that increasing cognitive capacity during middle childhood and adolescence is presumably related to gradual loss of synapses and strengthening of remaining synaptic connections (Casey et al. 2000).

Piaget called this developmental period of expanding cognitive skills and socialisation the *stage of concrete operations* (Piaget and Inhelder 1977). Emerging cognitive talents permit additional affect states: guilt, self-doubt, envy, low self-esteem, and vicarious shame or pride (Kagan 2001). Increased ability for comparison leads to the detection of the properties that a child shares with other people (Kagan 2001). Stress resilience is supported by the emergence of more sophisticated coping strategies, cognitive distraction strategies in particular, during this age period (Altshuler and Ruble 1989).

More sophisticated self-regulatory capacities develop in middle childhood (Shiner 2001). From the cognitive point of view this involves organised, planned behaviour, or *executive functioning*. The prefrontal cortex is involved in working memory functions and inhibitory processing, the development of which proceeds dimensionally during middle childhood and adolescence (Luciana and Nelson 1998, van der Molen 2000, Posner and Rothbart 2003).

In psychoanalytic theory the period beginning from the 6th or 7th year of life and ending at puberty is called *the latency period*, a term referring to diminished overt sexual manifestations (Tyson and Tyson 1990). By the beginning of the latency period both the structures of personality and the relations among these structures are considered to be already rather determined; however, according to present developmental theories many important changes also occur during this period (Tyson and Tyson 1990, Shiner 2001).

The cognitive, emotional and social maturation of children makes it possible for them to enter into a new developmental stage. Furthermore, maturation enables one of the most crucial transitions at this age: the beginning of school, which in Finland takes place at the age of six to seven years. Starting school involves the restructuring of environment and social relationships in children's everyday life (Shiner 2001). New important relationships arise with teachers and peers. Children spend more time with their peers, and in many cases afterschool hours without adult supervision (Belle et al. 1997). In the family context, the first of family separation processes is often signalled by the first child's entrance to school (Zilbach 1989) indicating that this period of time is a stage of change for the family, too. The central family task at this stage is to facilitate the child's progression from dependence to partial independence and the beginnings of separation from the family (Zilbach 1989). The changes in the balance of socio-emotional regulation during this developmental phase are illustrated in Figure 1.

From the viewpoint of developmental psychopathology, middle childhood can be determined as an important life transition creating a possible turning point in a child's life trajectory (Wheaton & Gotlib 1997). Developing skills, increasing environmental demands, and changing social relationships may either expose children with inborn and acquired vulnerabilities to disturbance, or

confirm an adaptive trajectory. The traditional comprehension of middle childhood as a “smooth and easy” stage of development is in conflict with the fact that higher rates of contacts in child guidance clinics and referrals to child psychiatric treatment occur as children enter middle childhood than at an earlier age (Nenonen et al. 2000, Kauppinen et al. 2003). One explanation for this conflict may be that the expanding social networks at this stage make it possible for maladaptive behaviour to be more easily identified, both in a structured context (such as classroom with increased cognitive and behavioural requirements), and unstructured settings (such as peer groups with increased challenges to social skills and aggression modulation). Altogether, this transition period is a significant developmental challenge in a child’s life.

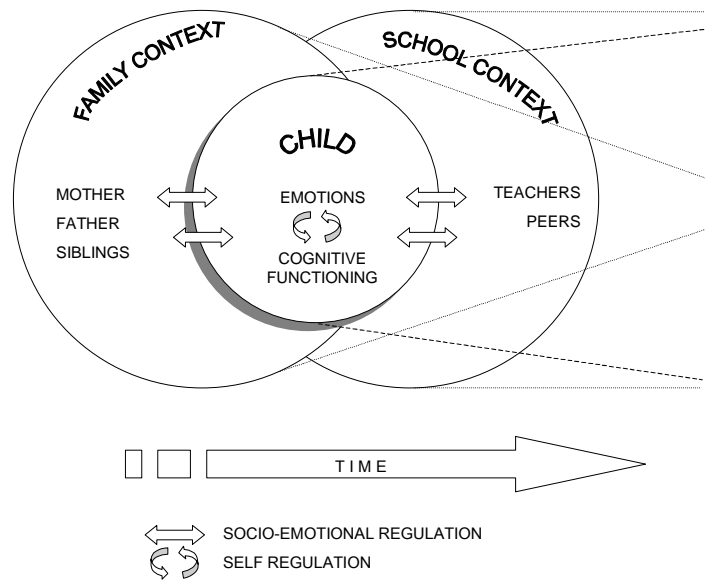


Figure 1. Middle childhood as a period of developing self-regulation and changes in environmental socio-emotional regulation.

Family context

Family environment as risk and resource

Family models of child psychopathology at first focused on mothers, and only later, with the emergence of interactional, cybernetic, and general systems principles, on larger family systems (Hinde 1980, Minuchin 1988, Combrinck-Graham 1989). The role of the family factors involved in the onset and outcome of childhood disorders can be considered from various theoretical backgrounds such as behavioural genetics, expressed emotion in the family and the interaction of family dynamics and child illness (Wamboldt and Wamboldt 2000).

Family structure is often taken into account as a possible explanatory factor for child disturbance, although other family qualities, such as family support, cohesion, parental style or maternal behaviour have in many studies been found to be more essential for child mental health (Stocker et al. 1989, Spruijt et al. 2001). The socio-economic differences between family types have also been reported to explain to some extent the variation in child outcomes in different types of families (O'Connor et al. 2001).

However, the developmental context differs depending on the family constellation in which the child is born and grows up. Each infant is born into a unique relational context (Hibbs 1989). Family development does not begin with the birth of the infant, because the infant is born into an already existing family unit in which the family development already is in progress (Zilbach 1989), so child development takes place in a developing context. Even in the same family the environment is not the same for each family member. A risk measured at the family level, such as family type, may affect children in the same family differently (O'Connor et al. 2001). Siblings, despite sharing the same parents and family, are not very similar in personality characteristics (Hoffman 1991). In the theoretic frame of behavioural genetics, family factors involved in the development of a certain disorder can be divided into genetic and environmental components (Pike and Plomin 1996), although, as mentioned above, there is a continuous dynamic interaction between genes and environment. The environmental components consist of influences that are shared (common to all siblings) or not shared (Pike and Plomin 1996). Much of the environmental impact is due to non-shared, rather than shared environmental factors (Wamboldt and Wamboldt 2000).

Family structure in Finland

Nuclear family with father, mother and children is usually considered a norm in western societies, but the developmental trend is towards an increasing proportion of other family types. According to statistics (Statistics Finland 2003), the marital status of parents in Finnish families with children below the age of 18 years in 1990 was marriage in 77% and cohabitation in 9%, whereas the proportion of single mothers was 12% and single fathers 2%. The corresponding figures in 1997 were marriage 68%, cohabitation 14%, single mothers 16% and single fathers 2%. However, families with married parents had on average more children, so 74% of children lived with married parents (Statistics Finland 1997). About 1% of children lived in foster families or residential centres (Kuoppala and Muuri 2002). In 1997 there were 276 8-year-olds and 255 9-year-olds (less than 0.5% of the age class) who were adoptive children with two adoptive parents (Statistics Finland 2000).

Nowadays 7% of families with children below the age of 18 years are stepfamilies (Statistics Finland 2003). About 50% of the firstborn, 32% of second-born and 25% of third-born children are born outside marriage, so parents often get married after the birth of the first child. Even though the majority of children live with two biological parents, the proportion of single parent families and, to a lesser extent, stepfamilies has been increasing (Statistics Finland 2003). One tenth of the children beginning school have experienced parental divorce (Statistics Finland 2000).

In 1996, among 8-year-olds, 11% were only children (Statistics Finland 1997). The mean number of children in families has been decreasing since the 1950's (mean number of children 2.2), being lowest in 1980 (1.7) and showing a slight increase in the 1990's (1.8 in 1996; Statistics Finland 2003). The mean sibship sizes from children's points of view, however, are not the same as mean numbers of children in the families. For example, if there is a family with one child and another family with three children, the mean number of children in these two families is $(1+3)/2 = 2$. For the four children living in these families the mean sibship size is $(1+3+3+3)/4 = 2.5$. When the sibship size is calculated in this way, children in Finland nowadays live in families with an average of 2.3 children (Statistics Finland 2000).

Studies on family structure and child well-being

Family structure as a context of development is considered in this review from the viewpoints of family type, birth order and sibship size.

Family type

Family type denotes here the family constellations typical for Western societies: families with two biological parents, single parent families and step-parent families. Adoptive families and foster care settings are shortly referred.

A family with two biological parents is almost invariably found to be the most favourable option for children's well-being, health and educational success (Najman et al. 1997, Dunn et al. 1998, Sandefur and Wells 1999, Spruijt et al. 2001, Sauvola et al. 2002, Weitoft et al. 2003). Higher rates of psychopathology, criminality, poorer academic achievements and even higher mortality rates are reported among children living or having grown up in single-parent families (Moilanen and Rantakallio 1988, Dunn et al. 1998, Sandefur and Wells 1999, Sauvola et al. 2002, Weitoft et al. 2003).

However, some studies show that the differences between family types may decrease or even vanish, if proximal factors like socio-economic status, parental depression or other mental illness, parent-child negativity or the quality of marital relationship are controlled for (Najman et al. 1997, McMunn et al 2001, O'Connor et al. 2001, Lipman et al. 2002). Children living in badly functioning families with two biological parents may, in point of fact, have poorer prognosis than children living in other family types (Spruijt et al. 2001). Parental economic resources and expectations of child's school achievements have been documented to explain children's performance in school irrespective of family type (Entwistle and Alexander 1996). In schools predominated by students from single parent and step-parent families the achievement scores are lower, but if the parents are socially well connected, this negative effect is reversed (Pong 1997).

Stability in the family constellation has been shown to be an important protective factor for children. Whether the mother is married or single, having no partner change is documented to be associated with lowest rates of behavioural problems in children (Najman et al. 1997). Socio-economic effects have been documented to explain the higher rates of psychological symptoms among children of lone mothers, but not of children in step-parent families, suggesting a risk-increasing effect of the family transitions (McMunn et al. 2001). The educational achievements of children are also associated both with the family type and the number of disruptions in family constellations (Sandefur and Wells 1999). Besides the well-being of children, the well-being of mothers has been reported to be associated with a stable marriage (Demo and Acock 1996).

The adjustment of children experiencing parental divorce has been examined in many studies (Hetherington 1989, Amato and Keith 1991, Aro and Palosaari 1992, Amato and Booth 1996). Parental divorce seems to be associated with a

wide range of risk factors, life course patterns and problems in adult adjustment (Aro and Palosaari 1992, Wertlieb 1997, O'Connor et al. 1999).

Single mothers are reported to experience more stress and less social support, which is likely to have an impact on parenting (Gringlas and Weinraub 1995). Some studies report interaction of risk factors in single mother families, which means that children of single mothers show more vulnerability to adversity, like negative life events, maternal stress or depression, or hostile parenting (Gringlas and Weinraub 1995, Lipman et al. 2002). The age of the child is likely to have an impact on adjustment: increased emotional and behavioural problems have been reported among lone mothers' school-aged children, but not among younger children (Gringlas and Weinraub 1995, Dunn et al. 1998).

There are conflicting results in studies examining the rates of psychopathology among adopted children (Hersov 1994, Brand and Brinich 1999, Sinkkonen 2001). In a study conducted by Brand and Brinich (1999) adopted children were found to be more likely to have mental health contacts than non-adopted children, but the differences between adopted and non-adopted children disappeared if a small group of the most deviant children was excluded, and the vast majority of adopted children showed problem patterns similar to those of non-adopted children.

About half of the children living in foster care are reported to have psychiatric symptoms (Wolkind and Rushton 1994, Hukkanen et al. 1999). Children placed in residential care are documented to have emotional and behavioural problems even more often than children in foster families (McCann et al. 1996, Dimigen et al. 1999). Serious problems such as suicidal ideation and behaviour are common among children in residential care (Hukkanen et al. 2003). Excess mortality in childhood, adolescence and young adulthood, particularly due to self-endangering behaviour, has been reported among Finnish children taken into foster care (Kalland et al. 2001).

Birth order

The family context for the firstborn is in many ways different from the other birth order positions. The milestones of birth, entrance to school, and leaving home of the first child mark new family stages (Zilbach 1989). Parents are most inexperienced and possibly most anxious with their first child, which is suggested to lead the firstborns having more anxiety and fears than later born children (Eisenman 1992, White and Woollett 1992). In a Swedish study, firstborns were documented to be less active, less intense and more distractible compared with later-born children at one year of age (Persson-Blennow and McNeil 1981). In adolescence, higher anxiety and internalising disorder rates have been reported in firstborns compared with later-born children (Feehan et al.

1994). In the Northern Finland 1966 Birth Cohort study, the risk for schizophrenia in adulthood was elevated among male firstborns (Kemppainen et al. 2001).

On the other hand, at the early stages firstborns receive their parents' total attention and in some cases special involvement throughout childhood, and hence may become the most competent, achieving or resilient children of the sibship (Werner 1989, White and Woollett 1992, Paulhus et al. 1999). In a recent cohort study conducted in Finland, 8-year-old eldest children were at lower risk for school-related behaviour problems than children in other birth positions (Taanila et al. 2004). In personality characteristics, firstborns are described to be more conscientious and status-oriented than later-borns (Davis 1997, Paulhus et al. 1999). Firstborns have also been reported to score higher on measures of pathological narcissism than middle- or lastborns (Curtis and Cowell 1993).

The birth of a younger sibling results in significant changes for the firstborn: maternal attention and positive interactions with the older child diminish, and controlling parenting styles increase (Dunn and Kendrick 1980, Kreppner 1988, Baydar et al. 1997). Instability in the mother-firstborn attachment after the birth of a younger sibling has also been reported (Touris et al. 1995). Children show temperamental differences in their reactions, but the majority of children are reported to have signs of disturbance or negative behaviour towards the mother after the birth of a younger sibling (Dunn et al. 1981). However, over half of firstborns also show signs of enhanced competence (Dunn et al. 1981). Positive effects of having younger siblings have been noted on verbal ability and peer relations (Baydar et al. 1997). Although mothers usually show consistency in their behaviour toward their older and younger children in dyadic interactions when the children are of the same age of infancy (Dunn et al. 1985), in triadic interactions between mother and children most mothers direct more affection, attention, control and responsiveness to the younger child than to the older sibling (Stocker et al. 1989).

Compared to firstborns, research on other ordinal positions is scarce. Second and subsequent children have the company and example provided by the older sibling(s), but they do not have their parents' exclusive attention (White and Woollett 1992). The firstborn may influence the development of the laterborn siblings (Dunn 1988). Middleborns in sibships of three or more children have been reported to perceive less closeness with their mothers and more closeness with their fathers or siblings than first- or lastborns (Salmon and Daly 1998, Rohde et al. 2003), and an excess of middleborns have been detected among psychiatric patients (Richter et al. 1997). Laterborns also more often perceive themselves to have the family rebel role (Paulhus et al. 1999, Rohde et al. 2003). Secondborns are reported to be more vulnerable to mothers' and fathers' differential treatment of siblings compared with the firstborns (McHale et al.

1995). Some studies have noted that achievement or intelligence tends to decrease with family size and with birth order (Hinde 1980, Downey 1995).

Lastborn children have been suggested to have the strongest dependency needs (Eisenman 1992), and to most often perceive themselves to be the parents' most favoured child (Rohde et al. 2003).

Sibship size

The evidence on the relations between sibship size and child adjustment is inconsistent. In the Kauai longitudinal study, the most resilient children had grown up in families with four or fewer children, with an age spacing of at least two years between themselves and their next sibling (Werner 1989). Also, in the Lundby longitudinal study, growing up in a relatively small family was a health promoting factor (Cederblad 1996). However, in a Finnish longitudinal study on family factors affecting prepubertal children's mental health, being the only child increased the child's risk of having psychiatric problems and having siblings promoted better mental health (Aronen 1991). In a large cohort study conducted in New Zealand, small family size was not associated with the child's psychiatric disorder at 11 years, but predicted having DSM-III disorder at the age of 15 years (Feehan et al. 1994). Among adults, however, a very large sibship size has been shown to be a risk factor for mental disorders (Kempainen et al. 2000).

According to the resource dilution model the parental resources (time, energy, and money) are limited, and as the number of children in the family increases, the parental resources for an individual child diminish, which has been claimed to explain the differences in educational achievements that have been detected between children from smaller and larger families (Downey 1995). A decrease of perceived parental emotional warmth and overprotection with an increase of the sibship size has been reported among adult psychiatric patients and healthy controls (Richter et al. 1997). The status ambitions of youngest children are also reported to inversely correlate with the number of older siblings they have (Davis 1997). Jensen and colleagues (1988b) suggest that particularly in large families, boys may be more susceptible to behavioural problems. However, the findings of Taanila et al. (2004) contradicted this suggestion: in a cohort study conducted in Finland, living in a large family was a protective factor against behavioural problems among among 8-year-old boys.

Research data concerning sibling relationships in sibships of differing sizes is also conflicting. There is some evidence that the emotional ties are more positive in large families but, on the other hand, greater amounts of overt conflict also exist between children in large sibships (Newman 1996). Strained sibling relationships have been noted to be associated with child's emotional and

behavioural problems, but this association is moderated by family type (Deater-Deckard et al. 2002).

Mechanisms of intergenerational risk transmission

Parental psychopathology is associated with increased rates of psychopathology in the offspring (Beardslee et al. 1998, Dierker et al. 1999). In some parental disorders, such as anxiety, the risk for similar disorder in the offspring seems rather specific, whereas other disorders, such as depression, expose the children to a broader scale of psychopathology (Beidel and Turner 1997, Dierker et al. 1999). However, parental diagnostic status *per se* does not have an impact on child development, but is merely a marker of maladaptive processes that have an impact on child development (Lee and Gotlib 1989, Cummings and Davies 1994). Several genetic and environmental mechanisms, and their combinations are involved in the intergenerational transmission of the developmental risk (Rutter 1990, Sameroff and Seifer 1990, Sameroff and Fiese 2000). The main features of these mechanisms across developmental periods in childhood are illustrated in Figure 2.

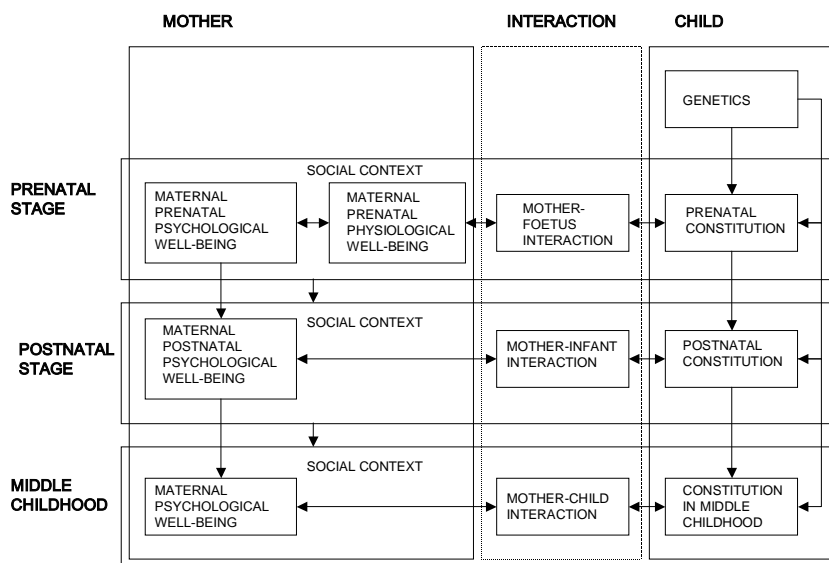


Figure 2. Mechanisms of intergenerational transmission of risk for psychopathology across three developmental stages.

There has long been evidence from family, adoptee and twin studies that genetic factors play a substantial role in both normal and abnormal behaviours (Kandel 1998, Rutter 2002). For some major psychiatric illnesses, such as

schizophrenia and bipolar disorder, over 70% of variance is reported to be attributable to genetic factors, whereas for unipolar depression 20-40% heritability has been documented (Rutter 2002). Reports concerning the heritability of depressive symptoms in children have a wide range from 28% to 71% (Eley 1999, Happonen et al. 2002), and suggest that depressive disorders with an early onset may have stronger genetic components than adult-onset disorders (Todd et al. 1993). Genetic studies have found major interplay between genetic and non-genetic factors (Rutter 2002). Not all genetic effects are deterministic: the transcriptional function of genes is regulated, and this regulation is responsive to environmental factors (Kandel 1998). Genetic liability to major depression is also documented to increase the risk for stressful life events (Kendler and Karkowski-Shuman 1997). Consequently, genetic mechanisms are likely to have an important role in intergenerational risk transmission, but these mechanisms are far from simple, and can be rarely categorically disentangled from environmental processes (Beardslee et al. 1998, Rutter 2002).

Another field in the research examining intergenerational continuities is the research on intergenerational patterns of mental representations and attachment. Bowlby (1969) has suggested that internal working models of relationships, based upon interactive experiences, are stable over time. In this developmental framework it is assumed that the representations of self and other are cognitive-affective structures that regulate an individual's behaviour in the relationships with all significant others, including the caregiving relationship with the parent and eventually one's own child (Fonagy 1994). Parents have representations of their children long before conception (Stern 1995). Among pregnant mothers having psychosocial risks (drug or alcohol dependency, depression, difficulties in social environment, and low social support) the representations of child and self-as-mother have been shown to be more negative than among control mothers (Pajulo et al. 2001b). Maternal representations of attachment during pregnancy are found to predict mother-infant attachment patterns at one year of child's age (Fonagy et al. 1991). Mothers' representations of their infants during pregnancy have been documented to have stability over 12 months in 80% of cases (Benoit et al. 1997) and to predict postnatal mother-infant interaction (Siddiqui and Hägglöf 2000). The formation of the mother-father-infant triad on a mental level begins during pregnancy (Perren et al. 2003). Both parents' attachment histories are reported to be associated with parents' marital interaction and parenting style, and to predict children's internalising and externalising behaviour (Cowan et al. 1996).

Environmental transmission mechanisms are possible already before birth (Figure 2, page 32). There is ample evidence from animal studies showing that maternal stress during pregnancy affects the hormonal and behavioural development of the offspring (Nelson and Bosquet 2000, Kofman 2002). Several physiological mechanisms may be involved (Glover 1997). The maternal-

placental-foetal neuroendocrine axis may be affected by increased levels of maternal stress hormones (Wadhwa et al. 1996, Wadhwa et al. 2001). Prenatal stress has been found to alter the functioning of the developing HPA axis and the levels and distribution of regulatory neurotransmitters, and to modify limbic structures of the offspring (Kofman 2002, Mulder et al. 2002).

In humans, maternal stress and anxiety have been found to be associated with increased uterine artery resistance, which may affect foetal development (Teixeira et al. 1999). Changes in foetal heart rate patterns have been detected among mothers with psychological distress (Sjöström et al. 2002). It has been documented that depressed mothers' prenatal norepinephrine and dopamine levels predict corresponding hormone levels of the newborn and it has been suggested that maternal depression during pregnancy may have an early biochemical influence on neonatal outcome (Lundy et al. 1999). Even anger experienced by mothers during pregnancy has been shown to relate to physiological well-being of the newborn: infants of mothers having had high anger level during the second trimester of pregnancy showed high cortisol and low dopamine levels, disorganised sleep patterns and less optimal performance on orientation, motor maturity and depression measures in a study conducted by Field et al. (2002). Depressive symptoms during pregnancy relate to maternal poor health habits, which in turn affect foetal development (Zuckerman et al. 1989, Kotimaa et al. 2003). Depressive symptoms of mothers during pregnancy have been found to be associated with adverse obstetric and neonatal outcomes, such as increased use of epidural analgesia, operative deliveries and admission of the newborn to the neonatal care unit (Chung et al. 2001). Perinatal insults in turn carry a risk for later developmental difficulties (Laucht et al. 2000).

Longitudinal studies concerning possible long-term effects of maternal prenatal psychological distress on child development are scarce, but some tentative findings have been reported. Maternal psychological stress due to loss of spouse during pregnancy (Huttunen and Niskanen 1978) and the unwantedness of pregnancy (Myhrman et al. 1996) have been shown to increase the risk of the child developing schizophrenia in adulthood. Mothers' perceived well-being and health during pregnancy have been documented to predict parental ratings of child behaviour at the age of 3 years (Uljas et al. 1999). A high level of (retrospectively recalled) maternal prenatal emotional problems has been reported to be associated with major depression and disruptive behaviour disorder in adolescence (Allen et al. 1998). Ratings of perceived prenatal stress have shown associations with temperamental characteristics of infants, such as difficult behaviour and attention regulation (Huizink et al. 2002), and with less optimal motor and mental development scores (Huizink et al. 2003). Although the mechanisms of transfer are only partly understood, the HPA axis is likely to mediate the effect (Huizink et al. 2002, Huizink et al. 2003). There is also some research evidence of an association between maternal psychosocial factors during pregnancy and attention deficit and hyperactivity disorder (ADHD) in

children (Linnet et al. 2003). In a recent large cohort study, maternal prenatal symptoms of anxiety predicted children's emotional and behavioural problems at 4 years of age (O'Connor et al. 2002).

Postnatally maternal psychopathology is associated with difficulties in mother-child bonding and attachment (Teti et al. 1995, Kumar 1997) and mother-infant interaction (Tronick and Weinberg 1997), thus compromising infant development. Postnatal risk transmission through mother-child interaction has been for the most part studied in relation to postnatal depression, and these studies are referred to in more detail in the next chapter.

The common association of parental psychopathology with other family processes and social adversities carrying their own risk for child maladjustment makes the picture even more complicated (Cummings and Davies 1994, Garnezy and Masten 1994). Adults affected by psychiatric disorders tend to have an increased risk of psychopathology in their spouses (Hammen and Brennan 2002), and if both parents are affected, the risk for psychopathology in their children is higher (Dierker et al. 1999). Among other mechanisms, parents' marital interaction and parenting have been shown to mediate the effect of both mothers' and fathers' psychopathology on child adjustment (Goodman et al. 1993, Cummings and Davies 1994, Leinonen et al. 2003).

Maternal depression and child development

Depression is a disorder which, besides of being rather common among mothers of young children (O'Hara et al. 1984, Gotlib et al. 1989, McLennan et al. 2001), has a profound impact on interpersonal and social functioning (Hirschfeld et al. 2000, Hammen and Brennan 2002). The awareness of the biobehavioural sensitivity and activity of young infants (Zeanah et al. 1997) and the relevance of the early experiences for later child development, both in a psychological and neurophysiological sense (Schore 2001), has at the same time increased tremendously. Children of depressed parents have been shown to be a high-risk group for the onset of various psychiatric disorders, including anxiety disorder, major depressive disorder (MDD) and alcohol dependence (Weissman et al. 1992, Beardslee et al. 1993, Beardslee et al. 1995, Weissman et al. 1997, Beardslee et al. 1998). These are probably the main reasons why the research concerning the impact of parental psychopathology on child development has in recent years most commonly concentrated on maternal depression, and postnatal depression in particular (Beardslee et al. 1998, Weinberg and Tronick 1998).

Concepts of depression and depressive symptoms

Depression may be understood in different ways. It may refer either to a subjective experience or to an affective disorder. Depressed mood and loss of interest or pleasure are the main features of depression as an illness (American Psychiatric Association 1994). In research, the subjective experience can be measured in terms of caseness, which is a categorical state, or severity, which is a dimensional concept (Wilhelm et al. 1997, Green 1998). Affective disorder can be assessed, for example, by patient or non-patient status, by psychiatric history or by clinical interviews (Wilhelm et al. 1997). Furthermore, functioning (a dimensional rating) of depressed individual can be assessed (Wilhelm et al. 1997).

Depression as a disorder is not a unitary construct. Unipolar and bipolar depressive disorders, for example, are separate diagnostic categories (World Health Organization [WHO] 1992, American Psychiatric Association 1994). Comorbid anxiety and depression may be a distinct entity in comparison to MDD only (Mufson et al. 2002). Furthermore, depression and anxiety are often comorbid, particularly in women, and difficult to distinguish from each other (Breslau et al. 1995, Wilhelm et al. 1997, Green 1998). The symptomatic course of depression is dynamic and changeable, symptom levels alternating over time in the same individuals (Judd et al. 1998). Depression is a long-term disorder with an increased risk for chronic and pervasive disability in interpersonal and psychosocial functioning, and the level of functioning varies over time with the depressive symptoms (Hirschfeld et al. 2000, Judd et al. 2000).

Depressive symptoms span a continuum of subthreshold depressive symptoms, minor depression or dysthymia, and major depressive disorder (Judd et al. 2000). Individuals with subthreshold depressive symptoms do not meet criteria for major depression, but report lowered psychosocial functioning like in individuals suffering from major depression (Weinberg et al. 2001). Impairment in interpersonal functioning is not just a consequence of depressive symptoms, but may exist before, during and after a depressive episode, and be a marker of underlying vulnerability to depression (Hammen and Brennan 2002).

There has been some confusion concerning the existence of *postpartum depression* as a unique disorder (Gotlib et al. 1989). The boundaries of postnatal depression may be unclear regarding maternity blues, a mood change that is generally considered a normal phenomenon associated with hormonal changes after delivery (Pritchard and Harris 1996). On the other hand, serious psychotic disturbances may also occur during puerperium (Pritchard and Harris 1996). It is recommended in the current diagnostic classification used in Europe (ICD-10) that puerperal psychiatric disturbances should be coded using the usual diagnostic codes for psychiatric disorders (F30-39), and the puerperal category (F53) used only if the disorders cannot be otherwise classified (WHO 1992).

However, postpartum depression has been documented to be associated more often with acute biopsychosocial stresses caused by childbirth, whereas depression among women in other time periods is more closely associated with long-term social adversity (Murray et al. 1995).

Young age and low occupational status have been shown in some studies to be risk factors for elevated levels of depressive symptoms post partum (Bernazzani et al. 1997), while other studies do not show these associations with a diagnosis of depression (Gotlib et al. 1989). Marital difficulties and doubts about having the child have been documented to be associated with both pre- and postnatal depression (Kumar and Robson 1984, Kitamura et al. 1996, Altshuler et al. 1998). Prenatal depression also is a risk factor for postpartum depression (O'Hara et al. 1984, Gotlib et al. 1989, Berle et al. 2003), but, on the other hand, it has been shown that the majority of women who are depressed during pregnancy are not depressed postpartum (O'Hara et al. 1984, Gotlib et al. 1989). Gotlib and coworkers (1989) have reported that depression during pregnancy is related with different sociodemographic factors than postpartum depression, suggesting different psychological or etiological background for depression at these two time periods (Gotlib et al. 1989). Previous history of depression has in some studies been associated with postnatal depression (Altshuler et al. 1998, Berle et al. 2003), but in the study conducted by Kumar and Robson (1984) this association was shown only for pre- but not postnatal depression.

Prevalence and continuity of depression and depressive symptoms among women during the early parenthood years

Prevalence rates of depression and high depressive symptom levels in women during pre- and postpartum periods are presented in Table 1. Depressive symptom levels during pregnancy are at least as high as post partum, some studies show even higher levels of depressive symptoms during pregnancy (Green 1998, Evans et al. 2001; see also Table 1, page 38, and Table 3, page 62). When categories such as caseness or presence of psychiatric diagnoses are considered, in some studies a majority of women categorised as depressed prenatally do not have this diagnosis post partum (Kumar and Robson 1984, O'Hara et al. 1984, Green and Murray 1994). However, when the depressive mood as a dimension is considered, depressive symptoms have been found to show continuity from prenatal to postnatal period (Gotlib et al. 1989, Green and Murray 1994, Green 1998).

The overall prevalence of depressive disorders among women in Europe is 10%, in Finland the prevalence is somewhat lower (7.4-8.4% among women aged 18-65 years) with little difference between rural and urban regions (Ayuso-Mateos et al. 2001). Eerola (1999) has reported the prevalence of psychiatric disorders among Finnish first-time mothers to be 21% during pregnancy and

25% post partum. In this study, anxiety disorders were reported to be most prevalent disorders (8% in early pregnancy and 10% post partum) whereas the prevalence of affective disorders was only 2% during pregnancy and 3% post partum (Eerola 1999).

Table 1. Prevalence rates (%) of significant depressive symptoms and depressive disorders among women during pregnancy and post partum.

	Kumar and Robson 1984	O'Hara et al. 1984	Gotlib et al. 1989	Cox et al. 1993
N	119	99	360	232 PN ¹ 232 C
Study site	UK	USA	Canada	UK
<u>High level of depressive symptoms (%)</u>				
Measure		BDI ²	BDI ²	
Pregnancy				
2 nd trimester	na ³	45.5	21.5	na ³
3 rd trimester	na ³	28.1	25.8	na ³
Post partum	na ³	27.4 (3 weeks) 23.9 (6 weeks) 11.2 (9 weeks) 11.7 (6 months)	24.8 (4 weeks)	na ³
<u>Depressive disorder (%)</u>				
Criteria	RDC ⁴	RDC ⁴	RDC ⁴	RDC ⁴
Pregnancy	10	9	10.2 (3 rd trim.)	na ³
Post partum	14	12	6.8 (4-5 weeks)	9.1
Post partum only ⁵	13	10	3.4 ⁶	na ³
Six-month period prevalence				13.8

¹ PN = postnatal subjects, C = control subjects

² Beck Depression Inventory (Beck et al. 1961)

³ Data not available

⁴ Research Diagnostic Criteria (Spitzer et al. 1978)

⁵ Refers to the subjects who were depressed post partum, but not during pregnancy

⁶ 13.2%, if the low-scorers in the BDI are included

In the Stoke study on postnatal depression (Cox et al. 1993) the prevalence of depressive disorders was similar in postnatal and matched non-postnatal women, but higher rates of onset of depressive disorders during the postnatal period were found compared with the equivalent time period in non-postnatal women. However, Najman et al. (2000a) reported that the postnatal periods of depressed

mood are generally of short duration and lesser intensity than a major depression, and the levels of depressive symptoms in the mothers increased as the children grew up. The authors argued that the postnatal period is a period of optimum mental health for the mother (Najman et al. 2000a), contradicting earlier reports (e.g. Kumar and Robson 1984, Cox et al. 1993).

Many of the depressive episodes during the early years of motherhood represent a recurrence of a previous depressive episode (Najman et al. 2000a). Elevated symptoms of depression have been documented to be common in mothers of toddlers (McLennan et al. 2001). Among other factors, the health and behaviour of the child has been reported to be associated with elevated levels of depressive symptoms in the mothers (Mathiesen et al. 1999, McLennan et al. 2001).

Timing and risk mechanisms of maternal depression

Numerous studies on the impact of maternal depression on child development have been conducted in recent years. Prospective studies with long follow-up times, however, are still rare. A summary of several longitudinal studies of maternal depression and child adjustment and their main findings is presented in Table 2.

Table 2. Longitudinal studies on maternal depression and child adjustment.

Authors, year	Country	N	Child's age	Main findings
Lee and Gotlib 1989	Canada	61 dyads: 16 D 10 PI 8 MI 27 C	7 – 13 years Follow-up 8 weeks	Both mothers and interviewers rated increased levels of disturbed behaviour in the children of depressed mothers. Child adjustment was more strongly related to the presence of any maternal psychopathology than to a specific diagnostic status.
Hammen et al. 1991	USA	90 children 68 mothers: 16 UD 12 BD 18 MI 22 C	8 – 16 years Follow-up: 6 months 3 years	There was a significant temporal association between mothers' and children's diagnoses of depression. Children's own stressful life events, maternal disorder, and the interaction between the two predicted changes in children's diagnostic states.

Table 2. Continued.

Authors, year	Country	N	Child's age	Main findings
Murray 1992	UK	117 dyads: 40 PD 14 PH 21PHPD 42 C	6 weeks 2-3 months 6 months 9 months 18 months	Infants of postnatally depressed mothers performed worse on object concept tasks, were more insecurely attached to their mothers and showed more mild behavioural difficulties. PD had no effect on general and language development, but appeared to make infants more vulnerable to adverse effects of lower social class and male gender.
Fergusson et al. 1993	New Zealand	765 dyads	8 years 12-13 years	The association between maternal depression and childhood disruptive behaviour arose from factors associated with long-term exposure to maternal depression, and from common social and contextual factors rather than from the effects of concurrent maternal state.
Campbell et al. 1995	USA	133 dyads: 70 D 63 C	2 months 4 months 6 months	There were no differences between depressed and control mothers or babies in either positive or negative interaction, when depression was defined in terms of 2-months diagnosis. Mothers whose depressive disorders lasted 6 months were less positive with their infants than mothers whose depressions were more short-lived, and their infants were less positive during face-to-face interaction.
Sharp et al. 1995	UK	135 dyads	pregnancy first year 46 months	Boys whose mothers were depressed in the first postpartum year scored lower on standardised tests of intellectual attainment than boys whose mothers were well.

Table 2. Continued.

Authors, year	Country	N	Child's age	Main findings
Tarullo et al. 1995a	USA	154 children 77 mothers: 34 UD 16 BD 27 C	Time 1: younger sibling mean 2.64 (SD 0.62) years, older sibling mean 6.35 (SD 1.04) years. Two follow-up periods 3 years apart.	Older siblings' symptoms were predicted by maternal UD or BD. Younger siblings' symptoms were predicted by lower maternal engagement and higher maternal critical-irritable behaviour in early childhood, in addition to maternal affective illness.
Lang et al. 1996	USA	29 dyads: 12 DP 17 NDP	3 months 6 months 1 year 2-5 years	Dysphoric mothers had more negative affect during play interactions and the dysphoric mother-infant dyads were rated as having a poorer quality interaction. Chronic dysphoria had a negative impact on the mothers' perceptions of their children as well as the interaction behaviour.
Murray et al. 1996b	UK	98 dyads	2 months 18 months 5 years	There was no evidence of an adverse effect of postnatal depression on child's cognitive functioning. Early experience of insensitive maternal interactions, however, predicted the persistence of poorer cognitive functioning.
Sinclair and Murray 1998	UK	100 dyads	2 months 18 months 5 years	Both postnatal and recent maternal depressions were associated with raised levels of child disturbance rated by teachers, particularly among boys and children from families with lower socio-economic status.

Table 2. Continued.

Authors, year	Country	N	Child's age	Main findings
Murray et al. 1999	UK	94 dyads	2 months 18 months 5 years	Postnatal depression was associated with child's diminished responsiveness in the interaction with the mother, the presence of behavioural disturbance at home, and the content and social patterning of play at school. The associations were independent of child's gender and social class.
Sugawara et al. 1999	Japan	615 dyads	5 days 6 months 12 months 18 months	Rhythmicity and attention span / persistence dimensions in the infant showed reciprocal relationships with postnatal depression. Unidirectional effects of maternal depression on infant temperament were found for frustration tolerance and fear of strangers and strange situations.
Galler et al. 2000	Barbados	226 dyads	7 weeks 3 months 6 months	There was a significant association between maternal moods and infant cognitive development. The combination of diminished feeding intensity and maternal depression predicted delays in infant's social development.
Carter et al. 2001	USA	69 dyads	2 nd -3 rd trimester of pregnancy 4 months 14 months 30 months	Lifetime maternal depression predicted less optimal mother-infant interactions and insecure infant attachment. The depression effect was accounted for by mothers with comorbid diagnoses. Pre- and postnatal depressive symptoms were associated with problem behaviours and lower competencies for boys. Quality of early interactions predicted problem behaviours in girls.

Table 2. Continued.

Authors, year	Country	N	Child's age	Main findings
Essex et al. 2001	USA	421 dyads	first year post partum 3 ½ years 4 ½ years	The initial exposure to maternal MDD during infancy was associated with high internalising symptoms, particularly those co-occurring with high externalising symptoms. Initial exposure in the toddler/preschool years increased the risk of “pure” externalising problems in girls.
Hay et al. 2001	UK	132 dyads	3 months 11 years	The children of mothers who were depressed at 3 months had significantly lower intelligence quotient scores, attentional problems and difficulties in mathematical reasoning. Boys were more severely affected than girls.
Kurstjens and Wolke 2001	Germany	813 dyads	20 months 4,8 years 6,3 years	No significant main effects of severity, timing of onset, duration, or chronicity of depression on the child' cognitive development were found. Low SES boys or boys born at neonatal risk of mothers with chronic depression had lower achievement scores at 6,3 years than children of mothers with less severe depression or controls.
Murray et al. 2001	UK	94 dyads	5-6 weeks 18 months 5 years	Children exposed to maternal depression at any time were more likely than non-exposed children to express depressive cognitions. The association was in part accounted for by current maternal hostility to the child.

Table 2. Continued.

Authors, year	Country	N	Child's age	Main findings
O'Connor et al. 2002	UK	7144 dyads	Pregnancy: 18 weeks 32 weeks Postnatal: 8 weeks 8 months 4 years	Postnatal depressed mood at 8 weeks and 8 months was associated with children's behavioural and emotional problems at the age of 4 years. When prenatal mood indicators were included in the analyses, prenatal anxiety at 32 weeks but not prenatal depression was independently associated with child problems at age 4.
Spence et al. 2002	Australia	4434 dyads	3-5 days 6 months 5 years 14 years	Maternal symptoms of anxiety and depression during early childhood had small but significant influences upon the development of high anxiety-depression symptoms at age 14, after controlling for the effects of poverty and marital relationship factors.

D = depression, PI = other psychiatric illness, MI = medical illness, C = controls, UD = unipolar depression, BD = bipolar depression, PD = postnatal depression, PH = previous history of depression, PHPD = both previous history of depression and postnatal depression, DP = dysphoric, NDP = non-dysphoric.

As shown in Table 2, in infancy there seems to be an association between maternal postnatal depression and infant's less optimal behaviour in the interaction with the mother, particularly in the cases of long-lasting depression. In most studies maternal depression predicted a number of measures of child adjustment at preschool stage and middle childhood, including higher levels of internalising and externalising problems, lower cognitive achievement and lower levels of competencies. Depressive and anxious symptoms of the offspring may be associated with maternal depression particularly in older children reaching adolescence (Cummings and Davies 1994, see also Table 2).

Although in most studies harmful effects of maternal depression have been documented, contradictory findings have also been reported concerning the impact of mother's depression on children (Table 2). This notion can be explained in different ways. As mentioned above, not all depression is uniform. For the prognosis and treatment of a woman's depression the correct diagnosis is naturally of importance. Regarding the consequences of a mother's depression for child development, however, other aspects may count more than a diagnosis *per se*. The presence and trajectory of depressive symptoms may be of more significance for child well-being than the presence or absence of diagnosis

(Hammen et al. 1987, Lee and Gotlib 1989, Seifer et al. 2001). Women with depression that is in remission may show normal interaction with their children whereas women with no depression, if distressed, may show negative perceptions and negative interaction with their children (Conrad and Hammen 1989). Depressed mothers' interaction with their children can show either intrusive or withdrawn features (Tronick and Weinberg 1997).

The type, severity, frequency, duration and timing of the mother's depression in relation to the child's developmental stages are of significance (Cummings and Davies 1994, Frankel and Harmon 1996). Even a brief episode of maternal major depression, and more prolonged mild depression, at any time during the first 10 years has been shown to increase the child's risk of depression in adolescence (Hammen and Brennan 2003). The risk mechanisms vary at different stages of development (see Figure 2, page 32). Most of the studies of maternal depression and child adjustment (presented in Table 2) examine mother's depression during child's postnatal life. However, the child may have been affected by maternal depression already prenatally.

Risk mechanisms of prenatal depression

Tiffany Field (1995) has presented the *prenatal environmental effects model*, which is based on the assumption that the infant has been affected either genetically or environmentally by maternal depression during foetal life. At the neonatal stage these infants show limited responsiveness, "depressed" behaviour, indeterminate sleep patterns and elevated norepinephrine levels (Field 1995, Lundy et al. 1999). Infants with these features of dysregulation are likely to have difficulties in the early interactions with their mothers. This model is supported by the notion that depression and anxiety are highly comorbid (Wilhelm et al. 1997), and prenatal stress and anxiety have been found to be associated with adverse behavioural outcomes of the offspring in many animal and some human studies, as mentioned in the previous chapter. Prenatal maternal depressive symptoms have also been shown to predict adverse obstetric and neonatal outcomes (Chung et al. 2001).

Furthermore, prenatal attachment has been reported to be inversely correlated with the symptoms of anxiety and depression experienced by the mothers (Condon and Corkindale 1997), and since representations and attachment patterns have stability (Fonagy et al. 1991, Benoit et al. 1997), the continuity is also possible on the psychological level.

Risk mechanisms of postnatal depression

In the *psychobiological attunement model* (also called unresponsive mother or postnatal environment effects model; Field 1995) the mother is seen as providing inadequate stimulation and arousal regulation during the critical period for the development of the infant's interaction skills. In this model the depressed mother's unresponsiveness or emotional unavailability in interaction leads to the infant's behavioural disorganisation. Mother's and infant's behaviours became poorly synchronised, resulting in inattentiveness and negative affect of the infant.

The psychobiological attunement model shows similarities with the *mutual regulation model* proposed by Tronick and Weinberg (1997). The assumption in the mutual regulation model is that the infant is motivated to communicate with other people, and can only create meanings in interaction with others. The critical processes in dyadic regulation are the capacity of the child's neurophysiological systems to regulate physiological states and behaviour, the integrity of the infant's communicative system, and the caregiver's ability to appropriately interpret the child's communications and take appropriate actions (Tronick and Weinberg 1997). Mothers' postnatal depression may interfere with this dyadic process.

Maternal depression may also lead to disruption in the functioning of the attachment system, which, in turn, may interfere with children's developing abilities for regulation of affect, behaviour and arousal (Cummings and Davies 1994). Some *insecure attachment patterns* can be considered as coping mechanisms that limit the child's involvement in stressful interactions with an intrusive or rejecting mother, or elicit the attention of a withdrawn or passive parent (Cummings and Davies 1994). These behavioural patterns are originally adaptive in depressive family systems, but maladaptive in other contexts (Cummings and Davies 1994).

These models of postnatal risk mechanisms are supported by studies showing the harmful impact of mother's depression on the early interaction (Campbell et al. 1995, Murray et al. 1996a, Tronick and Weinberg 1997), maternal self-efficacy (Teti and Gelfand 1991) and mother-child attachment patterns (Murray 1992, Teti et al. 1995).

Risk mechanisms of maternal depression later in childhood

Concerning toddlers and preschool-aged children, mother-child interaction quality has been documented to mediate the effect of the mother's depressive symptoms on the child's behaviour problems (Harnish et al. 1995). Mother's affectively charged negative statements concerning the child are associated with

a maternal history of depressive episodes (Goodman et al. 1994) and current depression (Nolen-Hoeksema et al. 1995), and these affectively charged negatives in turn have been found to be related to helpless behaviour (Nolen-Hoeksema et al. 1995) and psychopathology in the child (Goodman et al. 1994). Exposure to maternal depression during toddler or preschool years has been found to be associated particularly with externalising problems in girls (Essex et al. 2001).

Middle childhood can be considered a vulnerable period for maternal depression because the mother's depression may interfere with the achievement of the central developmental tasks in middle childhood: the formation of a positive self-concept, the development of self-regulation skills and the refinement of peer relation skills (Goodman et al. 1993). In a cross-sectional study conducted by Goodman et al. (1993) older children appeared to be more vulnerable than younger children to multiple risk factors associated with parental depression. It is also possible that the increased vulnerability in older children is a consequence of longer exposure to the cumulative adversity associated with chronic parental depression (Cummings and Davies 1994).

It has been suggested that in early and middle childhood the symptoms of children associated with mother's depression are typically behavioural problems, whereas in late childhood and adolescence internalising symptoms, such as dysphoria and passivity, are increasingly common (Cummings and Davies 1994).

Cumulative and continuous risk mechanisms during child development

A *multivariate cumulative risk model* is a combination of the models concerning prenatal and postnatal risk mechanisms (Field 1995). According to this model, a child would be affected by maternal depression during foetal life physiologically, hormonally and/or genetically; would be postnatally environmentally affected by the exposure to maternal depressive behaviour in the interaction and further compromised by additional environmental risk factors and lack of protective factors (Field 1995).

An important factor contributing to the diversity in children's outcomes is the resiliency and adaptability of the psychosocial developmental processes with many possible pathways to healthy adulthood (Rutter 1989). Children have individual competencies and coping strategies, which may vary over different developmental stages. A child may be resilient at one age period and vulnerable at another (Goodman et al. 1993).

Gender differences in vulnerability have been shown: boys have been documented to be more affected by maternal depression than girls, at least with regard to cognitive development in infancy and early childhood, but increased

susceptibility to behavioural problems has also been reported for girls (see Table 2). It is possible that boys and girls are vulnerable in different ways to the either intrusive or withdrawn styles of interaction associated with maternal depression (Tronick and Weinberg 1997). It has also been suggested that boys have greater biological vulnerability, whereas girls are more vulnerable to non-optimal interaction (Carter et al. 2001).

Early maternal reports concerning child problems and temperamental characteristics tend to have continuity (Novosad and Thoman 1999) and predict problems later in childhood (Broussard and Hartner 1971, Rende 1993, Guerin and Gottfried 1994, Pauli-Pott et al. 2003). A mother's perceptions of the child are likely to have an impact on both mother-child interaction and maternal reports of the child, and these perceptions in turn may be affected by depression. Questions of depression and the perceptions of the child are considered more closely in the next chapter.

Assessment of developmental outcome

Developmental outcome can be assessed by different measures, for example by the level of internalising or externalising symptoms, level of social competence, adaptive or cognitive functioning, academic achievements, attaining of developmental milestones, or the absence or presence of psychiatric diagnosis. Although these measures are usually highly correlated, they do not determine the same outcome. Like the measures of depression, the measures of child outcome may be dimensional or categorical.

Multi-informant assessment of child adjustment

The classification of psychiatric disorders is still largely based on phenomenology, and accordingly information is needed of the symptoms of the individual who is being assessed (Cantwell 1996). Particularly when young children are assessed, the assessment has to rely on multiple informants because the ability of a child to provide information concerning his or her level of functioning and the presence, severity, extent and duration of symptoms is dependent on the child's age and developmental level. There is general agreement that multiple informants provide the most comprehensive picture of child functioning (Achenbach et al. 1987, Bird et al. 1991).

Diagnostic classification of psychiatric disorders usually implies categorical judgements as to whether the symptom is present or absent (WHO 1992). When a child is assessed, this dichotomisation is challenging, because different informants, who have observed the child in different contexts, may report the

presence or severity of the child's symptoms differently (Achenbach et al. 1987). In their meta-analysis of several studies, Achenbach and colleagues (1987) reported that the mean Pearson correlations between similar pairs of informants, for example parents, were 0.60, whereas the mean correlations between different types of informants, such as parents and teachers, were 0.28, and between children and other types of informants as low as 0.22. The disagreements between ratings, however, are likely to result rather from different contexts than the unreliability of the informants. The authors stated that reports on children's functioning in different situations cannot be expected to converge in the way that is presumed in present/absent dichotomies in diagnostic classifications. Multi-informant assessment is useful for covering the possibility that different informants contribute valid information on different situations (Achenbach et al. 1987).

There is no definite "gold standard" for child deviancy (Achenbach et al. 1987, Baillargeon et al. 2001). It is possible that certain informants best identify some types of symptoms or disorders (Bird et al. 1992). For example, under-controlled or externalising symptoms are readily noted by both parents and teachers (Achenbach et al. 1987, Bird et al. 1991), but children themselves experience and report depression and anxiety more than parents and teachers notice (Bird et al. 1991, Puura 1998). The expressive skills of a child may have an impact on parental reports (Meade et al. 2001).

Parents and teachers as informants

Mothers and fathers as informants

Parents, and mothers in particular, are among the most important informants of child adjustment in child psychiatric clinical practice and research. Fathers as informants have been largely neglected in studies of child adjustment. This may be due to the traditional emphasis on mother-child dyad in psychoanalytic literature (Tyson and Tyson 1990), or the fact that mothers generally are more stable and present in children's lives. Children usually stay with their mothers in the cases of parental separations or divorces, which are increasingly common (Statistics Finland 2000). It has also been suggested that because fathers spend less time with their children they are not as aware of their children's behaviour and worries as mothers are (Schaughency and Lahey 1985, Seiffge-Krenke and Kollmar 1998). However, the need to include fathers' views has been increasingly acknowledged (Webster-Stratton 1988, Elander and Rutter 1996, Puura 1998, Hay et al. 1999). The views of parents concerning their child are in general moderately concordant (Achenbach et al. 1987, Hay et al. 1999). However, fathers have a different relationship with their children compared with

mothers (Mathijssen et al. 1998), and factors involved in paternal perceptions may be quite different from maternal perceptions (Schaughency and Lahey 1985, Hay et al. 1999). Thus, paternal reports may provide a unique view increasing the comprehension of the child's functioning and adjustment.

Fathers have been shown in some studies to report lower problem levels in their children than mothers (eg. Jensen et al. 1988a, Bartels et al. 2003), whereas in other studies no significant differences exceeding chance have been observed between parental reports (Achenbach 1991a). Mothers and fathers have also been suggested to report different sorts of problems: fathers' ratings have been shown to be associated with children's cognitive abilities, whereas mothers' reports have been reported to be more related with mothers' own mental state and view of the marriage (Hay et al. 1999). On the other hand, both parents' perceptions of poor marital adjustment have been shown to be significantly related to reports of externalising problems in the offspring (Seiffge-Krenke and Kollmar 1998).

In studies including fathers' reports the researchers have often considered the agreement between parents' and other informants' ratings (e.g. Jensen et al. 1988a, Jensen et al. 1988b, Tarullo et al. 1995b, Seiffge-Krenke and Kollmar 1998, Treutler and Epkins 2003). Schaughency and Lahey (1985) argued that fathers are not as accurate informants as mothers of their child's behavioural problems. In their study mothers' ratings were significantly correlated with teachers' ratings, whereas fathers' ratings were not. The authors suggested that this might be due to the fathers spending less time with their children than mothers do (Schaughency and Lahey 1985). This suggestion was supported in the study conducted by Treutler and Epkins (2003), which showed that mothers were more aware of internalising symptoms in their children than fathers, and increased levels of mother-father discrepancies in problem reports were associated with less time spent with children. However, other researchers have reported that the agreement between father and teacher is higher compared to mother-teacher-agreement (Webster-Stratton 1988), and fathers' problem ratings concerning their 4-year-old children have been shown to be more predictive of teachers' problem ratings seven years later when compared with mothers' judgements (Hay et al. 1999).

Hewitt and colleagues (1992) proposed two contrasting models to explain the differences between the parents' reports. In the Rater Bias Model the disagreement between parents is regarded as error due to rater bias. This model may apply when the parents perceive the same behaviours in the child and share a common view and understanding of the child. In the Psychometric Model each of the parents observe the child in distinct situations and are exposed to different kinds of child behaviour. In their study of 3-year-old twins van der Valk and colleagues (2001) concluded that the Psychometric Model fitted the data better than the Rater Bias Model, indicating that parents partially shared a common view of their children but that there also was a component that was unique to

each parent. A similar finding was obtained for 12-year-old twins (Bartels et al. 2003).

Studies that have examined the impact of both parents' psychological adjustment on their problem ratings concerning the child have also yielded contradictory results (Jensen et al. 1988a, Webster-Stratton 1988, Sawyer et al. 1998, Seiffge-Krenke and Kollmar 1998, Hay et al. 1999, Treutler and Epkins 2003). Some studies have found that psychological distress has little influence on both mothers' and fathers' reports of their children's behaviour problems (Sawyer et al. 1998), whereas other studies have reported that mothers' but not fathers' perceptions are influenced (Webster-Stratton 1988, Seiffge-Krenke and Kollmar 1998) or that both parents' reports are affected by parents' own psychological symptoms (Jensen et al. 1988a, Treutler and Epkins 2003). Hay and colleagues (1999) reported that both parents' mental health predicted their judgements of child problems, but mothers' ratings were primarily affected by their own mental state whereas fathers' ratings were primarily affected by the child's cognitive ability.

Parental perceptions and agreement regarding their child's adjustment is dependent on the nature of the behaviour observed, and the age and gender of the child (Achenbach et al. 1987, Jensen et al. 1988a, Lancaster et al. 1989, Tarullo et al. 1995b, Seiffge-Kranke and Kollmar 1998). Regarding the nature of the behaviour observed it seems quite clear that under-controlled, externalising behaviour is associated with higher levels of correspondence and fewer discrepancies between informants compared with internalising symptoms (Achenbach et al. 1987, Jensen et al. 1988a). Concerning the age of the child, the mother-father and parent-child agreement is usually reported to be higher for preadolescents than for adolescents (Achenbach et al. 1987, Tarullo et al. 1995b).

Concerning the gender of the child, however, the findings are less consistent and show complicated interactions with other factors. Some studies have shown a high degree of agreement between parents regarding daughters, whereas mothers have been reported to be more sensitive to their sons' emotional problems than fathers (Jensen 1988a, Seiffge-Krenke and Kollmar 1998). On the other hand, mothers and fathers have been documented to agree more concerning boys than girls for the presence of any problems, and more concerning girls than boys for the presence of mood problems in particular (Tarullo et al. 1995b). Maternal psychological factors have been reported to have greater influence on reports of externalising behaviour, and the ratings of boys (Lancaster et al. 1989).

The controversial issue of depressive bias

The negative distortion of perception due to depression, the so-called depressive bias, has attracted much attention in studies concerning maternal depression and child adjustment, but the results have been contradictory. Brody and Forehand (1986) suggested that the finding of the association between mother's depression and increased problem ratings of her child is due to the combined influence of lowered tolerance level of the mother and behaviour of the child. Conrad and Hammen (1989) reported that depressed mothers, in point of fact, were more accurate reporters of their children's symptoms than were nondepressed mothers when the mothers' reports were compared with interviewers' ratings and children's self reports. In their reviews concerning previous literature on the depression-distortion hypothesis Richters and Pellegrini (1989) and Richters (1992) concluded that there appeared to be no empirical foundation for the belief that depressed mothers have distorted perceptions of their children's problems.

In subsequent studies maternal depressive bias has been argued to be present in maternal ratings of externalising but not internalising problems (Chilcoat and Breslau 1997), and for adolescent boys' but not girls' problems (Boyle and Pickles 1997), and to be statistically significant, but to predict only small variance in problem ratings (Youngstrom et al. 1999). Najman et al. (2000b, 2001) reported that the difference between maternal versus child self-reports of child's problems is greater when associated with maternal depressive symptoms, and suggested that the finding was due to maternal depressive bias. However, when depressed and non-depressed mother's problem ratings have been compared with standardised psychiatric assessments of children, mother-child agreement has been found to be higher for mood problems but lower for disruptive behaviour if the mother was depressed (Tarullo et al. 1995b). Tarullo and colleagues (1995b) also reported that mother-father agreement on child problems was higher in families with a depressed mother and well father than in families with both parents well, which did not support the hypothesis of maternal depressive bias. Querido and colleagues (2001) reported that among mothers of children with conduct problems, mothers with depressive symptomatology perceived their child's behaviour more accurately and realistically than mothers with lower levels of depressive symptoms. However, in a study conducted by Randazzo and coworkers (2003) evidence was found for depression-related distortion in parental ratings compared with foster parents' and teachers' ratings and the authors suggested that foster parents have a less emotionally invested perspective on behaviour observations than biological parents.

Foreman and Henshaw (2002) emphasise that it is not possible to separate mother and child's well-being into objective and subjective categories in questionnaires on maternal perceptions. The research of maternal depressive bias is complicated by the context- and relationship-specificity of child behaviour, and the lack of a defined "gold standard" of judgements (Achenbach et al. 1987).

Teachers as informants

According to Achenbach (1991b) the teachers' reports are of crucial importance in child assessment for several reasons: problems that are not evident elsewhere may be present at school; school-based social and academic skills are important for adaptive child development; due to their training, experience and opportunities of observing children in groups, teachers are able to observe different kinds of behaviours than parents; teachers' reports are not likely to be influenced by family dynamics; and teachers are often involved in the referral of children for special services. Teachers are generally familiar with a wide range of child behaviour in a certain age group, and the classroom setting is a rather standard environment, and therefore teachers may be better able to assess children's behaviour in relation with other children than the parents are (Elander and Rutter 1996). These factors may contribute to the finding that teachers' ratings in some studies show more consistent patterns and reliability than parents' ratings (Elander and Rutter 1996).

However, teachers have not known the child as long as parents have, and often teachers' observations are limited to the school environment, whereas parents have observed their child in different places, times and situations. Like parental reports, teachers' reports may also be affected by psychological factors or interpersonal dynamics, although not much research exists on this subject.

Factors that have been found to be associated with teachers' reports of problems in child adjustment include family socio-economic status (SES), child's gender, parental educational level, and marital status of the caregiver (Horwitz et al. 1998). Problems in children from smaller families have been documented to be noticed more often by parents, whereas problems of children from larger families are more likely to be identified by teachers (Cundall 1987).

Who are the optimal informants?

The selection of the optimal informants of child adjustment is dependent on the child's age and main research questions to be answered. In a study conducted by Bird and colleagues (1991), for screening of child psychopathology in the community the parents' reports were most informative, and teachers' reports provided information that increased screening sensitivity. Children's self-reports contain information necessary for identifying children with depressive symptoms, whereas children scoring high on both self- and parent reports are likely to have more severe externalising problems (Kumpulainen et al. 1996). However, parents and teachers can also identify depressive symptoms in

prepubertal children (Puura 1998). Ferdinand and colleagues (2003) reported that in their study the standardised information from parents and teachers was superior to standardised clinical judgement (including the child's own interview and opinions of problems) regarding the prediction of prolonged treatment, school problems, and police contacts or problems with the law.

Several statistical models have been applied to identify the "optimal informant", but they do not seem to offer a clear advantage over a simple combinatorial rule, also generally used in clinical practice, that identifies symptom criteria as present if they are present according to one or more informants (Bird et al. 1992).

Aims of the study

The aims of the present study were:

- 1) *To assess the relations between family structure and child adjustment in an epidemiological setting using parental and teacher ratings (I).* On the basis of previous literature it was assumed that of the various family types the highest problem prevalence would be found among children in foster care and lowest in nuclear families. Concerning birth order, the highest level of internalising symptoms was hypothesised to be present among firstborns and the highest level of externalising symptoms among middle born children. Concerning the sibship size the parents were expected to detect problems in children from smaller families and teachers of children in larger families.
- 2) *To investigate the impact of maternal depressive symptoms at different developmental stages on measures of child adjustment using maternal reports (II, III, V) and a multi-informant approach (II, III).* Mothers with depressive symptoms were expected to show negative expectations and perceptions of their child at each time point, and maternal depressive symptoms prenatally and postnatally were expected to predict subsequent lower competence and adaptive functioning, and increased emotional and behavioural problems in children. Mothers' perceptions were expected to be more negative than fathers' perceptions, but maternal depressive symptoms were assumed also to be associated with elevated problem levels according to fathers' and teachers' ratings.
- 3) *To examine the associations between maternal symptoms of both depression and anxiety and child outcome (IV).* On the basis of previous findings it was hypothesised that particularly the prenatal symptoms of anxiety (closely related to stress) rather than “pure” depressive symptoms would predict subsequent child adjustment. It was presumed that prenatal symptoms of anxiety and postnatal symptoms of depression would predict the child's subsequent emotional and behavioural problems.
- 4) *To examine the continuity and change in maternal problem perceptions of the child during the developmental process (V).* Mother's early negative prenatal expectations and postnatal perceptions of her child were expected to have continuity and to predict subsequent problem perceptions.

Material and methods

Study I

Subjects and procedure

Study I was part of a large epidemiological two-stage multicentre study on child psychiatric disorders (Almqvist et al. 1999a). The basic population included 60007 8 to 9-year-old Finnish-speaking children born in 1981 and still living in Finland in autumn 1989. A random sample of 10% of the population or at least 1000 children was drawn in a two-stage procedure in the catchment areas of the five child psychiatric departments of the university hospitals in Finland (Helsinki, Kuopio, Oulu, Tampere and Turku). A representative sample of all the communities was selected from each university hospital district. The communities were selected according to their degree of urbanisation (urban, suburban, rural; Statistics Finland 1988). In the small communities all children belonging to the 1981 age cohort participated in the study while in the cities a representative subsample of all the school districts was selected. Attrition due to migration or unknown address was 1.2% and refusal to take part in the study was 2.2%. Thus, the subjects made up 96.6% (n = 5813) of the randomly selected sample.

The screening stage was carried out during autumn 1989. The entire sample was screened by parental and teacher questionnaires. Of the 5813 children those with missing answers in more than one third of the questions in one or more of the questionnaires were excluded from the analyses. Information was obtained from 5497 children (91.4% of the total study sample), but due to missing answers concerning the key issues in this report the number of subjects in the analyses presented here varied from 5257 (87.4% of the total study sample) to 5379 (89.4% of the total study sample).

The second stage of the epidemiological study consisted of interviews with a subsample of parents and children. The results of the interviews, not analysed in this study, have been published elsewhere (e.g. Puura et al. 1997, Puura 1998; Almqvist et al. 1999b).

Measures

The *Rutter scale A2 for parents (RA2)*; Rutter et al. 1970, Appendix 1) consists of 31 items scored in a three-step scale (0 = does not apply, 1 = applies to some extent, 2 = certainly applies), the total sum score thus ranging from 0 to 62. The parent is asked to respond to each item by selecting the statement suitable for the child. The first eight items concern health problems like headaches and bed-wetting. The following five questions concern speech, eating, stealing and sleeping. The last 18 items concern the child's behaviour. A cut-off point of 12/13 was used in this study. The internalising or neurotic subscore was obtained by summing the scores of the items "has stomach ache or vomiting", "has tears on arrival at school or refuses to go into the building", "has sleeping difficulty", "often worried" and "tends to be fearful or afraid of new things". The sum score of the internalising subscale ranged from 0 to 10. The externalising or conduct subscore was obtained by summing the score of items: "does he/she ever steal things", "often destroys his/her own or others' belongings", "is often disobedient", "often tells lies" and "bullies other children". The sum score of the externalising subscores also ranged from 0 to 10.

The *Rutter scale B2 for teachers (RB2)*; Rutter 1967, Appendix 2) was designed for the evaluation of a child's behaviour at school. RB2 consists of 26 items scored on a three-step scale as RA2. The total sum score ranges from 0 to 52 points. A cut-off point of 8/9 was used. The internalising or neurotic subscore in RB2 is obtained by summing the score of items: "often worried", "often appears miserable", "tends to be fearful or afraid of new things" and "has had tears on arrival at school or has refused to go into the building", the internalising subscore thus ranges from 0 to 8 points. The externalising or conduct subscore is obtained by summing the scores of the items "often destroys his/her own or others' property", "frequently fights or is extremely quarrelsome", "is often disobedient", "often tells lies", "has stolen things" and "bullies other children". The externalising subscore ranges from 0 to 12 points.

Questions concerning family type, birth order and sibship size were added to the parental questionnaire.

Studies II-V

Subjects and procedure

Studies II-V are parts of a prospective follow-up study that started in Tampere, Finland, in 1989 (Tamminen 1990). At the first stage of this longitudinal study,

maternal depressive symptoms and maternal (prenatal) expectations and (postnatal) perceptions of the baby were assessed in a community sample of healthy first-time mothers by means of questionnaires during late pregnancy (T1) and three times postnatally (T2 = after delivery, T3 = two months and T4 = six months postnatally). At the second and third stages of the follow-up study in 1994-1995 (T5) and in 1997-1998 (T6) maternal depressive symptoms were screened again and maternal reports of the firstborn's emotional and behavioural status were gathered by means of questionnaires.

The flow chart of the longitudinal study is shown in Figure 3. The sample was collected from all the maternity health clinics in Tampere, Finland, during a six-month period in 1989-1990. The original sample of 349 mothers who agreed to participate in the study represented healthy Finnish first-time mothers. Only 10% of the target population declined to participate.

A group of 279 mothers (Sample A) was included in a more intensive study design (Tamminen 1990). Seventy-eight of the 279 mothers dropped out of the study during the first six months after delivery. The largest group of drop-outs (69 mothers) consisted of mothers who did not receive the questionnaires of the first postnatal survey in the obstetrics ward in the hospital during the summer. The drop-out groups at the perinatal stage, particularly the first and largest group of drop-outs, were analysed carefully using prenatal data. They did not differ significantly from the respondent group by sociodemographic characteristics or by maternal prenatal level of depressive symptoms (Tamminen 1990).

A group of 70 mothers (Sample B), who also participated in the study, was not included in the more intensive part of the longitudinal study due to time schedule of Study Stage 1, and was also excluded at T5, but included again at T6 (Figure 3).

In Sample A, between T4 and T5 one mother withdrew from the study due to serious illness of the child, and thus at T5 questionnaires were sent to 200 mothers of the perinatal study stages (the follow-up sample). The questionnaires were completed at T5 by 158 recipients (79%).

At the third stage of the follow-up study (T6) the questionnaires were sent to 270 mothers (Samples A and B, Figure 3; Appendices 3-10). The postal survey was conducted during the period November 1997 - April 1998. The depressive symptoms of the mothers were screened and the firstborn children's psychosocial functioning and emotional/behavioural problems were assessed by questionnaires completed by parents and teachers. Three mothers and children were excluded: one mother could not be reached because of unknown address and two mothers had moved abroad. One hundred and eighty-eight mothers (70%) of 189 children (one set of twins) returned the completed questionnaires and written consent forms. The dropouts consisted of 2 mothers who had died

and 1 mother whose child had died, 13 mothers who refused to participate due to being too busy or because they considered the questionnaires too difficult, and 63 mothers who did not return questionnaires during the survey despite two reminders. The fathers' screening questionnaires were completed for 122 children and teachers' questionnaires with mother's permission for 157 children.

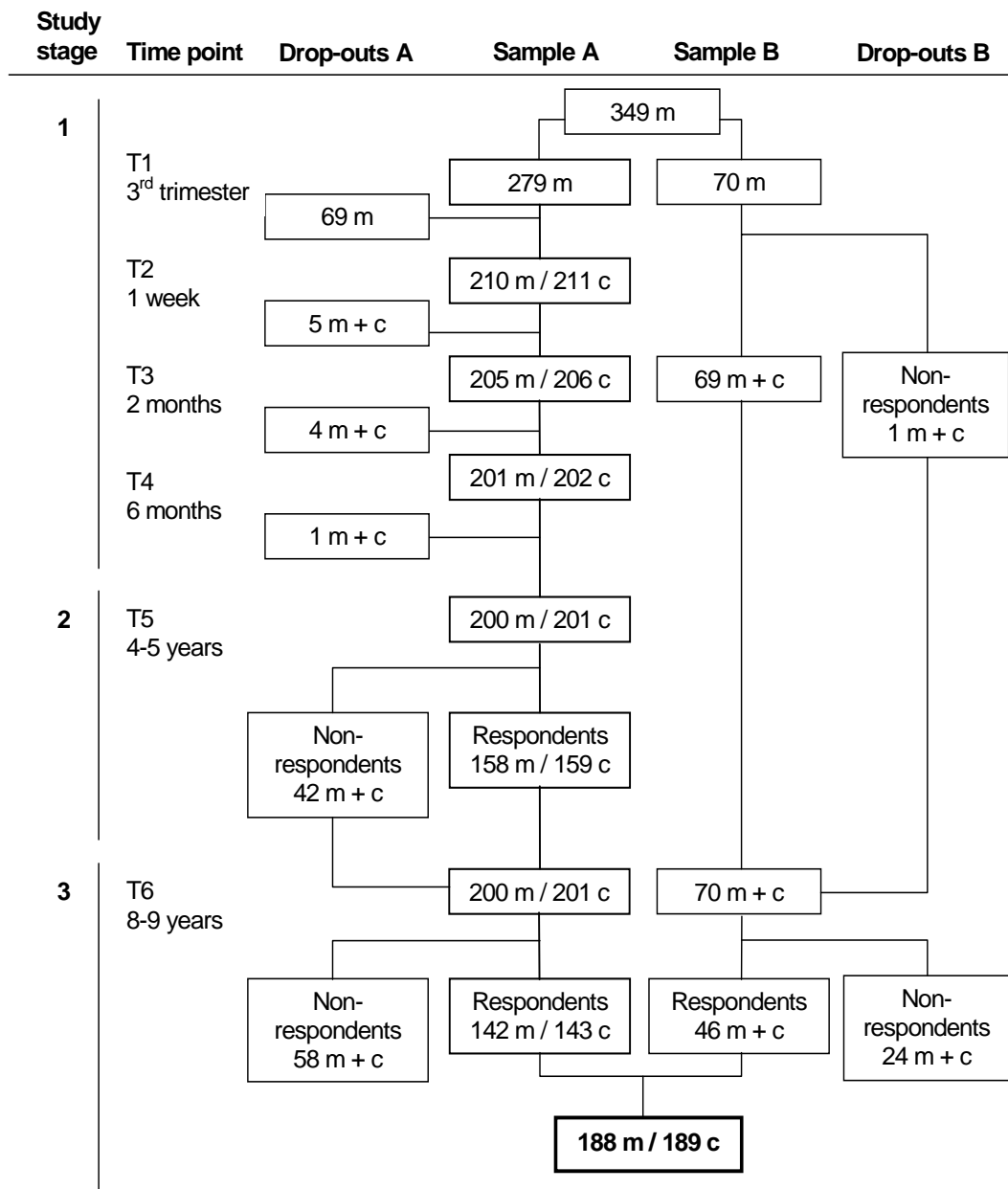


Figure 3. Flow chart of the longitudinal study (m = mother, c = child).

Of the postnatal measurements T3 was selected for analysis in studies III and V due to a known incidence peak of postnatal depression at 2 to 3 months (e.g. Kumar and Robson 1984) and the first biobehavioural shift in infant development at the same age (Zeanah et al. 1997).

The sample in Study II included 122 children for whom both mothers' and fathers' questionnaires at T6 were available. *The sample in Studies III and IV* included 147 mothers and children for whom complete longitudinal data from time points T1-T4 and both mothers' and teachers' questionnaires at T6 were available (Figure 4).

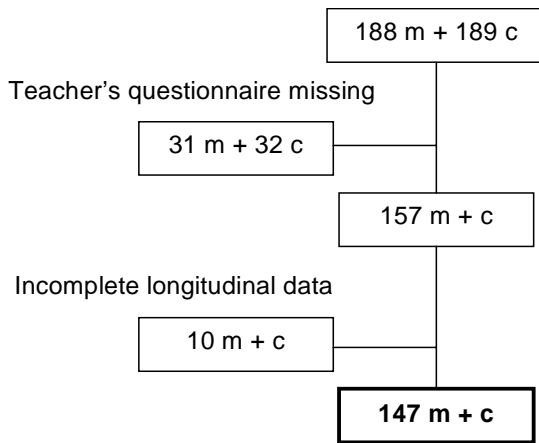


Figure 4. Formation of the sample in Studies III and IV (m = mother, c = child).

The sample in Study V included 119 children for whom complete longitudinal data from maternal questionnaires at time points T1, T3, T5 and T6 was available, and supplementary analyses were completed for 165 children for whom complete longitudinal data from time points T1, T3 and T6 was available (Figure 5).

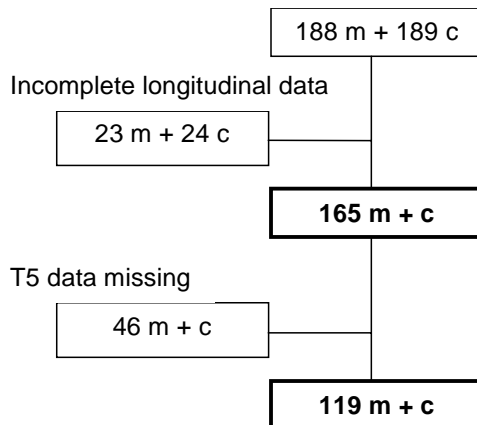


Figure 5. Formation of the sample in Study V (m = mother, c = child).

Attrition

In each of Studies II-V the groups of dropouts were compared with the groups of respondents. Mothers who had dropped out of the study did not differ statistically significantly from the mothers included in the study samples regarding marital status, education, socio-economic status, or the occurrence of high depressive symptom level prenatally (T1) or postnatally (T3). Mother-son dyads dropped out of the study more often than mother-daughter dyads (III, V). In Study II, the respondent fathers included a larger proportion of fathers with academic education and a smaller proportion of fathers with lower education than in the group of nonrespondents (II). In Study V, Sample A included a larger proportion of younger mothers compared with the group of drop-out mothers (maternal age below 24 years during the initial data collection 32% in Sample A and 11 % among the drop-outs, 25-29 years 46% vs. 59%, 30 years or older 22% vs. 31%, $p = 0.002$; V).

Measures

The depressive symptoms of the mothers at each of the time points were screened using the *Edinburgh Postnatal Depression Scale* (EPDS, Studies II-V, Appendix 10). The EPDS is a self-report questionnaire originally designed for screening depression among women during the postpartum period (Cox et al. 1987, Cox 1994), but it has been found also to have satisfactory validity among non-postnatal women (Cox et al. 1996). In the EPDS the mothers are asked to choose from the options those that best describe their feelings during the previous seven days. The scale consists of 10 items scored on a four-step scale from 0 to 3, the sum score of items thus ranging from 0 (no depressive symptoms) to 30 (high level of depressive symptoms).

The EPDS is an internationally widely used instrument developed in the UK and validated in many other countries (e.g. Pop et al. 1992, Wickberg and Hwang 1996, Eberhard-Gran et al. 2001a and 2001b, Berle et al. 2003). Cox et al. (1987) reported a sensitivity of 86% and specificity of 78% when the EPDS was validated against Research Diagnostic Criteria for depression (Spitzer et al. 1978). In the present longitudinal study, the Present State Examination (PSE; Wing et al. 1967) was used as a diagnostic interview for a subsample of 39 mothers at the postnatal stage (Tamminen 1990). With a cutpoint of 12/13 (also used in Studies II-IV), the sensitivity was 64% and specificity 96% for postnatal depression (Tamminen 1990).

A summary of studies having used the EPDS for screening maternal depression pre- and postnatally is presented in Table 3.

Table 3. Means and standard deviations (SD) of the EPDS sum scores in studies of pre- and postpartum depressive symptoms.

Stage	Author	Study site	n	Mean	SD
Prenatal					
18 weeks	Evans et al. 2001	UK	9028	6.62	4.66
32 weeks	Tamminen 1990	Finland	275	6.86	4.17
	Green 1998	UK	1272	8.75	4.75
	Evans et al. 2001	UK	9028	6.72	4.94
	Pajulo et al. 2001a	Finland	391	6.0	4.1
Postnatal					
1-2 weeks	Tamminen 1990	Finland	201	6.88	4.83
	Affonso et al. 2000	Sweden	108	4.90	3.90
		Australia	102	6.17	3.80
		Finland	58	6.64	4.01
		Italy	96	6.96	4.64
		USA	110	7.98	6.14
	Hiltunen et al. 2004	Finland	185	8.1	4.9
4-6 weeks	Affonso et al. 2000	Sweden	79	5.00	4.23
		Australia	100	5.20	3.99
		Finland	29	5.83	4.26
		Italy	100	6.42	4.57
		USA	95	7.57	5.54
8 weeks	Tamminen 1990	Finland	204	5.91	4.01
	Green 1998	UK	1272	7.50	4.70
	Evans et al. 2001	UK	9028	5.84	4.65
	Hiltunen et al. 2004	Finland	162	7.0	4.9
6 months	Tamminen 1990	Finland	199	5.55	4.56
	Cox et al. 1993	UK	232	7.6	5.6
8 months	Evans et al. 2001	UK	9028	5.25	4.61

Besides depression, the EPDS has been documented to measure anxiety (Pop et al. 1992, Brouwers et al. 2001). In Study IV the depressive and anxiety-related symptoms subscores were obtained by summing the scores of individual EPDS items according to Brouwers and colleagues (2001). The depressive symptom

subscore was obtained by summing the scores of items 1 (ability to laugh), 2 (looking forward with enjoyment) and 8 (feeling sad or miserable). The anxiety-related symptom subscore was likewise obtained by totalling the scores of items 3 (self-blame), 4 (anxiety or worry) and 5 (feeling scared or panicky). Since there are no established cut-offs for the subscales, the mothers were divided into low and high scorers for each of the subscales using the upper quartiles of the distributions as cut-offs.

The *Neonatal Perception Inventory* (NPI, Study V, Appendix 11) is a questionnaire designed for the assessment of the mother's perceptions of her baby (Broussard and Hartner 1971). The mother is asked to assess the crying, vomiting, feeding, bowel movements, sleeping, and predictability of the behaviour of her own baby (Your Baby) and of an average baby (Average Baby). The six items of both Your Baby and Average Baby sections are scored on a five-step scale from 1 (no concerns) to 5 (very many concerns). The sum score varies between 6 and 30 in both sections. The NPI score is obtained by subtracting the Your Baby sum score from the Average Baby sum score. According to Broussard and Hartner, the NPI score is categorized into better than average (positive) if the mother reports fewer problems in her baby than in an average baby and not better than average (negative), when the mother reports as many or even more problems in her baby compared with an average baby (Broussard and Hartner 1971). The proportions of positive and negative NPI scores from time points T1 (pregnancy) and T3 (2 months) are reported. Because the combined predictive ability of successive NPI reports has been reported to be greater than an NPI report at a single time point (Broussard and Hartner 1971) a combined measure of NPI reports was also formed by categorizing the NPI reports into those which were negative at both time points and those including a positive NPI report at one or both of the time points.

The mothers completed the *Child Behavior Checklist* (CBCL) questionnaires (Achenbach 1991a, Appendix 8) when the children were 4-5 years old (T5; V) and 8-9 years old (T6; II-V). CBCLs completed by fathers were obtained for 122 children at T6 (II). The CBCL is an internationally used instrument designed to record children's competencies and problems as reported by their parents. The social competence scores (II, III), internalising and externalising scores (II, III) and total problem scores (II-V) of the CBCL were used as child outcome variables. The social competence scale contains parents' reports concerning the child's activities (hobbies, tasks, chores), functioning in social relationships (with peers, siblings and parents) and school achievements. The total competence score is the sum of scores from activities, social and school scales. The CBCL problem scale includes 118 items, each of which is scored on a three-step scale from 0 (item not true) to 2 (item very true or often true). The internalising score is a sum score of problem items concerning withdrawal, somatic complaints and depressed/anxious symptoms whereas the externalising

score is a sum score of problem items concerning delinquent and aggressive behaviour.

The Teacher's Report Forms (TRFs) (Achenbach 1991b, Appendix 9) were completed by the teachers (III, IV). The TRF adaptive functioning score (III), internalising and externalising problem scores (III) and total problem scores (III, IV) were used. The TRF adaptive functioning scale comprises a teacher's ratings of the child's working, appropriate behaviour, learning and happiness. Each item is assessed on a scale from 1 to 7. The sum score of the items describes the child's overall adaptive functioning at school. The TRF internalising, externalising and total problem scales correspond to those of the CBCL scales. Descriptive statistics of the raw scores in the CBCL and TRF are presented in Appendix 12 (Tables 12.2 and 12.3).

In Study II the raw scores of the CBCL social competence and problem scales were used. In Studies III-V the raw scores of the CBCL (and in Studies III-IV of the TRF) were converted into normalised T scores. This made it possible to compare the internalising, externalising and total problem scores obtained by CBCL and TRF (Achenbach 1991a and 1991b). In Study III the low-functioning group for both CBCL social competence and TRF adaptive functioning was determined to consist of children whose scores were within the lowest 15th percentile. A cutpoint of $T \geq 60$ was used for internalising, externalising and total problem scores (III, IV). The simple combination of information obtained from mothers and teachers was used concerning the problem sections (III, IV): symptoms were determined to be present if the cut-off was exceeded by one or both of the informants.

Sociodemographic and health data on the mothers at T1, T5 and T6, and at T6 also on the fathers were gathered by questionnaires designed for this study (Appendices 6 and 7). The socio-economic status (SES) classification of the parents was made according to the guidelines of Statistics Finland (1983). Family SES was determined by the SES of the main breadwinner of the family, and in single mother families by the SES of the mother.

A summary of the measures and sample characteristics of Studies I-V is presented in Table 4.

Table 4. Summary of settings, measures and sample characteristics in Studies I-V.

	Study I	Study II	Study III	Study IV	Study V
Study setting	Cross-sectional	Cross-sectional	Longitudinal	Longitudinal	Longitudinal
Time points	8-9 years	8-9 years	Pregnancy 2 months 8-9 years	Pregnancy 1 st week 2 months 6 months 8-9 years	Pregnancy 2 months 4-5 years 8-9 years
Measures					
- independent	family type birth order sibship size	EPDS demographic factors	EPDS demographic factors	EPDS (depressive and anxiety- related symptoms) demographic factors	NPI CBCL/mother (4-5 years) demographic factors
- child outcome	RA2 RB2	CBCL/mother CBCL/father	CBCL/mother TRF	CBCL/mother TRF	CBCL/mother (4-5 years, 8- 9 years)
Sample size ^a	5257 – 5379	122	147	147	119 / 165
Gender of children (%)					
- girls	51	59	54	54	58 / 57
- boys	49	41	46	46	42 / 43
SES of the family (%) ^b					
- upper	46	61	47	47	52 / 47
- lower	54	39	53	53	48 / 53
Parent's marital status (%)					
- two parents	89	100	90	90	91 / 87
- single parent	10	-	10	10	9 / 13
- foster care, other	1	-	-	-	- / -
Birth order (%)					
- only child	13	10	16	16	15 / 17
- eldest child	32	90	84	84	85 / 83
- middle born	18	-	-	-	- / -
- youngest child	37	-	-	-	- / -

Table 4. Continued.

	Study I	Study II	Study III	Study IV	Study V
Sibship size (%)					
- only child	12	10	16	16	15 / 17
- 2-3 children	74	82	77	77	77 / 76
- 4-5 children	10	8	7	7	8 / 7
- 6 or more children	4	-	-	-	- / -

^aThe sample is the same in Studies III and IV.

^b Upper category consists of academic and other professionals in leading position and entrepreneurs. Lower category consists of skilled and unskilled workers, unemployed workers and students. SES is categorised in a different way in Table 1 of Study V.

Statistical methods

In Study I, the children were grouped on the basis of their family structure, birth order and sibship size. The proportion of children scoring above the cut-off point in the parents' and teachers' scales by different family type, birth order and sibship size were compared using crosstabulations and chi-square test, and 95% confidence intervals (95% CIs) were computed for the proportions. For the internalising and externalising subscores means and upper and lower quartiles, and in the overview medians as descriptives are also presented. Differences between groups were studied using the Kruskal-Wallis analysis of variance, and multiple comparisons were made using the modified Mann-Whitney test. The analyses were done using BMDP statistical software, version 1990.

In Study II, medians and lower and upper quartiles of the competence and problem scores were calculated as descriptive statistics by the background variables and by the presence of maternal depressive symptoms. To test for differences between groups, the Kruskal-Wallis analysis of variance and Mann-Whitney U test were used. To test for differences between parents' reports, Wilcoxon signed ranks tests were done for the whole group and separately for groups determined by gender of the child.

In Study III, mothers were divided into high- and low-scorers on the EPDS at different time points. They were also categorised by the number of time points at which they had scored high (never, once, twice or more). Cross-tabulations together with Fisher exact test (two-tailed) were used to examine the categorised child outcome by maternal depressive status. In the overview Pearson chi-square test results are also presented. Continuity of maternal depressive symptoms was examined by Spearman correlations. Logistic regression analyses were

conducted with child outcome measures as dependent variables. Sociodemographic factors, child's gender and measures of maternal prenatal, postnatal and concurrent depressive symptoms were included in the models.

In Study IV, means and standard deviations of the EPDS subscores and the frequencies of high scores in the CBCL and TRF were presented as descriptive statistics. Spearman correlations were computed between the continuous subscores of the EPDS at the various time points. Cross-tabulations together with Fisher exact tests (two-tailed) were used to examine child outcome by maternal symptom indicators. Logistic regression analyses were conducted with child outcome as dependent variable as in Study III.

In Study V, frequencies were used for descriptive purposes. Associations were examined by cross-tabulations, together with two-tailed Pearson chi-square test or Fisher exact test. The simultaneous effects of potential predictors of problems at school age were analysed by logistic regression.

In Studies II-V the data were analysed using SPSS for Windows version 9.0 statistical software. P-values smaller than 0.05 were considered statistically significant. In Study V, due to the small sample size, p-values smaller than 0.1 were also reported. The results of the logistic regression analyses were reported as odds ratios (ORs) and their 95% CIs.

Summary of the results

Family structure and children's emotional/behavioural problems (I)

Family type

The majority of the children (83.5%) were living with their biological parents, 9.2% with single mothers and 4.9% with mothers and stepfathers. Only one percent of children were living with single fathers and even lower percentages of children were living with fathers and stepmothers (0.5%), with adoptive parents (0.3%), with foster parents (0.4%) and in institutions (0.4%) (I, Table 1).

Irrespective of family type, boys scored high more often than girls on both parents' and teachers' scales (I, Tables 2a and 2b).

Family type and children's problems on the parents' scales

The proportion of children scoring above the cut-off point on the parents' scale was lowest among children living with both biological parents (9.1%, 95% CI 8.3-9.9) and highest among children living in institutions (36.4%, 95% CI 16.3-56.5). Children in single parent families scored high less often than children in step-parent families, although according to the confidence intervals the differences were not statistically significant (I, Table 2a).

When boys and girls were studied separately, the proportion of boys scoring high was lowest among those living with both biological parents and highest among boys living in institutions. Boys living with both biological parents scored above the cut-off less often than boys living with a single mother, in a stepfather family, or in institutions. Girls living with a single father or with both parents scored above the cut-off least often, but the differences between girls living with a single father and girls living in other family types were not statistically significant. There were significant differences between girls living

with both biological parents and girls living with single mother or in stepfather families (I, Table 2a).

The lowest levels of both internalising and externalising symptoms were found among children living with both biological parents (Table 5). The highest levels of internalising symptoms were found among children living in stepfather families and boys living in institutions. The highest levels of externalising symptoms were found among children living in stepfather families and single mother families.

Table 5. Summary of low and high scores in children's internalising and externalising symptoms on the parents' scales by family type. P-values refer to the statistical differences between groups according to the Kruskal-Wallis analysis of variance. Subcategories showing significant differences (Mann Whitney test, $p < 0.05$) are presented. Descriptive statistics of symptom scores are presented in parentheses (mean, median, [lower, upper quartile]).

	All	Boys	Girls
Internalising			
- significance	$p < 0.001$	$p < 0.001$	$p = \text{n.s.}$
-low level	Biological parents (1.89, 2.0, [1.0, 3.0])	Biological parents (1.90, 2.0, [1.0, 3.0])	
-high level	Mother and stepfather (2.24, 2.0, [1.0, 3.0])	Institution (3.67, 4.0, [1.5, 5.0])	
Externalising			
- significance	$p < 0.001$	$p < 0.001$	$p = 0.09$
-low level	Biological parents (1.00, 0.0, [0.0, 1.0])	Biological parents (1.23, 1.0, [0.0, 2.0])	Biological parents (0.68, 0.0, [0.0, 1.0])
-high level	Mother and stepfather (2.05, 1.0, [0.0, 2.0])	Mother and stepfather (2.73, 1.0, [0.0, 4.0])	Mother and stepfather (1.33, 1.0, [0.0, 1.0])
	Single mother (1.50, 1.0, [0.0, 2.0])	Single mother (1.85, 1.0, [0.0, 2.0])	

High levels of externalising problems were also detected among children living in institutions (mean 3.00, md, 1.0, [lower and upper quartile 0.0, 4.5]) and in foster families (mean 2.78, md 1.0, [0.0, 3.0]), but probably due to smaller cell sizes and wide variation in problem levels in these groups the differences compared with the other groups were not statistically significant.

Family type and children's problems on the teachers' scales

According to teachers' ratings, children living with both biological parents scored above the cut-off point least often (11.4%, 95% CI 10.5-12.3). In contrast to parents' reports, children living with single fathers scored above the cut-off

point most often (32.1%, 95% CI 19.5-44.6). The differences were significant between children living with biological parents versus children living with a mother and a stepfather, single father, single mother, or in an institution (I, Table 2b)

The proportion of boys scoring above the cut-off point was highest among boys in adoptive families and in foster care, but the differences between the groups were not statistically significant. Boys living with both their biological parents had high scores significantly less often compared to boys living with a single mother or with the mother and a stepfather. For girls, living with a single father was most often associated with high scores. The differences in the proportions of girls scoring high on the teachers' scale were significant between girls living with both biological parents and girls living with a single father or with the mother and a stepfather (I, Table 2b).

Table 6. Summary of low and high scores in children's internalising and externalising symptoms on the teachers' scales by family type. P-values refer to the statistical differences between groups according to the Kruskal-Wallis analysis of variance. Subcategories showing significant differences (Mann Whitney test, $p < 0.05$) are presented. Descriptive statistics of symptom scores are presented in parentheses (mean, median, [lower, upper quartile]).

	All	Boys	Girls
Internalising			
- significance	$p < 0.001$	$p < 0.001$	$p = n.s.$
-low level	Biological parents (0.56, 0.0, [0.0, 1.0])	Biological parents (0.60, 0.0, [0.0, 1.0])	
-high level	Single mother (0.81, 0.0, [0.0, 1.0])	Single mother (1.01, 0.0, [0.0, 2.0])	
Externalising			
- significance	$p < 0.001$	$p < 0.001$	$p < 0.001$
-low level	Biological parents (0.78, 0.0, [0.0, 1.0])	Biological parents (1.28, 0.0, [0.0, 2.0])	Biological parents (0.27, 0.0, [0.0, 0.0])
-high level	Mother and stepfather (1.52, 0.0, [0.0, 2.0])	Mother and stepfather (2.32, 1.0, [0.0, 4.0])	Mother and stepfather (0.64, 0.0, [0.0, 1.0])
	Single mother (1.36, 0.0, [0.0, 2.0])	Single mother (2.23, 1.0, [0.0, 3.0])	Single mother (0.45, 0.0, [0.0, 0.0])
	Single father (1.53, 1.0, [0.0, 2.5])		Foster parents (0.92, 0.5, [0.0, 1.8])
	Adoptive parents (1.81, 1.0, [0.0, 2.8])		
	Foster parents (2.17, 1.0, [0.0, 3.0])		

The levels of both internalising and externalising symptoms were lowest among children living with biological parents compared to other family types (Table 6). High levels of internalising symptoms were found among children and boys living in single mother families. High levels of externalising symptoms were found among children living in stepfather families, single parent families, adoptive families and foster families. Among both boys and girls living in stepmother or single mother families high levels of externalising symptoms were found.

Birth order

Birth order and children's problems on the parents' scales

On the parents' scale the highest proportion of children scoring above the cut-off point was found among eldest children with siblings (13.9%, 95% CI 12.2-15.5). The lowest proportion of children scoring high was found among the youngest children (7.4%, 95% CI 6.2-8.6). The differences between the youngest children and other subcategories were statistically significant. The same finding was true for boys and girls separately except for youngest and middle born boys (I, Table 2a).

Both only children and eldest children had significantly higher internalising symptom level than youngest or middle born children. This was true for girls, but for boys the difference between only children and other birth positions was not statistically significant. Externalising symptom levels were also highest among eldest children and lowest among youngest children (Table 7).

Table 7. Summary of low and high scores in children's internalising and externalising symptoms on the parents' scales by birth order. P-values refer to the statistical differences between groups according to the Kruskal-Wallis analysis of variance. Subcategories showing significant differences (Mann Whitney test, $p < 0.05$) are presented. Descriptive statistics of symptom scores are presented in parentheses (mean, median, [lower, upper quartile]).

	All	Boys	Girls
Internalising			
- significance	$p < 0.001$	$p = 0.002$	$p < 0.001$
-low level	Middle born (1.78, 1.0, [1.0, 4.0]) Youngest child (1.79, 2.0, [1.0, 3.0])	Middle born (1.84, 1.0, [1.0, 3.0]) Youngest child (1.79, 1.0, [1.0, 3.0])	Middle born (1.72, 2.0, [1.0, 3.0]) Youngest child (1.79, 1.0, [1.0, 3.0])
-high level	Only child (2.04, 2.0, [1.0, 3.0]) Eldest child (2.14, 2.0, [1.0, 3.0])	Eldest child (2.18, 2.0, [1.0, 3.0])	Only child (2.07, 2.0, [1.0, 3.0]) Eldest child (2.10, 2.0, [1.0, 3.0])
Externalising			
- significance	$p < 0.001$	$p < 0.001$	$p < 0.001$
-low level	Youngest child (0.93, 0.0, [0.0, 1.0])	Youngest child (1.20, 0.0, [0.0, 2.0])	Youngest child (0.64, 0.0, [0.0, 1.0])
-high level	Middle born (1.23, 0.0, [0.0, 2.0]) Eldest child (1.26, 1.0, [0.0, 2.0])	Middle born (1.62, 1.0, [0.0, 2.0]) Eldest child (1.65, 1.0, [0.0, 2.0])	Eldest child (0.89, 0.0, [0.0, 1.0])

Birth order and children's problems on the teachers' scales

On the teachers' scale a significantly higher proportion of only children scored above the cut-off point (18.4%, 95% CI 15.5-21.3) when compared to other subcategories of birth order. The lowest proportion of children scoring high on the teachers' scale was found among middleborns (11.7%, 95% CI 9.6-13.7). The differences were significant between only children and other ordinal positions. The same tendency was true for girls and boys separately, but the differences were significant only for boys (I, Table 2b).

Highest levels of both internalising and externalising symptoms were found among only children (Table 8).

Table 8. Summary of low and high scores in children's internalising and externalising symptoms on the teachers' scales by birth order. P-values refer to the statistical differences between groups according to the Kruskal-Wallis analysis of variance. Subcategories showing significant differences (Mann Whitney test, $p < 0.05$) are presented. Descriptive statistics of symptom scores are presented in parentheses (mean, median, [lower, upper quartile]).

	All	Boys	Girls
Internalising			
- significance	$p < 0.001$	$p = 0.04$	$p < 0.001$
-low level	Eldest child (0.61, 0.0, [0.0, 1.0]) Middle born (0.52, 0.0, [0.0, 1.0]) Youngest child (0.57, 0.0, [0.0, 1.0])	Eldest child (0.68, 0.0, [0.0, 1.0]) Middle born (0.55, 0.0, [0.0, 1.0]) Youngest child (0.62, 0.0, [0.0, 1.0])	Eldest child (0.54, 0.0, [0.0, 1.0]) Middle born (0.49, 0.0, [0.0, 1.0]) Youngest child (0.52, 0.0, [0.0, 1.0])
-high level	Only child (0.71, 0.0, [0.0, 1.0])	Only child (0.83, 0.0, [0.0, 1.3])	Only child (0.59, 0.0, [0.0, 1.0])
Externalising			
- significance	$p = 0.001$	$p = 0.006$	$p = 0.01$
-low level	Eldest child (0.80, 0.0, [0.0, 1.0]) Middle born (0.81, 0.0, [0.0, 1.0]) Youngest child (0.90, 0.0, [0.0, 1.0])	Eldest child (1.31, 0.0, [0.0, 2.0]) Middle born (1.31, 0.0, [0.0, 2.0])	Eldest child (0.31, 0.0, [0.0, 0.0]) Middle born (0.29, 0.0, [0.0, 0.0])
-high level	Only child (1.11, 0.0, [0.0, 1.0])	Only child (1.80, 1.0, [0.0, 3.0])	Only child (0.41, 0.0, [0.0, 0.0])

Sibship size

Sibship size and children's problems on the parents' scales

Concerning sibship size, the differences in proportions of children scoring above the cut-off point were not significant on the parents' scale (I, Table 2a).

Only children were found to have the highest level of internalising symptoms whereas children living in large sibships had the highest level of externalising symptoms on the parents' scale. Among girls the differences in externalising symptom levels were not significant by sibship size (Table 9).

Table 9. Summary of low and high scores in children's internalising and externalising symptoms on the parents' scales by sibship size. P-values refer to the statistical differences between groups according to the Kruskal-Wallis analysis of variance. Subcategories showing significant differences (Mann Whitney test, $p < 0.05$) are presented. Descriptive statistics of symptom scores are presented in parentheses (mean, median, [lower, upper quartile]).

	All	Boys	Girls
Internalising			
- significance	$p < 0.001$	$p = 0.002$	$p = 0.02$
-low level	6 or more children (1.54, 1.0, [0.0, 2.0])	6 or more children (1.49, 1.0, [0.0, 2.0])	6 or more children (0.61, 0.0, [0.0, 3.0])
-high level	One child (2.06, 2.0, [1.0, 3.0]) 2-3 children (1.94, 2.0, [1.0, 3.0]) 4-5 children (1.90, 2.0, [1.0, 3.0])	One child (2.03, 2.0, [1.0, 3.0]) 2-3 children (1.97, 2.0, [1.0, 3.0]) 4-5 children (1.98, 2.0, [1.0, 3.0])	One child (2.09, 2.0, [1.0, 3.0])
Externalising			
- significance	$p = 0.003$	$p = 0.008$	$p = \text{n.s.}$
-low level	One child (1.05, 0.0, [0.0, 1.0]) 2-3 children (1.07, 0.0, [0.0, 1.0])	One child (1.31, 1.0, [1.0, 3.0]) 2-3 children (1.34, 1.0, [1.0, 3.0])	
-high level	6 or more children (1.57, 1.0, [0.0, 2.0])	6 or more children (1.91, 1.0, [0.0, 2.0])	

Sibship size and children's problems on the teachers' scales

The highest proportion of children scoring high on the teachers' scale was found among only children (19.0%, 95% CI 16.0-22.0) and lowest among children from large sibships. For girls the differences between the groups were not significant (I, Table 2b).

Only children were found to have significantly higher internalising and externalising symptom levels compared with children with siblings. Concerning internalising symptoms the differences were not significant for girls (Table 10).

Table 10. Summary of low and high scores in children's internalising and externalising symptoms on the teachers' scales by sibship size. P-values refer to the statistical differences between groups according to the Kruskal-Wallis analysis of variance. Subcategories showing significant differences (Mann Whitney test, $p < 0.05$) are presented. Descriptive statistics of symptom scores are presented in parentheses (mean, median, [lower, upper quartile]).

	All	Boys	Girls
Internalising			
- significance	$p = 0.006$	$p < 0.001$	$p = n.s.$
-low level	2-3 children (0.58, 0.0, [0.0, 1.0])	2-3 children (0.65, 0.0, [1.0, 3.0])	
		4-5 children (0.55, 0.0, [1.0, 3.0])	
		6 or more children (0.47, 0.0, [0.0, 2.0])	
-high level	One child (0.71, 0.0, [0.0, 1.0])	One child (0.85, 0.0, [1.0, 3.0])	
Externalising			
- significance	$p < 0.001$	$p = 0.003$	$p < 0.001$
-low level	2-3 children (0.84, 0.0, [0.0, 1.0])	2-3 children (1.39, 1.0, [1.0, 3.0])	2-3 children (0.28, 0.0, [0.0, 0.0])
	4-5 children (0.85, 0.0, [0.0, 1.0])	6 or more children (1.15, 0.0, [0.0, 2.0])	4-5 children (0.31, 0.0, [0.0, 0.0])
-intermittent			One child (0.41, 0.0, [0.0, 0.0])
-high level	One child (1.14, 0.0, [0.0, 2.0])	One child (1.86, 1.0, [1.0, 3.0])	6 or more children (0.56, 0.0, [0.0, 1.0])

Perceptions of child adjustment in middle childhood (I-III)

Mothers' and fathers' CBCL reports of their children's social competence and internalising, externalising and total problems were examined in Study II. The sample included only two-parent families (see Table 4, page 65).

Regarding the children's social competence level the parental views were fairly similar both when all children were considered and when boys and girls were considered separately. Differential views appeared in the problems sections of the CBCL. Fathers reported lower internalising, externalising and total problem levels for all children. When the sexes were examined separately,

significant differences were found regarding mothers' and fathers' reports of internalising and externalising problems among boys: mothers reported higher problem levels than fathers. Among girls, the difference between mothers' and fathers' reports of internalising problems was of borderline significance ($p = 0.50$), showing slightly higher problem levels in mothers' reports. The differences between parental reports concerning externalising and total problem levels were not statistically significant in girls (II, Table 2).

Concerning single parents' reports, some conclusions can be drawn on the basis of results of Study I, in which parental and teachers' problem ratings by different family types were considered (I, Tables 2a and 2b). According to parental reports, the proportions of children scoring above the cut-off in single father families were in general of the same magnitude as among children in families with two biological parents, whereas among children living in single mothers' families a significantly higher proportion of children was reported to have problems than among the children in families with two biological parents. Although the respondent parent was not defined, it seems reasonable to assume that in single mother families the mother was the responding parent and in single father families the father, so the single fathers reported rather low problem levels in their children whereas single mothers reported high problem levels in their children. However, when the teachers' reports were considered, both the children living with single mothers and those living with single fathers scored above the cut-off significantly more often than children living with two biological parents.

The results of Study III showed that mothers reported high externalising problem levels less often but high internalising and total problem levels more often in children than did the teachers. The proportions of children scoring above the cutpoint in the CBCL vs. TRF were 20% vs. 16% for internalising, 11% vs. 18% for externalising and 18% vs. 10% for total problems (III).

Continuity of maternal problem perceptions during development (V)

The associations between mother's prenatal expectations of her baby, postnatal perceptions of the infant and problem perceptions at the age of 4-5 years and 8-9 years were examined in Study V. According to the NPI, over 40% of mothers had prenatal expectations of a baby with a level of problems equal to or higher than babies on average. At the age of two months postnatally 23-25% of the mothers considered their baby as "not better than average" whereas majority of mothers considered their baby as having fewer problems than average babies (V).

Among the children for whom maternal prenatal expectations according to the NPI were "better than average", smaller proportions of children were perceived to have problems at the age of 4-5 years and 8-9 years, but these tendencies were not statistically significant (V, Table 2). Regarding the associations between postnatal perceptions of a "better than average" infant and the low prevalence rates of problems at the age of 4-5 and 8-9 years, similar trends were also found, although they were not statistically significant. However, the persistence of negative NPI ratings (i.e. both prenatal and postnatal NPI ratings showed "not better than average" ratings) was statistically significantly associated with higher frequency of high problem scores at the age of 8-9 years. Over one third of children who had both pre- and postnatal negative NPI-ratings had high problem level at the age of 8-9 years compared with 13-14% among children who had at least one positive NPI-rating either pre- or postnatally (V, Table 2).

High problem level at the age of 4-5 years according to the CBCL also predicted high problem level at the age of 8-9 years (V, Table 2).

Maternal depressive symptoms and child adjustment (II - V)

Prevalence and continuity of maternal depressive symptoms

The proportions of mothers scoring high on the EPDS at different time points by samples analysed in Studies III and V are presented in Table 11.

Table 11. Proportions (%) of mothers scoring above the cut-off (≥ 13) in the EPDS at different time points.

Time point	Study III	Study V	Study V
	(n = 147)	Sample A (n = 119)	Sample A+B (n = 165)
T1 = prenatal	11	9	12
T2 = 1 st week	9	-	-
T3 = two months	9	6	9
T4 = six months	10	-	-
T5 = 4-5 years	-	8	-
T6 = 8-9 years	7	6	6

The continuity and discontinuity of maternal depressive symptomatology over time points T1-T4 and T6 was analysed in Study III. Only one of 147

mothers scored high at each of the time points and 101 mothers scored low at each assessment. Of the 16 mothers who scored high prenatally only 2 scored high postnatally at two months. Seven of the prenatally symptomatic mothers scored low at each subsequent assessment. The correlations of the continuous EPDS sum scores ranged from 0.27 (between T1 and T6) to 0.65 (between T3 and T4). Means and standard deviations of the EPDS sum scores in the samples of Studies II-V are presented in the Appendix (Table 12.1).

The correlations and continuity of separate dimensions of depressive symptoms, i.e. the depressive and anxiety-related subscores, were examined in Study IV. At each of the time points the depressive and anxiety-related symptoms were statistically significantly correlated ($p < 0.01$). The highest correlations between the subscores were found in the first week after delivery ($r = 0.67$) and lowest prenatally ($r = 0.42$). Correlations between depressive symptom subscores at different time points varied from 0.13 (T1 and T6) to 0.40 (T3 and T4). Correlations between anxiety-related symptom subscores varied from 0.30 (T2 and T6) to 0.61 (T3 and T4). All the correlation coefficients between anxiety-related symptoms subscores at various time points were statistically significant ($p < 0.01$).

The numbers of mothers scoring high on the EPDS subscales by the frequency of high scores are presented in Table 12.

Table 12. Occurrence of high scores on the EPDS subscales among the mothers ($n = 147$) at time points T1-T4 and T6.

Subscale	Occurrence of high scores					
	0	Once	Twice	3 times	4 times	5 times
Depressive symptoms	73	44	19	6	4	1
Anxiety-related symptoms	81	39	16	7	3	1

Maternal depressive symptoms and child adjustment

Prenatal maternal depressive symptoms

Children whose mothers had scored high on the EPDS prenatally had more often high externalising and total problem scores on the CBCL completed by the mothers at the child's age of 8-9 years (III, Table 3). The proportions of children scoring high on the externalising scale were 38% among children of mothers with prenatal depressive symptoms compared with 8% among prenatally non-symptomatic mothers' children (Fisher exact test $p = 0.003$; $\chi^2 = 13.112$, d.f. = 1, $p < 0.001$). The respective proportions for total problems were 56% vs. 13%

(Fisher exact test $p < 0.001$; $\chi^2 = 18.339$, d.f. = 1, $p < 0.001$). Regarding mothers' and teachers' reports of child's social and adaptive functioning, and mothers' reports of internalising problems and teachers' problem reports, the differences between prenatally symptomatic and nonsymptomatic mothers' children were not statistically significant (III, Tables 2 and 3).

Because mothers' health habits, particularly smoking or alcohol use during pregnancy, were not included in the analyses presented in Study III, the possible influence of these variables on the detected associations was examined separately (analyses are not presented in the original communications). Thirteen of the 147 mothers in Study III reported smoking and 2 alcohol consumption at T1. If these mothers and their children were excluded from the analyses, the association between prenatal depressive symptoms and child's total and externalising problems at T6 was still significant among the remaining 132 mothers. Among the children of the 119 mothers scoring low at T1, 8 (7%) scored high on the externalising problem scale compared with 39% (5/13) of the children whose mothers scored high ($p = 0.003$). On the total problem scale the respective figures were 12% (14/119) vs. 54% (7/13) ($p = 0.001$).

Postnatal maternal depressive symptoms

The children of mothers who had had a high level of depressive symptoms postnatally tended to score more often among the lowest 15th percentile in social competence according to mothers' reports at the age of 8-9 years (33% among children of postnatally depressive mothers vs. 11% among children of postnatally nondepressive mothers; Fisher exact test $p = 0.052$; $\chi^2 = 4.770$, d.f. = 1, $p = 0.029$) and among the lowest 15th percentile in adaptive functioning according to teachers' reports (27% vs. 9%; Fisher exact test $p = 0.089$; $\chi^2 = 3.681$, d.f. = 1, $p = 0.055$) (III, Table 3). According to mothers' reports the children whose mothers had had depressive symptoms postnatally scored more often high on the CBCL total problem scale; also this difference was on the border of statistical significance (39% vs. 16 %; Fisher exact test $p = 0.055$; $\chi^2 = 4.228$, d.f. = 1, $p = 0.040$).

Concurrent maternal depressive symptoms

Maternal high level of depressive symptoms, as assessed concurrently when the children were 8-9 years old, was statistically significantly associated with children's low level of social competence. Forty percent of children whose mothers had concurrent depressive symptoms scored among the lowest 15th percentile compared with 11% among the children of nonsymptomatic mothers (Fisher exact test $p = 0.026$; $\chi^2 = 6.907$, d.f. = 1, $p = 0.009$). Concurrent maternal depressive symptomatology was also associated with children's elevated total

problem level in mothers' CBCL reports (45% vs. 15%, Fisher exact test $p = 0.026$, $\chi^2 = 6.297$, d.f. = 1, $p = 0.012$) (III, Tables 2 and 3).

Of the children whose mothers scored high on the EPDS a higher proportion scored low in adaptive functioning according to teachers' reports (33% vs. 9%; Fisher exact test $p = 0.052$; $\chi^2 = 5.470$, d.f. = 1, $p = 0.019$) (III, Table 2). According to the teachers' reports, children whose mothers had a high level of depressive symptoms seemed to score high more often on externalising and total problem scales and less often on internalising scale compared with the children of mothers scoring low in the EPDS, but these differences were not statistically significant (III, Table 3).

In two-parent families, a high level of maternal depressive symptoms was associated with high levels of externalising symptoms in children in both mothers' and fathers' reports, and high scores on total problem scale in fathers' reports (II, Table 3).

Recurrence of maternal depressive symptoms

The impact of the recurrence of high level of maternal depressive symptoms on children's functioning and emotional and behavioural problems at the age of 8-9 years was examined in Study III. On both social competence and adaptive functioning scales and on three out of the six problem scales of the CBCL and the TRF the proportion of low-functioning or problematic children was largest if the mother had been symptomatic at two or more time points out of five assessments (T1-T4, T6). The exceptions to the problem scales were the internalising scale according to both mothers' and teachers' reports and the externalising scale according to the mothers. According to the mothers' reports the proportion of children scoring high on the internalising problem scales was lowest if the mother had not scored high on the EPDS in any of the assessments. According to the teachers' reports the proportions of children scoring low on functioning scales or high on problem scales were lowest if the mother had scored high at one time point (III, Tables 4 and 5).

Maternal depressive and anxiety-related symptom subscores and child adjustment

When the maternal symptoms according to the EPDS subscales were studied, high maternal depressive symptom levels at 2 months after delivery (T3) and concurrently (T6) as well as high levels of anxiety-related symptoms prenatally (T1) and concurrently (T6) were statistically significantly associated with child's high problem level at 8-9 years (IV, Tables 2 and 3).

Predictors of child adjustment (III - V)

In Study III, logistic regression analyses were conducted to determine the sociodemographic factors (III, Table 1) and maternal factors predicting child adjustment at the age of 8-9 years according to mothers' and teachers' separate reports of social competence and adaptive functioning and combined reports of child problems. Summary of the results is presented in Table 13. The finding that mother's postnatal and not concurrent high depressive symptom level remained as a significant predictor of child's low social competence in the logistic regression is likely to be explained by the correlation of the explanatory variables.

Table 13. Summary of factors predicting children's functioning and emotional and behavioural problems at the age of 8-9 years.

Child adjustment measure	Explanatory variable	OR	95% CI
Low social competence (CBCL)	Maternal postnatal depressive symptoms	7.6	1.6 - 36.6
	Maternal age \geq 35	5.5	1.5 - 20.4
	Single mother	5.0	1.2 - 20.6
	Male gender of the child	3.7	1.1 - 11.9
Low adaptive functioning (TRF)	Maternal concurrent depressive symptoms	5.2	1.1 - 23.8
High total problem score (CBCL and/or TRF)	Maternal prenatal depressive symptoms	8.5	2.7 - 26.5
High internalising problem score (CBCL and/or TRF)	Single mother	3.3	1.1 - 10.0
High externalising problem score (CBCL and/or TRF)	Maternal prenatal depressive symptoms	3.1	1.1 - 8.9

When the impact mothers' pre- and postnatal depressive and anxiety-related symptoms according to the EPDS subscales on child outcome were examined in Study IV, maternal depressive symptom subscore at two months postnatally was the only variable predicting child's emotional and behavioural problems (OR 2.9, 95% CI 1.1-7.7). When the indicators of maternal concurrent symptoms were included in the analyses, the only predictor remaining in the model was maternal concurrent high level of anxiety-related symptoms (OR 4.1, 95% CI 1.4-12.2).

In Study V, factors predicting child's emotional and behavioural problems according to mother's reports at child's age of 8-9 years were, besides maternal prenatal depressive symptoms (OR 6.3, 95% CI 1.6 - 25.1), the persistence of negativity in NPI reports both pre- and postnatally (OR 3.6, 95% CI 1.0 - 13.3)

and a high level of emotional and behavioural problems at the age of 4-5 years (OR 3.2, 95% CI 1.0 – 9.7). The significance of the continuity of early problem ratings was confirmed in the larger sample (Sample A+B, Figure 3) (OR 4.2, 95% CI 1.4 – 12.4).

Discussion

The aim of this thesis was to examine the family and maternal factors, past and present, having an impact on the emotional and behavioural adjustment of 8-9-year old children as perceived by their parents and teachers. Even though the methods used in this study were conventional, established questionnaires used in child psychiatric research, the full interpretation and comprehension of the results requires the integration of developmental theories in the fields of both human biology and child psychiatry. This integration is essential, because psychiatry is in the key position in analysing the interaction between social and biological determinants of behaviour (Kandel 1998, Kandel 1999). Furthermore, development itself is a multidimensional, interactional and dynamic process, which is not easily reduced to or explained by simple categorical constructs. There are no simple answers to simple questions in developmental psychopathology (Horowitz 2003). Therefore, the studies presented in this thesis do not provide any simple or comprehensive answers to the questions concerning what is essential for adjustment or maladjustment in middle childhood, but merely introduce and emphasise some previously rarely examined perspectives in developmental psychopathology and hopefully stimulate interest for further research particularly concerning mothers' psychological factors affecting foetal and subsequent child development, the long-term consequences of prenatal maternal depressive symptoms, and the role of siblings and fathers during child development.

Strengths and limitations

The strengths of Study I included the large and representative sample of the cohort of 8 to 9-year-olds. The drop-out rate was low. The methodological strength was the use of a multi-informant approach with internationally established and valid child psychiatric questionnaires. Specifically the associations between birth order and emotional and behavioural symptoms in children have seldom been studied in large epidemiological samples in children.

One of the most important limitations of Study I is the cross-sectional nature of the study. The timing of children's major life transitions, such as parental divorce or loss of parent, transfer to foster care or adoption, or age spacing between siblings, were not examined in this setting even though they are likely

to have an impact on problem occurrence. Single and step-parent families were not divided by stability or background of the family constellation, i.e. whether the child had experienced a parental divorce or the death of a parent. Even though the sample was large, the numbers of children living in single father families, stepmother families, adoptive families and foster care settings were relatively small. This is probably the reason why the apparently large differences between children living in these settings and children living with both biological parents were always not statistically significant.

The strengths of Studies II-IV were the population-based sample and the use of internationally established, standardised multi-informant measures. The specific strength of Study II was the inclusion of fathers' reports, which is still rare in child psychiatric research, even though researchers nowadays acknowledge the importance of fathers' perspectives in the assessment of their children and families (Webster-Stratton 1988, Hay et al. 1999). The strengths of Studies III-V were the prospective longitudinal setting, which is preferable in studies of development and causal mechanisms in psychopathology (Verhulst and Koot 1991). The strengths of Studies III - V also include the beginning of the follow-up during pregnancy with consideration of prenatal origins of psychopathology, successive assessments with standardised measures, and the lengthy follow-up time.

The limitations in Studies II-V are the small sample size and the relatively high attrition of subjects due to the cumulative effects of drop-out subjects and missing data at the successive assessment points. Even though the proportions of drop-outs and subjects with missing data were acceptable at each of the assessment points, the accumulation of these successive attritions and missing data was remarkable at T6. Due to the small sample size, and possibly the lower response rate among concurrently depressed mothers, the number of mothers with concurrently significantly elevated depressive symptoms was low particularly at T6.

The relative excess of mother-son dyads and families with lower-educated fathers among the drop-outs may have had an impact on the results. The sample in Study II, which included only two-parent families, was particularly enriched with socio-economically better-off families. Because depressive symptoms are more prevalent among mothers in families with lower parental education and SES, and externalising symptoms were found to be more common among boys and children of mothers with depressive symptoms, the excess of these subjects among dropouts has probably reduced the statistical significance of the differences detected between the children of mothers with and without concurrent depressive symptoms. The rates of maternal prenatal depressive symptoms, however, were similar among dropouts and study subjects, so distortion in the results due to sample attrition considering the association between prenatal depressive symptoms and subsequent child adjustment is

unlikely. Although the difference was not statistically significant, the dropout mothers had elevated postnatal depressive symptoms at T3 slightly more often, and this may have diluted the magnitude of the differences detected between children of mothers with and without postnatal depressive symptoms.

The common limitation in each of the studies was the use of questionnaires only instead of clinical interviews. This limitation was for the most part due to practical considerations of time and expense. However, the assessment of both mother's and child's symptom levels instead of mother's and child's interviews establishing clinical diagnoses is arguable in the context of developmental research. As noted in several studies, the present symptoms of the mothers are of more importance for child adjustment than diagnostic status (Hammen et al. 1987, Lee and Gotlib 1989, Seifer et al. 2001). For children, most disorders involve quantitative variations of normal phenomena (Verhulst and Koot 1991). Standardised questionnaires with age-specific norms provide detailed information on the behaviour and functioning of children compared with children of the same age.

Regarding children's emotional and behavioural problems the use of both diagnostic assessment with child reports and parents' and teachers' reports would have been the best option. However, in the diagnostic assessment of children, the diagnosis is based on the occurrence of behavioural and emotional phenomena, which for 8 to 9-year-old children are still mainly reported by parents. This is true particularly considering externalising problems such as antisocial and aggressive symptoms, which are readily noted by parents and teachers. Therefore it is likely that the association between mothers' depressive symptoms and children's externalising symptoms would also have been present using diagnostic assessments. On the other hand, the reliability of parents' and teachers' questionnaires is not so good regarding children's emotional problems such as depression (Elander and Rutter 1996, Kumpulainen et al. 1996). Thus it is probable that the association between mothers' depressive symptoms and children's internalising problems, previously documented in several studies, was not found in Studies II-III because only adults' reports were used. Because mothers' depressive symptoms may have had an impact on their reports, children's self-reports would have made the picture more complete.

Categorisations of mothers into low and high scorers by depressive symptom scores in Studies II, III and V were made. The decision to use the established cutpoint in the EPDS was made for reasons of practicality and clarity: the children of mothers with the most severe depressive symptoms were compared with children of mothers with low levels of symptoms. However, dichotomising may waste valuable data (Green 1998), so the dimensional features in associations between maternal depressive symptoms and child adjustment should be reverted to in further studies.

Family structure in middle childhood

Concerning the hypotheses of the family structure, the finding that children living in families with two biological parents had problems least often and also the lowest levels of internalising and externalising problems was entirely predictable and concurs with earlier studies (Najman et al. 1997, Dunn et al. 1998, Sprujt et al. 2001). Children living with single parents had more often high levels of emotional and behavioural problems on average compared with children living with both biological parents, as also in earlier studies (e.g. Moilanen and Rantakallio 1988, Dunn et al. 1998). In Study I both internalising and externalising symptom levels were higher among children living in single mother families. Given that single mothers are commonly more stressed and have less social support than parents in two-parent families (Gringlas and Weinraub 1995) and at the same time the children in single mother families are more vulnerable to stressors (Gringlas and Weinraub 1995, Lipman et al. 2002), the combinations of vulnerabilities may lead to vicious circles of maternal distress, dysfunctional parenting and child symptoms. However, there is evidence in the literature that in low-stress stable single-mother households child adjustment does not practically differ from two-parent families (Gringlas and Weinraub 1995, Najman et al. 1997, McMunn et al. 2001, O'Connor et al. 2001, Lipman et al. 2002).

According to the findings in study III, living in a single mother family was predictive of internalising symptoms and low social competence, but unexpectedly not of externalising symptoms in children. Given that externalising symptoms show relative stability across developmental stages (Offord et al. 1992, August et al. 1999, Spieker et al. 1999, Brame et al. 2001, Stevenson and Goodman 2001), it is possible that internalising symptoms are more dependent on recent and current environmental influences, such as single parenthood and the family factors leading up to it, than externalising symptoms, which may also originate from genetic and prenatal influences (van Goozen et al. 2000). It should also be noted that the same factors and mechanisms may be associated simultaneously both with the formation of a certain family type and with the occurrence and nature of child problems.

The stability of the family constellation, as mentioned above, was not examined in Study I. However, the trend towards higher rates of problems among children living in step-parent families than among those living with both biological parents or with single parents supports the findings of other studies suggesting that the formation of a new family is a transition creating a challenge for child adjustment (Najman et al. 1997, McMunn et al. 2001).

The question whether single and step-parent families were formed after parental separation, divorce or the death of a parent was likewise not examined.

However, the most common background for the formation of a single parent or single parent family is divorce (Statistics Finland 2003). Divorce and remarriage involve complex processes beginning before and continuing after the individual events of separating or remarrying (Amato and Keith 1991, Hetherington and Stanley-Hagan 1999). Sources of change and disruption for children include, for example, parental conflict before, during and after the divorce, loss of contact with one parent, distressed or diminished parenting of the custodial parent, changed socio-economic status, and possible residential changes leading to changes in the peer groups, day care or school (Hetherington and Stanley-Hagan 1999). The increased rates of emotional and behavioural problems are documented to occur particularly during the first year after the divorce, but also later (Hetherington and Stanley-Hagan 1999, Harland et al. 2002). However, long-term adverse outcomes only apply to a minority of children facing parental divorce (Hetherington and Stanley-Hagan 1999).

The high rates of problems among children living in foster care were expected and parallel with prevalence rates reported in earlier studies (Wolkind and Rushton 1994, Hukkanen et al. 1999). The backgrounds of children living in foster care vary, but usually these children have met with many, often chronic or recurrent adversities including experiences of loss, deprivation, separation, possibly neglect, abuse or otherwise inadequate parenting, parental mental disorders, and psychosocial disadvantage. Studies of risk and protective factors have shown the synergistic effects of multiple risk factors (Rutter 1987, Werner 1989). Emotional and behavioural problems were also highly prevalent among adopted children showing levels equal to children in foster care. However, it should be noted that among the children living in adoptive families and foster care there was a wide variation in problem levels, probably mirroring the diverse backgrounds and life histories of these children. Even if the problem prevalence was high, over half of the children still scored low on the scales.

The results regarding birth order were only partially consistent with the hypotheses. The highest level of internalising symptoms according to parents' reports was detected among eldest children, and eldest children also often scored high in the parental total problem ratings. This finding was parallel with the suggestions of Eisenman (1992) and findings of Feehan and colleagues (1994) that being a firstborn may expose children to higher levels of anxiety. However, in the study by Richter and colleagues (1997), firstborns were a minority among adult psychiatric patients compared with middleborns. These discrepancies in the findings may be due to developmental fluctuation and, on the other hand, to the context-specificity of the ratings. Developmental variation was present in the study by Feehan and colleagues (1994): associations between birth order and psychiatric morbidity varied by the developmental stages of the youngsters. Firstborns at the age of 8 to 9 years may face cumulative stress situations created by, for example, birth of younger siblings and adjustment to changing environments both at home and at school. Adjusting to these stresses in middle

childhood, however, may enhance the firstborns' competence and resilience later in development. Parents may be particularly sensitive with regard to their firstborns, which may partly explain the high scores in parental ratings.

The finding that teachers reported the lowest prevalence of problems in the firstborns parallels with the findings of Taanila and colleagues (2004) and may be explained in several ways. Before the birth of younger siblings, the firstborns has more time alone with parents and could be expected to develop an adult-directed orientation (Eisenmann 1992). Later on eldest children may have to take care of their younger siblings and need to get along with them. This may challenge the adaptivity of the firstborns, but on the other hand, it may also offer the opportunity to learn and practice more mature and constructive social skills in everyday life. This practice in responsibility and social ability may enhance the social competence and reduce the level of behavioural symptoms seen in firstborns in the school context. The hypothesis concerning the middleborns' externalising problems (Paulhus et al. 1999, Rohde et al. 2003) was only partially supported by these findings. Middleborns did show high levels of externalising symptoms on the parents' scales, but on the other hand, they did not differ from eldest children in this respect. At school middleborns showed low levels of externalising symptoms similar to those of the firstborns. The finding that only children scored above the cutoff point on the teachers' scale more often than other birth positions and showed high levels of both internalising and externalising symptoms at school may reflect the fact that only children have had the experience of adults' exclusive company at home but not the opportunities to practice social skills and aggression modulation provided by younger siblings (Dunn 1988).

In this study, sibship size had no association with the proportion of children scoring high on the parents' scale. This finding concurs with the findings of Taanila et al. (2004) and contradicts earlier studies (Werner 1989, Cederblad 1996). The finding may be partly due to the fact that the assessment relied on the parents' report. In large families the parents' threshold for detecting and reporting problems may be higher than in smaller families. The undesirable effects of growing up in large families may stem from other factors like lower standard of living, which in Finland have largely been eliminated by the social support system provided for families with children.

On the other hand, the findings were not consistent when the subscales were considered. Parents did report high levels of externalising problems in their children and particularly boys when the sibship size was six or more. The suggestion of Jensen and colleagues (1988b) that particularly boys in large families may be more susceptible to behavioural problems was thus supported by this finding. At school, however, children with siblings generally had low problem levels with the exception of girls from large sibships. As already mentioned above, it is possible that children living in larger families learn social

skills from their siblings (Dunn 1988, Baydar et al. 1997) and this is reflected as better skills and fewer problems in peer relations at school.

Prenatal influences on child adjustment

The main finding in this dissertation was that prenatal maternal depressed mood was a significant predictor of subsequent child adjustment in middle childhood (III, V). Even though it is common knowledge that brain development begins long before the birth of the child (Nelson and Bosquet 2000) and there is a long history of animal studies showing that maternal pregnancy-related stress affects this development and carries long-term consequences for the offspring's behaviour (Kofman 2002), previous human studies on the associations between prenatal maternal psychological factors and subsequent child development have been rare (Mulder et al. 2002). The studies conducted by Field and her team (Field 1995, Lundy et al. 1999, Field et al. 2002) and Teixeira and colleagues (1999) have suggested that the mechanisms mediating this association are probably predominantly hormonal and neurophysiological in nature.

It is also possible that common genetic causes have an impact both on the occurrence of maternal symptoms (prenatally, and also at subsequent stages) and on child adjustment. On the basis of the data in this study the genetic and environmental contributions cannot be disentangled. Further study is needed on the genetic factors which may influence both maternal depression and child adjustment.

Even though developmental programming during foetal life has recently also stimulated increasing interest in the field of child psychiatry, these findings and the theoretical background emphasising the beginning of child development during pregnancy may still be marginal among researchers and clinicians, at least when compared with the general knowledge of the harmful effects of postnatal depression on child development (which, naturally, also is of central importance).

Since Study III was published, parallel findings regarding prenatal maternal mood and subsequent child adjustment have been made in the Avon Longitudinal Study on Parents and Children (ALSPAC), which is a large-scale prospective cohort study conducted in the UK (O'Connor et al. 2002). In the ALSPAC study prenatally elevated maternal depressive symptoms both at weeks 18 and 32 predicted child's emotional/behavioural problems assessed by mothers when the children were 4 years old. Mothers' postnatal depressive symptoms were also associated with subsequent child adjustment. However, when separate indicators of maternal prenatal anxiety were included in the regression models,

the prenatal depressive symptoms were no longer significant predictors of child problems, but prenatal anxiety (32 weeks) and postnatal depressive symptoms (8 weeks) made independent contributions to the prediction of behavioural and emotional problems in children at age 4 (O'Connor et al. 2002). The findings in Study IV concur with the findings of the ALSPAC study: prenatal symptoms of anxiety and postnatal symptoms of depression were associated with child outcome at 8-9 years. These findings suggest that the association between prenatal depressive symptoms and subsequent problems in child adjustment is related rather to the anxiety component in maternal mood, which is often comorbid with depression, than to “pure” depressive symptoms. It has been shown that even though the EPDS is designed for screening for depression it also is a measure of anxiety (Brouwers et al. 2001), so it is likely that high-scoring mothers according to the EPDS have also been the mothers having the most severe symptoms of anxiety at the assessment points. Furthermore, Green (1998) argues that besides psychiatric states such as depressive disorder the EPDS is a measure of more general distress or dysphoria.

From the unborn child's point of view, however, the main question might not be the exact diagnosis of maternal mood disorder, but the consequences of the mood disturbance 1) for maternal physiological well-being and health behaviour during pregnancy and 2) for maternal psychological well-being postnatally, which has an impact on early mother-child bonding, interaction, and the care provided for the infant.

Prenatal depression may affect maternal health habits during pregnancy, as documented by Zuckerman and colleagues (1989). No detailed examination of maternal health habits during pregnancy was included in this dissertation although it should be noted that poor health habits such as poor diet, smoking, or drug or alcohol consumption, are often associated with depression and are also risk factors for subsequent child development. For example, mothers' smoking during pregnancy has been documented to be a predictor of hyperactivity in 8-year-old children (Kotimaa et al. 2003). However, mothers' smoking and drinking during pregnancy do not explain the impact of mothers' prenatal depressive symptoms on child development, because the association between maternal depressive symptoms and child problems was present even after exclusion of mothers who reported smoking or alcohol consumption during pregnancy. More detailed studies are needed on the association between mothers' depression and health habits during pregnancy and their long-term consequences for child's socio-emotional development.

Besides the physiological and hormonal mechanisms, still another mechanism was assumed to be possible. Prenatal depressive symptoms may affect the mothers' representations of the child, and the continuity of negative maternal mental representations may in turn have a harmful effect on mothers' interaction with her child, on attachment formation, and finally on child

adjustment (Fonagy 1994, Stern 1995). However, even if the continuity of the early negative trajectory from perinatal stage to middle childhood was detected in Study V, the concurrent elevated level of maternal depressive symptoms was not significantly associated with mothers' pre- or postnatal problem assessments. This finding contradicts the findings of Condon and Corkindale (1997) and suggests that the impact of maternal prenatal depressive symptoms on child adjustment is not mediated by maternal psychological representations of the child. Maternal expectations and early perceptions were found to have independent continuity during development, parallel with the findings from earlier studies (Broussard and Hartner 1971, Guerin and Gottfried 1994, Diener et al. 1995).

The role of maternal postnatal depressive symptoms

In Study III, maternal postnatal depressive symptoms predicted low social competence, and in Study IV, maternal postnatal depressive symptom subscores predicted emotional and behavioural problems in children in middle childhood. These findings are in keeping with the findings of Murray (1992), Sharp et al. (1995), Murray et al. (1999), Galler et al. (2000) and Hay et al. (2001), and support the hypothesis that mothers' postnatal depression is a risk factor for long-standing effects on child development. These effects are likely to be consequences of the harmful influences of depression on the mother's functioning in interaction with her infant (Field 1995, Tronick and Weinberg 1997). The particular clinical importance of postnatal depression for child development is based on the considerations of commonness and relative frequency of the onset of maternal depression during the postnatal period (Cox et al. 1993), the harmful impact of depressive symptoms on interpersonal functioning (Weinberg et al. 2001), the high sensitivity of an infant to the quality of interpersonal interaction (Tronick and Weinberg 1997), and the fact that usually the mother constitutes the infant's interpersonal environment during the early months (Murray 1992).

The finding that the occurrence of postnatal depressive symptoms predicted low social competence of the child can be explained in different ways. The findings of earlier studies suggest that the children, and sons in particular, of postnatally depressed mothers are more prone to delays in cognitive development compared with children of non-depressed mothers (Sharp et al. 1995, Galler et al. 2000, Hay et al. 2001). Social competence in the CBCL is a construct including the ratings of number, quality and amount of a child's participation in hobbies, assessment of social skills with other children and parents, and performance in academic subjects (Achenbach 1991a). The possible impact of postnatal depression on the development of cognitive functioning and

attention regulation of the child may to some extent explain the association at least concerning the academic achievements. Another aspect is that taking children to activities and hobbies requires parental activity, which is commonly impaired by depression. Besides postnatal depressive symptoms, concurrent and recurrent maternal depressive symptoms were also associated with child's low social competence. Thus it is possible that the association with postnatal depressive symptoms and child's lower social competence in middle childhood is explained by the recurrence, chronicity or present occurrence of maternal depressive symptoms. These may have impact on the mother's ability to support her child to various activities and social relations, and affect the concurrent mother-child relationship.

The finding that maternal postnatal depressive symptoms according to the EPDS subscale predicted subsequent emotional and behavioural symptoms in children, but that postnatal depressive symptoms according to the EPDS total sum score did not, may reflect the differential influences of various maternal symptoms on mother-child interaction. The depressive symptoms subscore included the core symptoms of depression: depressed mood and loss of interest and pleasure. Mothers having such symptoms are possibly passive and withdrawn in the interaction; and this kind of maternal behaviour has been documented to cause distress in infants (Tronick and Weinberg 1997). The EPDS total score also includes the symptoms of anxiety, which may have different consequences for maternal interactive behaviour. Naturally, the different maternal symptoms do not neatly determine the mother-child interaction and very far-reaching conclusions cannot be drawn on the basis of these findings. However, the differences in mother-child interaction styles between depressed and anxious mothers would be an interesting subject for further studies.

Unexpectedly, mothers with elevated levels of postnatal depressive symptoms did not rate their infants as having significantly more often problems according to the NPI than mothers with low levels of depressive symptoms (V). Early maternal expectations and perceptions of a child seem to have an independent role in the incidence of subsequent problem perceptions. However, the fact that there were no significant associations between the EPDS scores and the categorised NPI scores does not rule out the possibility that mothers with high level of depressive symptoms had more negative perceptions of their infants compared with non-symptomatic mothers. In the NPI the maternal perception of her baby is related to average babies (Broussard and Hartner 1971). Even if mothers with depressive symptoms perceived high problem levels in their own infants, they may have perceived high problem levels in average infants, too. In these cases the categorised NPI scores were not negative, even if the actual maternal perceptions of the infant may have showed high problem levels.

Factors associated with child adjustment in middle childhood

Among the factors associated with mothers' perceptions of children's adjustment in Studies I-V were, in addition to the factors considered above, child's gender (I-III), higher maternal age (III), concurrent depressive symptoms of the mother (II-III), and recurrence of maternal depressive symptoms (III). Factors associated with fathers' and teachers' ratings, however, were in some respects different compared to mothers' ratings.

Study I showed the well-known association between male gender and high levels of emotional and behavioural problems (Cantwell and Rutter 1994, Kraemer 2000). Usually girls are reported to have higher scores in internalising and boys in externalising problems (Achenbach 1991a), but in Study I boys in general scored higher than girls on both internalising and externalising scales. In Study II, fathers reported lower problem levels in their sons compared with mothers' ratings. If the fathers' ratings of problems among girls and boys were compared, the problem levels concerning daughters were at about the same level as the ratings of sons. It should be noted that in Study I most of the parent informants were likely to be mothers. The exceptions were the single father families and possibly father and stepmother families. The gender of the informant may be one of the factors having an impact on the informant's perceptions, personal norms of behaviour and thereby on ratings of problems in children (Jensen 1988a). In Study III only low social competence and no high level of emotional or behavioural problems were predicted by male gender.

Mothers with concurrent depressive symptoms rated their children as having emotional and behavioural problems more often than children of mothers without depressive symptoms (II, III). A plethora of studies has claimed that depressed mothers have negatively distorted perceptions of their children (e.g. Boyle and Pickles 1997, Chilcoat and Breslau 1997, Najman et al. 2000b, Najman et al. 2001, Randazzo et al. 2003). Depressive bias may at least partly explain the results. However, perceptions of mothers were paralleled by fathers' similar perceptions: fathers also reported higher problem levels in children whose mothers had depressive symptoms (II). It is possible that the association between maternal depressive symptoms and high problem levels in fathers' reports is explained by other simultaneous factors, such as simultaneous psychopathology of the fathers or the presence of conflict between parents, having an impact both on parental views and child's behaviour (Seiffge-Kranke and Kollmar 1998). External circumstances often have a simultaneous impact on the well-being of all family members. The balance of previous evidence, however, suggests that the ratings of fathers are less affected by fathers' own psychological adjustment (Webster-Stratton et al. 1988, Seiffge-Krenke and Kollmar 1998, Hay et al. 1999), and therefore fathers' reports may be less biased

than mothers' reports even if the fathers were simultaneously depressed. Fathers' parallel perceptions therefore support the accuracy of dysphoric mothers' ratings of their children, but do not explain the multidimensional processes leading to the child's maladjustment.

On teachers' scales the harmful effects of concurrent maternal depressive symptoms on children were merely shown as reduced level of adaptive functioning in children of mothers with depressive symptoms and not (statistically significantly) as increased levels of emotional or behavioural problems.

It should be noted that when the concurrent associations were examined, the direction of the influence could not be determined. Because problems in the health or well-being of the child are significant predictors of maternal depression (Mathiesen et al. 1999, McLennan et al. 2001), it is possible that in some cases maternal depressive symptoms are consequences and not causes of child's maladjustment.

The cumulative effect of recurrent maternal depressive symptoms on child's functioning and problem occurrence was detected to have an impact particularly on the functioning level of the children according to both mothers' and teachers' ratings, whereas there was more variation in the associations between the recurrence of the depressive symptoms and problem ratings of the children. Further research is needed on the impact of mothers' chronic or recurrent depressed mood on children's adjustment.

Developmental considerations

Examining the complex, dimensional, transactional and continuously changing processes of development over time is a challenging task. However, even by using rather simple measures to define mothers' and children's psychological adaptation or maladaptation over time some important conclusions can be drawn.

The prenatal stage in child development is unique and different from any other stage of development because during pregnancy the development of the unborn child is physiologically connected with the well-being of the mother (Nelson and Bosquet 2000, Kofman 2002, Mulder et al. 2002). Mothers' psychological well-being, social circumstances, and factors like nutrition and health habits influence each other and maternal physiological state, which in turn has an impact on child development with possible long-lasting consequences. Like at any other stage of development, risk and protective mechanisms seldom occur in isolation but are co-existing and interactional. It should also be noted that already during pregnancy fetuses differ from each other in their genetic

constitutions, and as foetal life continues, in their prenatal environments and experiences, which in turn shape the child's way of reacting later in life (van Goozen et al. 2000, Kofman 2002, Mulder et al. 2002). In this context the psychological well-being of the mother during pregnancy is no marginal phenomenon with subtle effects on child development, but a significant and potent predictor of child outcome regardless of the exact mechanism of transmission.

Besides the physiological level, already during pregnancy the child is also developing in the minds of his or her parents (Stern 1995). Parents' psychological representations or expectations of the child in turn are influenced by parents' past and present experiences with significant others (Fonagy 1994, Stern 1995). Parental representations of a child have an impact on how parents will perceive their child, and may ultimately predict subsequent child adjustment (Broussard and Hartner 1971, Diener et al. 1995, Pauli-Pott et al. 2002). On the basis of the findings in this study, it seems that factors other than depressive symptoms affect these expectations among mothers. The birth of the child seems to be an important transition period for the subsequent trajectory of maternal perceptions.

The transition from prenatal to postnatal environment changes the nature of environmental experiences shaping the developing brain (Schoore 2001). In the infancy these experiences occur in interpersonal context, which in turn is shaped by maternal behaviour in the interaction. Maternal regulatory functioning has been shown to be affected by particularly long-lasting depression (Campbell et al. 1995, Lang et al. 1996, Tronick and Weinberg 1997, Carter et al. 2001). However, at this stage the child is also an active participant in the interaction. Vulnerabilities caused by genetic or prenatal environmental influences may have a negative impact on the child's ability to engage in the interaction. Besides by affecting mother-child interaction, maternal postnatal and subsequent depression may affect child development by numerous other systemic mechanisms (Cummings and Davies 1994).

Neither in mothers nor in children is psychopathology a static categorical state. Life transitions may challenge child adjustment, but yet they may at the same time enhance subsequent adaptability. An understanding of the qualities, dimensions and processes within categorical states is essential in developmental psychopathology. There is a continuous interaction between stress and adaptation throughout any human life.

Conclusions

Ratings of adjustment in children at the age of 8 to 9 years are associated with:

- *family structure*. Children living in families with two biological parents had lowest levels of both internalising and externalising problems. Parents reported highest problem prevalence in their firstborn, whereas teachers reported low problem levels among firstborns and high levels among only children. Children in foster care showed the highest level of emotional and behavioural problems, probably due to the cumulative effect of various risk factors. Family structure, however, is only one rough marker of multiple processes having an impact on child mental health. Family transitions such as parental death, divorce, remarriage, birth of siblings and child's learning to cope with siblings are processes challenging child adjustment and exposing children to emotional and behavioural problems. Successful adaptation to these challenges, however, may enhance resilience. For example, the birth of a sibling may be a stress factor for a child but having siblings seems to reinforce children's adjustment in school, possibly by enhancing responsibility, aggression modulation and social skills. In addition to the experiences in the parent-child relationship, the experiences in sibling relationships have been suggested to contribute to child adjustment outside the home.
- *mothers' prenatal depressive and anxiety-related symptoms*. Maternal prenatal depressive symptoms predict particularly externalising symptoms in children, such as aggressive or defiant behaviour. The presence of mothers' prenatal depressive symptoms is a risk factor for the child's subsequent socio-emotional development. Transmission mechanisms are likely to be physiological, particularly if there is a strong component of anxiety in maternal symptoms, but these mechanisms are not very well known. Further studies regarding, for example, the development and functioning of the HPA axis and stress responses in children of prenatally depressed and non-depressed mothers are needed. The possible harmful influence of prenatal depression on maternal mental representations of the child and birth of attachment during pregnancy, and their long term consequences for child's socio-emotional development would also be interesting questions for further studies.
- *mothers' postnatal depressive symptoms*. Maternal postnatal depressive symptoms predict low social competence in children, which means

impaired functioning in activities and social relationships at home and at school. “Core” depressive symptoms in particular (depressed mood, and loss of pleasure and enjoyment) postnatally predict child’s emotional and behavioural problems in middle childhood. Mothers' postnatal depressive symptoms may have long-term consequences for child's development by compromising mothers' early interaction with her child, although other mechanisms, such as genetic influences or the quality of practical daily care, are likely to co-occur.

- *mothers' concurrent depressive and anxiety-related symptoms.* Maternal depressive symptoms are associated with children's externalising symptoms at home as reported by both parents. Maternal concurrent depressive symptoms are also associated with child's low adaptive functioning at school, i.e. impaired ability for learning, working, behaving appropriately and diminished happiness. Mothers’ anxiety-related symptoms are also a strong predictor of child's problems. However, when the concurrent maternal symptoms and child adjustment measures are examined, the direction of the influence cannot be determined and may be reciprocal.
- *the continuity of mothers' negative prenatal expectations of the baby as negative postnatal perceptions of the infant.* If a mother expects a "not better than average" infant and perceives her baby to be "not better than average", she is more likely to rate her child as having emotional and behavioural problems in middle childhood. The continuity of early negative trajectory of mothers' perceptions is a risk factor for subsequent emotional and behavioural problems.
- *gender of the child.* Boys show higher levels of emotional and behavioural problems at the age of 8 to 9 years. Male gender is also associated with vulnerability regarding the level of social competence. The greater vulnerability of boys is likely to be attributable to biological and social factors, but behavioural problems may also be partly due to the norms and expectations of the informants assessing the problem behaviour.
- *the informant's relationship with the child.* Fathers in general reported lower symptom levels in their children than mothers did, and teachers reported higher externalising and lower internalising problem levels in children than mothers did. However, children's behaviour is context and relationship specific and therefore the integration of the ratings of multiple informants is necessary.

Clinical implications

The integrative thinking applied in the framework of developmental psychopathology is also appropriate for the clinical work of child psychiatrists. In clinical work the biological, psychological, social, developmental and relationship aspects have to be considered. Biopsychosocial approaches are needed in assessment and treatment of children and their families.

Regarding family structure it is important to note that changes in the family context are challenges for child adjustment and parents should be aware of their children's needs in these situations. Children living in single parent families are at increased risk for internalising and externalising problems, but the stability of the family constellation and availability of social support mitigate the risk. Particularly children in foster care and in institutions have high levels of emotional and particularly behavioural problems. Because externalising problems involve a great risk for subsequent antisocial and risk behaviour, mental health services should be considered and offered to families whenever there is a need for child protection, and sufficient services should be provided for children living in foster care.

Mothers' psychological well-being contributes to the development and subsequent mental health of the unborn baby already during pregnancy. This should be noted in prenatal care. Mothers' self-reported symptoms of depression and anxiety are of importance. Screening of maternal symptoms by a short questionnaire, or by simply asking the mothers how they are feeling, is not a complicated task. Identifying mothers in need of support and providing adequate services is a way of promoting the mental health of the unborn child.

Maternal well-being is also of importance at subsequent stages of child development, although the risk mechanisms are different. The chronicity and recurrence of maternal depressive symptoms imply the greatest risk for the child, and this should be noted in health care and psychiatric clinics. The child's situation should be considered whenever there is a chronic or recurrent mood problem in the mother.

Problem anticipation regarding the baby is common during pregnancy. However, if a mother's negative anticipations continue in the form of negative perceptions of the baby, this is a risk factor for subsequent child adjustment. Early detection of negative trajectories in maternal perceptions would be

advisable. Therefore continuity, also in the pre- and postnatal health care of mothers and infants, is important.

In the assessment of children multi-informant approach is necessary. From a clinical point of view, there are no "incorrect" perceptions of the child, but different perceptions of the child based on different experiences in relationships in various contexts. The informants are usually significant people in the children's lives. Even if an informant's rating were distorted due to depression, it is important, because perceptions influence the informants' interaction with the child and may have prognostic value regarding subsequent child adjustment. For planning the treatment, however, it is important to pay attention to parents' depressive symptoms. Multiple informants are needed to gain a full comprehension of a child's adjustment in different contexts and relationships.

Acknowledgements

Studies II-V of this dissertation were carried out at the Medical School of the University of Tampere and at Tampere University Hospital. Study I was part of a national epidemiological study, the LAPSET Project.

I wish to express my deepest gratitude to my supervisor, Professor Tuula Tamminen, MD, PhD, for providing me with the opportunity to carry out this study. I have had the great privilege to specialise in child psychiatry and prepare this dissertation under her wise, inspiring and understanding guidance.

I extend my warmest thanks to Fredrik Almqvist, MD, PhD, Professor of Child Psychiatry at the University of Helsinki, for providing his expert advice and solid, encouraging supervision in planning the study and preparing the manuscript.

I am deeply indebted to late Professor Pekka Laippala for his significant contribution to the study. Beginning from the very first research plan, he provided his expertise and most valuable statistical advice.

I sincerely thank the official reviewers of this dissertation, Professor Hasse Karlsson, MD, PhD, and Hanna Ebeling, MD, PhD, for their wise comments and constructive criticism, which helped me to improve the manuscript.

Pälvi Kaukonen, MD, the head of the Department of Child Psychiatry in Tampere University Hospital, has provided valuable senior advice both as co-author and as my chief in clinical work. I am truly grateful for her positive attitude, gentle guidance and flexible support for my work.

My special thanks belong to the members of the excellent I-CAP group, Kaija Puura, MD, PhD, and Mirjami Mäntymaa, MD, for providing a stimulating atmosphere and many helpful comments on my manuscripts. Kaija and Mirjami have shared with me the ups and downs of both research and clinical work and given me some of the most valuable practical advice. We have had quite a many brilliant ideas and immemorial moments of music, laughter and good times together during these years.

I am truly grateful to Raili Salmelin, MSc, PhD, for her careful guidance in the analysis of longitudinal data, for answering my many questions, and for valuable help in preparing the manuscripts. I am also greatly indebted to Anna-

Maija Koivisto, B.Sc., for her expert advice, teaching me to use the SPSS, and patiently helping me with my frequent statistical problems.

I am sincerely grateful to Professor Irma Moilanen, MD, PhD, Professor Jorma Piha, MD, PhD, late Professor Emerita Eila Räsänen, MD, PhD, and Kirsti Kumpulainen, MD, PhD, for the opportunity to participate in the national LAPSET Project, and for interest in my subsequent work.

I wish to express my warmest thanks to Virginia Mattila, MA, for her prompt and always friendly responses to my requests for help with the English language.

I wish to thank all my colleagues and co-workers, particularly the teams of the Outpatient Unit (PLP), the Inpatient Ward (LPS1) and the Family Ward (LPS3) of the Department of Child Psychiatry in the Tampere University Hospital for their encouragement and patience during my many leaves of absence due to research. I also wish to thank the staff in the Medical School for helping me in my work.

Accomplishing of this dissertation would not have been possible without financial support. Grants from the Child Psychiatric Research Foundation, the Medical Research Fund of Tampere University Hospital, the Foundation of Paediatric Research in Finland, the Children's Fund of the Odd Fellow Association and the Emil Aaltonen Foundation are gratefully acknowledged.

Above all, I wish to thank all the mothers, children, fathers and teachers who participated in this study. Their contribution was most significant.

Finally, I want to express my gratitude to my parents Asko and Laura Moisio for their loving support, and for the education with which they equipped me. My dear sisters Asta, Heli and Leila have shown me in practice the fun, warmth and support provided by sibling relationships, for which I am grateful. I thank my husband Aki for his love and confidence, and for all the perspective-widening discussions. My dearest thanks and biggest hugs I owe to my children, Tiia and Juho, who have lived their middle childhood while Mom was writing this dissertation. They have shown unbelievably high adaptive functioning, nearly not at all internalising or externalising problems (despite their mother's occasional dysphoria), and they have brought into their mother's life an enormous amount of joy, pride and happiness.

Tampere, March 17th

Ilona Luoma

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Appendices

1. RA2
2. RB2
3. Covering letter for mothers
4. Covering letter for teachers
5. Written consent
6. General information questionnaire for mothers
7. General information questionnaire for fathers
8. CBCL
9. TRF
10. EPDS
11. NPI
12. Descriptive tables
 - 12.1. EPDS scores at different time points in Study samples II-V
 - 12.2. Competence and problem scores in mothers' and fathers' CBCLs
 - 12.3. Adaptive functioning and problem scores in the TRF

Original communications