MARIE KORHONEN

Developmental Perspectives of Adolescence

Adjustment for maternal depressive symptoms

ACADEMIC DISSERTATION
To be presented, with the permission of
the Board of the School of Medicine of the University of Tampere,
for public discussion in the Auditorium of
School of Health Sciences, Medisiinarinkatu 3,
Tampere, on October 10th, 2014, at 12 o'clock.

UNIVERSITY OF TAMPERE

MARIE KORHONEN

Developmental Perspectives of Adolescence

Adjustment for maternal depressive symptoms

Acta Universitatis Tamperensis 1972
Tampere University Press
Tampere 2014

UNIVERSITY OF TAMPERE

ACADEMIC DISSERTATION
University of Tampere, School of Medicine
Finland

Supervised by
Professor Tuula Tamminen
University of Tampere
Finland
M.D., Ph.D. Ilona Luoma
University of Tampere
Finland

Reviewed by
Professor Hanna Ebeling
University of Oulu
Finland
Professor Hasse Karlsson
University of Turku
Finland

The originality of this thesis has been checked using the Turnitin OriginalityCheck service in accordance with the quality management system of the University of Tampere.

Cover design by
Mikko Reinikka

Distributor:
kirjamyynti@juvenes.fi
http://granum.uta.fi

Acta Universitatis Tamperensis 1972
ISBN 978-951-44-9569-4 (print)
ISSN-L 1455-1616
ISSN 1455-1616

Acta Electronica Universitatis Tamperensis 1459
ISBN 978-951-44-9570-0 (pdf)
ISSN 1456-954X
http://tampub.uta.fi

Suomen Yliopistopaino Oy – Juvenes Print
Tampere 2014

To childhood

CONTENTS

List of original communications

I. Korhonen M., Luoma I., Salmelin R., Tamminen T. (2012) A Longitudinal Study of Maternal Prenatal, Postnatal and Concurrent Depressive Symptoms and Adolescent Well-being. Journal of Affective Disorders 136:680-692.

II. Korhonen, M., Luoma, I., Salmelin, R., & Tamminen, T. (2014) Maternal Depressive Symptoms: Associations with Adolescents' Internalizing and Externalizing Problems and Social Competence. Nordic Journal of Psychiatry 68:323-332.

III. Korhonen M., Luoma I., Salmelin R., Helminen M., Kaltiala-Heino R., Tamminen T. (in press) The Trajectories of Child's Internalizing and Externalizing Problems, Social Competence and Adolescent Self-reported Problems in a Finnish Normal Population Sample. School Psychology International. doi: 10.1177/0143034314525511

IV. Korhonen M, Luoma I., Salmelin R., Helminen M., Tamminen T. Maternal Depressive Symptoms and the Patterns of Child's Internalizing and Externalizing Problems. Submitted.

Abbreviations

ADHD	Attention deficit and hyperactivity disorder
AIC	Akaike Information Criteria
BIC	Bayesian Information Criteria
CBCL	Child Behavior Checklist
CI	Confidence Interval
EPDS	Edinburgh Postnatal Depression Scale
HPA-axis	Hypothalamus-Pituitary-Adrenocortical-axis
M	Mean
MDE	Major Depressive Episodes
mo	Months
OR	Odds Ratio
SD	Standard Deviation
SES	Socioeconomic status
vs	Versus
yrs	Years
YSR	Youth Self Report

Abstract

The pattern of child development is modified by multiple factors. This dissertation addresses the developmental patterns of child's emotional and behavioural problems identified in a Finnish normative sample and how they are associated with social competence in middle childhood and in adolescence. The co-occurrence of emotional and behavioural problems is also studied. Further, the study explores how maternal depressive symptoms from pregnancy to child's adolescence are associated first, with the adolescent's outcome at the age of 16-17 years and second, with the developmental patterns of emotional and behavioural problems of the child from the age of four to five years to the age of 16-17 years. The dissertation explores whether it is the timing, recurrence or the developmental pattern of maternal depressive symptoms that best explains the negative effect of maternal depressive symptoms on child development and adolescent outcome.

The dissertation is a part of a longitudinal study started in 1989 in the city of Tampere, Finland. The original sample of the study consisted of 349 consecutively selected normal population mothers expecting their first child (T1). The later data collection points of the first study stage of the longitudinal process took place after the delivery (T2; n =210 mother/211 children, one pair of twins) and when the children were two months (T3; n = 205/206) and six months old (T4; n = 201/202). The second study stage (T5; early childhood; n = 158/159) was conducted when the children were four to five years old and the third study stage (T6; middle childhood; n = 188/189) at the children's age of eight to nine years. At the latest study stage (T7; adolescence; n = 191/192) the children were 16-17 years old.

In all the study stages maternal depressive symptoms were screened using the Edinburgh Postnatal Depression Scale (EPDS), a ten-item self-administered questionnaire originally designed to detect postnatal depressive symptoms, but also validated for evaluating depressive symptoms among non-postnatal women. The emotional and behavioural problems and the social competence of the child (not at T5) were evaluated at the ages of four to five years, eight to nine years and 16-17 years using the Finnish translation of the Child Behavior Checklist (CBCL) completed by the mothers. At T7 the adolescents also completed the Youth Self-Report (YSR).

The patterns of child's emotional and behavioural problems indicated that most of the children had low or moderate level of problems. However, approximately 10% of the children had a chronically high level of emotional problems from the age of four to five years to the age of 16-17 years (high-stable) and 17% had an initially high pattern of behavioural problems (high-decreasing). The problem levels among those children assigned to the low or high trajectory groups of both emotional and behavioural problems were fairly stable throughout the development while among the children in the biggest trajectory

group the level of emotional problems increased towards adolescence (moderate-increasing; 41%). In addition, an adolescent-onset pattern of behavioural problems was detected (moderate-to-high; 5%). Among the children assigned to that group the level of behavioural problems also increased rapidly towards adolescence. In middle childhood and in adolescence the social competence was poorest among those children assigned to the chronic pattern of emotional problems. When considering the behavioural problems, in middle childhood the social competence was equally good between the children in various trajectory groups. In adolescence, however, the social competence was poorest among the children assigned to the adolescent-onset pattern of behavioural problems. There was also a fairly high co-occurrence between emotional and behavioural problems and one problem type increased the risk of the other.

Maternal prenatal depressive symptoms increased the child's risk for behavioural problems at adolescence. Maternal depressive symptoms two months postnatally increased the child's risk for emotional and behavioural problems as well as poorer social competence in adolescence. Initial exposure to maternal depressive symptoms in early childhood was moreover associated with the child's poorer social competence in adolescence. Boys were found to be more sensitive to maternal perinatal depressive symptoms than girls in terms of behavioural problems and poorer social competence in adolescence. Both adolescent girls and boys had more emotional and behavioural problems as well as poorer social competence if their mothers had depressive symptoms concurrent with their adolescence, especially if the children had also been exposed to maternal depressive symptoms at some point earlier in life. Recurrent maternal depressive symptoms increased the child's risk for emotional problems while chronic maternal depressive symptoms increased the child's risk for behavioural problems and poorer social competence in adolescence. Intermittent maternal depressive symptoms also increased the child's risk for poorer social competence in adolescence. Intermittent maternal depressive symptoms were also associated with the chronic pattern of child's internalizing problems. In addition to the increased risk for behavioural problems of the offspring among those exposed to perinatal and especially prenatal depressive symptoms, the association between maternal depressive symptoms after the perinatal period and child's behavioural problems seemed to be reciprocal.

This dissertation suggests that recurrent, chronic and also concurrent maternal depressive symptoms increase the child's risk for emotional and behavioural problems and poorer social competence. The timing of the exposure may, however, be critical to the developmental task of the child during such exposure. Thus, given that pregnancy and infancy are important developmental periods, maternal depressive symptoms in early life and during pregnancy may have a long-lasting impact on child development. The clinical conclusions of the study stress the importance of early interventions and prevention as well as comprehensively supporting children and families at risk.

Key words: internalizing problems; externalizing problems; social competence; developmental psychopathology; adolescence; maternal depressive symptoms; prenatal depression; postnatal depression

Tiivistelmä

Lapsen kehitystä muovaavat monet lapseen liittyvät sekä ulkoiset tekijät. Tässä väitöskirjassa selvitettiin, millaisia käytöksen ja tunne-elämän ongelmiin liittyviä kehityspolkuja suomalaisilla normaaliväestöön kuuluvilla lapsilla voidaan havaita. Lisäksi tutkittiin, kuinka erilaiset tunne-elämän ja käytöksen oireiden kehityspolut liittyvät lapsen sosiaaliseen kompetenssiin keskilapsuudessa ja nuoruudessa ja kuinka paljon käytöksen ja tunne-elämän pulmia esiintyy samanaikaisesti. Väitöskirjassa tutkittiin myös, kuinka äidin masennusoireet raskausajalta lapsen nuoruusikään liittyvät nuoren psyykkiseen vointiin 16-17 vuoden iässä sekä toisaalta lapsen käytöksen ja tunne-elämän oireiden kehityspolkuihin 4-5 vuoden iästä 16-17 vuoden ikään. Lisäksi arvioitiin, onko äidin masennusoireiden negatiivinen vaikutus lapsen kehitykseen parhaiten selitettävissä masennusoireiden ajoituksella, toistuvuudella tai niiden kehityspolulla.

Tämä tutkimus on osa pitkittäistutkimusta, joka on alkanut vuonna 1989 Tampereella. Alkuperäinen aineisto koostui 349 satunnaisesti valitusta normaaliväestöön kuuluvasta ensimmäistä lastaan odottavasta naisesta (T1). Ensimmäisen tutkimusvaiheen myöhemmät aineistokeräykset ajoittuivat välittömään synnytyksen jälkeiseen aikaan (T2; n = 210 äitiä/211 lasta, yhdet kaksoset), sekä lapsen kahden kuukauden (T3; n = 205/206) sekä kuuden kuukauden (T4; n = 201/202) ikään. Toinen tutkimusvaihe ajoittui lasten 4-5 vuoden ikään (T5; varhaislapsuus; n = 188/159) ja kolmas tutkimusvaihe (T6; keskilapsuus; n = 188/189) lasten 8-9 vuoden ikään. Viimeisimmässä tutkimusvaiheessa (T7, nuoruus; n = 191/192) lapset olivat iältään 16-17-vuotiaita.

Jokaisessa tutkimusvaiheessa äidin masennusoireita arvioitiin kymmenenkohtaisella itse täytettävällä masennuskyselyllä (Edinburgh Postnatal Depression Scale; EPDS). EPDS on alun perin suunniteltu synnytyksen jälkeisen masennuksen seulontaan, mutta sen on todettu olevan validi tunnistamaan naisten masennusta myös muissa elämän vaiheissa. Äidit arvioivat lapsen käytöksen ja tunne-elämän oireita sekä sosiaalista kompetenssia (ei vaiheessa T5) lapsen 4-5-vuoden, 8-9-vuoden sekä 16-17-vuoden iässä käyttämällä suomeksi käännettyä Child Behavior Checklist (CBCL) lomaketta. Tutkimusvaiheessa T7 nuoret täyttivät myös suomeksi käännetyn Youth Self-Report (YSR) lomakkeen.

Tulokset osoittivat, että suurimmalla osalla lapsista käytöksen ja tunne-elämän oireet olivat vähäisiä tai kohtalaisia varhaislapsuudesta nuoruusikään. Kuitenkin noin 10 %:lla lapsista tunne-elämän oirepisteet ylittivät kliinisen tason varhaislapsuudesta nuoruusikään ja 17 %:lla käytöksen oireet ylittivät kliinisen tason varhaislapsuudessa, mutta laskivat hieman ollen alle kliinisesti merkittävän tason nuoruusiässä. Vaikka sekä vähäisen että korkean oireilun ryhmissä oireiden taso oli melko vakaa läpi lapsuuden, suurin osa lapsista (41 %) kuului ryhmään, jossa tunne-elämän oireet lisääntyivät kohti nuoruusikää. Lisäksi 5 % lapsista kuului ryhmään, jossa käytöksen oireet olivat kohtalaisella tasolla varhais- ja

keskilapsuudessa, mutta nousivat kliiniselle tasolle nuoruusiässä (nuoruudessa alkavat käytösongelmat). Sosiaalinen kompetenssi keskilapsuudessa ja nuoruudessa oli huonointa lapsilla, joilla oli kroonisesti kliinisen tason ylittävät tunne-elämän oireet. Käytösoireiden osalta keskilapsuudessa sosiaalisessa kompetenssissa ei ollut eroa ryhmien välillä, mutta nuoruusiässä kompetenssi oli huonointa nuoruusiässä alkavien käytösoireiden ryhmässä. Käytöksen ja tunne-elämän oireet esiintyivät melko usein yhdessä ja lisäsivät toistensa riskiä.

Äidin raskaudenaikaiset masennusoireet lisäsivät lapsen riskiä käytösoireille nuoruusiässä ja äidin synnytyksen jälkeiset masennusoireet lisäsivät lapsen riskiä tunne-elämän oireille ja huonommalle sosiaaliselle kompetenssille nuoruusiässä. Lisäksi äidin varhaislapsuuteen ajoittuvat masennusoireet lisäsivät huonomman sosiaalisen kompetenssin riskiä nuoruusiässä. Pojat osoittautuivat olevan herkempiä äidin raskaudenaikaisen ja synnytyksen jälkeisen masennuksen negatiivisille vaikutuksille nuoruusiässä käytösoireiden ja sosiaalisen kompetenssin osalta. Äidin ajankohtainen masennus lisäsi nuoruusiässä sekä poikien että tyttöjen riskiä tunne-elämän ja käytöksen oireille sekä huonommalle sosiaaliselle kompetenssille, erityisesti jos lapset olivat altistuneet äidin masennukselle myös jossain aiemmassa elämänvaiheessa. Äidin toistuvat masennusoireet lisäsivät nuoruusikäisen lapsen tunne-elämän oireiden riskiä kun taas krooniset masennusoireet lisäsivät lapsen käytöksen ongelmien ja huonomman sosiaalisen kompetenssin riskiä nuoruusiässä. Lisäksi myös äidin ajoittaiset, syvemmät masennusoireet lisäsivät lapsen huonomman sosiaalisen kompetenssin riskiä nuoruusiässä. Vaihtelevat ja syvemmät äidin masennusoireet liittyivät myös lapsen kroonisten tunne-elämän oireiden kehityspolkuun. Sen lisäksi, että käytösoireiden riski oli suurempi lapsilla, jotka olivat altistuneet äidin masennusoireille raskausaikana, suhde lapsen käytösoireiden ja äidin masennusoireiden välillä vaikutti olevan kahdensuuntainen.

Tämä väitöskirja osoittaa, että toistuvat, krooniset ja ajankohtaiset äidin masennusoireet lisäävät lapsen riskiä tunne-elämän ja käytöksen oireille sekä huonommalle sosiaaliselle kompetenssille. Lisäksi altistuminen tiettynä ajankohtana voi häiritä lapsen senhetkistä kehitysvaihetta ja sitä kautta vaikuttaa myöhempään kehitykseen. Koska raskausaika ja lapsen ensimmäinen elinvuosi ovat tärkeitä lapsen myöhemmän kehityksen kannalta, altistuminen äidin masennukselle tänä tärkeänä kehityksen ajankohtana saattaa vaikuttaa lapsen kehitykseen pitkäaikaisesti tai jopa pysyvästi. Tulokset osoittavat varhaisen intervention ja ennaltaehkäisyn tärkeyden sekä tarpeen riskiperheiden ja lasten kokonaisvaltaiseen tukemiseen.

Avainsanat: tunne-elämä oireet; käytöksen oireet; sosiaalinen kompetenssi; kehityspsykopatologia; nuoruus; äidin masennusoireet; raskaudenaikainen masennus; synnytyksenjälkeinen masennus

1. Introduction

Growing up is about acquiring skills and completing certain developmental tasks as well as adjusting to the changes in the environment and in the self. If development is endangered, signs of emotional or behavioural problems or problems in the social or academic competence may emerge. Some of the maladaptation is transient and problems dissipate when the hazard is over. However, occasionally these hazards have a long-lasting influence on child adaptation and development and may even influence the plasticity and maturation of the developing brain.

There are also individual differences in the resilience and the ability to adapt (Masten, 2007; Rutter, 2006a; Sameroff & Rosenblum, 2006). These differences may be genetic or child-related e.g. personality characteristics or neurodevelopmental deficits, or environment-induced like parenting, maltreatment and traumas. Accumulating risk factors also increase the risk for psychopathology (Appleyard, Egeland, van Dulmen, & Sroufe, 2005). Longitudinal studies are essential to explore child development and the continuity and changes in child's problems and competence. Person-centred trajectory analyses have recently offered tools for such studies to explore the different patterns of e.g. child's emotional and behavioural problems (Nagin & Odgers, 2010a; Nagin & Odgers, 2010b; Nagin, 1999)

The level of child's emotional and behavioural problems, whether low or high, has been found to be fairly stable from early childhood to adolescence and even adulthood. Thus the course of the developmental pattern is perhaps determined at a very early age. Adolescence, however, is the developmental period after the early childhood during which changes mostly occur. As the ability to affect control and the verbal expression of emotions improve, the level of behavioural problems is found to decrease while the level of emotional problems is found to increase towards adolescence. However, among some children the behavioural problems may rather increase towards adolescence (Moffitt & Caspi, 2001). The co-occurrence of emotional and behavioural problems is also rather common (Angold, Costello, & Erkanli, 1999). In addition, problems in academic and social competence often precede or accompany emotional and behavioural problems (Burt & Roisman, 2010).

Child development is modified by multiple factors. Maternal depression is known to have a harmful effect on child adjustment and outcome throughout childhood (Goodman, 2007; Talge, Neal, & Glover, 2007; Weissman et al., 2006). Maternal concurrent depressive symptoms are associated with emotional and behavioural as well as social competence problems in the child, although some of the problems diminish over time, especially if maternal depressive symptoms are alleviated (Gunlicks & Weissman, 2008; Pilowsky et al., 2008; Wickramaratne et al., 2011). Maternal prenatal depressive symptoms and stress increase the child's risk for maladaptation in various areas of life (O'Connor, Monk, &

Fitelson, 2014). In addition, postnatal depressive symptoms are also associated with multiple deficits in the child's life including lower IQ and poorer cognitive academic performance (Hay et al., 2001; Murray et al., 2010), attention and aggression problems (Hay, Pawlby, Angold, Harold, & Sharp, 2003) as well as affective problems and depression (Halligan, Murray, Martins, & Cooper, 2007; Murray et al., 2011). Males have been suggested to be more sensitive to the perinatal depressive symptoms of the mother than females (Weinberg, Olson, Beeghly, & Tronick, 2006). However, less is known about the effects of maternal depressive symptoms after the perinatal period on child development and adolescent outcome. It has also been speculated whether the harmful effects of maternal prenatal and postnatal depressive symptoms are rather explained by the recurrent and chronic depressive symptoms of the mother and thus prolonged or recurrent exposure of the child to maternal depressive symptoms. In addition, although the use of trajectory analyses in describing the child's patterns of emotional and behavioural problems has increased, only few studies have explored how maternal depressive symptoms influence the pattern of child's problems from early childhood to the preadolescent or adolescent years (Fanti & Henrich, 2010; Feng, Shaw, & Silk, 2008; Leve, Kim, & Pears, 2005; Sterba, Prinstein, & Cox, 2007). No earlier studies have included prenatal data or the different patterns of maternal depressive symptoms.

This study aims to explore the trajectories of child's emotional (internalizing) and behavioural (externalizing) problems from the child's age of four to five years to the age of 16-17 years in a Finnish normal population sample. In addition, it explores how social competence is associated with different patterns of internalizing and externalizing problems and whether there is co-occurrence of the abovementioned problems. Further, this study explores how maternal depressive symptoms from pregnancy to the adolescence of the child are associated with the internalizing and externalizing problems of the adolescent at the age of 16-17 years and with the developmental patterns of child's internalizing and externalizing problems.

2. Review of the literature

2.1 Towards adolescence

Although the interaction between environment and individual begins already *in utero*, infancy is the base of emerging social and psychological capacities. Emotion regulation is the cornerstone of social and emotional development during infancy (Crockenberg & Leerkes, 2000). A sensitive caregiver facilitates infant's emotion and behaviour regulation and the infant learns to use the caregiver to assist in the regulation of emotions and emotion-linked behaviour (Crockenberg & Leerkes, 2000). Infants also internalize emotion regulation through social learning from the caregivers.

The survival of the child depends on the care of the adult for many years from birth. As the human newborn is unable to seek for shelter and comfort and there is no fur to cling to, the successive attachment on the part of the baby and bonding on the part of the caregiver are evolutionarily crucial (Brüne, 2008). The psychological purpose of the attachment relationship is to reduce infant's stress, regulate emotions and promote exploration (Bowlby, 1988). Attachment theory describes the dynamics of long-term relationships between infant and caregivers. Sensitive responsiveness on the part of the caregiver to the infant's needs and affects is one of the factors influencing the development of a secure attachment relationship between infant and caregiver. Disturbances in the attachment relationship are considered to be the origin of many psychopathological patterns.

Through experiences from the attachment relationship infants and children develop cognitive and emotional representations which serve as guides for future relationships (Crockenberg & Leerkes, 2000). In early childhood the child takes the first steps towards social contact outside the family members. The importance of social contacts and social skills as well as the need for regulating one's own behaviour rapidly increases as the child enters school (Luoma, 2004). The feedback mechanisms from others in social contacts modify the child's self-image and self-esteem.

When entering adolescence, the child encounters new developmental tasks: changes in the body and in sexuality, increasing need and pressure for independence from parents, finding one's place among peers and making decisions on the future. Thus the exposure to stressful life events increases. At the same time the brain undergoes enormous functional and hormonal changes. Because of the increasing independency, the adolescent must also come through affect regulation with less parental assistance. If the base for development is not stable or previous developmental tasks have not been accomplished e.g. due to traumatic events, the new tasks may become overwhelming (Ebeling, 2002). Adolescence

and early adulthood are developmental phases characterized by increased incidence of many psychiatric problems.

Hence, as early attachment and bonding are the base for emotional and behavioural regulation and the representations for later human relations, the foundations for psychosocial development are laid in the early of life. The development is, however, modified by multiple environmental and child-related factors and forthcoming events, which may alter the developmental pattern towards either maladaptation or adaptation.

2.2 Classification of emotional and behavioural problems

Internalizing problems include emotional problems like withdrawn behaviour, somatic complaints, anxiety and depression. A large cross-cultural multicentre study found that in general, internalizing problems increased with age in five out of 24 countries and that girls in most societies tend to score higher on internalizing problems, especially at ages 12 to 16 (Rescorla et al., 2007a; Rescorla et al., 2007b). According to epidemiological data from WHO World Mental Surveys the age of onset of diagnosed internalizing problems anxiety disorders has two distinct sets; separation anxiety and phobias have very early onset ages (median 7-14 years), while generalized anxiety disorder, panic disorder, and posttraumatic stress disorder have much later age-of-onset distributions (median 25-53 years) (Kessler, Amminger et al., 2007a; Kessler, Angermeyer et al., 2007b). The ages of onset for mood disorders are quite similar to those for late-onset anxiety disorders (Kessler et al., 2007a; Kessler et al., 2007b). Especially in females the incidence of mood disorders has been found to rapidly increase in late adolescence and early adulthood (Roza, Hofstra, van der Ende, & Verhulst, 2003). However, even infants and toddlers experience e.g. depression and anxiety although they express emotional distress more comprehensively. Diagnostic criteria like the Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood (DC:0-3) used in infants and toddlers are not as widely used as the Diagnostic and Statistical Manual of Mental Disorders (DSM) or the International Classification of Diseases (ICD) used to diagnose older children and adults with psychiatric problems. One reason for this lesser use of diagnostic criteria could be the rapid and dramatic changes in infant psychological development.

Externalizing problems refers to behavioural problems including oppositional behaviour, conduct problems and also attention deficiency and hyperactivity problems, although the last-mentioned is often categorized as its own entity. The prevalence of externalizing problems has been found to decrease with age and boys in most societies tend to score higher on externalizing problems, especially at ages 6 to 11 than girls (Rescorla et al., 2007a; Rescorla et al., 2007b). Among externalizing problem diagnoses impulse control disorders have been found to have the earliest age-of-onset distributions and also extremely narrow age range of onset risk across countries (Kessler et al., 2007a; Kessler et al., 2007b). In addition, some disorders, such as oppositional defiant disorder, require childhood onset, while some diagnoses, such as antisocial behavioural problems, are not diagnosed until adolescence or late childhood onwards.

Social competence refers to skills in social relations, academic performance and activities. Child's competencies may be as important as problems when evaluating strengths and difficulties and making prognoses as good social competence may also facilitate successful

adaptation (Achenbach, 1991). The developmental cascade model refers to the cumulative consequences of the development of the many interactions and transactions occurring in the developing systems (Masten & Cicchetti, 2010). The cascade model posits that earlier levels and changes in functioning in one domain affect subsequent functioning in a different domain. Studies on the cascade model indicate that early externalizing problems may be a risk for poorer social and academic competence in early school age, which may lead to an increased risk for later internalizing problems (Burt & Roisman, 2010; Masten et al., 2005; Obradovic, Burt, & Masten, 2010; van Lier & Koot, 2010). Poor social competence has also been found to be associated with internalizing problems, in both cascading and bidirectional ways (Burt, Obradović, Long, & Masten, 2008; Cole, Martin, Powers, & Truglio, 1996; Verboom, Sijtsema, Verhulst, Penninx, Brenda W. J. H., & Ormel, 2014).

2.3 Developmental psychopathology

Developmental psychopathology is concerned with the basic mechanisms causing developmental pathways to diverge toward pathological or adaptive outcomes. Longitudinal normal population studies of developmental psychopathology indicate that while most children have a fairly stable pattern of low or moderate levels of emotional and behavioural problems, there is also a high continuity of emotional and behavioural problems from early childhood to young adulthood (Fergusson, 1998; Fergusson, Horwood, & Boden, 2006; Goodwin, Fergusson, & Horwood, 2004; Haavisto et al., 2004; Hofstra, Van der Ende, & Verhulst, 2000; Pihlakoski et al., 2006; Sourander et al., 2005).

The development of emotional and behavioural problems is a complex interplay between risk and protective factors of the child, parents and the environment. In addition, the continuity of psychopathology may be homogenous or heterogeneous, that is, the problem profile may also change in the course of the development. Symptoms and disorders tend to evolve over time as the brain develops before crystallizing into an operational diagnostic entity. Sroufe et al. (Sroufe, Egeland, Carlson, & Collins, 2005; Sroufe, 2005) have proposed the term *Developmental nosology,* which refers to pathways rather than syndromes and is characterized by the following aspects:

1) Multiple pathways can lead to the same outcome (*equifinality*) and
2) The same initial pathway can lead to multiple outcomes (*multifinality)*

Emotional and behavioural problems have shown complex and multiple pathways and the same mental health diagnoses in adolescence or adulthood may have different developmental pathways in childhood (Reef, Diamantopoulou, van Meurs, Verhulst, & van der Ende, 2011; Roza et al., 2003).

In addition, the same difficulties in childhood may lead to different kinds of difficulties in adulthood. Externalizing problems in childhood, although continuing into adolescence and adulthood have also been found in many studies to be related to anxiety in adolescence or adulthood. Longitudinal studies have identified a subgroup of childhood behavioural difficulties whose later difficulties are not antisocial behavioural problems but social isolation, avoidance of close relationships and susceptibility to anxiety and depressed mood

(Rutter, Kim-Cohen, & Maughan, 2006). A longitudinal study of a Dutch normal population sample indicated that anxiety/withdrawn behaviour in childhood was related to affective problems, while social difficulties and externalizing behaviour were related to anxiety in adolescence and early adulthood (Roza, Hofstra et al. 2003). The authors suggested that affective problems and anxiety may have different developmental pathways. Another study on the same Dutch longitudinal sample found that social problems at school entry were a pathway to overall internalizing problems at preadolescence, but only for boys (Mesman, Bongers, & Koot, 2001). In addition, the study indicated that early oppositional behaviour at home reflected a general susceptibility to psychopathology, especially internalizing problems, in both genders. Thus some children may express emotional distress through behavioural problems and, as the cognitive abilities and emotion expression improve, the identification and expression of anxiety also evolves. The outcome may also be modified by later environmental or child-related factors.

3) Change is possible at many points of development

Brain development was earlier found to have critical periods, which were regarded as a subset of sensitive periods, termed *experience-expectant programming* (Glaser, 2012; Greenough, Black, & Wallace, 1987). The sensitive periods are well established in some areas of brain development, as in the development of eyesight. However, with the proliferation of studies using neuroimaging and the enhanced understanding of brain plasticity the term *experience-adaptive programming* has been proposed (Rutter, 2002). It postulates that neurobiological changes following stress or negative life experiences in early childhood are adaptive to the environment. For example, children living in a threatening environment learn to identify anger preferentially as it is adaptive for their survival (Glaser, 2012; Tottenham et al., 2011). Another aspect of neuroplasticity is ability to learn, termed by Greenough et al. (1987) *experience-dependent* development. This is associated with the formation of new synapses and continues into adulthood, although at a decelerated rate.

Longitudinal studies have identified not only persistently low or high patterns of behavioural problems but also childhood limited and adolescent-onset patterns of emotional and behavioural problems (see Chapters 2.3.1 and 2.3.2), indicating a change in the developmental patterns. The factors associated with these changes in the symptom course, however, are not yet well identified. However, turning points in the developmental patterns of psychopathology do occur, both for better and worse.

4) Change is constrained by prior development

Experiences especially in the early years of human life modify brain structures. For example, the amygdala is the brain structure involved in memory processing and emotional learning reactions. The amygdala undergoes early rapid development and has been found to enlarge under stressful conditions (Pechtel, LyonsRuth, Anderson, & Teicher, 2014; Tottenham et al., 2010). The cost, however, is difficulty in self-regulation and modulations of arousal. Studies on institutionalized and maltreated children have also found differences in the neural circuitry (Moulson, Fox, Zeanah, & Nelson, 2009), structural changes in brain connectivity from the amygdala to the prefrontal cortex (Eluvathingal et al., 2006) as well as altered patterns of EEG power and coherence (Marshall, Reeb, Fox, Nelson, & Zeanah, 2008; Otero, Pliego-Rivero, Fernandez, & Ricardo, 2003; Tarullo, Garvin, & Gunnar, 2011). In addition prefrontal cortex reduction in the size of the corpus callosum (Teicher et al., 2004) and changes in the neural pathways (Choi, Jeong, Rohan, Polcari, & Teicher, 2009; Choi, Jeong, Polcari, Rohan, & Teicher, 2012) have been identified among those

exposed to maltreatment in childhood. The changes in brain structure and functions related to early experiences are only partially reversible, or not at all (Glaser, 2012).

5) Early caregiving is important.

Despite neuroplasticity there are probably changes that are at least to some extent irreversible or possible only during a certain sensitive period. Romanian adoptee studies indicate that institutional deprivation for over six months of life has a major effect on pervasive impairment at the age of 11 years (Kreppner et al., 2007). Those adopted before the age of six months had significantly less impairment at the age of 11 years. In addition, those adopted after the first eight months of life have also been found to have higher cortisol levels than those adopted earlier (Gunnar, Morison, Chisholm, & Schuder, 2001). Thus the longer the pathological pathway is pursued, the more difficult change becomes.

2.3.1 Trajectories of internalizing problems

The studies exploring the developmental trajectories of *internalizing problems* of normal population children have indicated three main patterns: low, moderate-increasing and chronically high, most of the children being assigned to the first two groups (Brendgen, Wanner, Morin, & Vitaro, 2005; Brendgen, Lamarche, Wanner, & Vitaro, 2010; Dekker et al., 2007; Fanti & Henrich, 2010; Sterba et al., 2007; Figure 2.3.1.). The percentages of children assigned to the high trajectory group of internalizing problems in different studies varies from 9% to 18% depending e.g. on the total number of trajectory groups in each study.

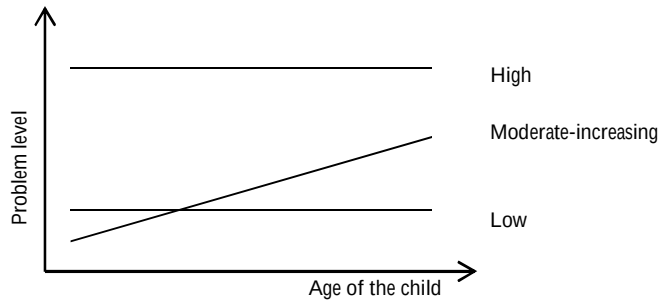

Figure 2.3.1. An illustration of the trajectories of child's internalizing problems identified in longitudinal studies.

As previously mentioned, from adolescence onwards girls have been found to have more internalizing problems than boys, and some trajectory studies have also found gender differences. A study by Jenkins et al. (2008) found boys' internalizing problems to decrease and girls' to increase from late childhood to adolescence. Leve et al. (2005) reported similar gender differences from the age of five to the age of 17). Dekker et al. (2007) reported quite similarly shaped trajectories of low and moderate levels of internalizing problems for both genders between the ages of four and 18 years. However, among boys there was also an inverse u-shaped trajectory of high depressive symptoms peaking in childhood as well as a high-decreasing trajectory of depressive symptoms. Conversely, among girls moderate-increasing and high increasing trajectories were identified (Dekker et al., 2007). On the other hand, Sterba et al. (2007) found no differences in the shapes of children's trajectories

of internalizing problems between ages two and 11. The trajectory groups they identified were low, decreasing-increasing and elevated-stable for both genders. However, there were more girls in the elevated-stable group (21% vs. 13%) and more boys in the decreasing-increasing group (22% vs. 10%). Girls also had a more rapid increase in internalizing symptoms in the decreasing-increasing group (Sterba et al., 2007). In the study by Dekker et al. (2007) six different trajectory groups were identified compared to one to three trajectory groups in other studies, which may explain the different findings. The different age ranges may also explain some of the differences.

2.3.2 Trajectories of externalizing problems

Most studies on the trajectories of externalizing problems have used narrow definitions of behavioural problems, especially disruptive behaviour and physical aggression, and a few studies also ADHD. Externalizing problems have been reported to have low, moderate, chronically high and decreasing trajectories from childhood to adolescence (Brame, Nagin, & Tremblay, 2001; Broidy et al., 2003; S. Cote, Zoccolillo, Tremblay, Nagin, & Vitaro, 2001; Fanti & Henrich, 2010; Leve et al., 2005; Miner & Clarke-Stewart, 2008; Moffitt, 1993; Monahan, Steinberg, Cauffman, & Mulvey, 2009; Odgers et al., 2008; Reef et al., 2011; Shaw, Lacourse, & Nagin, 2005; Tremblay et al., 2004; Zhou et al., 2007; Figure 2.3.2.). Girls and boys have been found to have quite similar patterns of behavioural problems (Cote et al., 2009; Leve et al., 2005). The percentages of children assigned to the chronically high group of behavioural problems vary from 7% to 18% between different studies and different outcome measures. In a study by Shaw et al. (2005) the outcome measure used was "hyperactivity and attention problems" and 20% of the children were assigned to the chronically high trajectory group.

Some trajectory studies have reported trajectories of adolescent-onset externalizing problems, especially antisocial behaviour (Monahan et al., 2009; Odgers et al., 2008; Reef et al., 2011), while others have not (Broidy et al., 2003). The percentages of children assigned to the adolescent-onset behavioural problems vary between 12% and 15%.

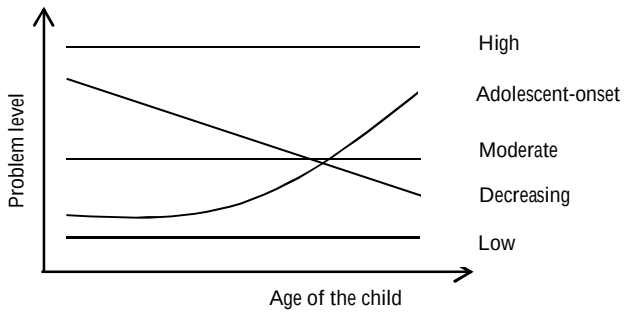

Figure 2.3.2. An illustration of the trajectories of child's externalizing problems identified in longitudinal studies.

The patterns of adolescent-onset behavioural problems are supported by the findings reported by criminologists indicating that offending rates increase through adolescence peaking around the age of 16 or 17 years and drop sharply in young adulthood (Saunders, 2007). Terrie Moffitt's developmental taxonomy of delinquency hypothesizes that there are

two types of offenders: life-persistent offenders and adolescence limited offenders (Moffitt, 1993; Saunders, 2007). Moffitt's theory suggests that the contemporary gap between biological and social maturity encourages some teens to mimic antisocial behaviour in ways that may be more of adaptive social behaviour rather than pathological. Adolescence-limited offenders desist in antisocial behaviour once the behaviour ceases to be rewarding, and thus they can return to the more rewarding prosocial behaviour they learned as children. The theory has been supported by findings indicating that, compared to childhood-onset antisocial problems adolescents with adolescent-onset problems lack the social, familial and neurodevelopmental risk factors from childhood (Moffitt & Caspi, 2001; Odgers et al., 2008). However, both adolescent-onset and childhood-limited behavioural problem types have been found to be associated with various difficulties in adulthood (Odgers et al., 2008; Reef et al., 2011).

Comparing the abovementioned studies, however, is difficult due to the differing definitions of behavioural problems used. A study by Reef et al. (2011) found that there are in fact differences in the adult outcome depending on the type of externalizing problems in childhood. As all types of aggression in childhood were associated with disruptive behaviour in adulthood, status violations like runaways, truancy and obscene language were associated with substance abuse, anxiety and mood disorders (Reef et al., 2011). In addition, oppositional behaviour in childhood was associated with anxiety disorders in adulthood, also found in the studies by Roza et al. (2003) and Meshman et al. (2001) referred to earlier. According to a study by Reef et al. (2011) only status violations showed an adolescent-onset pattern.

2.3.3 Co-occurrence

There is also high co-occurrence between emotional and behavioural problems (Achenbach, 2001; R. Chen & Simons-Morton, 2009; Pihlakoski et al., 2006; Reinke, Eddy, Dishion, & Reid, 2012; Ritakallio et al., 2008; Sourander et al., 2005; Wiesner & Kim, 2006). This co-occurrence has been explained in various ways (Angold et al., 1999; Wolff & Ollendick, 2006). One possibility is diagnostic overlapping, as internalizing and externalizing behaviours may present with similar symptoms, such as irritability. Both internalizing and externalizing problems may also share the same environmental risk factors e.g. parental psychopathology or hostility, which expose the child to maladjustment (Achenbach, 2001). Internalizing problems, such as depression, may also be a risk factor for externalizing problems like conduct problems or vice versa (Pihlakoski et al., 2006; Reinke et al., 2012; Ritakallio et al., 2008; Rutter et al., 2006).

It has also been discussed whether co-occurrence of internalizing and externalizing problems is a distinct syndrome (Fanti & Henrich, 2010; O'Connor, McGuire, Reiss, Hetherington, & Plomin, 1998). It has been argued that behavioural difficulties are a group of problems involving multiple dysfunctions, including behavioural and emotional dysregulation and cognitive disabilities and distortions (Rutter et al., 2006; Wolff & Ollendick, 2006). Nevertheless, comorbidity has been found to worsen the prognosis of later adjustment (Fanti & Henrich, 2010; Sourander et al., 2007; Wolff & Ollendick, 2006).

2.3.4 What predicts child psychopathology?

Family conflict and other environmental stress factors play an important role in the outcome of adolescents' psychopathology (Najman et al., 1997; Shiner & Marmorstein, 1998). A fairly well studied familial risk factor associated with child psychopathology is parental mental health problems (Brennan, Le Brocque, & Hammen, 2003; Goodman, Brogan, Lynch, & Fielding, 1993; Klein, Lewinsohn, Rohde, Seeley, & Olino, 2005; Lewinsohn, Olino, & Klein, 2005). Other familial risk factors include single parenting (Goodman et al., 1993), low marital satisfaction and family discord (Hammen, Brennan, & Shih, 2004), mother's dissatisfaction with her social support (McCarty, McMahon, & Conduct Problems Prevention Research, 2003), paternal substance abuse (Brennan et al., 2003), low family income (Leve et al., 2005), harsh discipline (Leve et al., 2005; Miner & Clarke-Stewart, 2008) and maternal expressed emotion criticism or overinvolvment (Frye & Garber, 2005; Tompson et al., 2010).

Child related risk factors found to impact psychopathology include difficult infant temperament (Miner & Clarke-Stewart, 2008), shy and withdrawn child's temperament (BoothLaForce & Oxford, 2008; Feng et al., 2008; Leve et al., 2005; Miner & Clarke-Stewart, 2008) and neurodevelopmental deficits (Odgers et al., 2008). At adolescence the importance of peer relations in individual's mental health increases (Brendgen et al., 2005; Brendgen et al., 2010; Fanti & Henrich, 2010). In addition, cumulative risk factors have been found to increase the risk for psychopathology (Appleyard et al., 2005).

Genetic studies propose that genetic heredity explains approximately half of internalizing and externalizing psychopathology. In a twin study on a Canadian sample the heritability estimates for externalizing problems ranged between 43% and 62% and for internalizing problems between 28% and 48% for both girls and boys (Haberstick, Schmitz, Young, & Hewitt, 2005). Another twin study on the co-variation between depressive symptoms and antisocial behaviour (O'Connor et al., 1998) found approximately 45% of the observed co-variation to be genetically mediated in a normal to moderate risk sample. Among some individuals externalizing conduct problems and internalizing anxiety/withdrawal have been found to be fairly stable behavioural dimensions and may be seen as generalized behaviour models (Goodwin et al., 2009; Hofstra, van der Ende, & Verhulst, 2002). In a longitudinal twin study the stability of withdrawn behaviour was mainly explained via genetic effect, explaining 74% stability in boys and 65% in girls, while shared environmental effects explained only 7% in boys and 17% in girls (Hoekstra, Bartels, Hudziak, Van Beijsterveldt, & Boomsma, 2008). Thus the genetic heritability of a more stable behaviour dimension could be higher than that of a syndrome or disorder.

In the earlier years of genetic studies there were high hopes of finding an aetiological origin for all psychiatric disorders from genes (Rutter, Moffitt, & Caspi, 2006). The present belief is rather interplay between genes and environment that is multifactorial and probabilistic rather than the deterministic origin of most disorders, also including other than psychiatric disorders (Plomin & Asbury, 2005; Rutter et al., 2006). Epigenetics and studies of brain plasticity imply that the interplay between genes and environment is bidirectional. An example of interplay between genes and environment is the rat studies by Meaney and his colleagues. They reported that the nursing habits of rats are genetically inherited by the offspring. However, adopting a baby rat from one kind of nursing habits

to another also modifies the offspring's gene expression, thus the effect is epigenetic and plastic to changes depending on the environment (Szyf, Weaver, & Meaney, 2007). It has also been suggested that powerful environmental risk factors mitigate the impact of genetic factors (Rutter et al., 2006).

On the other hand, the genetic influence may increase over the environmental influence during adolescence as individuals come more able to control their environment (Kendler & Baker, 2007). Rutter, Moffit and Caspi (2006) suggest in their review that two firm conclusions can be drawn. First, experiences *do* affect gene expression and second, epigenetic effects *do not* constitute the only possible process in psychopathology. Mind, thoughts, personality characteristics and psychosocial experiences influence one's choices and reactions to events in life, and thus individuals also modify the environment and the expression of genes.

2.3.5 Resilience

Why do some adolescents seem to do well despite environmental risk experiences, stress and adversity? Rutter (2006b) considers that resilience and overcoming stress or adversity may depend either on experiences following the risk exposure, or on the genetic effects on susceptibility to the environment, or the physiological and psychological responses to the environmental hazard. Resilience may also be seen as individuals' agency, such as coping skills and strategies, that is, what the person does when encountering a stressful event (Rutter, 2006b). It should be noted, however, that resilience to stress is relative, not absolute and the degree of resistance varies over time and according to circumstances (Rutter, 1985). The timing of the event in light of the developmental phase of the child also matters (Rutter, 1985).

Studies have reported that the individual's ability to work and engage in supportive and intimate interpersonal relationships contributes to the resilient outcomes of children (Beardslee, Versage, & Gladstone, 1998) and adults (Collishaw et al., 2007). In addition, perceived parental care and adolescent peer relations have been shown to be related to adult resilience among those exposed to maltreatment in childhood (Collishaw et al., 2007). In a study by Brennan et al. (2003) maternal warmth and low levels of maternal overinvolvement seemed to predict resilient outcome in adolescents of depressed mothers (Brennan et al., 2003).

The role of intelligence in the concept of resilience is not clear. Although intelligence has been shown to be associated with more favourable psychopathological outcomes, it does not seem to be an important predictor of resilience (Rutter, 2007; Sameroff & Rosenblum, 2006). However, Horowitz and Garber (2003) found that adolescent intelligence was a protective factor against adolescent depression if there was no or less chronic maternal depression but was a risk factor for children of mothers with more chronic depression (Horowitz & Garber, 2003). On the other hand, in a study by Malcarne et al. (2000) children between the ages of 8 and 12 whose mothers were depressed but who had higher levels of verbal ability were significantly less likely to report experiencing depressive symptoms and internalizing problems (Malcarne, Hamilton, Ingram, & Taylor, 2000). Thus the intellectual abilities represented by verbal ability, which could also be seen

partially as an acquired coping skill, may constitute a buffer against distress, particularly the experience of depressive symptoms, at least in childhood.

Hay and Pawlby (2003) found that children exposed to maternal depression evaluated themselves to be more prosocial than their mothers and teachers. The authors discuss whether children's reports are less reliable or whether positive self-perception should be seen as a source of resilience for the child in difficult family circumstances (Hay & Pawlby, 2003). Nevertheless, resilience is not absence of risk factors, but rather a combination of an individual's capacities and environmental risk and protective factors affecting and occurring in an individual's life in a proper force and timing.

The differential susceptibility hypothesis by Belsky and Pluess (2009) and the biological sensitivity to environment thesis by Boyce and Ellis (2011) suggest that individuals characterized by high environmental susceptibility display an enhanced sensitivity to both negative and positive environments. Thus the characteristics of individuals making them disproportionately susceptible to adversity also make them disproportionately likely to benefit from contextual support. Exposure to stressful environments may upregulate biological sensitivity to context, thereby increasing the individual's capacity and tendency to detect and respond to environmental stress (Belsky & Pluess, 2009; Ellis, Boyce, Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2011). In that sense, a reasonable amount of stress may even benefit development in some areas.

2.4 Maternal depressive symptoms and child development

The prevalence of major depressive episodes (MDE) is one and half to three times higher in women than men (Burke, 2003; Goodman, 2007). Approximately five to 21 percent of women experience MDE at some point of their lives (Burke, 2003; Goodman, 2007). Maternal depression is especially common in women in the childbearing years. The rates, however, are strikingly similar throughout the motherhood from pregnancy, postpartum period and overall throughout the childbearing years (Goodman, 2007). The nature of depression is recurrent and ranges from subsyndromal depression or elevated depressive mood to major depressive disorder (Goodman, 2007) and patients' diagnoses also change from one depression subtype to another over time (Chen, Eaton, Gallo, Nestadt, & Crum, 2000; Judd, Akiskal, & Paulus, 1997).

Children of depressed mothers are at risk for abnormal development and subsequent psychiatric problems (Beardslee et al., 1998; Lewinsohn et al., 2005; Weissman et al., 2006). It has been postulated that the harmful effects of maternal depression are rather due to the recurrent and chronic nature of depression or then there are sensitive periods, e.g. pregnancy and the postnatal period, when maternal depression is especially harmful to child development.

Some studies suggest that adolescent girls are more sensitive to maternal depression and distress than boys (Crawford, Cohen, Midlarsky, & Brook, 2001; Davies & Windle, 1997; Duggal, Carlson, Sroufe, & Egeland, 2001; Fergusson, Horwood, & Lynskey, 1995; Jenkins & Curwen, 2008). Contrary to this, boys have been estimated to be more sensitive than girls to maternal depression during pregnancy and infancy (Carter, Garrity-Rokous,

Chazan-Cohen, Little, & Briggs-Gowan, 2001; Essex, Klein, Cho, & Kraemer, 2003; Hay et al., 2001; Hay, Pawlby, Waters, & Sharp, 2008; Murray, Kempton, Woolgar, & Hooper, 1993; Murray, Marwick, & Arteche, 2010; Weinberg et al., 2006).

The following sections review the literature on the associations between the timing and the course of maternal depression and depressive symptoms and child development.

2.4.1 Maternal prenatal depressive symptoms

Studies especially on maternal prenatal depression are confounded by moods that are co-morbid with depression, such as anxiety and anger as little is known about the possible differences in the neuroendocrine responses to the various causes of prenatal stress (Field, Diego, & Hernandez-Reif, 2006). Many studies on the biochemical effects of maternal depression on the child in fact talk about maternal stress, which can be considered to include both depression and anxiety. There may, however, be actual differences in the infant's neuroendocrine profile depending on the type of stress exposure, as although depression and anxiety in general have been found to be related to higher cortisol levels, the infants of mothers with post-traumatic stress syndrome have been found to have lower cortisol levels (Glover, O'Connor, & O'Donnell, 2010; Yehuda et al., 2005). Whereas high cortisol levels have been found to be associated, for example, with anxiety and behavioural problems in the offspring, low cortisol levels have been found to be associated with post-traumatic stress (Glover et al., 2010; Yehuda et al., 2005). Longitudinal studies in developmental psychopathology also suggest that depression and anxiety may actually have different developmental pathways in childhood (Roza et al., 2003).

Maternal prenatal depression has been found to have physiological effects on the foetus and the neonate. Foetuses of prenatally depressed mothers have been found to be more active, have higher heart rate, increased physiological reactivity and to be at heightened risk of being born prematurely (Field et al., 2006). Neonates of prenatally depressed mothers are at greater risk for having low birthweight, being small for their gestational age as also for showing greater relative right frontal EEG activity and lower vagal tone (Field et al., 2006; Weinstock, 2008). They also displayed more irritability and less activity, robustness and endurance during the Brazelton neonatal behaviour assessment (Field et al., 2006).

Maternal prenatal depressive symptoms have been found to be associated especially with higher prevalence of externalizing problems but also internalizing problems such as depression in the offspring in childhood and adolescence (Hay et al., 2008; Hay, Pawlby, Waters, Perra, & Sharp, 2010; Luoma et al., 2001; O'Connor, Heron, Glover 2002; O'Connor et al., 1998; Pawlby, Hay, Sharp, Waters, & O'Keane, 2009; Van den Bergh & Marcoen, 2004; van den Bergh et al., 2006). The South London Child Development Study (SLCDS) followed up mothers and children from pregnancy to the 16 years of age of the child. The number of families at the latest data collection point was 137. The researchers found that women with a history of conduct problems were at elevated risk for experiencing prenatal depression (Hay et al., 2010). Further, maternal prenatal depression was associated with offspring's antisocial behaviour in adolescence when other risk factors and later exposures to maternal depressive symptoms were taken into account. In addition, mother's past history of conduct problems increased the child's risk for antisocial

behaviour but did not remove the effect of prenatal depression. Another study on the same sample found the offspring's risk for depression at the age of 16 to be 4.7 times higher if there had been exposure to prenatal depression (Pawlby et al., 2009). The effect of prenatal depression on offspring's depression was mediated by repeated exposures. Each adolescent depressed at the age of 16 had been exposed to maternal depression at some point of their life. However, only 20.7% of the adolescents exposed to maternal depression had depressive disorder at the age of 16. This particular study did not consider prenatal depression as an independent risk factor without the confounding effect of later exposures.

Some longitudinal samples have studied maternal prenatal anxiety rather than depression. The effects of maternal prenatal anxiety on child development are in many ways similar to those of prenatal depression (O'Connor et al., 2002; O'Connor, Heron, Golding, Beveridge, & Glover, 2002; O'Connor, Heron, Golding, Glover, 2003; Van den Bergh & Marcoen, 2004; Van den Bergh et al., 2005; van den Bergh et al., 2006).

'*In utero* programming' was first recognized between the links of low birthweight and health outcomes in adulthood by Barker and colleagues and led to the Fetal Origins Hypothesis (Barker, 1998). It proposes that some diseases, like coronary heart disease, originate through responses to nutrition during foetal life and infancy and these responses permanently change the body's structure, physiology and metabolism. The effects of maternal prenatal depression and anxiety on the newborn have also been considered in light of the Fetal Origins Hypothesis (O'Connor et al., 2003). It postulates that the foetus is preparing itself to the world outside the uterus according to the best of its knowledge. Thus, if the mother is depressed or otherwise stressed with elevated cortisol levels, the foetus assumes that surviving in the outside world demands elevated cortisol levels and high stress reactivity. Evolutionarily this ability has been adaptive, but in a modern world it may result in maladaptive processes and increase the vulnerability to psychopathology (Glover et al., 2010). Maternal prenatal stress may also alter the epigenetic programming of the foetus *in utero* (Szyf et al., 2007).

2.4.2 Maternal postnatal depressive symptoms

Postnatal depression and its effects on child development have been widely studied. Maternal postnatal depression may interfere in the mother-infant relationship and thus infant's well-being, but it may also have a long-lasting impact on the child's development over a longer period of time (Abbott, Dunn, Robling, & Paykel, 2004; Halligan et al., 2007; Hay et al., 2008; Hay et al., 2010; Luoma et al., 2001; Luoma et al., 2004; Maki et al., 2003; Murray et al., 2011; Murray et al., 2010; Pawlby et al., 2009).

A longitudinal study by Murray and colleagues reported that adolescents exposed to maternal postnatal depression showed elevated cortisol levels (Halligan, Herbert, Goodyer, & Murray, 2004), had elevated rates of affective disorders by 13 years of age (Halligan et al., 2007) and more depression at the age of 16 (Murray et al., 2011). Additionally, the academic performance was poorer among 16-year-old boys whose mothers' had experienced postnatal depression (Murray et al., 2010). Hay et al. (2001) also documented with another sample that children of postnatally depressed mothers had poorer cognitive ability at the ages of 11 and 16 and more attention problems than other children. The

impact was found to be greater for boys than for girls (Hay et al., 2001; Hay et al., 2008) and the effect was already apparent at the age of four in the same community sample (Cogill, Caplan, Alexandra, Robson, & Kumar, 1986). In another study on the same sample postnatally depressed mothers' children were reported to be more violent at the age of 11, in addition to having problems in regulating attention and emotion (Hay et al., 2003). Maternal postnatal depression has also been found to increase the risk for poorer social competence (Luoma, 2004) and co-occurring internalizing and externalizing problems (Fanti & Henrich, 2010).

2.4.3 Maternal depressive symptoms at offspring's childhood

There are not many studies exploring exposure to maternal depressive symptoms in childhood and the offspring's subsequent outcome. Most studies consider the concurrent effect of maternal depressive symptoms on child outcome (Chapter 2.4.4). Some studies have found exposure to maternal depressive symptoms after infancy to be associated with more externalizing problems in childhood (Alpern L., 1993; Brennan et al., 2000; Essex, Klein, Miech, & Smider, 2001). A study by Munson et al. (2001) found that children whose mothers reported higher levels of depressive symptoms between child's age of four and nine years had higher levels of externalizing problems at the age of nine years and the problem level increased faster than among children whose mothers reported low level of depressive symptoms (Munson, McMahon, & Spieker, 2001). Miner et al. (2008) confirmed the finding with another sample, but only in maternal reports and not in teachers' reports of externalizing problems.

2.4.4 Maternal concurrent depressive symptoms

Maternal concurrent depression has been found to have an impact on child and adolescent well-being assessed by various measures and evaluators (Luoma et al., 2001; Malcarne et al., 2000; Nelson, Hammen, Brennan, & Ullman, 2003; Pilowsky et al., 2006; Tompson et al., 2010). A study by Malgarne et al. (2000) showed that eight to 12-year-old children of concurrently depressed mothers not only expressed more internalizing and externalizing symptoms in the assessments of their mothers but also had more depressive symptoms according to the self-reported Child Depression Inventory than the children of non-depressed mothers. A study by Nelson et al. (2003) showed that concurrent maternal depression, along with a previous history of maternal depression and emotional expression criticism, had a significant correlation with adolescent's internalizing and externalizing symptoms assessed by both the mother and the adolescent. Expressed emotion criticism was seen as an intervening variable.

Thus maternal concurrent depressive symptoms influence adolescents' present lives. In addition, children of depressed mothers are at higher risk of experiencing a depressive episode in close time to maternal depression (Hammen, Burge, & Adrian, 1991). However, the influence of maternal depressive symptoms may diminish over time, especially if reduction or remission of maternal depressive symptoms is achieved (Gunlicks & Weissman, 2008; Pilowsky et al., 2008; Wickramaratne et al., 2011).

2.4.5 Recurrent maternal depressive symptoms

The recurrent and chronic nature of depression causes most of the children of depressed mothers to be exposed to maternal depression several times or for a long period of time in their lives, especially when the initial exposure has occurred at an early age. Repeated exposures may also be associated with different kinds of developmental risks. Halligan et al. (2007) found in their longitudinal study that maternal postnatal depression was associated with adolescent's anxiety disorder while postnatal depression together with later episodes of maternal depression was a risk for depression in adolescent offspring. Postnatal depression was associated with recurrent episodes of maternal depression in a majority (84%) of cases, which led the authors to suggest that the harmful effect of postnatal depression may be rather based on the recurrent nature of depression than the timing of maternal depression (Halligan et al., 2007).

Later exposures have also been found to mediate the harmful effects of pre- and postnatal depression. Hay and colleagues (Hay et al., 2008; Pawlby et al., 2009) reported maternal prenatal depression to be associated with adolescents' depression and girls' emotional problems when mediated by later exposures. Fihrer et al. (2009) found maternal postnatal depression to increase the risk for child's internalizing problems in early school age while the association between postnatal depression and externalizing problems at the age of 6-8 years was mediated by maternal concurrent depression.

2.4.6 Chronic maternal depressive symptoms

Chronic depressive symptoms refer to a persistently high level of depressive symptoms at multiple assessment points. In longitudinal study settings it may, however, intermingle with recurrent depressive symptoms. Chronic maternal depressive symptoms have been found to be associated with child's emotional and behavioural problems and poorer social competence (Ashman, Dawson, & Panagiotides, 2008; Brennan et al., 2000; Frye & Garber, 2005; Hammen & Brennan, 2003). Campbell et al. (2007) detected different patterns of the evolution of maternal depressive symptoms. They found that mothers having chronic, high-decreasing or increasing levels of depressive symptoms rated their children as having more internalizing and externalizing problems at the age of seven than did mothers with low level of symptoms (Campbell, Matestic, von Stauffenberg, Mohan, & Kirchner, 2007). Another study by Campbell et al. (2009) found that chronic clinical maternal depressive symptoms, elevated and also chronic subclinical maternal depressive symptoms from infancy to the adolescence of the child were associated with more internalizing and externalizing problems in adolescent self-reports at the age of 15 years (Campbell, MorganLopez, Cox, McLoyd et al. 2009). A surprising finding was that the children of the mothers who had high but decreasing level (yet all the time higher than the chronic subclinical group mothers) of depressive symptoms from the infancy to the adolescence of the child reported no more internalizing problems at the age of 15 years than did the adolescents of never-depressed mothers. The study suggests that the pattern of maternal depressive symptoms throughout development, rather than individual depressive episodes, may be a more important explanatory risk factor affecting child outcome than the actual timing of the exposures. It also suggests that remission and

reduction of maternal depressive symptoms decreases child's emotional and behavioural problem level, as also found in the studies concerning maternal concurrent depressive symptoms (see above).

Chronic depressive symptoms also affect and burden the whole family environment and the interaction of the depressed mother and the child over a long period of time. Frye and Garber (2005) found that more chronic and severe maternal depressions as well as maternal anger, hostility and expressed criticism were associated with more externalizing symptoms in their children. Maternal expressed criticism, although associated with maternal depression did not, however, mediate the negative effect of maternal depression on child's internalizing or externalizing symptoms.

2.4.7 Subclinical maternal depressive symptoms

Some studies suggest that subclinical depression might be as debilitating for both mother and child as major depression (Chen et al., 2000; Field et al., 2008; Field, Diego, Hernandez-Reif, & Ascencio, 2009; Judd, Paulus, Wells, & Rapaport, 1996; Judd et al., 1997; Weinberg et al., 2001). It is also known that after remission from severe depression, residual symptoms may remain. Studies using trajectories of maternal depressive symptoms also indicate that trajectories of decreasing or subclinical depressive symptoms often fluctuate or persist in a slightly elevated level (Ashman et al., 2008; Campbell et al., 2007; Campbell et al., 2009).

Maternal subclinical depressive symptoms also increase the risk for adverse development of the child. According to a study by Hammen and Brennan (Hammen & Brennan, 2003), even a brief maternal major depression or prolonged mild depression was a risk factor for the adolescent's negative outcome. A study by Ashman and colleagues (2008) indicated that although the children of mothers with chronic depressive symptoms were at the highest risk for adverse outcome, the children of mothers with subclinical and decreasing depressive symptoms also had more problems at the age of six years than did the children of nondepressed mothers. The same findings were reported in the studies by Campbell and colleagues at child's ages of seven and 15 years (Campbell et al., 2007; Campbell et al., 2009).

2.5 Intergenerational risk transmission of maternal depressive symptoms

The mediating factors in the risk transmission of maternal depressive symptoms to child development and outcome have been the focus of research in many recent studies (Ashman et al., 2008; Duggal et al., 2001; Elgar, Mills, McGrath, Waschbusch, & Brownridge, 2007; Hammen et al., 2004; McCarty et al., 2003). The theory of the intergenerational risk transmission of maternal depressive symptoms to children involves the heritability, biological neuroregulatory systems, cognitive, behaviour and interpersonal

processes, family functioning, as well as other environmental factors (Goodman & Gotlib, 1999).

Genes and environment act together and modify both individuals' genetic phenotype and behaviour. The influence of stress factors on the onset of depression is greater among those individuals with genetically higher risk for depression than among those with genetically lower risk (Kendler et al., 1995). Individuals with juvenile-onset major depression have been found to have significantly more childhood risk factors than those with adult-onset depression (Jaffee et al., 2002; Wilkinson, Trzaskowski, Haworth, & Eley, 2013). Thus, multiple risk factors may increase the risk for earlier onset of depression. In addition, individuals with certain genotypes may be more susceptible to environmental influences than others, as noted earlier (Ellis et al., 2011; Nederhof et al., 2010).

One of the recently studied effects of prenatal depression on the newborn is the *biochemical profile*. The neonates of prenatally depressed mothers show elevated cortisol and norepinephrine levels and lower urinary dopamine levels than the newborns of nondepressed mothers, thus replicating or mimicking their mother's biochemical profile of stress (Field et al., 2006; Weinstock, 2008). However, the excess amount of maternal or foetal stress hormone may impede the formation of neural connections and reduce plasticity and neurotransmitter activity and thus have an impact later on the developing child's abilities in cognitive functioning and behaviour (Weinstock, 2008).

Elevated cortisol levels have been reported in the children of prenatally stressed mothers even at the age of seven years (Ashman et al., 2008) and 14-15 (Van den Bergh, Van Calster, Smits, Van Huffel, & Lagae, 2008) and prenatally anxious mothers' offspring at the age of ten (O'Connor et al., 2005), suggesting a long-term effect of prenatal stress and depression on the neuroendocrine functioning of the offspring. Elevated cortisol levels have been found to be associated with attention and learning deficits (Weinstock, 2008) as well as poorer performance under stressful conditions (Mennes, Bergh, Lagae, & Stiers, 2009; Van den Bergh et al., 2005). This has also been reported to be associated with internalizing symptoms and depression in children and adolescents (Ashman, Dawson, Panagiotides, Yamada, & Wilkinson, 2002; Halligan, Herbert, Goodyer, & Murray, 2007; Van den Bergh et al., 2008), although Van den Bergh et al. (2008) found the association only among adolescent females.

In infancy secure maternal attachment is an important environmental influence that decreases the sensitivity of the HPA-axis (Bergman, Sarkar, Glover, & O'Connor, 2010; Goldberg, 2006). However, building a secure attachment may be disturbed by maternal postnatal depressive symptoms. Maternal depression reportedly increases the risk for an insecure attachment relationship between mother and child (Carter et al., 2001; Murray, Halligan, Adams, Patterson, & Goodyer, 2006; Teti, Gelfand, Messinger, & Isabella, 1995).

In addition, the attachment style has been reported to mediate the effects of maternal depression on child outcome as well as on the developmental pattern of the child (Munson et al., 2001; Murray et al., 2006). In a study by Murray et al. (2006) maternal postnatal depression was associated with different outcomes depending on the attachment style of the mother and the child at infancy: securely attached girls exposed to postnatal depressive symptoms had higher narrative coherence at the age five superior social maturity and good adjustment at the age of 13. Conversely, insecurely attached girls exposed to maternal postnatal depressive symptoms had raised awareness of the emotional environment of the family at the age of five and more depressive symptoms at the age of 13. Surprisingly, boys

exposed to maternal postnatal depression showed the opposite trajectories, namely lower emotional sensitivity and inferior social maturity, but with less strong statistical significance. The results were discussed in terms of modelling the behaviour of the same sex parent and the differences in mother-son and mother-daughter relationships. For example, mothers discuss emotions with their daughters more and reward their emotional displays differently than with their sons. Adolescent girls also spent more time with their family than did boys.

A study by Munson et al. (2001) explored associations between the level of maternal depression symptoms when the child was one to nine years old and child's externalizing problems when the child was from four to nine years old. They found that avoidant and insecure attachment as well as higher levels of maternal depressive symptoms were associated with higher level of externalizing problems at the age of nine. However, changes in maternal depressive symptomatology (in either direction) over time predicted the level of child's externalizing problems only for children with avoidant insecure attachments (Munson et al., 2001). The writers speculated whether insecurely attached children are more reactive to variations in maternal depressive symptomatology or if the mothers of securely attached infants perhaps more able to buffer their children against fluctuations. As the externalizing problems of the child were reported by the mother, the results may also reflect a stronger association between reporting own depressive symptoms and child's externalizing problems among the mothers of insecurely attached children, as the writers speculate.

The parenting style (Burke, 2003) and negative expressed emotions (Frye & Garber, 2005; Nelson et al., 2003; Tompson et al., 2010) of depressed mothers has been shown to have a negative effect on their children, both together and separately. In a study by Thompson et al. (2010) a history of maternal depressive symptoms (non-recurrent, severe or chronic) was associated with both emotional criticism as well as high emotional overinvolvement. Thus depressed mothers may become either more critical or more anxious and overprotective towards their offspring. Maternal perceptions of the child may also be more negative when the mother is depressed (Talge et al., 2007). Maternal sensitivity has also been found to decrease among most mothers when depressive symptoms increase (Campbell et al., 2007). In addition to the mother-child relationship, maternal depression has an impact on the whole family system (Burke, 2003) and women with past or concurrent depression find their environment more stressful (Hammen & Brennan, 2003).

Thus some of the harmful effects of maternal depression can be explained through the changes in interaction and increased family adversity. Children also acquire coping skills and behavioural models through observation and may learn depressive-like behaviour and inefficient coping skills from their depressed mothers, which places them at increased risk for depression. Infant studies consider that babies mimic maternal behaviour and adjust their behaviour to the mother's behaviour in order to be in contact with the mother and thus emotionally balanced (Seifer & Dickstein, 2000). A depressed mother may be less sensitive or either intrusive or withdrawn in interaction with the baby (Cohn & Tronick, 1989). The infants of depressed mothers who constantly deal with emotional overstimulation may learn avoidant, withdrawal or muting coping strategies while, on the other hand understimulated infants must seek experiences and regulate the emotions without the requisite developmental skills (Seifer & Dickstein, 2000).

It is also likely that there is a reciprocal relation between maternal depression and child adjustment problems, especially behavioural problems (Elgar et al., 2007; Gross, Shaw, Burwell, & Nagin, 2009; Gross, Shaw, Moilanen, Dishion, & Wilson, 2008). The study by Frye and Garber (2005) referred to earlier reported that maternal criticism did not mediate the effect of maternal depression on child's externalizing symptoms but child's externalizing symptoms mediated the effects of maternal depression on maternal criticism, thus suggesting that the interaction between mother and child is bidirectional. Reciprocity is also to be found between maternal depressive symptoms and child's internalizing problems (Nicholson, Deboeck, Farris, Boker, & Borkowski, 2011).

2.6 Assessment of child outcome

Parents know their child best, but they often lack the opportunity for comparison to other children of the same age. Parents' ratings of their child may also be influenced by their psychiatric status, e.g. the presence of depression or their perspectives on family life (Hay et al., 1999; Seiffge-Krenke & Kollmar, 1998). There is evidence that mothers' mental state is associated with an observation bias in their ratings of children's problems. Most studies support the theory of depression-distortion, meaning that depressed mothers report more internalizing and externalizing problems than other reporters (Berg-Nielsen, Vika, & Dahl, 2003; Chilcoat & Breslau, 1997; De Los Reyes, Goodman, Kliewer, & Reid-Quinones, 2008; Najman et al., 2000; van der Toorn et al., 2010). There are, however, opposite findings, namely that depressed mothers are more accurate and sensitive in evaluating their children's problems (Conrad and Hammen, 1989). Teachers' reports may even have more consistency with child–reported anxiety and depression than parents' reports (Mesman & Koot, 2000). Nevertheless, multi-informant data enables comprehensive assessment (Achenbach, 2006).

Cross-informant consistency between children and parents has been found to decrease during the adolescent years, probably as independence and preference for peers over parents increases. However, a study by Bergen-Nielsen et al (2003) suggests that agreement on externalizing symptoms increased as adolescents grew older (Berg-Nielsen et al., 2003). In general, adolescents have been found to report more problems than their parents (Achenbach & Edelbrock, 1991).

3. Aims of the study

1. *What are the mother-reported trajectories of child's internalizing and externalizing problems from early childhood to adolescence like? How are they associated with social competence and adolescent's self-reported problems? (III)* The hypothesis was that trajectories of low, moderate and chronic patterns of internalizing and externalizing problems would be identified, with most of the adolescents assigned to the two first groups. It was also hypothesized that poorer social competence would be associated with more chronic patterns of internalizing and externalizing problems.

2. *Does the timing of maternal depressive symptoms matter? (I, II).* The hypotheses were that adolescents exposed to maternal depressive symptoms prenatally would show more externalizing problems, and that those exposed postnatally would show more internalizing problems. In addition, pre- and postnatal depressive symptoms were hypothesized to be more harmful to child development than maternal depressive symptoms occurring in offspring's childhood. According to the literature, maternal concurrent depressive symptoms were expected to be associated with both internalizing and externalizing problems and poorer social competence of the adolescent.

3. *Are there gender differences in the associations between maternal prenatal, postnatal and concurrent depressive symptoms and adolescent outcome? (I).* According to the literature the hypothesis was that boys exposed to early maternal depressive symptoms would show more internalizing and externalizing problems and have poorer social competence in adolescence than girls. Further, maternal concurrent depressive symptoms were assumed be associated with more internalizing and externalizing problems and poorer social competence in both genders.

4. *Is the negative effect of maternal depressive symptoms on adolescent's outcome best explained by the timing, recurrence, or chronicity of maternal depressive symptoms? (I, II).* The hypothesis was that recurrence or chronicity of maternal depressive symptoms would be a stronger predictor of child's internalizing and externalizing problems and poorer social competence than timing. However, the timing of the exposure was expected to be associated with different kinds of psychosocial problems in adolescence depending on the developmental task of the child during the exposure.

5. *What are the associations between the trajectories of maternal depressive symptoms and those of child's internalizing and externalizing problems? (IV).* The hypothesis was that more

chronic patterns of maternal depressive symptoms would be associated with more chronic levels of child's internalizing and externalizing problems.

4. Material and methods

4.1 Subjects and procedure

This dissertation is part of a longitudinal study begun in Tampere, Finland, in 1989. The original sample was collected from Tampere maternity health clinics during the period 1989-1990. At the first study stage data was collected during the last trimester of the pregnancy (T1), postnatally on discharge from the maternity hospital (later first postnatal weeks; T2) and two (T3) and six months from the delivery (T4). The second study stage was conducted at the child's age of four to five years (early childhood; T5) and the third at child's age of eight to nine years (middle childhood; T6). At the latest study stage the children were 16-17 years old (adolescence; T7).

The original sample consisted of 349 consecutively selected normal population mothers expecting their first child. Less than 10% of the mothers invited to the study refused to participate. The sample flow of the study is presented in Figure 4.1.1. Seventy mothers excluded from study points T2-T5 were again included from T6 on. The large number of drop-outs (n = 69) between T1 and T2 was due to these mothers not receiving the questionnaires from the maternity hospital because of summer holiday arrangements of the personnel. These 69 mothers and children, and also the drop-outs between study points T2 and T3 (n = 5) were again included in the study at stage four (T7). The drop-outs between time points T3-T4 (n = 4) and study stages T4-T5 (n = 1) were due to the mother's or the child's serious illness or death and were therefore not included in any later stages.

By T7, altogether 22 mothers or children of the original 349 had died or explicitly refused to participate at earlier study stages, leaving 327 mothers and 328 children to be contacted. The address of 14 mothers could not be obtained. Thus at T7 the questionnaires were sent to 313 mothers and their 314 adolescents (one set of twins). The questionnaire on emotional/behavioural problems (Child Behavior Checklist, CBCL for the parents and Youth Self Report, YSR for the adolescent, see later) was returned by 191 mothers (62% of those who received the questionnaires and 55% of the original sample) and by 192 (60%) adolescents. The sample comprised 185 mother-child dyads (184 mothers and 185 children, one set of twins) as six mothers only and seven adolescents only returned the questionnaires. The maternal depressive symptoms screening questionnaire (Edinburgh Postnatal Depression Scale, EPDS, see later) was returned by 183 mothers as in seven cases the questionnaire was completed by the adolescent and in one case only the first side of the questionnaire was filled. One hundred of the 116 drop-outs were mothers not returning the questionnaires despite two reminders, ten mothers and adolescents refused to participate in the study and five mothers and one child had died between study stages T6 and T7 (Figure 4.1.1). The sociodemographic characteristics of the sample are presented in Table 4.1.1.

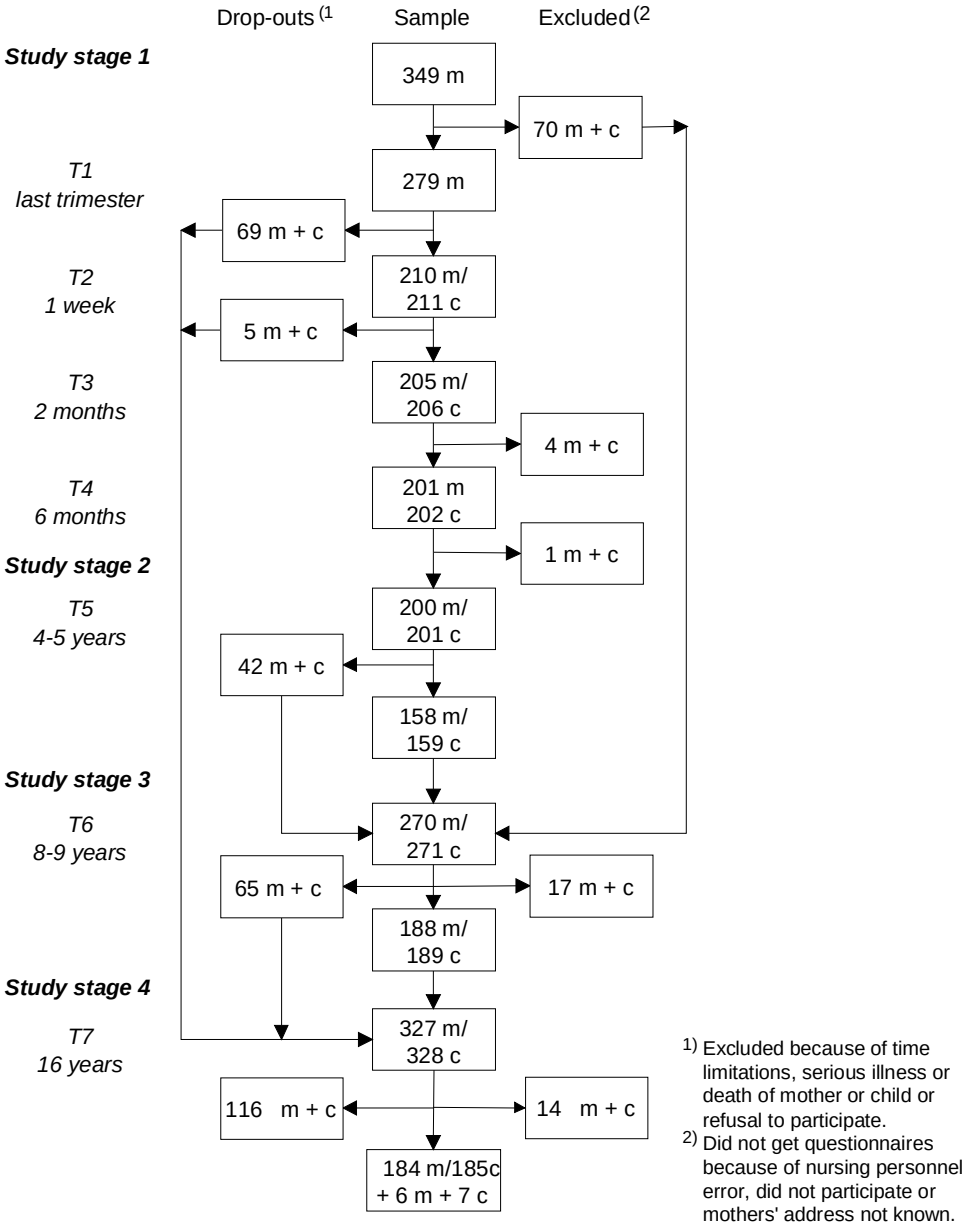

Figure 4.1.1 Flowchart of the sample.

Table 4.1.1. Sociodemographic characteristics of the sample at different data collection points.

	Prenatal (T1)		Early Childhood (T5) n = 159		Middle Childhood (T6) n = 189		Adolescence (T7) n = 191[2]	
	%		%		%		%	
Child's gender[1]								
Female	51		53		56		52	
Male	49		47		44		48	
Mother's marital status								
Married or cohabiting	96		92		86		82	
Single	4		8		14		18	
Mother's education								
Elementary, vocational school	37		37		31		37	
College	51		46		53		47	
Academic	12		17		16		16	
No. of mother's biological children								
One			28		17		13	
Two			62		52		52	
Three or more			10		31		35	
	Mean yrs	SD yrs	Mean yrs	SD yrs	Mean yrs	SD yrs	Mean yrs	SD yrs
Mother's age	27.1	4.2	31.4	4.1	35.5	4.2	43.7	4.2
Child's age			4.4	0.1	8.5	0.3	16.7	0.2

[1] Prenatally based on the information at child's birth

[2] Based on information in mother's reports

4.2 Measures

Mothers' depressive symptoms were assessed by the Finnish version of the *Edinburgh Postnatal Depression Scale* (EPDS; Appendices) at each time point. The EPDS is a valid, self-administered questionnaire originally designed to detect postnatal depression, but also valid for detecting depression among non-postnatal women (Cox et al. 1987; Cox et al., 1996). It includes ten questions on depressive symptoms with four response options scored from 0 to 3, giving a maximum sum score of 30. In research EPDS scores have been used as continuous variables as well as with the lower and upper cutpoints. The cutpoint ≥ 10 (lower cutpoint) has been reported to have satisfactory sensitivity and specificity for detecting even minor depression, while the cutpoint ≥ 13 (upper cutpoint) has been found to identify major depression better (Cox, Murray, & Chapman, 1993; Cox, Chapman, Murray, & Jones, 1996). As the EPDS is not a diagnostic questionnaire, in all the studies of this dissertation the term depressive symptoms is used as no clinical evaluations of the maternal depressive symptoms were conducted. In this study both the lower and upper cutpoints as well as continuous EPDS variables were used.

Background information including sociodemographic data as well as data on maternal and child health and well-being at T7 was collected with a questionnaire designed for that study stage (Appendices), and completed by the mother. Background information questionnaires, adapted for each study stage, were also used at time points T1, T5 and T6. The socioeconomic status of the family at T7 was determined according to the guidelines of Statistics Finland (1989). Family SES was determined by the higher value of mother's and father's SESs in two parent families and mother's SES in single parent families.

Child outcome was measured using the Finnish version of the *Child Behavior Checklist* (CBCL; Achenbach, 1991a; Achenbach and Rescorla, 2001) at time points T5, T6 and T7. The CBCL was completed by the mother. At T5 forms for children below school age (in Finland 4-6 years) and at T6 and T7 a form for children of school age (6-18 years; Appendices) were used. The CBCL contains questions and statements for parents to record their child's emotional/behavioural problems. The problem scales for school aged children contain 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 Total Problems score is a sum score of all the problem items. The Internalizing Problems score is a sum score including items concerning withdrawal, somatic complaints and anxiety/depression. The Externalizing Problems score is a sum score of items concerning social problems, rule-breaking behaviour and aggressive behaviour. The form for school-aged children also includes questions concerning child's social competence. The Social Competence sum score includes scores from activities, social skills and relationships and school performance subscales.

At T7 the adolescents completed the *Youth Self Reports* (YSRs; Appendices) for ages 11-18 (Achenbach, 1991b; Achenbach and Rescorla, 2001). The YSR problem scores as well as the Social Competence sum score are derived from responses to 119 questions similar to those of the CBCL. The problem items also include 16 items involving social desirability, that are not included in the Problem sum score or in the Social Competence score.

The CBCL and YSR Internalizing and Externalizing raw problem scores as well as Social Competence scores can be converted into normalized T-scores. In clinical use scoring between 60 and 63 in Internalizing or Externalizing Problems is considered the subclinical level and $\geq$ 64 the clinical level. In research both continuous raw Problem scores and normalised T-scores as categorized and as continuous variables have been used. For Social Competence no cutpoints are being set. In this study both dichotomous variables of the Problem scores with the higher cutpoint as well as continuous CBCL and YSR variables were used.

4.3 Attrition

Being a longitudinal process, the group size varied at different time points (Figure 4.1.1). The drop-out analysis was conducted between data collection points a) T1 and T3, T5, T6 and T7, b) T3 and T5, T6 and T7, e) T5 and T6, and f) T6 and T7 (as the number of drop-outs and excluded cases between T3 and T4 was only five, that comparison was not examined, and T2 was excluded from all analyses). These analyses showed no statistically significant differences between the mothers included in the analysis and those who dropped out regarding marital status, education level, family SES (data available at T6 and T7 only) or mother's age. Neither did the drop-outs from T5 to T6 nor from T6 to T7 show differences in Internalizing and Externalizing problem scoring. However, there were more mother-son dyads in the drop-out group at data collection points T5, T6 and T7.

4.4 Statistical methods

In Studies I-IV both categorical and continuous variables of adolescent's problems and maternal depressive symptoms were used. Means, standard deviations (SD) and 95% confidence intervals (95% CI) were calculated for the normally distributed continuous adolescent outcome variables and median and upper and lower quartiles for continuous, skewed maternal depressive symptom variables. Cross-tabulations with Fisher's exact two-tailed significance test were used to examine the categorized adolescent outcome variables by maternal depressive symptoms. Independent samples t-test was used to test for differences in continuous variables between groups. In some analyses Kruskall-Wallis test was used to compare continuous variables when the number of cases in some of the groups was too small for one way analyses of variance.

In Study I the simultaneous effects of various explanatory variables on adolescent outcome were examined using both dichotomous and continuous EPDS sum scores and CBCL and YSR outcome variables. The aim was to explore whether a continuous scale would show a similar or different model than the categorized variables. In the case of dichotomous CBCL and YSR Problems scores and the EPDS sum scores, logistic regression with the enter-method was used. When analysing the continuous CBCL and YSR scores and EPDS sum scores, linear regression was used with EPDS distributions normalised by square root transformation. For Social Competence linear regression was performed using both dichotomous and continuous EPDS scores. For logistic regression, odds ratios (ORs) and their 95% CIs and p-values were reported, and for linear regression, regression coefficients and p-values were represented.

In Study II, to explore whether the association between maternal depressive symptoms and adolescent psychosocial functioning and emotional/behavioural problems was best explained via the initial timing, the recurrence or the pattern of maternal depressive symptoms, both ordinary linear regression and generalized linear regression (with gamma distribution and log link function) were applied. As the results were similar, only those of ordinary linear regression were reported. In both analysis types the enter-method was used. The best models were based on the adjusted R^2 and the p -value of F change between models.

In Studies II-IV group-based trajectory analysis was used to identify the distinctive developmental patterns of maternal depressive symptoms (II, IV) and child's internalizing and externalizing problems (III, IV) over time. These techniques include person-centred models to identify different developmental patterns (Nagin & Tremblay, 2001; Nagin & Odgers, 2010b; Tremblay et al., 2004). In all the trajectory analyses the data collection points were treated as sequential time points instead of using the actual time intervals between time points.

The analyses of maternal depressive symptoms were based on the EPDS data of 329 mothers who had completed the EPDS at least once during T1-T7. Original skewed EPDS values were normalized by square root transformation. The cubic function of time was used for modelling the transformed EPDS scores. The selected four-cluster model had the best fit based on the Bayesian Information Criteria (BIC) values.

The trajectory analyses of the internalizing and externalizing problems of the child were based on the data of 261 children (49 % male) whose mothers had completed the CBCL during at least one of the three assessment points T5-T7. The best fits according to Akaike Information Criteria (AIC) and BIC were contradictory, resulting into a two-cluster model based on BIC and a three or five-cluster model based on AIC. Thus, due to these contradictions and the theoretical framework, a four group model was selected to best fit and characterize the data for both internalizing and externalizing problems.

In all the studies p-values < 0.05 were considered statistically significant and values between 0.05 and 0.10 indicative. Trajectory models were fitted using the flexmix package in statistical program R, version 2.13.0. All other analyses were performed with SPSS 15.0 and 16.0.

5. Summary of the results

5.1 Psychosocial functioning of the child

5.1.1 Cross-section of adolescents' psychosocial adjustment (I, II)

The means, standard deviations and 95% Confidence Intervals (CIs) of the continuous variables of Total (not reported elsewhere), Internalizing and Externalizing Problem T-scores in both the CBCL and YSR, used in Studies I and II are presented in Table 5.1.1. In addition, the proportions of adolescents scoring at or above the clinical level (≥ 64) used in Study I are presented in Table 5.1.2.

For genders separately, the means, standard deviations and 95% CIs of the continuous variables of Total, Internalizing and Externalizing Problems are presented in Table 5.1.1 (not reported elsewhere). The proportions of those scoring above the cutpoint ≥ 64 are presented in Table 5.1.2.

Table 5.1.1. Means, standard deviations and 95% Confidence Intervals of the CBCL and YSR Problem scores and Social Competence scores of the adolescents.

	Scale	All			Boys			Girls		
		Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI
CBCL	Total Problems	48	10	47-50	47	9	46-49	49	10	47-51
	Internalizing Problems	51	10	49-52	50	9	48-52	52	10	50-54
	Externalizing Problems	49	9	48-50	49	9	47-51	49	9	47-51
	Social Competence	47	10	45-48	45	9	43-48	48	10	46-50
YSR	Total Problems	50	10	48-51	48	10	46-50	52	10	50-54
	Internalizing Problems	50	11	49-52	48	11	46-50	53	11	50-55
	Externalizing Problems	52	9	51-53	50	9	48-52	54	9	52-55
	Social Competence	46	10	44-48	44	10	41-46	48	10	46-50

High cross-informant consistencies of both internalizing and externalizing problems were detected between self-reported and maternal reported problems ($p < 0.001$ in both; not reported elsewhere). High cross-informant consistency was also detected for the genders separately ($p < 0.05$ in all).

Table 5.1.2 Proportions (%) of adolescents scoring at or above the clinical cutpoint 64 in CBCL and YSR in each Problem score.

	Problem Score	All	Boys	Girls
CBCL	Total Problems	8	3	12
	Internalizing Problems	11	9	12
	Externalizing Problems	6	5	6
YSR	Total Problems	9	4	14
	Internalizing Problems	13	8	18
	Externalizing Problems	10	10	10

5.1.2 Trajectories of child's internalizing and externalizing problems (III, IV)

The trajectories of child's emotional and behavioural problems were based on maternal reports. The trajectory groups of *internalizing problems* were low-stable (n = 73, 28%), moderate-decreasing (n = 53, 20%), moderate-increasing (n = 107, 41%) and high-stable (n = 28, 11%; Figure 5.1.1; III, Supplementary Materials, Figure 2.). The biggest proportion of the adolescents thus belonged to the moderate-increasing group. The mean internalizing problems T-score in that group was highest in adolescence yet remained below even the subclinical level. The mean in the chronically high (high-stable) trajectory was at the subclinical/clinical level from early childhood to adolescence.

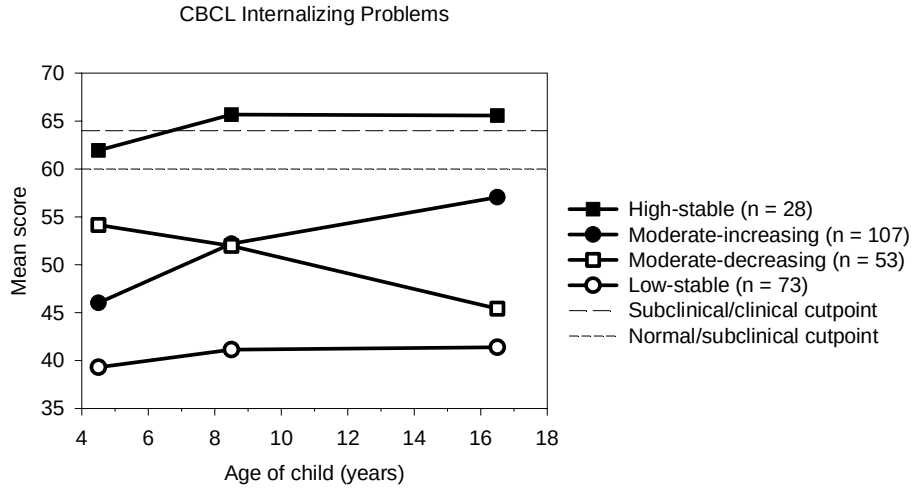

Figure 5.1.1. Trajectories of child's internalizing problems (Korhonen et al., in press).

The trajectories of *externalizing problems* detected were low-stable (n = 53, 20%), moderate-decreasing (n = 151, 58%), high-decreasing (n = 45, 17%) and moderate-to-high (n = 12, 5%; Figure 5.1.2; III, Supplement Materials Figure 2.). Hence most of the children were assigned to the moderate-decreasing trajectory of externalizing problems. The mean externalizing problem T-score in the high-decreasing trajectory was above the subclinical/clinical level in childhood but below the cutpoint in adolescence. The

adolescent-onset (moderate-to-high) trajectory was below even the subclinical level in childhood but significantly above the clinical level in adolescence.

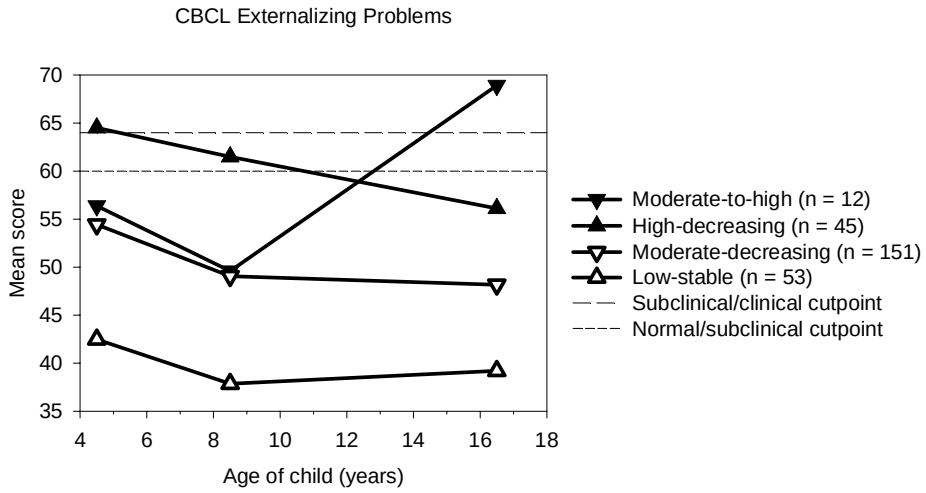

Figure 5.1.2. Trajectories of child's externalizing problems (Korhonen et al., in press).

The trajectory groups were heterogeneous in terms of child's gender and age, the marital status and education level of the mother and the number of siblings of the index child at T7. The trajectories of both internalizing and externalizing problems based on maternal reports were associated with adolescents' self-reported internalizing and externalizing problems at T7 thus indicating cross-informant consistency (III, Supplementary Materials, Figure 3.).

5.1.3 Social competence and the trajectories of internalizing and externalizing problems (III)

Social competence was poorest in middle childhood (according to mothers' reports) and in adolescence (according to mothers' and adolescents' reports) among the children with chronic internalizing problems. In adolescents' self-reports the social competence was also poorer among those assigned to the moderate-increasing trajectory group of internalizing problems than among those with low or moderate-decreasing trajectory of internalizing problems (III, Supplementary Materials, Figure 4.).

In middle childhood social competence was equally good in all the trajectory groups of *externalizing problems*. In adolescence children with adolescent-onset externalizing problems had the poorest social competence. It is noteworthy that the children assigned to the high-decreasing trajectory group who had clinical/subclinical level of externalizing problems in childhood had equally good social competence both in middle childhood and in adolescence as the children assigned to the low or moderate-decreasing trajectory groups of externalizing problems (III, Supplementary Materials, Figure 4.).

5.1.4 Co-occurrence of internalizing and externalizing problems (III)

The associations between the trajectories of internalizing and externalizing problems indicated somewhat high proportions of co-occurrence. Thirty-two percent of the children who had chronically high levels of internalizing problems throughout the study also had high (although decreasing) levels of externalizing problems. Further, 56% of the children with high levels of externalizing problems in childhood had an increasing level of internalizing problems and 20% had chronically high level of internalizing problems from childhood onwards. In addition, over one half of the adolescents with adolescent-onset externalizing problems had increasing and one third had chronically high level of internalizing problems (III, Figure 1.).

There was also a fairly high co-occurrence between the adolescent self-reported problems at T7 and the trajectories of internalizing and externalizing problems. The adolescents belonging to the increasing internalizing problems trajectory group according to mothers' reports reported significantly more externalizing problems in adolescence than did those from the low trajectory group ($p = 0.006$). The adolescents with the adolescent-onset externalizing problems according to mothers' reports also reported significantly more internalizing problems in self-reports than did those from the low trajectory group ($p = 0.048$; III, Figure 1.).

5.2 Maternal depressive symptoms

5.2.1 Timing of maternal depressive symptoms (I, II, IV)

The numbers and proportions of mothers exceeding the lower and upper cutpoint in the EPDS at different timepoints are presented in Table 5.2.1. In Study I, with the upper EPDS cutpoint, only maternal depressive symptoms prenatally, two months postnatally and in child's adolescence (concurrently) were used. However, the numbers and proportions from all timepoints are presented in the abovementioned table. In Study II a new variable indicating the timing of the initial exceeding (first time) of the lower cutpoint of maternal depressive symptoms was defined and the proportions are also presented in Table 5.2.1.

Table 5.2.1. Numbers and proportions of mothers scoring at or above the lower (≥ 10) and upper (≥ 13) cutpoints on the on the Edinburgh Postnatal Depression Scale (EPDS) altogether and those scoring at or above the lower cutpoint for the first time at different data collection points (among those who participated at T7).

Data collection point		EPDS ≥ 10				EPDS ≥ 13	
	Total	All		First time		All	
	(n)	(n)	(%)	(n)	(%)	(n)	(%)
Prenatal (last trimester)	190	43	23	43	22	14	7
Postnatal (first weeks)	154	39	25	20	10	20	10
Postnatal (2 mo)	154	26	17	6	3	12	8
Postnatal (6 mo)	155	30	19	9	5	16	10
Early childhood (4-5 yrs)	115	24	21	9	5	8	7
Middle childhood (8-9 yrs)	143	27	19	6	3	9	6
Adolescence (16-17 yrs)	176	36	21	13	7	19	11

5.2.2 Trajectories of maternal depressive symptoms (II, IV)

The model chosen to describe the trajectories of maternal depressive symptoms from pregnancy to child's adolescence consisted of four groups: very-low (n = 58; 18%), low-stable (n = 173; 53%), high-stable (n = 88; 27%) and intermittent (n = 10; 3%; Figure 5.2.1.; II, Figure 2.).

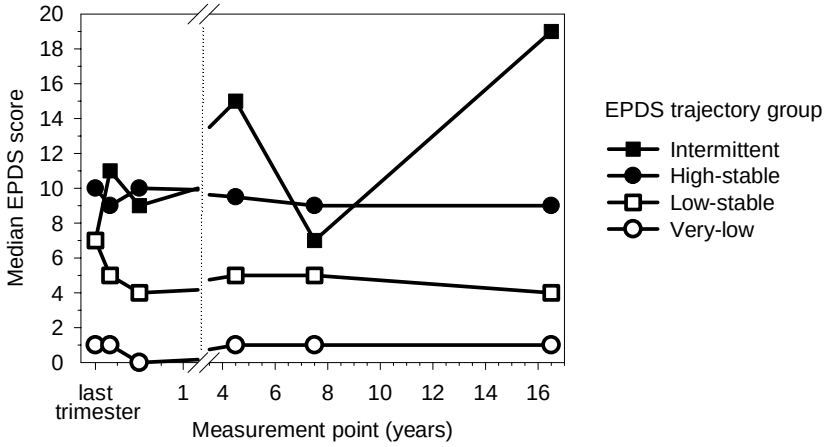

Figure 5.2.1 Trajectories of maternal depressive symptoms from pregnancy to child's adolescence (Korhonen et al. in press).

5.3 Maternal depressive symptoms and adolescent's psychosocial functioning

5.3.1 Timing of maternal depressive symptoms and adolescent's adjustment (I, II)

In Study I the timing of maternal depressive symptoms was determined using the upper ≥ 13 EPDS cutpoint. Maternal depressive symptoms prenatally, two months postnatally and concurrently at child's adolescence were included in the study. The Total, Internalizing and Externalizing problem scores were used with the clinical cutpoint ≥ 64 and the Social Competence score as a continuous variable.

In Study II a variable indicating the initial exceeding of the lower ≥ 10 EPDS cutpoint was defined to rule out the confounding effects of previous depressive episodes. In this study maternal depressive symptoms at all timepoints T1-T7 were included in the analyses. Adolescent Internalizing and Externalizing Problem and Social Competence scores were used as continuous T-scores.

Maternal depressive symptoms prenatally and adolescent outcome

In the YSR there were more adolescents exceeding the clinical cutpoint in Externalizing Problems score among those adolescents whose mothers had depressive symptoms prenatally (9% vs. 29%; p = 0.041; Table 5.3.1; I, Figure 3.).

With the lower EPDS cutpoint and continuous CBCL and YSR Problem score variables initial exposure to maternal prenatal depressive symptoms was also associated with higher scoring in Externalizing Problems in the CBCL (p = 0.037; Table 5.3.2; II, Figure 3).

Maternal depressive symptoms postnatally and adolescent outcome

A large proportion of adolescents exceeded the clinical cutpoint in Externalizing Problems in self-reports among those exposed to maternal depressive symptoms two months postpartum (T3; 7% vs. 33%; p = 0.012; Table 5.3.1; I, Figure 3.). Social Competence in mothers reports was likewise poorer among the adolescents whose mothers scored above the upper EPDS cutpoint two months postnatally (p = 0.031; M = 44; 95 % CIs 36-51) than among those who scored below the cutpoint (M = 48; 95 % CIs 46-50). The same applied to adolescent self-reports (p = 0.038; M = 42; 95 % CIs 36-49 vs. M = 46; 95 % CIs 44-48).

When considering the initial exposure with the lower EPDS cutpoint and continuous CBCL and YSR Problem score variables there were no statistically significant associations between maternal depressive symptoms during first postnatal weeks (T2) or six months (T4) postnatally and adolescent psychosocial functioning. However, initial exposure to maternal depressive symptoms two months postnatally (T3) was associated with higher scoring in the Internalizing Problems score in the YSR (p = 0.030; Table 5.3.2; II, Figure 3.). The findings were parallel in maternal reports but did not reach statistical significance.

Table 5.3.1. Proportions (%) of adolescents scoring high (T-score ≥ 64) on the CBCL or YSR in groups

	Prenatal (T1)		Postnatal (T3)		Concurrent /T7)	
	ND	D	ND	D	ND	D
	n = 170/171	n = 13/14	n = 137/138	n = 11/12	n = 159/153	n = 19/18
ALL						
Total Problems						
CBCL	8	8	10	0	6	26*
YSR	10	7	9	17	6	28**
Internalizing						
CBCL	11	15	10	18	8	37***
YSR	14	14	14	25	10	39**
Externalizing						
CBCL	7	0	6	9	3	21**
YSR	9	29**	7	33*	7	22*
BOYS	n = 82/80	n = 5	n = 60/59	n = 6/6	n = 75/72	n = 9/8
Total Problems						
CBCL	4	0	3	0	1	22*
YSR	5	0	3	17	1	13
Internalizing						
CBCL	9	20	3	17	5	33*
YSR	9	0	7	17	4	25†
Externalizing						
CBCL	6	0	3	17	3	22†
YSR	9	40†	2	50***	6	38*
GIRLS	n = 88/91	n = 8/9	n=77/79	n=5/6	n=81/81	n=10/10
Total Problems						
CBCL	13	13	14	0	11	30
YSR	14	11	14	17	10	40*
Internalizing						
CBCL	13	13	14	20	10	40*
YSR	18	22	19	33	15	50*
Externalizing						
CBCL	7	0	8	0	4	20†
YSR	9	22	10	17	7	10

Note: The number of mothers and children varies because of missing data.
The first number refers to CBCL and the second to YSR.
ND = EPDS sum score <13, D = EPDS sum score >13
† p ≤ .1* $p \leq .05$; ** $p \leq .01$; *** $p \leq .005$ (Fisher's Exact test)

Maternal depressive symptoms in early and middle childhood and adolescent outcome

With the upper EPDS as well as CBCL and YSR cutpoints maternal depressive symptoms in early or middle childhood were not associated with adolescents' Internalizing or Externalizing Problems or poorer Social Competence (not reported elsewhere).

In Study II, with the lower EPDS cutpoint and continuous CBCL and YSR variables initial exposure to maternal depressive symptoms at the age of four to five years was associated with lower scoring on Social Competence in self-reports (p = 0.029; Table 5.3.2; II, Figure 3.). Initial exposure to maternal depressive symptoms at the age of eight to nine years on the other hand was not associated with adolescent psychosocial functioning (II, Figure 3.).

Table 5.3.2. Associations between initial exposure to maternal depressive symptoms and adolescent outcome. Continuous variables of both EPDS and CBCL and YSR variables are used. Only those timing columns with statistically significant associations are included (first weeks and six months postnatally and childhood 8-9 years excluded).

		Prenatal					Postnatal two months				
		non-depressed		depressed			non-depressed		depressed		
		mean	95%CI	mean	95%CI	p	mean	95%CI	mean	95%CI	p
CBCL	int	51	49-52	53	50-56	0.12	51	49-53	56	46-66	0.2
	ext	48	47-50	52	49-55	0.03*	49	48-51	52	42-61	0.42
	sos.comp.	46	45-48	48	45-51	0.4	47	46-49	41	32-50	0.13
YSR	int	50	48-52	51	47-54	0.9	50	49-52	60	52-70	0.03*
	ext	51	50-53	54	51-57	0.12	52	50-53	53	42-64	0.83
	sos.comp.	46	44-47	46	43-49	1.0	46	44-47	41	32-51	0.28

		Childhood 4-5 years					Concurrent				
		non-depressed		depressed			non-depressed		depressed		
		mean	95%CI	mean	95%CI	p	mean	95%CI	mean	95%CI	p
CBCL	int	51	49-52	54	46-61	0.42	51	49-52	52	44-59	0.75
	ext	49	47-51	52	43-61	0.49	49	47-50	54	46-61	0.19
	sos.comp.	48	45-50	45	38-53	0.69	47	45-49	45	38-52	0.62
YSR	int	51	49-53	50	40-60	0.9	50	48-52	55	49-61	0.11
	ext	52	51-54	52	45-58	0.89	51	50-52	60	54-65	0.005**
	sos.comp.	46	44-48	40	35-45	0.03*	46	44-47	47	41-53	0.67

Maternal concurrent depressive symptoms and adolescent outcome

Adolescents whose mothers scored above the upper EPDS cutpoint concurrently had more often high Total (p = 0.013 in CBCL and 0.008 in YSR), Internalizing (p = 0.001 and 0.003 respectively) and Externalizing (p = 0.009 and 0.044 respectively) problems in both self-reports and in maternal reports (Table 5.3.1; I, Figure 3). In maternal reports they also had lower scores in Social Competence (p = 0.003; M 40; 95% CIs = 32-47) than those whose mothers scored below the cutpoint (M = 48; 95% CIs = 46-50). In self-reports Social Competence was also somewhat poorer among those whose mothers scored above the upper cutpoint in the EPDS (p = 0.066; M = 41; 95% CIs = 34-47) compared to those whose mothers scored below the cutpoint (M = 47; 95% CIs = 45-49).

With the lower EPDS cutpoint and continuous CBCL and YSR Problem score variables initial exposure to maternal depressive symptoms concurrently (in adolescence) was associated with higher scoring on Externalizing Problems in the YSR (p = 0.005; Table 5.3.2; II Figure 3).

5.3.2 Gender differences in the associations of the timing of maternal depressive symptoms and adolescent's adjustment (I)

In Study I the associations between maternal depressive symptoms and adolescent outcome were also examined separately by gender. The CBCL and YSR Problems as well as the EPDS were used with the upper cutpoint.

When analysed by gender, there were statistically indicatively more boys scoring above the cutpoint on Externalizing Problems in self-reports among those exposed to maternal depressive symptoms *prenatally* (40% vs. 9%, p = 0.083; Table 5.3.1; I, Figure 3.). Boys whose mothers scored above the upper EPDS cutpoint prenatally also scored significantly lower on Social Competence in the CBCL (p = 0.009; M = 34; 95% CIs = 15-53) than those whose mothers scored below the cutpoint (M = 46; 95% CIs = 44-48). The same applied indicatively in adolescent self-reports (p = 0.072; M= 35; 95% CIs = 20-49 vs. M = 44; 95% CIs = 42-46; I, Figure 2.).

Significantly more boys exceeded the cutpoint of Externalizing Problems in self-reports among those exposed to maternal depressive symptoms *two months postnatally* (50% vs. 2%, p = 0.002) than those not exposed (Table 5.3.1; I, Figure 3). No such associations were found among girls. Mothers exceeding the upper EPDS cutpoint two months postnatally also evaluated their adolescent boys to have poorer Social Competence (p = 0.010; M = 37; CIs = 26-48) than did mothers scoring below the EPDS cutpoint (M = 47; 95% CIs 45-50). The same applied to self-reports (p = 0.010: M = 33; 95% CIs = 21-46 vs. M = 45; 95% CIs = 42-47; I, Figure 2.).

In adolescence there were more both boys and girls scoring high on Total, Internalizing and Externalizing Problems among those whose mothers had depressive symptoms *concurrently* (Table 5.3.1; I, Figure 3.) The sons of mothers who concurrently exceeded the upper EPDS cutpoint also had significantly lower Social Competence score in mothers' reports (p = 0.009; M = 37; 95% CIs = 26-47) than did those whose mothers scored below the EPDS cutpoint (M = 47; 95% CIs = 44-49). The same applied indicatively to girls (p = 0.084; M = 39; 95% CI = 34-43 vs. M = 44; 95% CIs 42-47). The sons but not the daughters of concurrently depressed mothers also had lower Social Competence scores in self-reports (p = 0.031; M = 39; 95% CIs = 34-43 vs. M = 44, 95% CIs = 42-47; I, Figure 2.).

5.3.3 Recurrent maternal depressive symptoms and adolescent's adjustment (I)

In Study I, to study whether it was the perinatal, concurrent or recurrent maternal depressive symptoms that best explained the internalizing or externalizing problems or the poorer social competence of the adolescent, a variable with four groups was created, based

on the number of times the mother had scored above the upper cut point in the EPDS: 1) never (n = 108), 2) only perinatally, i.e. pre- and/or postnatally (n = 12), 3) perinatally and concurrently (n = 4) i.e. recurrently, 4) only concurrently (n = 11). Continuous variables of CBCL and YSR Problem scores were used, as the number of high-scoring adolescents in the groups would have been too small for categorical analysis.

The highest mean in Total, Internalizing and Externalizing Problems scores both in maternal and adolescent reports were among the adolescents whose mothers had depressive symptoms only concurrently ($p \leq 0.05$ in all; I, Figure 4). In maternal reports the level of Internalizing Problems was also higher among those adolescents whose mothers had recurrent depressive symptoms than those whose mothers had never had depressive symptoms or had had them only perinatally. In maternal reports Social Competence was poorest among the adolescents whose mothers had recurrent depressive symptoms ($p = 0.016$). The mean Externalizing Problem score was also higher among the adolescents whose mothers had depressive symptoms only perinatally than among those whose mothers never exceeded the upper EPDS cutpoint ($p = 0.016$; I, Figure 4.).

5.3.4 Combined effects of initial timing, recurrence and trajectories of maternal depressive symptoms on adolescent's adjustment (II)

As the number of mothers exceeding the upper EPDS cutpoint is some of the groups in the analyses presented in Study I and Chapter 5.3.3 were rather small, in Study II to further examine the combined effects of the various aspects of maternal depressive symptoms, six sets of regression analyses were accomplished, one set for each of the adolescent outcome variables: continuous variables of CBCL and YSR Internalizing and Externalizing Problem scores and Social Competence scores. The explanatory variables in each of the sets were the depressive symptoms trajectory the mother was assigned to, representing the pattern of maternal depressive symptoms (groups see 5.2.2), the recurrence of maternal depressive symptoms ("never", "once", "twice", "three or more times") and the time-point at which the mother had exceeded the lower cutpoint for the first time (time from first exposure).

Internalizing Problems were best explained by recurrence of maternal depressive symptoms, more recurrent symptoms increasing the risk. Further, the high-stable trajectory of maternal depressive symptoms, indicating chronic depressive symptoms, was the best explanatory variable for adolescent's higher scoring in Externalizing Problems and poorer Social Competence (II, Table 3.). In addition, in maternal reports maternal intermittent depressive symptoms also predicted poorer Social Competence and unexpectedly the low-stable trajectory of maternal depressive symptoms was also associated with adolescents' poor Social Competence in self-reports.

5.4 Multiple risk analysis of adolescent's adjustment (I)

In Study I both logistic and linear regression analyses were conducted to determine the sociodemographic and maternal factors predicting the adolescent psychosocial functioning and emotional and behavioural problems (I, Tables 3 and 4). The summary of the results of

the logistic regressions, using dichotomized Problems and EPDS scores is presented in Table 5.4.1.

When using continuous EPDS variables, higher scoring on the EPDS concurrently predicted poorer Social Competence both on the CBCL (b = -2.2, p = 0.017) and YSR (b = -2.2, p < 0.001; I, Table 4).

Table 5.4.1. Summary of the strongest factors predicting adolescent's Total, Internalizing and Externalizing Problems and Social Competence scores in CBCL and YSR

Adolescent adjustment measure	Explanatory variable and its categories	b	OR	95%CI	p
CBCL					
Better Social Competence	Maternal concurrent depressive symptoms above cutpoint	-5.5		-10.2-(-0.8)	0.022
	Maternal higher education	4.5		1.5-7.5	0.004
High Total Problem Score	Maternal concurrent depressive symptoms above cutpoint		5.7	1.6-20.0	0.007
	Female gender of the adolescent		4.3	1.1-16.3	0.032
High Internalizing Problem Score	Maternal concurrent depressive symptoms above cutpoint		5.8	1.8-19.1	0.004
High Externalizing Problem Score	Maternal concurrent depressive symptoms above cutpoint		4.7	1.1-20.5	0.038
YSR					
Better Social Competence	Maternal higher education	3.7		0.5-6.9	0.024
	Female gender of the adolescent	3.6		0.6-6.6	0.021
High Total Problem Score	Maternal concurrent depressive symptoms above cutpoint		4.4	1.1-17.6	0.037
	Female gender of the adolescent		7.0	1.4-34.5	0.016
High Internalizing Problem Score	Maternal concurrent depressive symptoms above cutpoint		5.4	1.6-18.5	0.007
	Female gender of the adolescent		3.8	1.2-11.5	0.019
High Externalizing Problem Score	Mothers older age		0.7	0.6-1.0	0.025

To explore whether the results were the same or different when using continuous variables of CBCL Problem scores and EPDS scores, linear regression analyses were conducted. Continuous CBCL Problem scores as well as EPDS scores indicated that a higher score on the EPDS concurrently was a risk factor for higher scoring in Total (b = 3.6, p < 0.001), Internalizing (b = 3.4, p < 0.001) and Externalizing (b = 2.9, p < 0.001) Problem scores (I, Table 4). Regarding continuous YSR Problem scores and EPDS scores, scoring higher on the EPDS concurrently (b = 3.1, p ≤ 0.001) and female gender (b = 5.5, p = 0.001) were risk factors for scoring higher on Total Problems, whereas mother's older age was a protective factor (b = -0.5, p = 0.002). Higher scoring on the EPDS concurrently (b = 3.0, p 0.004) and female gender (b = 6.9, p ≤ 0.001) were risk factors for scoring higher on Internalizing Problems. Higher scoring on the EPDS concurrently (b = 2.0, p = 0.001) was a risk factor and mother's older age (used as a continuous variable) was a protective factor (b = -0.5, p = 0.002) for scoring higher on Externalizing Problems. Female gender was indicatively a risk factor for higher scoring on Externalizing Problems (b = 2.3, p = 0.071; I, Table 4.).

To summarize, the results between continuous and categorized Problem scores and EPDS scores did not differ significantly. The small differences were probably explained by the different group sizes.

5.5 Summary of the results concerning maternal depressive symptoms and adolescent adjustment

Figure 5.5.1 presents a summary of the results concerning the timing of maternal depressive symptoms and adolescent's psychosocial functioning.

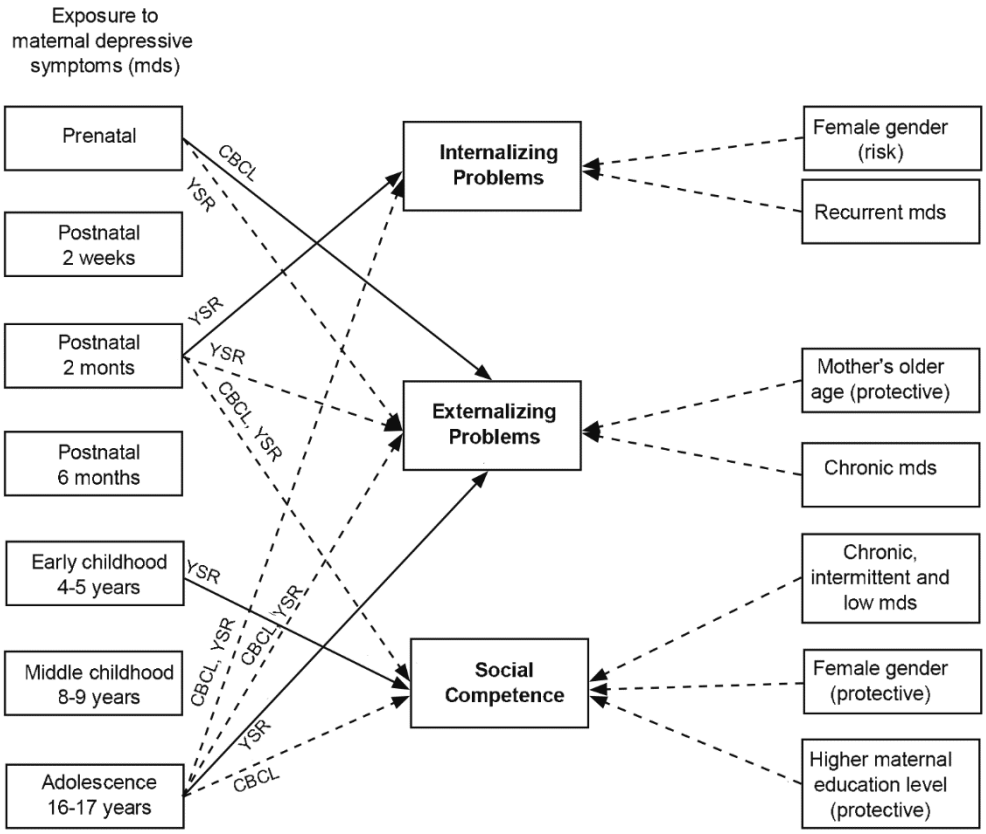

Figure 5.5.1. A summary of the results concerning the effect of the timing of maternal depressive symptoms and other selected explanatory factors on adolescents' internalizing and externalizing problems and social competence. Only statistically significant ($p < 0.05$) associations are shown. The dashed line arrows indicate associations derived by using 1) the $\geq$ 13 cutpoint of the Edinburgh Postnatal Depression Scale (EPDS) without excluding previous exposures and 2) the $\geq$ 64 cutpoint of the Child Behavior Checklist (CBCL) and Youth Self report (YSR) Problem scores (Social Competence score as a continuous variable). The continuous line arrows indicate associations between the initial exceeding of the $\geq$ 10 cutpoint of EPDS and the continuous CBCL/YSR variables. The CBCL/YSR marks attached to the arrows indicate the outcome measure with which each particular association was seen.

5.6 Maternal depressive symptoms and the trajectories of child's internalizing and externalizing problems

5.6.1 Timing of maternal depressive symptoms and the trajectories of child's internalizing and externalizing problems (IV)

In Study IV the associations between the timing of maternal depressive symptoms (T1, T3-T7) used as continuous variables and child's patterns of internalizing and externalizing problems were examined.

Maternal depressive symptoms at each data collection point used were statistically significantly associated with the trajectories of adolescent internalizing problems (T1 $p = 0.029$; T3 $p < 0.001$; T4 $p = 0.006$; T5 $p = 0.040$; T6 $p = 0.003$ and T7 $p = 0.002$; Figure 5.6.1; IV, Figure 4). The highest EPDS median at all time points was among the mothers of the children assigned to the high-stable trajectory group and the lowest median among those assigned to the low-stable group (IV, Figure 4a). Pairwise analyses between the trajectory groups indicated that the level of maternal depressive symptoms was significantly lower among the mothers of the children assigned to the low-stable trajectory group of internalizing problems than all the other trajectory groups (except between the low-stable and moderate-increasing group at T5). In middle childhood (T6) the level of maternal depressive symptoms was also significantly lower among the mothers of the children assigned to the moderate-increasing group than among those assigned to the high-stable group ($p = 0.011$). In addition, in early childhood (T5) the level of maternal depressive symptoms was indicatively higher among the mothers of the children assigned to the moderate-decreasing group than among those belonging to the moderate-increasing group ($p = 0.066$).

Maternal depressive symptoms were statistically significantly associated with the trajectories of adolescent's externalizing problems at T3 ($p = 0.038$), T4 ($p = 0.006$), T6 ($p = 0.012$) and T7 ($p = 0.040$) and indicatively at T5 ($p = 0.074$; Figure 5.6.1; IV, Figure 4). The highest EPDS medians at T3-T5 were in the high-decreasing group and at T6 and T7 in the moderate-to-high group of externalizing problem trajectories. The lowest EPDS median at all the data collection points was in the low-stable trajectory group (at T3 equal to the moderate-decreasing group; IV, Figure 4b). Pairwise associations indicated a statistically significant difference between the high-decreasing and both the low-stable and the moderate-decreasing groups at T3-T6. The discrepancy between the significance of comparing all four groups and pairs of groups at T6 is most likely due to the considerable difference in the size of the trajectory groups (high-decreasing $n = 45$, moderate-to-high $n = 12$) and the differing shapes of the maternal EPDS distributions. At T7 the level of maternal depressive symptoms was significantly higher among the mothers of the children belonging to the moderate-to-high group than among all the other trajectory groups. Pairwise comparison also indicated a statistically significant difference in maternal depressive symptoms at T1 between the low-stable and high-decreasing groups.

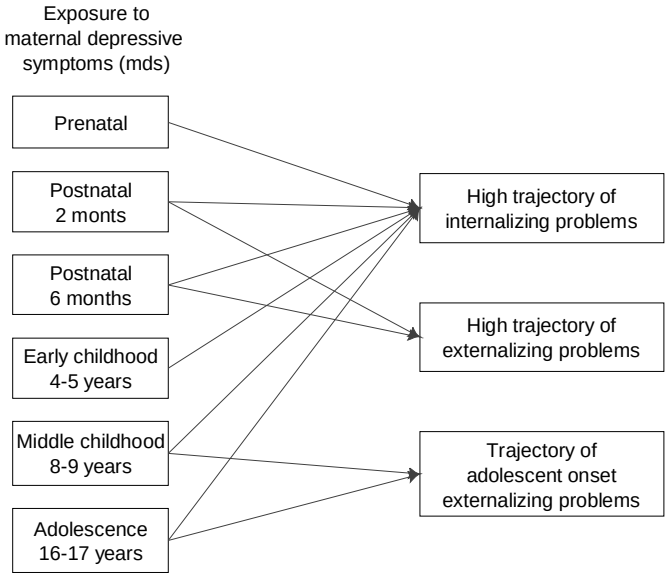

Figure 5.6.1. A summary of the results for the associations of the timing of maternal depressive symptoms (using the continuous EPDS variables) and the trajectory of child's internalizing and externalizing problems (each comprising four groups). The arrows connect each mds time to the trajectory group with the highest EPDS median. Only statistically significant ($p < 0.05$) associations are shown.

5.6.2 Associations between the trajectories of maternal depressive symptoms and the trajectories of child's internalizing and externalizing problems (IV)

The trajectories of maternal depressive symptoms were statistically significantly associated with the trajectory of child's internalizing problems ($p < 0.001$). Fifteen percent of the adolescents whose mothers had chronically high (high-stable) level of depressive symptoms had chronic (high-stable) internalizing problems. In addition, 50% of the children whose mothers had a pattern of intermittent depressive symptoms had chronic internalizing problems and 30% had low level of internalizing problems (IV, Figure 5).

The trajectory of maternal depressive symptoms, on the other hand, was only indicatively associated with child's trajectory of externalizing problems ($p = 0.083$) and did not well explain the child's membership to the different trajectory groups of externalizing problems (IV, Figure 5).

6. Discussion

The five aims of the dissertation can be divided into two larger sections. The first main aim was to draw a picture of the patterns of the child's emotional and behavioural problems from the age of four to five years to the age of 16-17 years (Aim 1). The second main aim was to explore how maternal depressive symptoms from pregnancy to child's adolescence influence the child's well-being in adolescence (Aims 2 to 4) and longitudinally from the child's age of four to five years to 16-17 years (Aim 5). An issue of further interest was whether it is the timing, recurrence or the pattern of maternal depressive symptoms that best explains the harmful effect on child's well-being and development (Aim 4).

The outstanding strength of the study is the extremely long follow-up time also covering the prenatal period. The questionnaires used here are widely used in both research and in clinical practice. In addition, the questionnaires were the same throughout the longitudinal study. Despite the cumulative attrition during the longitudinal process, the sample size remained moderate in size, and the adolescent self-reports are a valuable addition to the data.

Development psychology and psychopathology is multidimensional and complex. This dissertation introduces some aspects of the child's psychosocial development and maladaptation and raises questions to be addressed in future studies.

6.1 Continuity and co-occurrence of psychopathology and competence

6.1.1 Developmental patterns of child's internalizing and externalizing problems

The trajectories of both internalizing and externalizing problems identified were to some extent as hypothesized. Most of the children had moderate level of internalizing problems that increased towards adolescence and moderate level of externalizing problems that decreased towards adolescence. Eleven percent of the children had a high level of internalizing problems from the age of four to five years to the age of 16-17 years and 17% of them had a high level of externalizing problems. The high level of internalizing and to a lesser extent the high level of externalizing problems remained fairly stable from early childhood to adolescence. Although there are longitudinal studies using Finnish samples exploring the continuity and changes in child's emotional and behavioural problems (Pihlakoski et al., 2006; Sourander et al., 2005; Sourander et al., 2007), this is the first study to explore the developmental patterns of the abovementioned problems. The findings in the shapes and proportions of the trajectories are consistent with those of other trajectory

studies from other Western societies referred earlier, except that none of these earlier studies identified a trajectory of adolescent onset externalizing problems.

Five percent of the children were assigned to the trajectory of adolescent onset externalizing problems. As mentioned before, studies that have identified an "adolescent onset–group" of children have used antisocial behaviour as an outcome measure and the proportions vary from 12% to 15% (Monahan et al., 2009; Odgers et al., 2008; Reef et al., 2011). By contrast, a cross-national study conducted by Broidy et al. (2003) from three countries and with five different longitudinal samples explored the trajectories of physical aggression and identified no adolescent-onset trajectory but suggested that the onset of physical aggression occurs in early childhood (Broidy et al., 2003). In fact, the level of physical aggression among individuals was found to be fairly stable. However, they did speculate that this could partially be explained by the age range of the studies samples used: only in one sample were the children over 15 years of age, while all the others included subjects that were not older than 13 years. Thus one explanation for the identification of the adolescent-onset group could be that the sample of this study includes follow-up to the adolescents' age of16-17 years, which has found to be the peak age for adolescent-onset antisocial behaviour problems. According to Moffitt's theory, most of the children with adolescent onset antisocial behaviour actually have adolescent-limited problems and after the adolescent years they revert to their "natural" behaviour (Moffitt, 1993). Thus, a new follow-up should be conducted to address that question. The number of trajectory groups in the model also alters the findings in different studies.

Surprisingly, no gender differences were identified in the trajectories of internalizing and externalizing problems. This may be due to the statistical method used as the CBCL T-scores are based on separate normative samples for each gender within each age range (Achenbach, 1991). This may prevent the identification of the differences between genders. Thus using the raw scores might be better than using normalized T-scores, as Achenbach (1991a) recommends. However, using the raw problem scores makes it more difficult to compare the results to those of clinical samples. Earlier studies also suggest running separate trajectories for genders (Dekker et al., 2007). However, the sample size restricted the analyses.

According to this study there were no socioeconomic differences between groups although a trajectory study by Lansford et al. (2006) indicated that lower SES was associated with high levels of internalizing and externalizing problems in a sample from the USA. This absence of socioeconomic differences may be due to the Finnish population being relatively homogenous. In addition, in the study by Lansford et al. teachers' reports were used instead of the maternal reports in our study. The mother's evaluation is made from her own perspective while teachers have more experience of children of the same age. The inability to perform trajectory analyses from other reporters' data is a limitation of the present study.

6.1.2 Social competence and the developmental patterns of internalizing and externalizing problems

Social competence is about how an individual gets along with other people, forms close relationships and performs in hobbies and academically. Thus internalizing problems and withdrawn behaviour are likely to influence social competence. According to the findings

of Study III chronically high level of internalizing problems from early childhood onwards was associated with poorer social competence in middle childhood and in adolescence. This study cannot, however, address the causality of internalizing problems and social competence as social competence was measured for the first time in middle childhood and trajectories were based on data from early childhood onwards.

As mentioned before, in addition to somatic complaints and anxious/depressive symptoms the internalizing problem score also includes withdrawal behaviour. Thus the chronic internalizing problems may also indicate withdrawn behaviour, which, as noted above, has been found to be a fairly stable and also more genetically inheritable behavioural dimension. Withdrawn behaviour is also likely to increase the risk of becoming socially isolated and rejected and bullied by peers. Burt et al. (2008) found that social competence in childhood showed negative longitudinal links to internalizing problems in adolescence, and even in adulthood. They also tested ruling out the withdrawn behaviour dimension from the analyses but that did not notably change the results. Thus perhaps all kinds of internalizing problems increase the risk for poor social competence and vice versa.

In addition, according to Study III in adolescence the social competence was also poorer among the children assigned to the moderate-increasing trajectory of internalizing problems compared to those with moderate-decreasing and low-stable. In addition to the peer relations, academic skills and hobbies, the Social Competence score on the CBCL also measures sibling relations and participation in housework. While considering youth and puberty, conflicts, especially at home and with family members, are also to some extent normative. It should also be noted that the level of internalizing problems among those children assigned to the moderate-increasing group remained below the clinical level even in adolescence. A longitudinal study by Hofstra et al (2002) exploring the psychopathological development from the age of 11-18 to the age of 21-28 years found that subjects whose problem level increased towards adolescence reverted to normal level after adulthood. There may, however, be a subgroup of children who continue to have increasing level of internalizing problems that later exceed the clinical cutpoint (Hofstra, Van der Ende, & Verhulst, 2002). Again, a follow-up should be conducted to explore this.

Surprisingly, in middle childhood and in adolescence the social competence of those children with high (decreasing) level of *externalizing problems* from early childhood onwards was just as good as the social competence of those with low or moderate level of externalizing problems. However, in adolescence among those with adolescent-onset externalizing problems the social competence was significantly poorer than among those in all other trajectory groups. No differences between groups were found in middle childhood. Thus, poorer social competence did not precede adolescent-onset externalizing problems but rather accompanied it. Hence the cascading model suggesting that externalizing problems in early childhood increase the risk for poorer social competence later was not supported. The findings rather suggest that the association between social competence and externalizing problems is more likely contemporary than causal, as also reported in a study by Burt et al. (2008).

6.1.3 Co-occurrence of internalizing and externalizing problems

The findings in Study III indicate that there is a high co-occurrence of emotional and behavioural problems. In addition, one problem type increases the risk for the other. It has been hypothesized that high level of internalizing problems might be protective against externalizing problems as internalizing problems are often related to inhibited and low risk-taking behaviours (Burt et al., 2008; Masten et al., 2005; Moffitt, Caspi, Harrington, & Milne, 2002). However, according to this study one third of the children with chronic internalizing problems had high (decreasing) level of externalizing problems and one fourth had adolescent-onset externalizing problems.

An association between increasing internalizing problems and co-occurring externalizing problems was also detected in self-reports in adolescence. As mentioned before, it is to some extent normative that internalizing problems increase towards adolescence. However, the findings of this study suggest that, although externalizing problems are found to decrease towards the adolescence, they may increase among those with increasing level of internalizing problems. Externalizing problems may also express inner malaise.

Joint trajectories of internalizing and externalizing problems would have better described the different patterns of co-occurring problems. However, the sample size restricted the analyses. In future studies it would be interesting to explore the differences in risk factors as well as in future well-being between those with "pure" or co-occurring internalizing and externalizing problems.

6.2 Maternal depression as a risk factor for child psychopathology

6.2.1 Maternal prenatal depressive symptoms and adolescent's adjustment

The findings in Studies I and II show that exposure to maternal prenatal depressive symptoms increases the child's risk for externalizing problems in adolescence. The results thus confirm the hypothesis and earlier findings referred to earlier, including those of this same sample when the children were eight to nine years old (Luoma et al., 2001; Luoma, 2004). As noted earlier, maternal prenatal anxious and depressive symptoms are associated with changes in the HPA-axis activation level and elevated cortisol levels in offspring. The HPA-axis and cortisol are also associated with stress reactivity. The adolescents of prenatally anxious mothers have been found to manage less well and react more impulsively in cognitive testing than unexposed adolescents (Latimer et al., 2012; Mennes et al., 2009; Van den Bergh et al., 2005). Externalizing problems of the child may thus also be accompanied by poorer adaptation and stress control and further increase the child's risk for maladaptation.

The foetus also exposes to the environmental factors via the mother. The health habits of stressed or depressed expectant mothers may be less optimal than those of healthy expectant mothers. For example, exposure to smoking (Ashford, van Lier, Timmermans, Cuijpers, & Koot, 2008; Brion et al., 2010) and alcohol (O'Connor, 2001; Welch-Carre,

2005) *in utero* increase the risk for subsequent externalizing problems and neuropsychiatric as well as neurocognitive problems.

In addition, prenatal depressive symptoms may affect the mother's representations of the child (Luoma, 2004) and later interaction and bonding. Prenatal depressive symptoms have also been found to influence infant's negative reactivity and temperament (Davis et al., 2007), which may further affect the attachment relationship. The findings by Bergman et al. (2010) even suggest that the association between increased cortisol *in utero* and impaired cognitive development is dependent on the quality of the mother-infant relationship (Bergman et al., 2010).

The risk factors increasing the risk for prenatal depression may also mediate or modify the risk of prenatal depression of the externalizing problems of the child. The study by Hay et al. (2010) referred to earlier indicated that previous maternal conduct problems and prenatal depressive symptoms increase the child's risk for conduct problems even more than prenatal depressive symptoms alone.

According to this study, the harmful effects of maternal prenatal depressive symptoms on adolescent's externalizing problems were found only in adolescent self-reports when using the clinical cutpoint. When using the outcome measure as a continuous variable, the difference between the means of those exposed to maternal prenatal depressive symptoms and those unexposed were parallel in maternal reports and in adolescent self-reports, although the differences between means in self-reported externalizing problems did not reach statistical significance. This discrepancy is probably due to the small numbers in groups of those exposed to maternal depressive symptoms. Thus the results should be replicated in other studies.

6.2.2 Maternal depressive symptoms postnatally and adolescent's adjustment

The findings in Studies I and II confirm the previous findings indicating that maternal depressive symptoms two months postnatally increase the child's risk for internalizing problems as well as poorer social competence in adolescence. The postnatal period is an important time for bonding and attachment and, as mentioned before, postnatal maternal depressive symptoms increase the risk for insecure attachment. The difficulties in bonding and attachment may also explain why two months postnatally seems to be a more critical period for maternal depressive symptoms than the first weeks or six months postnatally (Study II). Maternal depressive symptoms in the first weeks after delivery, also called "the baby blues" are also more normative and less severe and are considered to be related to the changes in hormonal levels and adjustment to the new life situation.

Maternal postnatal depressive symptoms were also associated with poorer social competence of the child in this same sample when the children were eight to nine years old (Luoma, 2004). The findings thus suggest stability, although it was not tested. As mentioned before, over- or understimulation of the infant by postnatally depressed mother may prevent the infant from learning the required social and emotion regulation skills. In addition, insecure attachment is associated with poorer social competence throughout childhood (Sroufe, 2005). Children also learn social skills, cognitions and coping styles

through social learning and may thus acquire inadequate coping strategies from their depressed mothers (Taylor & Ingram, 1999).

Maternal depressive symptoms two months postnatally were also associated with more externalizing problems in self-reports (Study I). However, when prenatal exposure was controlled for, no statistical significance was found (Study II). In Study II the EPDS cutpoint was, however, lower and the outcome measure was used as a continuous variable. Thus the results are not entirely comparable.

6.2.3 Maternal depressive symptoms in early or middle childhood and adolescent's adjustment

Another possible indication of the negative influence of maternal depressive symptoms on child's social learning processes are the findings in Study II showing that maternal depressive symptoms initially in child's early childhood (4-5 years) but not at middle childhood (8-9 years) were associated with self-reported poorer social competence in adolescence. If the exposure to maternal depressive symptoms occurs earlier, the risk for recurrent exposures increases.

The discrepancy in the findings might also be explained by the developmental phase of the child. The younger the children are the more fundamental skills they practise. In Finland children start school at the age of six to seven years, after which they become more independent and spend more time with peers and also learn and adjust their social skills more in peer relationships. Thus some of the skills the child has acquired by school age have perhaps become more customary and changes and increased stress in the environment may exert less influence on the child's social competence skills. Appleyard at al. (2005) also claimed that the same risk factors (child maltreatment, family disruption, interparental violence, maternal stress and family SES) in early childhood that predicted maladaptation in adolescence did not predict maladaptation if occurring in middle childhood. The writers speculate that there are perhaps other risk factors, like peer relations, neighbourhood ecology and academic achievements that are more crucial in predicting the risk for later maladaptation in middle childhood.

At an earlier study stage of the same longitudinal sample (Luoma, 2004; Luoma et al., 2004) maternal concurrent depressive symptoms at child's age of eight to nine were associated with child's poorer social competence in maternal reports. However, as the findings in Study II show, the social competence of children exposed to maternal depressive symptoms at the age of eight to nine years was just as good as the social competence of those not exposed in adolescence. Thus some of the psychosocial problems of the child are rather a reaction to the prevailing situation and the child's level of emotional and behavioural problems decreases as the maternal depressive symptoms diminish.

6.2.4 Maternal depressive symptoms concurrently and adolescent's adjustment

Adolescents whose mothers had depressive symptoms concurrently had significantly more internalizing problems and poorer social competence (Study I). However, this was true only if there were previous exposures to maternal depressive symptoms (Study II). Thus those adolescents already previously exposed to maternal depressive symptoms reacted more strongly to maternal concurrent depressive symptoms in adolescence than did those exposed for the first time in adolescence.

However, as in Study I the upper and in Study II the lower cutpoint of maternal depressive symptoms was used, the findings might also suggest that more severe concurrent maternal depressive symptoms may have a more negative effect on adolescent psychosocial functioning than milder depressive symptoms, although this was not examined. Thus more studies are needed.

The findings of the multiple risk analysis indicate that along with maternal concurrent depressive symptoms female gender increased the risk for total and internalizing problems. The findings thus confirm earlier findings (Jenkins & Curwen, 2008; Rescorla et al., 2007a). The pubertal status is suggested to be the trigger for the increasing prevalence among girls of internalizing problems as well as for the decreasing prevalence of internalizing problems among boys in adolescence (Angold, Costello, & Worthman, 1998). However, as mentioned before, females continue to express more internalizing problems (Burke, 2003; Goodman, 2007; Nolen-Hoeksema, 1994; Nolen-Hoeksema & Girgus, 1994). Nolen-Hoeksema (1994) and Nolen-Hoeksema and Girgus (1994) speculate that girls' ruminating coping style, social conditions and negative life events, in addition to hormonal and pubertal changes, may explain the higher prevalence of depression among adolescent girls than among boys. According to findings in Study I girls also evaluated themselves as having better social competence than boys.

Maternal higher education level (which was strongly associated with family SES) was also associated with better social competence both in maternal reports and in self-reports (Study I). The same was found in a Swedish epidemiological study (Larsson, Knutsson-Medin, Sundelin, & Trost von Werder, 2000). The Swedish study also found that children from lower SES families had more emotional and behavioural problems than those coming from upper SES families. In addition, risk factors are known to accumulate in families with lower economic status (Appleyard et al., 2005).

Maternal concurrent depressive symptoms also increased the risk for adolescent's externalizing problems (Study I). This was also found among those offspring exposed to maternal depressive symptoms for the first time in adolescence (Study II). This may suggest a reactive and reciprocal influence of maternal concurrent depressive symptoms and child's problems (see also 6.2.7). Reciprocity is supported by the findings of earlier studies indicating that the level of child's behavioural problems is found to decrease or increase as mother's depressive symptoms improve or deteriorate respectively (Munson et al., 2001; Nicholson et al., 2011). Less sensitive parenting (by depressive mothers) may also lead to children's externalizing behaviour and "acting out" (Cummings & Davies, 1994). However, less is known about adolescents' reactions to maternal concurrent depressive symptoms.

In multiple risk analyses maternal concurrent depressive symptoms was the strongest predictor of adolescent's externalizing problems in maternal reports. However, in adolescents' self-reports mother's age was the only predictive variable in the model. Mother's older age was a protective factor against scoring higher on externalizing problems. It is known that the children of adolescent mothers are at higher risk for psychopathology, especially externalizing problems (Harden & Zoccolillo, 1997). Mothers' young age is often related to poverty, poor education level and child neglect, all of which are reportedly related to externalizing problems of the child (Lounds, Borkowski, & Whitman, 2006). The pregnancy may also be more often unexpected when the mother is very young, and thus the preparation for motherhood may be more difficult and of shorter duration. It should be noted, however, that the age range of the mothers in this sample was quite narrow (M = 27.1, SD = 4.2 at pregnancy).

6.2.5 Recurrence, chronicity or timing?

Recurrent maternal depressive symptoms were the best predictor of adolescent's internalizing problems when recurrence, chronicity and the timing of the first exposure were considered (Study II). Recurrent depressive symptoms of the mother are likely to increase the family stress and to be accompanied by other risk factors. Although it can be only hypothesized, the genetic inheritability of depressive symptoms probably explains some of the risk transmission, especially among those with recurrent depressive symptoms. The inheritability of depression includes direct inheritability of the predisposition to depression as well as the inheritability of the vulnerabilities to personality or environmental characteristics that increase the risk for the development of depression (Goodman & Gotlib, 1999; Kendler & Baker, 2007; Wilkinson et al., 2013) The diathesis-stress model suggests that the predisposition to depression interacts with subsequent stress responses of the individual. However, both environment and genes are involved in the intergenerational risk transmission of disorders like depression (Wilkinson et al., 2013; Plomin & Asbury, 2005)) and the onset of depression is often triggered by a negative life event.

When recurrence, chronicity and the initial timing of maternal depressive symptoms were combined, chronic subclinical maternal depressive symptoms (the high-stable trajectory) was the strongest variable to predict high scoring on externalizing problems and poorer social competence in adolescence. It is emphasized that when maternal depression is severe, it is perhaps easier for the child to accept and adjust to the illness than to milder depressive symptoms. Mothers with more severe depressive symptoms may also receive more help from others than those with milder, subclinical symptoms. As mentioned before, depressive symptoms often have a negative influence on parenting and on the whole family system (Burke, 2003). Interpersonal conflicts within the family and less effective parenting of the depressed mother have been found to increase the risk for externalizing problems in the child (Buschgens et al., 2010). In addition, parental acceptance has been found to be influenced by parental stress and further, to influence adolescents' self-reported competence (Ohannessian, Lerner, Lerner, & von Eye, 1998; Putnick et al., 2008). Internalizing and externalizing problems are also likely to co-occur and behavioural problems may also reflect emotional distress.

Along with chronic maternal depressive symptoms intermittent maternal depressive symptoms (the intermittent trajectory) also predicted poorer social competence in

adolescence. The intermittent trajectory shows higher peaks two months postnatally, at the child's age of four to five years and also in adolescence. As maternal depressive symptoms at the same time points were also associated with poor adolescent competence in the analyses concerning the timing, the findings could again indicate sensitive periods in the child's social learning process (see below). In addition, mothers with intermittent depressive symptoms had more severe depressive symptoms than did mothers in all the other trajectory groups. The effect of severity of maternal depressive symptoms on child development, however, was beyond the scope of this study and merits further investigation.

6.2.6 Males are more sensitive to maternal perinatal depressive symptoms

As hypothesized, maternal depressive symptoms perinatally were found to be more harmful to boys in adolescence than to girls; boys exposed to maternal depressive symptoms prenatally and/or postnatally had more externalizing problems and poorer social competence in adolescence than those not so exposed. No such associations were found among girls. Although the numbers of both symptomatic mothers and adolescents were relatively small, the results confirmed earlier research findings as noted earlier.

Some studies suggest that male infants are more demanding social partners, have more difficulty in regulating affective states and that mother-son dyads have to work harder to keep the interaction affectively organized than do mother-daughter dyads, especially under stressful conditions (Weinberg et al., 2006; Weinberg et al., 2001). Thus, a cycle of problematic interaction may establish itself with mothers showing more anger towards their sons than to their daughters and the sons showing less positive affect and having greater difficulty maintaining affective regulation (Weinberg & Tronick, 1998). There is also some evidence from studies on rats and mice indicating that maternal prenatal stress has different effect on the developing brains of male foetuses compared to females (Weinstock, 2008). In addition, there may be differences in the brain maturation processes between girls and boys (Glaser, 2012). More studies are, however, needed.

It is also likely that there are differences in the parental practices and in the normative socialization practices applied to girls and boys. Externalizing behaviour is more common and perhaps more accepted in boys than in girls, while girls are encouraged to more emotional and social behaviour (Hops, 1995). Moreover, the sons of postnatally depressed mothers have also been found to achieve poorer academic performance and have lower IQs than the daughters (Hay et al., 2001; Murray et al., 2010). Externalizing problems are often combined with academic problems, partly by interfering in the child's learning processes and preventing the child from meeting academic demands, thereby increasing the risk for maladaptation.

No gender differences were detected among adolescents exposed to maternal concurrent depressive symptoms; both the sons and daughters of concurrently depressed mothers had more internalizing and externalizing problems and poorer social competence. It has even been hypothesized that although boys seem to me more sensitive to maternal perinatal stress, later in childhood and adolescence girls may be more vulnerable to maternal depressive symptoms (Jenkins & Curwen, 2008). However, this was not supported in this study.

6.2.7 Patterns of child's internalizing and externalizing problems and maternal depressive symptoms

Study IV showed that the higher the level of maternal depressive symptoms the higher the problem level in child's pattern of internalizing problems. The findings did not, however, confirm the hypothesis that maternal depressive symptoms prenatally or postnatally are more harmful to the development of child's internalizing problems than maternal depressive symptoms appearing later in child's life as the associations between the level of maternal depressive symptoms and the pattern of child's internalizing problems were similar at all time points.

In addition, 50% of the children whose mothers had a pattern of intermittent depressive symptoms experienced chronic internalizing problems. This is contrary to the findings of another trajectory study by Campbell et al. (2007), which found that the children of mothers with intermittent depressive symptoms had low levels of internalizing symptoms at the age of seven years, although the trajectory of maternal depressive symptoms was quite similar to ours. It is perhaps more difficult for the child to adjust to the fluctuating symptoms and behaviour of the mother. It is noteworthy that 30% of the children of the mothers with intermittent depressive symptoms were assigned to the low-stable group, thus showing resilience. Another study on this sample suggests that the prenatal risk factors among the mothers assigned to the intermittent trajectory group are different from those of the mothers assigned to the chronic (high-stable) trajectory group (Luoma, Korhonen, Salmelin, Helminen, & Tamminen, in press). Thus the risk factors associated with the mothers' intermittent depressive symptoms may themselves make motherhood more difficult, especially when combined with depressive symptoms. The effect of maternal depressive symptoms on child's emotional and behavioural problems is thus likely complex and other maternal or child related risk factors may mediate or moderate the harmful effects of maternal depressive symptoms on child's development.

In addition, as mentioned before, the median of depressive symptom scores among mothers assigned to the intermittent group exceeded the lower cutpoint at two months postnatally and the upper cutpoint in early childhood and adolescence, also indicating a more severe level of depressive symptoms than in those assigned to the chronically high pattern of depressive symptoms. A study by Brennan et al. (2000) found that both prolonged mild maternal depressive symptoms and severe depressive symptoms of short duration had an equally negative effect on child outcome (Brennan et al., 2000). Hence, the severity of depressive symptoms among those assigned to the intermittent trajectory of maternal depressive symptoms may also explain the higher risk for internalizing problems of the child. The severity of maternal depressive symptoms and other risk factors related to maternal depressive symptoms and child development should be further studied.

The high peaks in the trajectory of intermittent maternal depressive symptoms at the child's ages of two months, four to five years and 16-17 years also raise a question as to whether the developmental phase of the child explains on the one hand high maternal depressive symptoms and presumably high levels of stress and on the other hand the negative effect of maternal depressive symptoms on child's development. Infancy and adolescence are considered precarious periods for maternal depressive symptoms due to the developmental tasks of forming an attachment relationship in infancy and on the other hand forming an autonomous identity in adolescence (Beardslee, 1986; Gross et al., 2009; LaRoche, 1989). Child's externalizing problems were also found to be at their highest

among some children at the age of four to five years. Thus these developmental periods may be sensitive and hard times for the mother, too, especially if there is already a predisposition to depressive symptoms. In addition, as the mother was the informant on both her own depressive symptoms and child's psychosocial functioning, the findings may also reflect mother's experiences during the high depressive symptoms period.

The findings concerning maternal depressive symptoms and the pattern of child's externalizing problems on the other hand suggest that the relationship between maternal depressive symptoms and the pattern of child's externalizing problems is reciprocal, as suggested in studies mentioned earlier. There may, however, be more sensitive periods in a child's life (Gross, Shaw, & Moilanen, 2008). According to this study elevated maternal depressive symptoms postnatally, or at child's age of four to five years increased the child's risk for high (decreasing) level of externalizing problems from the age of four to five years onwards. However, as the level of child's externalizing problems decreased towards adolescence, so did the level of maternal depressive symptoms.

Elevated maternal depressive symptoms at the child's age of eight to nine years moreover increased the child's risk for high levels of externalizing problems in adolescence (adolescent-onset). Further, maternal depressive symptoms during offspring's adolescence were also associated with adolescent-onset externalizing problems. Earlier studies on the reciprocity of maternal depressive symptoms and child's externalizing problems have suggested that maternal depressive symptoms in childhood increase the level of child's behavioural problems, while teens' behavioural problems increase maternal depressive symptoms (Allen, Manning, & Meyer, 2010; Gross et al., 2008). Hence the findings of this study support those earlier findings. Such findings may also imply that maternal depressive symptoms in middle childhood may increase the risk for adolescent-onset externalizing problems, although further analyses are needed to address the question.

6.2.8 Limitations

Due to the longitudinal setting the cumulative attrition in this study was rather high, although the drop-out analyses indicated no differences in the socio-emotional characteristics or the status of previous maternal depressive symptoms between the drop-outs and participators. The relative excess of boys among the drop-outs may, however, affect the results. In some of the analyses the numbers of mothers and children with high symptom levels were small and the results should be considered tentative and replicated in other longitudinal samples.

According to this study there was high cross-informant consistency between mothers' reports and adolescents' self-reports concerning both the competence and emotional and behavioural problems of the adolescents. Including teachers' reports on child's problems and competence would have been a valuable viewpoint, as in an earlier stage of this longitudinal study (Luoma, 2004). However, in Finland the children go to upper comprehensive school from the age of 12-13 years to the age of 15-16 years. At the upper comprehensive school the children have many different teachers and thus, perhaps none who teaches them enough to be in a position to evaluate their psychosocial functioning. In addition, as the age of the children in this study stage ranged from 15.3 to 17.2 years, some of the children had already completed comprehensive school. CBCLs from the fathers

were also collected at the middle childhood (T6) and adolescence (T7) study stages, but were not used in any of the studies forming part of this dissertation. These are to be used in future work.

Neither the mothers nor the children were clinically interviewed or diagnosed, which is also a limitation of the study. As a normal population study the findings should be considered more as variations and phenomena of normal life.

The inability to perform trajectory analyses on other authors' data is a limitation of the present study. As both the child's internalizing and externalizing problems and the mother's depressive symptoms were reported by the mother, the findings may be biased by maternal depressive symptoms and express rather the mother's experiences of her and her offspring's problems. Maternal experience is nevertheless important and may have an influence on the interaction between the mother and the child and further influence the child's well-being and development. The findings in Study III, however, indicated that the trajectories of the internalizing and externalizing problems of the child based on mothers' reports were significantly associated with adolescent's self-reported internalizing and externalizing problems at the age of 16-17 years, indicating some degree of cross-informant consistency.

The four-cluster model chosen for this study was not the one with best statistical fits, as mentioned before, but was chosen based on the theoretical framework refereed earlier, to best fit and characterize the sample. Adding the fourth cluster into the model separated the moderate-increasing and moderate-decreasing groups of internalizing problems and generated the adolescent-onset externalizing problems group (other models not represented in this dissertation). Thus the phenomenon exists in this sample, although the model does not offer the best statistical fit. Choosing the five group model might have restricted the analyses by making the group smaller. In general trajectory analyses are a valuable mechanism to explore the patterns of change in longitudinal samples.

The different use of cutpoints and continuous variables complicates the integration of the results. The different use of variables was mostly due to limitations in the number of symptomatic mothers and children, but also made it possible to consider the associations between the different levels of maternal depressive symptoms child's outcome.

7. Conclusions

This study demonstrates that chronic internalizing problems are associated with poorer social competence throughout childhood. However, it also shows that children having a high level of externalizing problems from early childhood onwards have equally good social competence in middle childhood and in adolescence as children with moderate or low level of externalizing problems. Rapidly increasing adolescent-onset externalizing problems, on the other hand, are accompanied by poorer social competence. There is also a high co-occurrence of internalizing and externalizing problems and one problem type increases the risk for the other.

Maternal depressive symptoms are harmful to child's psychosocial development and functioning. Chronic and recurrent depressive symptoms of the mother are more likely to influence child development than a single depressive episode. The timing of the exposure may, however, interfere with the on-going developmental task of the child. More severe, intermittent depressive episodes may also be more harmful to the child than chronic subsyndromal depressive symptoms. The developmental phase of the child may also increase the risk for maternal depressive symptoms, especially if there is a predisposition to depression. The severity and reciprocity of maternal depressive symptoms and child development, however, were not the focus of this study, but these questions ought to be studied further.

Boys are more susceptible to maternal prenatal and postnatal depressive symptoms. According to the findings of this study maternal prenatal and postnatal depressive symptoms increase boys' risk for externalizing problems and poorer social competence in adolescence. The greater vulnerability of boys may be due to higher biological susceptibility to maternal stress prenatally and postnatally or due to more difficult mother-son interaction compared to mother-daughter dyads in infancy, as suggested in some studies. The social norms and expectations are also somewhat different for boys and girls.

In adolescence the children of mothers with concurrent depressive symptoms have more emotional and behavioural problems and poorer social competence, especially if there are previous exposures, than do the children of non-depressed mothers. Some of the emotional and behavioural maladaptation is likely to be reactive and problems diminish as maternal depressive symptoms ease.

Maternal depressive symptoms at any time of child's development increase the child's risk for chronic internalizing problems. The risk transmission may be explained by genetic inheritance and susceptibility to depression, increased environmental stress, by the problems in the attachment and interaction of the mother and the child as well as by other maternal risk factors detrimental to motherhood. It is likely however, that the

intergenerational risk transmission as well as resilience involves multiple risk and protective factors.

The associations between maternal depressive symptoms and the developmental patterns of child's externalizing problems seem to be reciprocal or bidirectional. High level of maternal depressive symptoms may have a negative influence on parenting and on the mother-child interaction, which may further endanger the child's development, for example by interfering with the child's ability for emotion control. Thus a vicious circle may develop.

8. Clinical implications

This study confirms earlier findings on the harmful effects of maternal depressive symptoms on child development and well-being. It is gradually being acknowledged that maternal prenatal and postnatal depressive symptoms may have a long-term effect on child development. In addition, depressive symptoms are recurrent. In adult psychiatric clinics as well as in primary health care systems, concerns about the children of affectively ill parents should be born in mind and support for the family should be offered. The most important clinical implication of this dissertation, however, is the importance of prevention.

As has been noted, children and adolescents exposed to prenatal or postnatal maternal stress or depression have long-term, perhaps permanent dysregulation of the biochemical profile. However, some recent studies suggest that psychotherapeutic interventions, either prenatally of after the birth, may normalize the biochemical profile of either the mother or the child and also improve the interaction within the dyad (Cicchetti, Rogosch, Toth, & Sturge-Apple, 2011; Kaplan, Evans, & Monk, 2008; Richter et al., 2012; Urizar & Munoz, 2011). Prevention at an early age via parent-child psychotherapy or psychoeducational parenting groups might be a cost-effective and long-lasting investment. (O'Connor et al., 2014).

As an individual's coping skills and strategies have been found to be associated with resilience, the effectiveness of group treatments to enhance coping strategies for high-risk children and adolescents should be explored. It is also known that the cumulative risk factors increase the risk for psychopathology. Thus minimising and preventing the risks in all the areas of the child's life is important in preventing alienation and psychopathology.

Although according to this study cross-informant consistency between the mother and adolescent was high, a multi-informant assessment of child's psychosocial functioning is important. It is also important to evaluate the well-being of the parents, if the well-being of the child is a cause for concern.

Child development should be seen as a pathway which is influenced by different child related and environmental risk and protective factors. Understanding the different patterns of emotional and behavioural problems enables us to identify risk groups and plan interventions more precisely and to achieve better results. Not only is there a rather high co-occurrence between emotional and behavioural problems but also one problem type increases the risk for the other type. Thus, when working with children and adolescents with behavioural problems emotional problems should also be screened for. Behavioural problems should not be seen as mere "bad behaviour" or a lack of upbringing. All children taken to custody due to behavioural problems deserve to be evaluated by a child or adolescent psychiatry.

Both chronic and increasing internalizing problems as well as adolescent-onset externalizing problems were associated with poorer social competence. Thus social or academic problems might be seen as reflections of emotional distress or adjustment problems. When working with children experiencing academic problems, emotional problems should also be evaluated. In addition, supporting children in their social contacts and academic achievements in schools might also be beneficial in relieving emotional and behavioural problems.

Among children with clinical level of internalizing problems the problems persisted at the clinical level from early childhood to adolescence. Although it is unknown whether these children received any professional help, it is likely that they will continue to have adjustment problems in adulthood. This means a difficult task for those working in psychiatry as the resources are limited. Thus preventing problems and supporting the child's development in all areas of the child's life is essential for the good of the child and also of the economy.

9. Acknowledgements

This study was carried out at the Medical School of the University of Tampere.

I want to express my deepest gratitude to my supervisor Professor Tuula Tamminen, MD, PhD, for providing me with the opportunity for this study. I am privileged to have benefited from her inspiring and wise guidance all the way from being a pre-medical student.

I am also very grateful to my other supervisor Ilona Luoma, MD, PhD, for her perspicacious notions and ideas and the endless support and encouragement I have enjoyed during these years.

I am indebted to Raili Salmelin, MSc, PhD, for all her help with the millions of statistical questions I have had during all these years and for her assistance with the manuscripts.

I want to thank the official reviewers of this dissertation Hanna Ebeling, MD, PhD, Professor of Child Psychiatry at the University of Oulu and Hasse Karlsson, MA, MD, PhD, Professor of Integrative Neuroscience and Psychiatry at the University of Turku for their precise and critical comments which helped me to improve the manuscript and crystallize my views.

Thank you, Professor Tapio Nummi, for introducing me to trajectory analyses. Special thanks to Mika Helminen, MSc, for completing the trajectory analyses and helping me to understand statistics a little more.

I want to thank Professor Riittakerttu Kaltiala-Heino MD, PhD for sharing her views and expertise in preparing the manuscript.

Thank you all the members of the Child Psychiatry Research Group and especially the members of EMORE, Kaija, Mirjami and Reija, for sharing their expertise and enjoyable moments with me and showing interest in and support for my study.

I am very grateful to Virginia Mattila MA, for all the super-fast assistance with the English language both with the dissertation and the manuscripts.

Thank you all the colleagues in the various places I have worked in for encouraging me in this project. Special thanks to Terhi Pajunen, MD for being my first mentor in clinical practise.

I also want to thank the staff of the Medical School, University of Tampere, especially Leena Kiuru for her prompt and thorough assistance and for reminding me about all the things one so easily forgets.

This work would not have been accomplished without financial support. The Medical Research Fund of Tampere University Hospital, the Foundation of Paediatric Research in Finland, the Children's Fund of the Odd Fellows Association, the Emil Aaltonen Foundation, the University of Tampere, Pirkanmaa Regional Fund and the Finnish Brain Foundation are all to be thanked.

I am very grateful to all the families of the longitudinal study for their participation. They have kept this study alive for all these years.

My dearest friends from years back Heli, Johanna, Ellinoora, Satu, Anna, Iitu, Mia, Larisa, Taru, Tiia and all the others I want to thank for growing up with me and always believing in me.

Finally, I want to thank my parents Sini and Markku and my brothers Riku and Petteri for all the memories of my childhood and their endless support and help, whether it was problems with the car, renovating the house or just sharing my good and bad moods. Special acknowledgements to my mother for all her help with the children and the house. My life partner Aki I want to thank for his patience and understanding with this project and for sharing all the enthusiastic and despairing moments with me. Most of all I want to thank my three beautiful children, Pihla, Miska and Hilla, for reminding me every day of the wonders of childhood and the truly meaningful things in life. Thank you for tolerating the occasional temper tantrums and absent-mindedness I have had under stressful conditions and when faced with deadlines. I hope they find passion and inspiration in life as I have.

Vantaa 5th of September

Marie Korhonen

10. References

Abbott, R., Dunn, V. J., Robling, S. A., & Paykel, E. S. (2004). Long-term outcome of offspring after maternal severe puerperal disorder. *Acta Psychiatrica Scandinavica, 110*(5), 365-373.

Achenbach, T. (1991). *Manual for the child behavior checklist/4-18 and 1991 profile*. Burlington: University of Vermont Department.

Achenbach, T., & Edelbrock, C. (1991). *Manual for the youth self-report and 1991 profile*. Burlington: University of Vermont Department of Psychiatry.

Achenbach, T. (2001). *Manual for the ASEBA school-age forms and profiles.*

Achenbach, T. M. (2006). As others see us: Clinical and research implications of cross-informant correlations for psychopathology. *Current Directions in Psychological Science, 15*(2), 94-98. doi:http://dx.doi.org/10.1111/j.0963-7214.2006.00414.x

Allen, J. P., Manning, N., & Meyer, J. (2010). Tightly linked systems: Reciprocal relations between maternal depressive symptoms and maternal reports of adolescent externalizing behavior. *Journal of Abnormal Psychology, 119*(4), 825-35.

Alpern L., L. K. (1993). Preschool children at social risk: Chronicity and timing of maternal depressive symptoms and child behaviour problems at school and at home. *Development and Psychopathology, 5*, 371-387.

Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 40*(1), 57-87.

Angold, A., Costello, E. J., & Worthman, C. M. (1998). Puberty and depression: The roles of age, pubertal status and pubertal timing. *Psychological Medicine, 28*(1), 51-61. doi:http://dx.doi.org/10.1017/S003329179700593X

Appleyard, K., Egeland, B., van Dulmen, M. H. M., & Sroufe, L. A. (2005). When more is not better: The role of cumulative risk in child behavior outcomes. *Journal of Child Psychology and Psychiatry, 46*(3), 235-245. doi:http://dx.doi.org/10.1111/j.1469-7610.2004.00351.x

Ashman, S. B., Dawson, G., & Panagiotides, H. (2008). Trajectories of maternal depression over 7 years: Relations with child psychophysiology and behavior and role of contextual risks. *Development & Psychopathology, 20*(1), 55-77.

Ashman, S. B., Dawson, G., Panagiotides, H., Yamada, E., & Wilkinson, C. W. (2002). Stress hormone levels of children of depressed mothers. *Development & Psychopathology, 14*(2), 333-349.

Barker, D. J. (1998). In utero programming of chronic disease. *Clinical Science, 95*(2), 115-128.

Beardslee, W. R. (1986). The need for the study of adaptation in the children of parents with affective disorders. In M. Rutter, C. Izard & P. Read (Eds.), *Depression in young people* (pp. 189-204). New York: Guilford Press.

Beardslee, W. R., Versage, E. M., & Gladstone, T. R. (1998). Children of affectively ill parents: A review of the past 10 years. *Journal of the American Academy of Child & Adolescent Psychiatry, 37*(11), 1134-1141.

Belsky, J., & Pluess, M. (2009). Beyond diathesis stress: Differential susceptibility to environmental influences. *Psychological Bulletin, 135*(6), 885-908. doi:http://dx.doi.org/10.1037/a0017376

Bergman, K., Sarkar, P., Glover, V., & O'Connor, T.,G. (2010). Maternal prenatal cortisol and infant cognitive development: Moderation by infant-mother attachment. *Biological Psychiatry, 67*(11), 1026-32.

Berg-Nielsen, T. S., Vika, A., & Dahl, A. A. (2003). When adolescents disagree with their mothers: CBCL-YSR discrepancies related to maternal depression and adolescent self-esteem. *Child: Care, Health and Development, 29*(3), 207-213. doi:10.1046/j.1365-2214.2003.00332.x

BoothLaForce, C., & Oxford, M. L. (2008). Trajectories of social withdrawal from grades 1 to 6: Prediction from early parenting, attachment, and temperament. *Developmental Psychology, 44*(5), 1298-1313. doi:10.1037/a0012954

Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy human development*. New York, NY, US: Basic Books, New York, NY.

Brame, B., Nagin, D. S., & Tremblay, R. E. (2001). Developmental trajectories of physical aggression from school entry to late adolescence. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 42*(4), 503-512.

Brendgen, M., Lamarche, V., Wanner, B., & Vitaro, F. (2010). Links between friendship relations and early adolescents' trajectories of depressed mood. *Developmental Psychology, 46*(2), 491-501. doi:http://dx.doi.org/10.1037/a0017413

Brendgen, M., Wanner, B., Morin, A. J., & Vitaro, F. (2005). Relations with parents and with peers, temperament, and trajectories of depressed mood during early adolescence. *Journal of Abnormal Child Psychology, 33*(5), 579-594.

Brennan, P. A., Hammen, C., Andersen, M. J., Bor, W., Najman, J. M., & Williams, G. M. (2000). Chronicity, severity, and timing of maternal depressive symptoms: Relationships with child outcomes at age 5. *Developmental Psychology, 36*(6), 759-766.

Brennan, P. A., Le Brocque, R., & Hammen, C. (2003). Maternal depression, parent-child relationships, and resilient outcomes in adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 42*(12), 1469-1477. doi:10.1097/00004583-200312000-00014

Broidy, L. M., Nagin, D. S., Tremblay, R. E., Bates, J. E., Brame, B., Dodge, K. A., . . . Vitaro, F. (2003). Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site, cross-national study. *Developmental Psychology, 39*(2), 222-245.

Brüne, M. (2008). *Textbook of evolutionary psychiatry*. New York, United States: Oxford University Press.

Burke, L. (2003). The impact of maternal depression on familial relationships. *International Review of Psychiatry, 15*(3), 243-255.

Burt, K. B., Obradović, J., Long, J. D., & Masten, A. S. (2008). The interplay of social competence and psychopathology over 20 years: Testing transactional and cascade models. *Child Development, 79*(2), 359-374. doi:http://dx.doi.org/10.1111/j.1467-8624.2007.01130.x

Burt, K. B., & Roisman, G. I. (2010). Competence and psychopathology: Cascade effects in the NICHD study of early child care and youth development. *Development & Psychopathology, 22*(3), 557-567.

Buschgens, C. J., van Aken, M. A., Swinkels, S. H., Ormel, J., Verhulst, F. C., & Buitelaar, J. K. (2010). Externalizing behaviors in preadolescents: Familial risk to externalizing behaviors and perceived parenting styles. *European Child & Adolescent Psychiatry, 19*(7), 567-575.

Campbell, S. B., Matestic, P., von Stauffenberg, C., Mohan, R., & Kirchner, T. (2007). Trajectories of maternal depressive symptoms, maternal sensitivity, and children's functioning at school entry. *Developmental Psychology, 43*(5), 1202-1215. doi:10.1037/0012-1649.43.5.1202

Campbell, S. B., MorganLopez, A. A., Cox, M. J., McLoyd, V. C., & National Institute of Child Health and Human Development Early Child Care Research Network. (2009). A latent class analysis of maternal depressive symptoms over 12 years and offspring adjustment in adolescence. *Journal of Abnormal Psychology, 118*(3), 479-493. doi:10.1037/a0015923

Carter, A. S., Garrity-Rokous, F. E., Chazan-Cohen, R., Little, C., & Briggs-Gowan, M. J. (2001). Maternal depression and comorbidity: Predicting early parenting, attachment security, and toddler social-emotional problems and competencies. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(1), 18-26.

Chen, L. S., Eaton, W. W., Gallo, J. J., Nestadt, G., & Crum, R. M. (2000). Empirical examination of current depression categories in a population-based study: Symptoms, course, and risk factors. *American Journal of Psychiatry, 157*(4), 573-580.

Chen, R., & Simons-Morton, B. (2009). Concurrent changes in conduct problems and depressive symptoms in early adolescents: A developmental person-centered approach. *Development & Psychopathology, 21*(1), 285-307. doi:http://dx.doi.org/10.1017/S0954579409000169

Chilcoat, H. D., & Breslau, N. (1997). Does psychiatric history bias mothers' reports? an application of a new analytic approach. *Journal of the American Academy of Child & Adolescent Psychiatry, 36*(7), 971-979.

Choi, J., Jeong, B., Polcari, A., Rohan, M. L., & Teicher, M. H. (2012). Reduced fractional anisotropy in the visual limbic pathway of young adults witnessing domestic violence in childhood. *NeuroImage, 59*(2), 1071-1079. doi:http://dx.doi.org/10.1016/j.neuroimage.2011.09.033

Choi, J., Jeong, B., Rohan, M. L., Polcari, A. M., & Teicher, M. H. (2009). Preliminary evidence for white matter tract abnormalities in young adults exposed to parental verbal abuse. *Biological Psychiatry, 65*(3), 227-234. doi:http://dx.doi.org/10.1016/j.biopsych.2008.06.022

Cicchetti, D., Rogosch, F. A., Toth, S. L., & Sturge-Apple, M. L. (2011). Normalizing the development of cortisol regulation in maltreated infants through preventive interventions. *Development and Psychopathology, 23*(Special Issue 3), 789-800. doi:doi:10.1017/S0954579411000307

Cogill, S. R., Caplan, H. L., Alexandra, H., Robson, K. M., & Kumar, R. (1986). Impact of maternal postnatal depression on cognitive development of young children. *British Medical Journal Clinical Research Ed, 292*(6529), 1165-1167.

Cohn, J. F., & Tronick, E. (1989). Specificity of infants' response to mothers' affective behavior. *Journal of the American Academy of Child & Adolescent Psychiatry, 28*(2), 242-248. doi:http://dx.doi.org/10.1097/00004583-198903000-00016

Cole, D. A., Martin, J. M., Powers, B., & Truglio, R. (1996). Modeling causal relations between academic and social competence and depression: A multitrait-multimethod longitudinal study of children. *Journal of Abnormal Psychology, 105*(2), 258-270. doi:http://dx.doi.org/10.1037/0021-843X.105.2.258

Collishaw, S., Pickles, A., Messer, J., Rutter, M., Shearer, C., & Maughan, B. (2007). Resilience to adult psychopathology following childhood maltreatment: Evidence from a community sample. *Child Abuse & Neglect, 31*(3), 211-229.

Cote, S., Zoccolillo, M., Tremblay, R. E., Nagin, D., & Vitaro, F. (2001). Predicting girls' conduct disorder in adolescence from childhood trajectories of disruptive behaviors. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(6), 678-684.

Cote, S. M., Boivin, M., Liu, X., Nagin, D. S., Zoccolillo, M., & Tremblay, R. E. (2009). Depression and anxiety symptoms: Onset, developmental course and risk factors during early childhood. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 50*(10), 1201-1208.

Cox, J. L., Chapman, G., Murray, D., & Jones, P. (1996). Validation of the Edinburgh postnatal depression scale (EPDS) in non-postnatal women. *Journal of Affective Disorders, 39*(3), 185-189.

Cox, J. L., Murray, D., & Chapman, G. (1993). A controlled study of the onset, duration and prevalence of postnatal depression. *British Journal of Psychiatry, 163*, 27-31.

Crawford, T. N., Cohen, P., Midlarsky, E., & Brook, J. S. (2001). Internalizing symptoms in adolescents: Gender differences in vulnerability to parental distress and discord. *Journal of Research on Adolescence, 11*(1), 95-118. doi:10.1111/1532-7795.00005

Crockenberg, S., & Leerkes, E. (2000). Infant social and emotional development in family context. In C. Zeanah (Ed.), *Handbook of infant mental health (2nd ed.)* (pp. 60-90). New York, NY, US: Guilford Press, New York, NY.

Cummings, E. M., & Davies, P. T. (1994). Maternal depression and child development. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 35*(1), 73-112.

Davies, P. T., & Windle, M. (1997). Gender-specific pathways between maternal depressive symptoms, family discord, and adolescent adjustment. *Developmental Psychology, 33*(4), 657-668.

De Los Reyes, A., Goodman, K. L., Kliewer, W., & Reid-Quinones, K. (2008). Whose depression relates to discrepancies? testing relations between informant characteristics and informant discrepancies from both informants' perspectives. *Psychological Assessment, 20*(2), 139-149.

Dekker, M. C., Ferdinand, R. F., van Lang, N. D., Bongers, I. L., van der Ende, J., & Verhulst, F. C. (2007). Developmental trajectories of depressive symptoms from early childhood to late adolescence: Gender differences and adult outcome. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 48*(7), 657-666.

Duggal, S., Carlson, E. A., Sroufe, L. A., & Egeland, B. (2001). Depressive symptomatology in childhood and adolescence. *Development and Psychopathology, 13*(1), 143-164. doi:10.1017/S0954579401001109

Ebeling, H. (2002). Nuoruusiän psyykkisten häiriöiden juuret ja kulku. [The roots and outcome of adolescent psychiatric disorders (in Finnish)] *Suomen Lääkärilehti, 57*(47), 4819-4822.

Elgar, F. J., Mills, R. S., McGrath, P. J., Waschbusch, D. A., & Brownridge, D. A. (2007). Maternal and paternal depressive symptoms and child maladjustment: The mediating role of parental behavior. *Journal of Abnormal Child Psychology, 35*(6), 943-955.

Ellis, B. J., Boyce, W. T., Belsky, J., Bakermans-Kranenburg, M., & van Ijzendoorn, M.,H. (2011). Differential susceptibility to the environment: An evolutionary--neurodevelopmental theory. *Development and Psychopathology, 23*(1), 7-28.

Eluvathingal, T. J., Chugani, H. T., Behen, M. E., Juhasz, C., Muzik, O., Maqbool, M., . . . Makki, M. (2006). Abnormal brain connectivity in children after early severe socioemotional deprivation: A diffusion tensor imaging study. *Pediatrics, 117*(6), 2093-2100.

Essex, M. J., Klein, M. H., Miech, R., & Smider, N. A. (2001). Timing of initial exposure to maternal major depression and children's mental health symptoms in kindergarten. *The British Journal of Psychiatry : The Journal of Mental Science, 179*, 151-156.

Essex, M. J., Klein, M. H., Cho, E., & Kraemer, H. C. (2003). Exposure to maternal depression and marital conflict: Gender differences in children's later mental health symptoms. *Journal of the American Academy of Child & Adolescent Psychiatry, 42*(6), 728-737. doi:10.1097/01.CHI.0000046849.56865.1D

Fanti, K. A., & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: Findings from the national institute of child health and human development study of early child care. *Developmental Psychology, 46*(5), 1159-1175.

Feng, X., Shaw, D. S., & Silk, J. S. (2008). Developmental trajectories of anxiety symptoms among boys across early and middle childhood. *Journal of Abnormal Psychology, 117*(1), 32-47. doi:10.1037/0021-843X.117.1.32

Fergusson, D. M. (1998). Stability and change in externalising behaviours. *European Archives of Psychiatry & Clinical Neuroscience, 248*(1), 4-13.

Fergusson, D. M., Horwood, L. J., & Boden, J. M. (2006). Structure of internalising symptoms in early adulthood. *British Journal of Psychiatry, 189*, 540-546.

Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1995). Maternal depressive symptoms and depressive symptoms in adolescents. *Journal of Child Psychology and Psychiatry, 36*(7), 1161-1178. doi:10.1111/j.1469-7610.1995.tb01363.x

Field, T., Diego, M., & Hernandez-Reif, M. (2006). Prenatal depression effects on the fetus and newborn: A review. *Infant Behavior & Development, 29*(3), 445-455.

Field, T., Diego, M., Hernandez-Reif, M., & Ascencio, A. (2009). Prenatal dysthymia versus major depression effects on early mother-infant interactions: A brief report. *Infant Behavior & Development, 32*(1), 129-131.

Field, T., Diego, M. A., Hernandez-Reif, M., Figueiredo, B., Ascencio, A., Schanberg, S., & Kuhn, C. (2008). Prenatal dysthymia versus major depression effects on maternal cortisol and fetal growth. *Depression & Anxiety, 25*(6), E11-6.

Fihrer, I., McMahon, C. A., & Taylor, A. J. (2009). The impact of postnatal and concurrent maternal depression on child behaviour during early school years. *Journal of Affective Disorders,* (119), 116-123.

Frye, A. A., & Garber, J. (2005). The relations among maternal depression, maternal criticism, and adolescents' externalizing and internalizing symptoms. *Journal of Abnormal Child Psychology, 33*(1), 1-11. doi:10.1007/s10802-005-0929-9

Glaser, D. (2012). The effects of child maltreatment on the developing brain. In M. E. Garralda, & J. Raynaud (Eds.), *Brain, mind, and developmental psychopathology in childhood* (pp. 199-218). Lanham, MD, US: Jason Aronson, Lanham, MD.

Glover, V., O'Connor,T.G., & O'Donnell, K. (2010). Prenatal stress and the programming of the HPA axis. *Neuroscience and Biobehavioral Reviews, 35*(1), 17-22.

Goldberg, D. (2006). The aetiology of depression. *Psychological Medicine, 36*(10), 1341-1347.

Goodman, S. H. (2007). Depression in mothers. *Annual Review of Clinical Psychology, 3*, 107-135. doi:10.1146/annurev.clinpsy.3.022806.091401

Goodman, S. H., Brogan, D., Lynch, M. E., & Fielding, B. (1993). Social and emotional competence in children of depressed mothers. *Child Development, 64*(2), 516-531.

Goodman, S. H., & Gotlib, I. H. (1999). Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. *Psychological Review, 106*(3), 458-490.

Goodwin, R. D., Fergusson, D. M., & Horwood, L. J. (2004). Early anxious/withdrawn behaviours predict later internalising disorders. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 45*(4), 874-883.

Goodwin, R. D., Sourander, A., Duarte, C. S., Niemela, S., Multimaki, P., Nikolakaros, G., . . . Almqvist, F. (2009). Do mental health problems in childhood predict chronic physical conditions among males in early adulthood? Evidence from a community-based prospective study. *Psychological Medicine, 39*(2), 301-311.

Greenough, W. T., Black, J. E., & Wallace, C. S. (1987). Experience and brain development. *Child Development, 58*(3), 539-559.

Gross, H. E., Shaw, D. S., & Moilanen, K. L. (2008). Reciprocal associations between boys' externalizing problems and mothers' depressive symptoms. *Journal of Abnormal Child Psychology, 36*(5), 693-709. doi:http://dx.doi.org/10.1007/s10802-008-9224-x

Gross, H. E., Shaw, D. S., Burwell, R. A., & Nagin, D. S. (2009). Transactional processes in child disruptive behavior and maternal depression: A longitudinal study from early childhood to adolescence. *Development & Psychopathology, 21*(1), 139-156.

Gross, H. E., Shaw, D. S., Moilanen, K. L., Dishion, T. J., & Wilson, M. N. (2008). Reciprocal models of child behavior and depressive symptoms in mothers and fathers in a sample of children at risk for early conduct problems. *Journal of Family Psychology, 22*(5), 742-751. doi:10.1037/a0013514

Gunlicks, M. L., & Weissman, M. M. (2008). Change in child psychopathology with improvement in parental depression: A systematic review. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*(4), 379-89.

Gunnar, M. R., Morison, S. J., Chisholm, K., & Schuder, M. (2001). Salivary cortisol levels in children adopted from romanian orphanages. *Development and Psychopathology, 13*(3), 611-628. doi:http://dx.doi.org/10.1017/S095457940100311X

Haavisto, A., Sourander, A., Multimaki, P., Parkkola, K., Santalahti, P., Helenius, H., . . . Almqvist, F. (2004). Factors associated with depressive symptoms among 18-year-old boys: A prospective 10-year follow-up study. *Journal of Affective Disorders, 83*(2-3), 143-154.

Haberstick, B. C., Schmitz, S., Young, S. E., & Hewitt, J. K. (2005). Contributions of genes and environments to stability and change in externalizing and internalizing problems during elementary and middle school. *Behavior Genetics, 35*(4), 381-396.

Halligan, S. L., Herbert, J., Goodyer, I. M., & Murray, L. (2004). Exposure to postnatal depression predicts elevated cortisol in adolescent offspring. *Biological Psychiatry, 55*(4), 376-381. doi:10.1016/j.biopsych.2003.09.013

Halligan, S. L., Herbert, J., Goodyer, I., & Murray, L. (2007). Disturbances in morning cortisol secretion in association with maternal postnatal depression predict subsequent depressive symptomatology in adolescents. *Biological Psychiatry, 62*(1), 40-46. doi:10.1016/j.biopsych.2006.09.011

Halligan, S. L., Murray, L., Martins, C., & Cooper, P. J. (2007). Maternal depression and psychiatric outcomes in adolescent offspring: A 13-year longitudinal study. *Journal of Affective Disorders, 97*(1), 145-154. doi:10.1016/j.jad.2006.06.010

Hammen, C., Burge, D., & Adrian, C. (1991). Timing of mother and child depression in a longitudinal study of children at risk. *Journal of Consulting & Clinical Psychology, 59*(2), 341-345.

Hammen, C., & Brennan, P. A. (2003). Severity, chronicity, and timing of maternal depression and risk for adolescent offspring diagnoses in a community sample. *Archives of General Psychiatry, 60*(3), 253-258. doi:10.1001/archpsyc.60.3.253

Hammen, C., Brennan, P. A., & Shih, J. H. (2004). Family discord and stress predictors of depression and other disorders in adolescent children of depressed and nondepressed women. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*(8), 994-1002. doi:10.1097/01.chi.0000127588.57468.f6

Harden, P. W., & Zoccolillo, M. (1997). Disruptive behavior disorders. *Current Opinion in Pediatrics, 9*(4), 339-345.

Hay, D. F., & Pawlby, S. (2003). Prosocial development in relation to children's and mothers' psychological problems. *Child Development, 74*(5), 1314-1327.

Hay, D. F., Pawlby, S., Angold, A., Harold, G. T., & Sharp, D. (2003). Pathways to violence in the children of mothers who were depressed postpartum. *Developmental Psychology, 39*(6), 1083-1094.

Hay, D. F., Pawlby, S., Sharp, D., Asten, P., Mills, A., & Kumar, R. (2001). Intellectual problems shown by 11-year-old children whose mothers had postnatal depression. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 42*(7), 871-889.

Hay, D. F., Pawlby, S., Sharp, D., Schmucker, G., Mills, A., Allen, H., & Kumar, R. (1999). Parents' judgements about young children's problems: Why mothers and fathers might disagree yet still predict later outcomes. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 40*(8), 1249-1258.

Hay, D. F., Pawlby, S., Waters, C. S., Perra, O., & Sharp, D. (2010). Mothers' antenatal depression and their children's antisocial outcomes. *Child Development, 81*(1), 149-65.

Hay, D. F., Pawlby, S., Waters, C. S., & Sharp, D. (2008). Antepartum and postpartum exposure to maternal depression: Different effects on different adolescent outcomes. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 49*(10), 1079-88.

Hoekstra, R. A., Bartels, M., Hudziak, J. J., Van Beijsterveldt, T. C., & Boomsma, D. I. (2008). Genetic and environmental influences on the stability of withdrawn behavior in children: A longitudinal, multi-informant twin study. *Behavior Genetics, 38*(5), 447-461.

Hofstra, M. B., Van der Ende, J., & Verhulst, F. C. (2000). Continuity and change of psychopathology from childhood into adulthood: A 14-year follow-up study. *Journal of the American Academy of Child & Adolescent Psychiatry, 39*(7), 850-858.

Hofstra, M. B., van der Ende, J., & Verhulst, F. C. (2002). Child and adolescent problems predict DSM-IV disorders in adulthood: A 14-year follow-up of a dutch epidemiological sample. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*(2), 182-189.

Hofstra, M. B., Van der Ende, J., & Verhulst, F. C. (2002). Pathways of self-reported problem behaviors from adolescence into adulthood. *American Journal of Psychiatry, 159*(3), 401-407.

Hops, H. (1995). Age- and gender-specific effects of parental depression: A commentary. *Developmental Psychology, 31*(3), 428-431. doi:10.1037/0012-1649.31.3.428

Horowitz, J. L., & Garber, J. (2003). Relation of intelligence and religiosity to depressive disorders in offspring of depressed and nondepressed mothers. *Journal of the American Academy of Child & Adolescent Psychiatry, 42*(5), 578-586. doi:10.1097/01.CHI.0000046831.09750.03

Jaffee, S. R., Moffitt, T. E., Caspi, A., Fombonne, E., Poulton, R., & Martin, J. (2002). Differences in early childhood risk factors for juvenile-onset and adult-onset depression. *Archives of General Psychiatry, 59*(3), 215-222.

Jenkins, J. M., & Curwen, T. (2008). Change in adolescents' internalizing symptomatology as a function of sex and the timing of maternal depressive symptomatology. *Journal of the American Academy of Child & Adolescent Psychiatry, 47*(4), 399-405.

Judd, L. L., Akiskal, H. S., & Paulus, M. P. (1997). The role and clinical significance of subsyndromal depressive symptoms (SSD) in unipolar major depressive disorder. *Journal of Affective Disorders, 45*(1-2), 5-17.

Judd, L. L., Paulus, M. P., Wells, K. B., & Rapaport, M. H. (1996). Socioeconomic burden of subsyndromal depressive symptoms and major depression in a sample of the general population. *American Journal of Psychiatry, 153*(11), 1411-1417.

Kaplan, L. A., Evans, L., & Monk, C. (2008). Effects of mothers' prenatal psychiatric status and postnatal caregiving on infant biobehavioral regulation: Can prenatal programming be modified?. *Early Human Development, 84*(4), 249-256.

Kendler, K. S., & Baker, J. H. (2007). Genetic influences on measures of the environment: A systematic review. *Psychological Medicine, 37*(5), 615-626.

Kendler, K. S., Kessler, R. C., Walters, E. E., MacLean, C., Neale, M., Heath, A., & Eaves, L. J. (1995). Stressful life events, genetic liability, and onset of an episode of major depression in women. *American Journal of Psychiatry, 152*(6), 833-842.

Kessler, R., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustun, T. B. (2007a). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry, 20*(4), 359-364.

Kessler, R., Angermeyer, M., Anthony, J., DE Graaf, R., Demyttenaere, K., Gasquet, I., . . . Ustün, T. (2007b). Lifetime prevalence and age-of-onset distributions of mental disorders in the world health organization's world mental health survey initiative. *World Psychiatry, 6*(3), 168-176.

Klein, D. N., Lewinsohn, P. M., Rohde, P., Seeley, J. R., & Olino, T. M. (2005). Psychopathology in the adolescent and young adult offspring of a community sample of mothers and fathers with major depression. *Psychological Medicine, 35*(3), 353-365.

Korhonen, M., Luoma, I., Salmelin, R., Helminen, M., Kaltiala-Heino, R., & Tamminen, T. (in press). The trajectories of child's internalizing and externalizing problems, social competence and adolescent self-reported problems in a Finnish normal population sample. *School Psychology International,* doi:10.1177/0143034314525511

Kreppner, J. M., Rutter, M., Beckett, C., Castle, J., Colvert, E., Groothues, C., . . . Sonuga-Barke, E. J. (2007). Normality and impairment following profound early institutional deprivation: A longitudinal follow-up into early adolescence. *Developmental Psychology, 43*(4), 931-946.

LaRoche, C. (1989). Children of parents with major affective disorders: A review of the past 5 years. *Psychiatric Clinics of North America, 12*(4), 919-932.

Larsson, B., Knutsson-Medin, L., Sundelin, C., & Trost von Werder, A. C. (2000). Social competence and emotional/behavioural problems in children of psychiatric inpatients. *European Child & Adolescent Psychiatry, 9*(2), 122-128. doi:http://dx.doi.org/10.1007/PL00010708

Leve, L. D., Kim, H. K., & Pears, K. C. (2005). Childhood temperament and family environment as predictors of internalizing and externalizing trajectories from ages 5 to 17. *Journal of Abnormal Child Psychology, 33*(5), 505-520. doi:10.1007/s10802-005-6734-7

Lewinsohn, P. M., Olino, T. M., & Klein, D. N. (2005). Psychosocial impairment in offspring of depressed parents. *Psychological Medicine, 35*(10), 1493-1503. doi:10.1017/S0033291705005350

Lounds, J. J., Borkowski, J. G., & Whitman, T. L. (2006). The potential for child neglect: The case of adolescent mothers and their children. *Child Maltreatment, 11*(3), 281-294.

Luoma, I., Korhonen, M., Salmelin, R. K., Helminen, M., & Tamminen, T. (in press). Long-term trajectories of maternal depressive symptoms and their antenatal predictors. DOI: 10.1016/j.jad.2014.08.017

Luoma, I. (2004). *From pregnancy to middle childhood.* Academic Dissertation, Acta Universitatis Tamperensis 1002.

Luoma, I., Kaukonen, P., Mantymaa, M., Puura, K., Tamminen, T., & Salmelin, R. (2004). A longitudinal study of maternal depressive symptoms, negative expectations and perceptions of child problems. *Child Psychiatry & Human Development, 35*(1), 37-53.

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. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(12), 1367-1374.

Maki, P., Veijola, J., Rasanen, P., Joukamaa, M., Valonen, P., Jokelainen, J., & Isohanni, M. (2003). Criminality in the offspring of antenatally depressed mothers: A 33-year follow-up of the northern finland 1966 birth cohort. *Journal of Affective Disorders, 74*(3), 273-8.

Malcarne, V. L., Hamilton, N. A., Ingram, R. E., & Taylor, L. (2000). Correlates of distress in children at risk for affective disorder: Exploring predictors in the offspring of depressed and nondepressed mothers. *Journal of Affective Disorders, 59*(3), 243-251.

Marshall, P. J., Reeb, B. C., Fox, N. A., Nelson, C. A.,3rd, & Zeanah, C. H. (2008). Effects of early intervention on EEG power and coherence in previously institutionalized

children in romania. *Development & Psychopathology, 20*(3), 861-880. doi:http://dx.doi.org/10.1017/S0954579408000412

Masten, A. S. (2007). Resilience in developing systems: Progress and promise as the fourth wave rises. *Development & Psychopathology, 19*(3), 921-930.

Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development & Psychopathology, 22*(3), 491-495.

Masten, A. S., Roisman, G. I., Long, J. D., Burt, K. B., Obradovic, J., Riley, J. R., . . . Tellegen, A. (2005). Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 years. *Developmental Psychology, 41*(5), 733-746.

McCarty, C. A., McMahon, R. J., & Conduct Problems Prevention Research, G. (2003). Mediators of the relation between maternal depressive symptoms and child internalizing and disruptive behavior disorders. *Journal of Family Psychology, 17*(4), 545-556.

Mennes, M., Bergh, B. V. d., Lagae, L., & Stiers, P. (2009). Developmental brain alterations in 17 year old boys are related to antenatal maternal anxiety. *Clinical Neurophysiology, 120*(6), 1116-1122. doi:http://dx.doi.org/10.1016/j.clinph.2009.04.003

Mesman, J., Bongers, I. L., & Koot, H. M. (2001). Preschool developmental pathways to preadolescent internalizing and externalizing problems. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 42*(5), 679-689.

Mesman, J., & Koot, H. M. (2000). Child-reported depression and anxiety in preadolescence: II. preschool predictors. *Journal of the American Academy of Child & Adolescent Psychiatry, 39*(11), 1379-1386.

Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology, 44*(3), 771-786.

Moffitt, T. E., Caspi, A., Harrington, H., & Milne, B. J. (2002). Males on the life-course-persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. *Development and Psychopathology, 14*(1), 179-207. doi:http://dx.doi.org/10.1017/S0954579402001104

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*(4), 674-701.

Moffitt, T. E., & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development & Psychopathology, 13*(2), 355-375.

Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. P. (2009). Trajectories of antisocial behavior and psychosocial maturity from adolescence to young adulthood. *Developmental Psychology, 45*(6), 1654-1668.

Moulson, M. C., Fox, N. A., Zeanah, C. H., & Nelson, C. A. (2009). Early adverse experiences and the neurobiology of facial emotion processing. *Developmental Psychology, 45*(1), 17-30. doi:10.1037/a0014035

Munson, J. A., McMahon, R. J., & Spieker, S. J. (2001). Structure and variability in the developmental trajectory of children's externalizing problems: Impact of infant attachment, maternal depressive symptomatology, and child sex. *Development & Psychopathology, 13*(2), 277-296.

Murray, L., Arteche, A., Fearon, P., Halligan, S., Goodyer, I., & Cooper, P. (2011). Maternal postnatal depression and the development of depression in offspring up to 16 years of age. *Journal of the American Academy of Child & Adolescent Psychiatry, 50*(5), 460-470.

Murray, L., Kempton, C., Woolgar, M., & Hooper, R. (1993). Depressed mothers' speech to their infants and its relation to infant gender and cognitive development. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 34*(7), 1083-1101.

Murray, L., Arteche, A., Fearon, P., Halligan, S., Croudace, T., & Cooper, P. (2010). The effects of maternal postnatal depression and child sex on academic performance at age 16 years: A developmental approach. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 51*(10), 1150-9.

Murray, L., Halligan, S. L., Adams, G., Patterson, P., & Goodyer, I. M. (2006). Socioemotional development in adolescents at risk for depression: The role of maternal depression and attachment style. *Development and Psychopathology, 18*(2), 489-516.

Murray, L., Marwick, H., & Arteche, A. (2010). Sadness in mothers' 'baby-talk' predicts affective disorder in adolescent offspring. *Infant Behavior & Development, 33*(3), 361-4.

Nagin, D. S., & Odgers, C. L. (2010a). Group-based trajectory modeling (nearly) two decades later. *Journal of Quantitative Criminology, 26*(4), 445-453. doi:http://dx.doi.org/10.1007/s10940-010-9113-7

Nagin, D. S., & Odgers, C. L. (2010b). Group-based trajectory modeling in clinical research. *Annual Review of Clinical Psychology, 6*, 109-138.

Nagin, D. S., & Tremblay, R. E. (2001). Analyzing developmental trajectories of distinct but related behaviors: A group-based method. *Psychological Methods, 6*(1), 18-34.

Nagin, D. S. (1999). Analyzing developmental trajectories: A semiparametric, group-based approach. *Psychological Methods, 4*(2), 139-157.

Najman, J. M., Behrens, B. C., Andersen, M., Bor, W., O'Callaghan, M., & Williams, G. M. (1997). Impact of family type and family quality on child behavior problems: A longitudinal study. *Journal of the American Academy of Child & Adolescent Psychiatry, 36*(10), 1357-1365.

Najman, J. M., Williams, G. M., Nikles, J., Spence, S., Bor, W., O'Callaghan, M., . . . Andersen, M. J. (2000). Mothers' mental illness and child behavior problems: Cause-effect association or observation bias? *Journal of the American Academy of Child & Adolescent Psychiatry, 39*(5), 592-602.

Nederhof, E., Bouma, E. M., Riese, H., Laceulle, O. M., Ormel, J., & Oldehinkel, A. J. (2010). Evidence for plasticity genotypes in a gene-gene-environment interaction: The TRAILS study. *Genes, Brain, & Behavior, 9*(8), 968-973. doi:http://dx.doi.org/10.1111/j.1601-183X.2010.00637.x

Nelson, D. R., Hammen, C., Brennan, P. A., & Ullman, J. B. (2003). The impact of maternal depression on adolescent adjustment: The role of expressed emotion. *Journal of Consulting and Clinical Psychology, 71*(5), 935-944. doi:10.1037/0022-006X.71.5.935

Nicholson, J. S., Deboeck, P. R., Farris, J. R., Boker, S. M., & Borkowski, J. G. (2011). Maternal depressive symptomatology and child behavior: Transactional relationship with simultaneous bidirectional coupling. *Developmental Psychology, 47*(5), 1312-1323. doi:10.1037/a0023912

Nolen-Hoeksema, S. (1994). An interactive model for the emergence of gender differences in depression in adolescence. *Journal of Research on Adolescence, 4*(4), 519-534. doi:10.1207/s15327795jra0404_5

Nolen-Hoeksema, S., & Girgus, J. S. (1994). The emergence of gender differences in depression during adolescence. *Psychological Bulletin, 115*(3), 424-443. doi:10.1037/0033-2909.115.3.424

Obradovic, J., Burt, K. B., & Masten, A. S. (2010). Testing a dual cascade model linking competence and symptoms over 20 years from childhood to adulthood. *Journal of Clinical Child & Adolescent Psychology, 39*(1), 90-102.

O'Connor, T.,G., Ben-Shlomo, Y., Heron, J., Golding, J., Adams, D., & Glover, V. (2005). Prenatal anxiety predicts individual differences in cortisol in pre-adolescent children. *Biological Psychiatry, 58*(3), 211-7.

O'Connor, T.,G., Heron, J., Glover, V., & Alspac, S. T. (2002). Antenatal anxiety predicts child behavioral/emotional problems independently of postnatal depression. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*(12), 1470-7.

O'Connor, T.,G., Heron, J., Golding, J., Beveridge, M., & Glover, V. (2002). Maternal antenatal anxiety and children's behavioural/emotional problems at 4 years. report from the avon longitudinal study of parents and children. *The British Journal of Psychiatry : The Journal of Mental Science, 180*, 502-8.

O'Connor, T.,G., Heron, J., Golding, J., Glover, V., & ALSPAC, S. T. (2003). Maternal antenatal anxiety and behavioural/emotional problems in children: A test of a programming hypothesis. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 44*(7), 1025-36.

O'Connor,T.G., McGuire, S., Reiss, D., Hetherington, E. M., & Plomin, R. (1998). Co-occurrence of depressive symptoms and antisocial behavior in adolescence: A common genetic liability. *Journal of Abnormal Psychology, 107*(1), 27-37.

O'Connor, T. G., Monk, C., & Fitelson, E. M. (2014). Practitioner review: Maternal mood in pregnancy and child development? Implications for child psychology and psychiatry. *Journal of Child Psychology and Psychiatry, 55*(2), 99-111. doi:10.1111/jcpp.12153

Odgers, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., . . . Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development & Psychopathology, 20*(2), 673-716. doi:http://dx.doi.org/10.1017/S0954579408000333

Ohannessian, C. M., Lerner, R. M., Lerner, J. V., & von Eye, A. (1998). Perceived parental acceptance and early adolescent self-competence. *American Journal of Orthopsychiatry, 68*(4), 621-629. doi:http://dx.doi.org/10.1037/h0080370

Otero, G. A., Pliego-Rivero, F. B., Fernandez, T., & Ricardo, J. (2003). EEG development in children with sociocultural disadvantages: A follow-up study. *Clinical Neurophysiology, 114*(10), 1918-1925.

Pawlby, S., Hay, D. F., Sharp, D., Waters, C. S., & O'Keane, V. (2009). Antenatal depression predicts depression in adolescent offspring: Prospective longitudinal community-based study. *Journal of Affective Disorders, 113*(3), 236-43.

Pechtel, P., LyonsRuth, K., Anderson, C. M., & Teicher, M. H. (2014). Sensitive periods of amygdala development: The role of maltreatment in preadolescence. *NeuroImage, 97* (Supplement C), 236-244. doi:10.1016/j.neuroimage.2014.04.025

Pihlakoski, L., Sourander, A., Aromaa, M., Rautava, P., Helenius, H., & Sillanpaa, M. (2006). The continuity of psychopathology from early childhood to preadolescence: A prospective cohort study of 3-12-year-old children. *European Child & Adolescent Psychiatry, 15*(7), 409-417.

Pilowsky, D. J., Wickramaratne, P. J., Rush, A. J., Hughes, C. W., Garber, J., Malloy, E., . . . Weissman, M. M. (2006). Children of currently depressed mothers: A STAR*D ancillary study. *The Journal of Clinical Psychiatry, 67*(1), 126-136.

Pilowsky, D. J., Wickramaratne, P., Talati, A., Tang, M., Hughes, C. W., Garber, J., . . . Weissman, M. M. (2008). Children of depressed mothers 1 year after the initiation of maternal treatment: Findings from the STAR*D-child study. *The American Journal of Psychiatry, 165*(9), 1136-47.

Plomin, R., & Asbury, K. (2005). Nature and nurture: Genetic and environmental influences on behavior. *The Annals of the American Academy of Political and Social Science, 600*(1), 86-98. doi:10.1177/0002716205277184

Putnick, D. L., Bornstein, M. H., Hendricks, C., Painter, K. M., Suwalsky, J. T. D., & Collins, W. A. (2008). Parenting stress, perceived parenting behaviors, and adolescent self-concept in european american families. *Journal of Family Psychology, 22*(5), 752-762. doi:http://dx.doi.org/10.1037/a0013177

Reef, J., Diamantopoulou, S., van Meurs, I., Verhulst, F. C., & van der Ende, J. (2011). Developmental trajectories of child to adolescent externalizing behavior and adult DSM-IV disorder: Results of a 24-year longitudinal study. *Social Psychiatry & Psychiatric Epidemiology, 46*(12), 1233-1241.

Reinke, W. M., Eddy, J. M., Dishion, T. J., & Reid, J. B. (2012). Joint trajectories of symptoms of disruptive behavior problems and depressive symptoms during early

adolescence and adjustment problems during emerging adulthood. *Journal of Abnormal Child Psychology, 40*(7), 1123-1136. doi:http://dx.doi.org/10.1007/s10802-012-9630-y

Rescorla, L., Achenbach, T. M., Ivanova, M. Y., Dumenci, L., Almqvist, F., Bilenberg, N., . . . Verhulst, F. (2007a). Epidemiological comparisons of problems and positive qualities reported by adolescents in 24 countries. *Journal of Consulting & Clinical Psychology, 75*(2), 351-358.

Rescorla, L., Achenbach, T., Ivanova, M. Y., Dumenci, L., Almqvist, F., Bilenberg, N., . . . Verhulst, F. (2007b). Behavioral and emotional problems reported by parents of children ages 6 to 16 in 31 societies. *Journal of Emotional and Behavioral Disorders, 15*(3), 130-142. doi:http://dx.doi.org/10.1177/10634266070150030101

Richter, J., Bittner, A., Petrowski, K., Junge-Hoffmeister, J., Bergmann, S., Joraschky, P., & Weidner, K. (2012). Effects of an early intervention on perceived stress and diurnal cortisol in pregnant women with elevated stress, anxiety, and depressive symptomatology. *Journal of Psychosomatic Obstetrics & Gynecology, 33*(4), 162-170. doi:http://dx.doi.org/10.3109/0167482X.2012.729111

Ritakallio, M., Koivisto, A. M., von der Pahlen, B., Pelkonen, M., Marttunen, M., & Kaltiala-Heino, R. (2008). Continuity, comorbidity and longitudinal associations between depression and antisocial behaviour in middle adolescence: A 2-year prospective follow-up study. *Journal of Adolescence, 31*(3), 355-370.

Roza, S. J., Hofstra, M. B., van der Ende, J., & Verhulst, F. C. (2003). Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: A 14-year follow-up during childhood, adolescence, and young adulthood. *American Journal of Psychiatry, 160*(12), 2116-2121.

Rutter, M. (1985). Resilience in the face of adversity. protective factors and resistance to psychiatric disorder. *British Journal of Psychiatry, 147*, 598-611.

Rutter, M. (2006a). Implications of resilience concepts for scientific understanding. *Annals of the New York Academy of Sciences, 1094*, 1-12.

Rutter, M. (2006b). Implications of resilience concepts for scientific understanding. *Annals of the New York Academy of Sciences, 1094*, 1-12.

Rutter, M. (2007). Resilience, competence, and coping. *Child Abuse & Neglect, 31*(3), 205-209.

Rutter, M., Kim-Cohen, J., & Maughan, B. (2006). Continuities and discontinuities in psychopathology between childhood and adult life. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 47*(3-4), 276-295.

Rutter, M., Moffitt, T. E., & Caspi, A. (2006). Gene-environment interplay and psychopathology: Multiple varieties but real effects. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 47*(3-4), 226-261.

Rutter, M. (2002). Nature, nurture, and development: From evangelism through science toward policy and practice. *Child Development, 73*(1), 1-21. doi:http://helios.uta.fi:2125/10.1111/1467-8624.00388

Sameroff, A. J., & Rosenblum, K. L. (2006). Psychosocial constraints on the development of resilience. *Annals of the New York Academy of Sciences, 1094*, 116-124.

Saunders, J. M. (2007). *An empirical test of Terrie Moffitt's developmental taxonomy of delinquency.* City University of New York.

Seifer, R., & Dickstein, S. (2000). Parental mental illness and infant development. In C. Zeanah (Ed.), *Handbook of infant mental health (2nd ed.)* (pp. 145-160). New York, NY, US: Guilford Press, New York, NY.

Seiffge-Krenke, I., & Kollmar, F. (1998). Discrepancies between mothers' and fathers' perceptions of sons' and daughters' problem behaviour: A longitudinal analysis of parent-adolescent agreement on internalising and externalising problem behaviour. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 39*(5), 687-697.

Shaw, D. S., Lacourse, E., & Nagin, D. S. (2005). Developmental trajectories of conduct problems and hyperactivity from ages 2 to 10. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 46*(9), 931-942.

Shiner, R. L., & Marmorstein, N. R. (1998). Family environments of adolescents with lifetime depression: Associations with maternal depression history. *Journal of the American Academy of Child & Adolescent Psychiatry, 37*(11), 1152-1160. doi:10.1097/00004583-199811000-00014

Sourander, A., Jensen, P., Davies, M., Niemela, S., Elonheimo, H., Ristkari, T., . . . Almqvist, F. (2007). Who is at greatest risk of adverse long-term outcomes? the finnish from a boy to a man study. *Journal of the American Academy of Child & Adolescent Psychiatry, 46*(9), 1148-1161.

Sourander, A., Multimaki, P., Nikolakaros, G., Haavisto, A., Ristkari, T., Helenius, H., . . . Almqvist, F. (2005). Childhood predictors of psychiatric disorders among boys: A prospective community-based follow-up study from age 8 years to early adulthood. *Journal of the American Academy of Child & Adolescent Psychiatry, 44*(8), 756-767.

Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development, 7*(4), 349-367. doi:http://dx.doi.org/10.1080/14616730500365928

Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005). *The development of the person: The minnesota study of risk and adaptation from birth to adulthood*. New York, NY, US: Guilford Publications, New York, NY.

Sterba, S. K., Prinstein, M. J., & Cox, M. J. (2007). Trajectories of internalizing problems across childhood: Heterogeneity, external validity, and gender differences. *Development & Psychopathology, 19*(2), 345-366.

Szyf, M., Weaver, I., & Meaney, M. (2007). Maternal care, the epigenome and phenotypic differences in behavior. *Reproductive Toxicology, 24*(1), 9-19.

Talge, N., Neal, C., & Glover, V. (2007). Antenatal maternal stress and long-term effects on child neurodevelopment: How and why? *Journal of Child Psychology & Psychiatry & Allied Disciplines, 48*(3-4), 245-261.

Tarullo, A. R., Garvin, M. C., & Gunnar, M. R. (2011). Atypical EEG power correlates with indiscriminately friendly behavior in internationally adopted children. *Developmental Psychology, 47*(2), 417-431. doi:10.1037/a0021363

Teicher, M. H., Dumont, N. L., Ito, Y., Vaituzis, C., Giedd, J. N., & Andersen, S. L. (2004). Childhood neglect is associated with reduced corpus callosum area. *Biological Psychiatry, 56*(2), 80-85.

Teti, D. M., Gelfand, D. M., Messinger, D. S., & Isabella, R. (1995). Maternal depression and the quality of early attachment: An examination of infants, preschoolers, and their

mothers. *Developmental Psychology, 31*(3), 364-376. doi:http://dx.doi.org/10.1037/0012-1649.31.3.364

Tompson, M. C., Pierre, C. B., Boger, K. D., McKowen, J. W., Chan, P. T., & Freed, R. D. (2010). Maternal depression, maternal expressed emotion, and youth psychopathology. *Journal of Abnormal Child Psychology, 38*(1), 105-17.

Tottenham, N., Hare, T. A., Millner, A., Gilhooly, T., Zevin, J. D., & Casey, B. J. (2011). Elevated amygdala response to faces following early deprivation. *Developmental Science, 14*(2), 190-204.

Tottenham, N., Hare, T. A., Quinn, B. T., McCarry, T. W., Nurse, M., Gilhooly, T., . . . Casey, B. J. (2010). Prolonged institutional rearing is associated with atypically large amygdala volume and difficulties in emotion regulation. *Developmental Science, 13*(1), 46-61. doi:http://helios.uta.fi:2162/10.1111/j.1467-7687.2009.00852.x

Tremblay, R. E., Nagin, D. S., Seguin, J. R., Zoccolillo, M., Zelazo, P. D., Boivin, M., . . . Japel, C. (2004). Physical aggression during early childhood: Trajectories and predictors. *Pediatrics, 114*(1), e43-50.

Urizar, G. G.,Jr, & Munoz, R. F. (2011). Impact of a prenatal cognitive-behavioral stress management intervention on salivary cortisol levels in low-income mothers and their infants. *Psychoneuroendocrinology, 36*(10), 1480-1494. doi:http://dx.doi.org/10.1016/j.psyneuen.2011.04.002

Van den Bergh, B.,R.H., & Marcoen, A. (2004). High antenatal maternal anxiety is related to ADHD symptoms, externalizing problems, and anxiety in 8- and 9-year-olds. *Child Development, 75*(4), 1085-97.

Van den Bergh, B.,R.H., Mennes, M., Oosterlaan, J., Stevens, V., Stiers, P., Marcoen, A., & Lagae, L. (2005). High antenatal maternal anxiety is related to impulsivity during performance on cognitive tasks in 14- and 15-year-olds. *Neuroscience and Biobehavioral Reviews, 29*(2), 259-69.

van den Bergh, B.,R.H., Mennes, M., Stevens, V., van, d. M., Borger, N., Stiers, P., . . . Lagae, L. (2006). ADHD deficit as measured in adolescent boys with a continuous performance task is related to antenatal maternal anxiety. *Pediatric Research, 59*(1), 78-82.

Van den Bergh, B.,R.H., Van Calster, B., Smits, T., Van Huffel, S., & Lagae, L. (2008). Antenatal maternal anxiety is related to HPA-axis dysregulation and self-reported depressive symptoms in adolescence: A prospective study on the fetal origins of depressed mood. *Neuropsychopharmacology : Official Publication of the American College of Neuropsychopharmacology, 33*(3), 536-45.

van der Toorn, S.,L.M., Huizink, A. C., Utens, E. M. W. J., Verhulst, F. C., Ormel, J., & Ferdinand, R. F. (2010). Maternal depressive symptoms, and not anxiety symptoms, are associated with positive mother-child reporting discrepancies of internalizing problems in children: A report on the TRAILS study. *European Child & Adolescent Psychiatry, 19*(4), 379-88.

van Lier, P. A., & Koot, H. M. (2010). Developmental cascades of peer relations and symptoms of externalizing and internalizing problems from kindergarten to fourth-grade elementary school. *Development & Psychopathology, 22*(3), 569-582.

Verboom, C. E., Sijtsema, J. J., Verhulst, F. C., Penninx, Brenda W. J. H., & Ormel, J. (2014). Longitudinal associations between depressive problems, academic

performance, and social functioning in adolescent boys and girls. *Developmental Psychology, 50*(1), 247-257. doi:http://dx.doi.org/10.1037/a0032547

Weinberg, M. K., Olson, K. L., Beeghly, M., & Tronick, E. Z. (2006). Making up is hard to do, especially for mothers with high levels of depressive symptoms and their infant sons. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 47*(7), 670-683.

Weinberg, M. K., Tronick, E. Z., Beeghly, M., Olson, K. L., Kernan, H., & Riley, J. M. (2001). Subsyndromal depressive symptoms and major depression in postpartum women. *American Journal of Orthopsychiatry, 71*(1), 87-97.

Weinberg, M., & Tronick, E. (1998). Emotional characteristics of infants associated with maternal depression and anxiety. *Pediatrics, 102*, 1298-1304. doi:DOI: 10.1542/peds.102.5.SE1.1298

Weinstock, M. (2008). The long-term behavioural consequences of prenatal stress. *Neuroscience and Biobehavioral Reviews, 32*(6), 1073-1086. doi:10.1016/j.neubiorev.2008.03.002

Weissman, M. M., Wickramaratne, P., Nomura, Y., Warner, V., Pilowsky, D., & Verdeli, H. (2006). Offspring of depressed parents: 20 years later. *The American Journal of Psychiatry, 163*(6), 1001-8.

Wickramaratne, P., Gameroff, M. J., Pilowsky, D. J., Hughes, C. W., Garber, J., Malloy, E., . . . Weissman, M. M. (2011). Children of depressed mothers 1 year after remission of maternal depression: Findings from the STAR*D-child study. *The American Journal of Psychiatry, 168*(6), 593-602.

Wiesner, M., & Kim, H. K. (2006). Co-occurring delinquency and depressive symptoms of adolescent boys and girls: A dual trajectory modeling approach. *Developmental Psychology, 42*(6), 1220-1235.

Wilkinson, P. O., Trzaskowski, M., Haworth, C. M. A., & Eley, T. C. (2013). The role of gene–environment correlations and interactions in middle childhood depressive symptoms. *Development and Psychopathology, 25*, 93-104. doi:10.1017/S0954579412000922

Wolff, J. C., & Ollendick, T. H. (2006). The comorbidity of conduct problems and depression in childhood and adolescence. *Clinical Child & Family Psychology Review, 9*(3-4), 201-220.

Yehuda, R., Engel, S. M., Brand, S. R., Seckl, J., Marcus, S. M., & Berkowitz, G. S. (2005). Transgenerational effects of posttraumatic stress disorder in babies of mothers exposed to the world trade center attacks during pregnancy. *Journal of Clinical Endocrinology & Metabolism, 90*(7), 4115-4118.

Zhou, Q., Hofer, C., Eisenberg, N., Reiser, M., Spinrad, T. L., & Fabes, R. A. (2007). The developmental trajectories of attention focusing, attentional and behavioral persistence, and externalizing problems during school-age years. *Developmental Psychology, 43*(2), 369-385. doi:10.1037/0012-1649.43.2.369

11. Appendices

1. Covering letter for mothers
2. Covering letter for adolescents
3. Written consent for mothers
4. Written consent for adolescents
5. General information questionnaire for mothers
6. Child Behavior Checklist for ages 4-18
7. Youth Self Reports
8. Edinburgh Postnatal Depression Scale

Appendix 1.

TUTKIMUSTIEDOTE 12.01.2006

Hyvä äiti,

Pyydämme Sinua ja esikoistasi osallistumaan tutkimukseen, jossa selvitetään nuoren käyttäytymisen ja tunne-elämän kehitystä. Pirkanmaan sairaanhoitopiirin eettinen toimikunta on antanut tutkimuksesta myönteisen lausunnon.

Perheenne on jo esikoisenne odotusajasta lähtien ollut mukana seurantatutkimuksessa. Osallistumisenne on mahdollistanut jo kaksi väitöskirjaa (Tuula Tamminen ja Ilona Luoma). Lähestyn Sinua jälleen uuden kyselyn tiimoilta. Esikoisesi on ennättänyt jo murrosikään ja on aika toteuttaa seurantatutkimuksen neljäs vaihe.

Tällä tutkimuskerralla saat tutkimussopimuksen allekirjoitettavaksi, yleistietolomakkeen ja mielialalomakkeen Sinun täytettäväksesi sekä vanhempien kyselylomakkeen (sininen) molempien vanhempien täytettäväksi. Mikäli esikoisesi ei ole tekemisissä oman isänsä kanssa, eikä perheessänne ole isän asemassa olevaa henkilöä, voitte palauttaa isän lomakkeen tyhjänä muiden lomakkeiden kanssa.

Tällä tutkimuskerralla myös esikoisesi saa täytettäväkseen kyselylomakkeen sekä tutkimussopimuksen allekirjoitettavakseen. Hän saa oman palautuskuoren, jolloin hänen ei ole välttämätön näyttää Teille vastauksiaan. Tällä pyrimme saamaan nuoret paremmin vastaamaan kyselyyn.

Pyydän Teidän löytävän hetken näiden lomakkeiden täyttämiseen ja mahdollistavan arvokkaan tutkimuksen jatkumisen. Tutkimustuloksia käsitellään luottamuksellisesti ja nimettöminä. Tutkimukseen osallistuminen on vapaaehtoista, eikä vastaamatta jättämistä tarvitse perustella. Mikäli päätätte olla osallistumatta tutkimukseen, toivoisimme kuitenkin teidän ilmoittavan kieltäytymisestänne ja kieltäytymisen syystä joko sähköpostitse tai kirjeellä esimerkiksi oheista palautuslomaketta käyttäen. Myös tämä tieto on tutkimuksen kannalta tärkeää.

Pyydämme Teitä palauttamaan vastauksenne 10.02.2006 mennessä. Kiitän Teitä lämpimästi osallistumisestanne.

Marie Korhonen
Lääketieteen kandidaatti
marie-kaarin.korhonen@uta.fi

Tuula Tamminen
Professori

Appendix 2.

TUTKIMUSTIEDOTE 12.01.2006

Hyvä nuori,

Pyydämme Sinua osallistumaan tutkimukseen, jossa kartoitetaan nuoren hyvinvointia, käytöstä ja tunne-elämää. Pirkanmaan sairaanhoitopiirin eettinen toimikunta on antanut tutkimuksesta myönteisen lausunnon.

Et ehkä tiedäkään, että olet jo ennen syntymääsi ollut mukana Tampereen yliopistossa tehdyssä tutkimuksessa. Kun äitisi odotti Sinua ja kun olit vauva, äidiltäsi kyseltiin raskausajan tunteita ja ajatuksia sekä sitä, millainen Sinä olit vauvana. Kun olit 4-5- ja 8-9-vuotias äidiltäsi ja 8-9-vuotiaana myös isältäsi kyseltiin jälleen heidän ajatuksiaan ja kokemuksiaan Sinusta sekä siitä, millainen lapsi Sinä heidän mielestään olit.

Nyt on tullut tutkimuksen neljäs vaihe ja tällä kertaa Sinäkin pääset osallistumaan. Pyytäisin Sinua täyttämään oheisen kyselylomakkeen ja allekirjoittamaan tutkimussopimuksen. Osa kysymyksistä voi tuntua oudoilta tai Sinulle vierailta, mutta on silti tärkeää että vastaat jokaiseen kysymykseen. Saat oman palautuskuoren, jolloin Sinun ei tarvitse näyttää vastauksiasi kenellekään. Voit toki myös palauttaa lomakkeesi samassa kuoressa äitisi ja isäsi täyttämien lomakkeiden kanssa.

Tutkimustuloksia käsitellään luottamuksellisesti ja nimettöminä. Tutkimukseen osallistuminen on vapaaehtoista, eikä vastaamatta jättämistä tarvitse perustella. Toivoisin Sinun löytävän hetken näiden lomakkeiden täyttämiseen.

Pyytäisin palauttamaan lomakkeet 10.02.2006 mennessä.

Kiitos osallistumisestasi!

Marie Korhonen
Lääketieteen kandidaatti
marie-kaarin.korhonen@uta.fi

Tuula Tamminen
Professori

Appendix 3.

SUOSTUMUS

LAPSUUDEN KOTI NUORUUDEN LÄHTEENÄ

Olemme saaneet kirjallista tietoa 15-16-vuotiaiden esikoislasten hyvinvointia, käytöstä ja tunne-elämää kartoittavasta tutkimuksesta.

Olemme halukkaita osallistumaan kyseiseen kirjekyselytutkimukseen täyttämällä ja palauttamalla oheiset vanhempien kyselylomakkeet ja tämän suostumuksen. Ymmärrämme, että tutkimukseen osallistuminen on vapaaehtoista ja että meillä on oikeus kieltäytyä siitä milloin tahansa syytä ilmoittamatta. Ymmärrämme myös, että tiedot käsitellään luottamuksellisesti.

_____ ___.___.200_
paikka päiväys

Suostun osallistumaan tutkimukseen: Suostumuksen vastaanottaja:

_____ _____
äidin allekirjoitus tutkijan allekirjoitus

_____ _____
nimenselvennys nimen selvennys

_____
syntymäaika tai henkilötunnus

_____
isän (tai isän asemassa olevan) allekirjoitus

_____
nimenselvennys

_____
syntymäaika tai henkilötunnus

_____
osoite

Appendix 4.

SUOSTUMUS

LAPSUUDEN KOTI NUORUUDEN LÄHTEENÄ

Olen saanut kirjallista tietoa 15-16-vuotiaiden esikoislasten hyvinvointia, käytöstä ja tunne-elämää kartoittavasta tutkimuksesta.

Olen halukas osallistumaan kyseiseen kirjekyselytutkimukseen täyttämällä ja palauttamalla oheisen nuoren kyselylomakkeet ja tämän suostumuksen. Ymmärrän, että tutkimukseen osallistuminen on vapaaehtoista ja että minulla on oikeus kieltäytyä siitä milloin tahansa syytä ilmoittamatta. Ymmärrän myös, että tiedot käsitellään luottamuksellisesti.

_____ ___.___.200_
paikka päiväys

Suostun osallistumaan tutkimukseen: **Suostumuksen vastaanottaja:**

_____ _____
nuoren allekirjoitus tutkijan allekirjoitus

_____ _____
nimenselvennys nimen selvennys

_____
syntymäaika tai henkilötunnus

_____
osoite

Appendix 5.

YLEISTIETOLOMAKE äidin täytettäväksi

Nimi _____

Lomakkeen täyttöpäivä _____

Ole ystävällinen ja vastaa kaikkiin kysymyksiin. Rengasta oikea tai oikeat vaihtoehdot ja/tai kirjoita vastauksesi sille varattuun tilaan.

A. Nykyinen elämäntilanteesi

1. Koulutuksesi (viimeinen päästötodistuksesi)
   1 kansa-, kansalais- tai peruskoulu
   2 keskikoulu
   3 ammattikoulu
   4 lukio
   5 opisto, ammattikorkeakoulu
   6 yliopisto
   7 muu, mikä? _____

2. Oletko
   1 kokopäivätyössä kodin ulkopuolella
   2 osapäivätyössä kodin ulkopuolella
   3 työttömänä
   4 työkyvyttömyyseläkkeellä
   5 itsenäinen yrittäjä
   6 opiskelija
   7 työssä kotona
   8 kotiäiti
   9 muu, mikä? _____

3. Siviilisäätysi
   1 Avioliitto
   2 Avoliitto
   3 Naimaton
   4 Eronnut
   5 Leski

4. Avioliiton (-liittojen) solmimisvuosi (-vuodet) _____

5. Avoliiton (-liittojen) alkamisvuosi (-vuodet) _____

6. Avioliiton (-liittojen) päättymisvuosi (-vuodet) _____

7. Avoliiton (-liittojen) päättymisvuosi (-vuodet) _____

8. Asutko
   1 yhdessä miehesi ja lapsesi tai lastesi kanssa
   2 yksinhuoltajana lapsesi tai lastesi kanssa
   3 yksin

4 uusperheenä (sinun lapsiasi ja/tai miehesi lapsia)
5 muuten, miten? _____

9. Oletko tyytyväinen tämänhetkiseen taloudelliseen tilanteeseesi?
1 kyllä
2 en

B. Ihmissuhteet ja tyytyväisyys

10. Millainen on suhteesi mieheesi ollut viime aikoina?
1 minulla ei ole miestä
2 erittäin hyvä
3 melko hyvä
4 tavanoimainen
5 melko huono
6 erittäin huono
7 en osaa sanoa

11. Onko esikoisesi murrosikä muuttanut suhdettasi mieheesi?
1 minulla ei ole miestä
2 ei
3 en osaa sanoa
4 kyllä, miten?_____

12. Onko sinulla hyvää ystävää tai läheistä ihmistä, jolle voit puhua ja jolta voit pyytää apua?
1 kyllä, useita
2 kyllä, riittävästi
3 liian vähän
4 ei ollenkaan
5 en osaa sanoa

13. Tunnetko itsesi yksinäiseksi?
1 aina
2 usein
3 joskus
4 harvoin
5 en koskaan
6 en osaa sanoa

14. Onko sinulla mielestäsi tällä hetkellä ongelmia tai vaikeuksia?
1 ei
2 en osaa sanoa
3 kyllä, millaisia?_____
_____

15. Oletko tällä hetkellä elämääsi
1 hyvin tyytyväinen
2 melko tyytyväinen
3 en osaa sanoa
4 sekä tyytyväinen että tyytymätön
5 melko tyytymätön
6 hyvin tyytymätön

16. Oletko tällä hetkellä huolissasi jostakin?
    1 en
    2 en osaa sanoa
    3 kyllä, mistä? _____
    _____

C. Elämäntavat ja harrastukset

17. Onko sinulla itsellesi tärkeää toimintaa kodin ja/tai työn ulkopuolella?
    1 kyllä
    2 ei

18. Onko sinulla mielestäsi ongelmia alkoholin kanssa?
    1 ei
    2 en osaa sanoa
    3 kyllä, millaisia? _____
    _____

19. Tupakoitko?
    1 kyllä
    2 en

D. Terveydentilasi

20. Millainen terveydentilasi on mielestäsi tällä hetkellä?
    1 hyvä
    2 melko hyvä
    3 keskinkertainen
    4 melko huono
    5 huono, miksi? _____
    _____

21. Onko sinulla jokin pysyvä tai pitkäaikainen sairaus tai vamma?
    1 ei
    2 kyllä, mikä? _____
    _____

22. Onko sinulla mielenterveydellisiä ongelmia tai psyykkistä sairautta?
    1 ei
    2 en osaa sanoa
    3 kyllä, aiemmin
    4 kyllä, tällä hetkellä, mitä? _____
      _____

23. Oletko ollut hoidettavana mielenterveydellisistä syistä?
    1 en
    2 kyllä, missä, milloin ja miksi? _____
      _____

24. Onko sinulla säännöllistä lääkitystä?
    1 ei
    2 kyllä, mitä? _____
      _____

E. Lapsuuden perheesi

25. Elääkö äitisi?
    1 kyllä
    2 ei, kuolinvuosi _____

26. Millainen on (oli) suhteesi äitiisi?
    1 erittäin hyvä
    2 melko hyvä
    3 tavanomainen
    4 melko huono
    5 erittäin huono
    6 en osaa sanoa

27. Muuttuiko suhteesi äitiisi lapsesi/lastesi syntymän jälkeen?
    1 ei
    2 kyllä
    3 en osaa sanoa

28. Millainen äitisi oli mielestäsi äitinä?
    1 hyvä
    2 melko hyvä
    3 keskinkertainen
    4 melko huono
    5 huono
    6 en osaa sanoa

29. Elääkö isäsi vielä?
    1 kyllä
    2 ei, kuolinvuosi? _____

30. Millainen on (oli) suhteesi isääsi?
    1 hyvä
    2 melko hyvä
    3 keskinkertainen
    4 melko huono
    5 huono
    6 en osaa sanoa

31. Muuttuiko suhteesi isääsi lapsesi/lastesi syntymän jälkeen?
    1 ei
    2 kyllä
    3 en osaa sanoa

32. Millainen isäsi oli mielestäsi isänä?
    1 hyvä
    2 melko hyvä
    3 keskinkertainen
    4 melko huono
    5 huono
    6 en osaa sanoa

33. Millaisena näet nyt aikuisena oman lapsuutesi?
    1 hyvänä
    2 melko hyvänä
    3 keskinkertaisena
    4 melko huonona
    5 huonona
    6 en osaa sanoa

34. Kuinka paljon lapsuuden perheessäsi mielestäsi riideltiin?
    1 vähän
    2 melko vähän
    3 jonkin verran
    4 melko paljon
    5 paljon
    6 en osaa sanoa

35. Oliko lapsuuden perheessäsi avioero tai avioeron uhka?
    1 ei
    2 kyllä, avioeron uhka
    3 kyllä, avioero

F. Nykyinen perheesi

36. Kuinka monta biologista lasta sinulla nyt on? _____

37. Onko sinulla lapsia, joilla on eri isä kuin esikoisellasi?
    1 ei
    2 kyllä

38. Onko sinulla lapsia, jotka eivät asu luonasi?
    1 ei
    2 kyllä

39. Kuuluuko perheeseesi muita lapsia kuin omia lapsiasi?
    1 ei
    2 kyllä, kuinka monta?_____

40. Onko miehelläsi aikaisempia lapsia, jotka eivät asu kanssanne?
    1 minulla ei ole miestä
    2 ei
    3 kyllä

41. Mikäli perheessäsi on muita lapsia kuin esikoisesi, onko heillä terveyteen, käyttäytymiseen tai kehitykseen liittyviä ongelmia?
    1 esikoisen lisäksi perheessä ei ole muita lapsia
    2 ei
    3 kyllä, millaisia? _____
    _____
    4 en osaa sanoa

42. Millainen miehesi on mielestäsi isänä?
    1 minulla ei ole miestä
    2 hyvä
    3 melko hyvä
    4 kohtalainen
    5 melko huono
    6 huono
    7 en osaa sanoa

43. Millainen Sinä olet mielestäsi äitinä?
    1 hyvä
    2 melko hyvä
    3 kohtalainen
    4 melko huono
    5 huono
    6 en osaa sanoa

G. Esikoisesi

44. Kuinka esikoisesi murrosikä on mielestäsi mennyt?
    1 hyvin
    2 melko hyvin
    3 kohtalaisesti
    4 melko huonosti
    5 huonosti, miksi? _____
      _____
    6 en osaa sanoa

45. Onko suhteesi esikoiseesi muuttunut murrosiän myötä?
    1 ei
    2 kyllä, miten? _____
      _____

46. Miten sinä olet mielestäsi pärjännyt esikoisesi kanssa hänen murrosikänsä aikana?
    1 hyvin
    2 melko hyvin
    3 kohtalaisesti
    4 melko huonosti
    5 huonosti, miksi? _____
      _____
    6 en osaa sanoa

47. Millainen mielestäsi on sinun ja esikoisesi suhde tällä hetkellä?
    1 erittäin hyvä
    2 hyvä
    3 melko hyvä
    4 kohtalainen
    5 melko huono
    6 huono
    7 erittäin huono
    8 en osaa sanoa

48. Onko esikoisellasi jokin pitkäaikainen sairaus tai vamma?
    1 ei; *siirry kysymykseen 50*
    2 kyllä, millainen? _____
      _____

49. Jos esikoisellasi on pitkäaikainen sairaus tai vamma, miten hän on mielestäsi sopeutunut sairauteensa tai vammaansa?
    1 hyvin
    2 melko hyvin
    3 kohtalaisesti
    4 melko huonosti
    5 huonosti
    6 en osaa sanoa

50. Jos esikoisellasi on nuorempia sisaruksia, millaiset välit esikoisellasi mielestäsi on nuorempiin sisaruksiinsa?
    1 ei ole nuorempia sisaruksia
    2 hyvät
    3 melko hyvät
    4 kohtalaiset

5 melko huonot
6 huonot, kuvaile _____
_____
7 en osaa sanoa

51. Jos perheessänne on tapahtunut avio- tai avoero, miten esikoisesi on mielestäsi sopeutunut tähän?
1 ei avo-/avioeroa
2 hyvin
3 melko hyvin
4 kohtalaisesti
5 melko huonosti
6 huonosti, kuvaile _____
_____
7 en osaa sanoa

52. Onko esikoisesi kokenut läheisen ihmissuhteen menetystä?
1 ei
2 kyllä, minkä ja milloin? _____
_____

53. Onko esikoisellesi tapahtunut jotakin muuta erityisen merkittävää?
1 ei*; siirry kysymykseen 55*
2 kyllä, mitä ja milloin? _____
_____
3 en osaa sanoa

54. Jos esikoisellesi on tapahtunut jotain merkittävää, miten hän on mielestäsi sopeutunut siihen?
1 hyvin
2 melko hyvin
3 kohtalaisesti
4 melko huonosti
5 huonosti, kuvaile _____
_____
6 en osaa sanoa

55. Jos esikoisesti isä ei kuulu nykyiseen perheeseesi, onko esikoisesi yhteydessä isäänsä?
1 esikoisen isä kuuluu nykyiseen perheeseen
2 tapaavat säännöllisesti tai usein
3 ovat muutoin yhteydessä säännöllisesti tai usein
4 ovat yhteydessä tai tapaavat silloin tällöin
5 eivät ole lainkaan yhteydessä

56. Millainen mielestäsi esikoisesi ja hänen isänsä välinen suhde tällä hetkellä on?
1 eivät ole tekemisissä/isä kuollut
2 erittäin hyvä
3 hyvä
4 huono
5 erittäin huono
6 en osaa sanoa

57. Onko esikoisesi tällä hetkellä
    1 peruskoulussa
    2 lukiossa
    3 ammattikoulussa
    4 työssä
    5 muuta, mitä? _____

58. Kuinka esikoisesi on mielestäsi pärjännyt koulussa?
    1 erittäin hyvin
    2 hyvin
    3 melko hyvin
    4 kohtalaisesti
    5 melko huonosti
    6 huonosti
    7 en osaa sanoa

59. Oletko huolissasi esikoisesi tulevaisuudesta?
    1 en
    2 en osaa sanoa
    3 kyllä, miksi? _____
      _____

KIITOS VASTAUKSESTASI!

Appendix 6.

KYSELY VANHEMMILLE
6-18-vuotiaista koululaisista

Luottamuksellinen

Lapsen nimi:		**Vanhempien työ ja ammatti** (Mahdollisimman tarkasti- esim. automekaanikko, yläasteen opettaja, sairaanhoitaja, kotirouva, merkonomi, myyjä, myös vaikka vanhemmat eivät olisi juuri nyt työssä): Isä: _____ Äiti: _____
Sukupuoli: ☐ Poika ☐ Tyttö	**Ikä:**	**Äidinkieli:** ☐ Suomi ☐ Ruotsi ☐ Muu, mikä?
Päiväys: _____ pv kk v	**Lapsen sosiaaliturvatunnus:** _____ pv kk v tunnus	**Lomakkeen täyttäjä:** ☐ Äiti ☐ Isä ☐ Muu, kuka? _____
Käykö lapsi koulua?	☐ Ei ☐ Kyllä, mikä luokka?	

Ole ystävällinen ja vastaa tämän lomakkeen kysymyksiin laittamalla rasti siihen kohtaan, joka parhaiten kuvaa, miten *Sinä itse* koet ja näet lapsen, vaikka muut saattavat olla toista mieltä. Voit lisäksi kirjoittaa omia kommenttejasi.

I. Luettelisitko urheilulajeja, joita lapsesi mieluiten harrastaa (esim. uiminen, jääkiekko, voimistelu, jalkapallo jne): ☐ Ei mitään urheilulajeja	**Kuinka paljon aikaa lapsi käyttää lajiin muihin samanikäisiin verrattuna?**				**Kuinka hyvä hän on lajissa muihin samanikäisiin verrattuna?**			
	Keskimääräistä vähemmän	**Keskimääräisesti**	**Keskimääräistä enemmän**	**En tiedä**	**Keskitasoa huonompi**	**Keskitasoinen**	**Keskitasoa parempi**	**En tiedä**
a.	☐	☐	☐	☐	☐	☐	☐	☐
b.	☐	☐	☐	☐	☐	☐	☐	☐
c.	☐	☐	☐	☐	☐	☐	☐	☐

II. Luettelisitko lapsesi muita lempiharrastuksia, tekemisiä ja leikkejä (esim. lukeminen, pelit, musiikki, käsityöt, postimerkkeily jne. - tv:tä ei lasketa): ☐ Ei tällaisia harrastuksia	**Kuinka paljon aikaa lapsi käyttää siihen muihin samanikäisiin verrattuna?**				**Kuinka hyvä hän on siinä muihin samanikäisiin verrattuna?**			
	Keskimääräistä vähemmän	**Keskimääräisesti**	**Keskimääräistä enemmän**	**En tiedä**	**Keskitasoa parempi**	**Keskitasoa huonompi**	**Keskitasoinen**	**En tiedä**
a.	☐	☐	☐	☐	☐	☐	☐	☐
b.	☐	☐	☐	☐	☐	☐	☐	☐
c.	☐	☐	☐	☐	☐	☐	☐	☐

III. Luettelisitko mihin joukkueisiin, kerhoihin, yhdistyksiin tai ryhmiin lapsi kuuluu (esim. urheiluseura/joukkue, harrastuskerho, kuoro jne): ☐ Ei mihinkään	**Kuinka aktiivinen hän on niissä muihin samanikäisiin verrattuna?**			
	Ei yhtä aktiivinen kuin muut	**Yhtä aktiivinen kuin kuin muut**	**Aktiivisempi kuin muut**	**En tiedä**
a.	☐	☐	☐	☐
b.	☐	☐	☐	☐
c.	☐	☐	☐	☐

Lastenpsykiatrian klinikka (1.5.2002)
Helsingin yliopisto
Lastenlinnantie 2, 00250 Helsinki

IV. Luettelisitko mitä töitä ja tehtäviä lapsella on (esim. oman huoneen siivous, muut kotityöt, mainosten jakaminen, lastenhoito jne):	Kuinka hyvin hän itsenäisesti suoriutuu tehtävistään muihin samanikäisiin verrattuna?			
☐ Ei mitään	Keskitasoa huonommin	Keskitasoisesti	Keskitasoa paremmin	En tiedä
a.	☐	☐	☐	☐
b.	☐	☐	☐	☐
c.	☐	☐	☐	☐

V.1. Kuinka monta läheistä ystävää lapsella on? (Sisaruksia ei lasketa mukaan) ☐ Ei yhtään ☐ 1 ☐ 2 tai 3 ☐ 4 tai enemmän

2. Kuinka monta kertaa viikossa lapsi tapaa ystäviään koulun ulkopuolella? ☐ Vähemmän kuin kerran ☐ 1 tai 2 ☐ 3 tai useammin

VI. Verrattuna muihin samanikäisiin kuinka hyvin lapsesi:

		Huonommin	Keskitasoisesti	Paremmin	
a.	Tulee toimeen sisarustensa kanssa	☐	☐	☐	☐ Ei ole sisaruksia
b.	Tulee toimeen muiden lasten kanssa	☐	☐	☐	
c.	Tulee toimeen vanhempiensa kanssa	☐	☐	☐	
d.	Leikkii tai työskentelee omin päin	☐	☐	☐	

VII. Lapsen koulumenestys
Kuinka lapsi menestyy seuraavissa aineissa verrattuna muihin samanikäisiin:

☐ Ei käy koulua, miksi?

		Ala-arvoisesti	Keskitasoa huonommin	Keskitasoisesti	Keskitasoa paremmin
a.	Äidinkieli	☐	☐	☐	☐
b.	Ympäristöoppi, uskonto, historia	☐	☐	☐	☐
c.	Matemaattiset aineet	☐	☐	☐	☐
d.	Biologia, fysiikka, kemia	☐	☐	☐	☐
	Muut aineet:				
e.	_____	☐	☐	☐	☐
f.	_____	☐	☐	☐	☐
g.		☐	☐	☐	☐

2. Käykö lapsi erityisluokkaa tai -koulua? ☐ Ei ☐ Kyllä, minkälaista?

3. Onko lapsi käynyt jonkun luokan kahteen kertaan? ☐ Ei ☐ Kyllä, minkä ja miksi ?

4. Onko lapsella ollut vaikeuksia jossain kouluaineessa tai muita kouluvaikeuksia?
☐ Ei ☐ Kyllä, minkälaisia? Milloin nämä vaikeudet alkoivat?

Ovatko nämä ongelmat loppuneet? ☐ Ei ☐ Kyllä, milloin?

Onko lapsellasi joku sairaus, ruumiillinen vamma tai mielenterveysongelma?
☐ Ei ☐ Kyllä - kertoisitko tarkemmin:

Mikä huolestuttaa Sinua eniten lapsessasi?

Kuvailisitko lapsesi parhaita puolia:

Seuraavassa on joukko lapsilla joskus esiintyviä ominaisuuksia ja ongelmia. Arvioi miten mikin väittämä sopii lapseesi, kun ajattelet **tätä hetkeä ja viimeksi kulunutta puolta vuotta. Ympyröi** sopivin vaihtoehto. Ole ystävällinen ja vastaa kaikkiin kysymyksiin, myös vaikka joku väittämä ei oikein sovi tälle lapselle.

0 = Ei sovi lainkaan **1 = Sopii jossain määrin tai toisinaan** **2 = Sopii erittäin hyvin tai usein**

0 1 2 1. Lapsi käyttäytyy ikäistään nuoremmalla tavalla

0 1 2 2. Juo alkoholia ilman vanhempien lupaa

_____

0 1 2 3. Väittää usein vastaan

0 1 2 4. Ei pysty tekemään aloittamiaan asioita loppuun saakka

0 1 2 5. Hän nauttii vain harvoista asioista

0 1 2 6. Ulostaa muualle kuin vessaan , esim. housuihin

0 1 2 7. Kerskailee, leuhkii, mahtailee

0 1 2 8. Ei pysty keskittymään / olemaan tarkkaavainen pitkää aikaa

0 1 2 9. Ei saa pois mielestään tiettyjä ajatuksia. (Kuvaile):

_____

0 1 2 10. On levoton, ei pysty istumaan hiljaa

0 1 2 11. On liian riippuvainen, takertuu aikuisiin

0 1 2 12. Valittaa yksinäisyyttä

0 1 2 13. On hämmentynyt ja ymmällään

0 1 2 14. Itkee paljon

0 1 2 15. On julma eläimille

0 1 2 16. On julma tai ilkeä, kiusaa muita

0 1 2 17. Unelmoi tai vaipuu ajatuksiinsa

0 1 2 18. Vahingoittaa itseään tahallisesti tai yrittää itsemurhaa

0 1 2 19. Vaatii paljon huomiota

0 1 2 20. Rikkoo tai tuhoaa omia tavaroitaan

0 1 2 21. Rikkoo perheelleen tai muille kuuluvia tavaroita

0 1 2 22. On tottelematon kotona

0 1 2 23. On tottelematon koulussa

0 1 2 24. Syö huonosti

0 1 2 25. Ei tule toimeen muiden lasten kanssa

0 1 2 26. Ei näytä tuntevan syyllisyyttä käyttäydyttyään huonosti

0 1 2 27. On helposti kateellinen

0 1 2 28. Ei noudata sääntöjä kotona, koulussa tai muualla

0 1 2 29. Pelkää tiettyjä eläimiä, tilanteita tai paikkoja - muuta kuin koulua. (Kuvaile):

_____

0 1 2 30. Pelkää kouluun menoa

0 1 2 31. Pelkää ajattelevansa tai tekevänsä jotain pahaa. (Kuvaile):

_____

0 1 2 32. Tuntee, että hänen on oltava täydellinen

0 1 2 33. Tuntee tai valittaa, että kukaan ei rakasta häntä

0 1 2 34. Tuntee toisten uhkaavan tai vainoavan itseään

0 1 2 35. Tuntee olevansa arvoton tai huonompi kuin muut

0 1 2 36. Satuttaa itsensä usein, on tapaturma-altis

0 1 2 37. Joutuu usein tappeluun

0 1 2 38. Joutuu usein kiusatuksi

0 1 2 39. Liikkuu sellaisten kavereiden kanssa, jotka joutuvat usein vaikeuksiin

0 1 2 40. Kuulee ääniä, joita ei ole olemassa. (Kuvaile):

_____

0 1 2 41. Toimii hetken mielijohteesta tai ajattelematta

0 1 2 42. On mieluummin yksin kuin muiden kanssa

0 1 2 43. Valehtelee tai petkuttaa

0 1 2 44. Pureskelee kynsiään

0 1 2 45. Lapsi on hermostunut, kireä tai jännittynyt

0 1 2 46. Hermostuneita liikkeitä tai nykimistä. (Kuvaile):

_____

0 1 2 47. Näkee painajaisia

0 1 2 48. Muut lapset eivät pidä hänestä

0 1 2 49. Hänellä on ummetusta

0 1 2 50. On liian pelokas tai ahdistunut

0 1 2 51. Tuntee huimausta

0 1 2 52. Tuntee liikaa syyllisyyttä

0 1 2 53. Syö liikaa

0 1 2 54. On liian väsynyt

0 1 2 55. On ylipainoinen. Paino: _____ kg. Pituus: _____ cm.

56. On ruumiillisia vaivoja ilman todettua lääketieteellistä syytä

0 1 2 a. Särkyjä tai kipuja (ei päänsärky)

0 1 2 b. Päänsärky

0 1 2 c. Pahoinvointia, sairaalloinen.

0 1 2 d. Silmävaivoja (Kuvaile):

_____

0 1 2 e. Ihottumaa tai muita iho-ongelmia

0 1 2 f. Vatsakipuja

0 1 2 g. Oksentelua

0 1 2 h. Muuta (Kuvaile):

_____

0 1 2 57. Hyökkää toisten kimppuun, esim. lyö toisia

0 1 2 58. Nyppii ihoaan, nenäänsä tai muita ruumiinosiaan. (Kuvaile):

_____

0 1 2 59. Leikkii sukupuolielimillään julkisesti

0 1 2 60. Leikkii sukupuolielimillään liian paljon

0 1 2 61. Selviytyy huonosti koulutyöstä

0 1 2 62. On kömpelö, liikkeiden koordinaatio on huono

0 = Ei sovi lainkaan **1 = Sopii jossain määrin tai toisinaan** **2 = Sopii erittäin hyvin tai usein**

0 1 2 63. On mieluiten itseään vanhempien lasten kanssa

0 1 2 64. On mieluiten itseään nuorempien lasten kanssa

0 1 2 65. Kieltäytyy puhumasta

0 1 2 66. Toistaa tiettyjä toimintoja uudelleen ja uudelleen, on pakkotoimintoja. (Kuvaile):

0 1 2 67. Karkailee kotoa

0 1 2 68. Huutaa paljon

0 1 2 69. Vaitelias, pitää asiat itsellään

0 1 2 70. Näkee asioita, joita ei ole. (Kuvaile):

0 1 2 71. On vaivautunut, menee helposti hämilleen

0 1 2 72. Sytyttelee tulipaloja

0 1 2 73. Seksuaalisuuteen liittyviä ongelmia. (Kuvaile):

0 1 2 74. Yrittää tehdä vaikutuksen tai pelleilee

0 1 2 75. On ujo

0 1 2 76. Nukkuu vähemmän kuin useimmat lapset

0 1 2 77. Nukkuu päivällä ja/tai yöllä enemmän kuin useimmat lapset. (Kuvaile):

0 1 2 78. Ei pysty keskittymään, häiriintyy helposti

0 1 2 79. Puhevaikeuksia. (Kuvaile):

0 1 2 80. Tuijottaa ilmeettömästi

0 1 2 81. Varastaa kotoa

0 1 2 82. Varastaa kodin ulkopuolelta

0 1 2 83. Kerää tavaroita, joita ei tarvitse. (Kuvaile):

0 1 2 84. Outoa käyttäytymistä. (Kuvaile):

0 1 2 85. Outoja ajatuksia. (Kuvaile):

0 1 2 86. On itsepäinen, juro tai ärtyisä

0 1 2 87. Mielialat tai tunteet vaihtelevat äkillisesti

0 1 2 88. Murjottaa paljon

0 1 2 89. On epäluuloinen

0 1 2 90. Kiroilee tai käyttää rivoa kieltä

0 1 2 91. Puhuu itsensä tappamisesta

0 1 2 92. Puhuu tai kävelee unissaan. (Kuvaile):

0 1 2 93. Puhuu liian paljon

0 1 2 94. Kiusaa paljon muita

0 1 2 95. Saa raivokohtauksia tai on kiivasluontoinen

0 1 2 96. Ajattelee liikaa seksiasioita

0 1 2 97. Uhkailee muita ihmisiä

0 1 2 98. Imee peukaloaan

0 1 2 99. Tupakoi tai käyttää nuuskaa

0 1 2 100. Nukkumisongelmia. (Kuvaile):

0 1 2 101. Pinnaa koulusta

0 1 2 102. On vetämätön, hidasliikkeinen ja voimaton

0 1 2 103. On onneton, surullinen tai masentunut

0 1 2 104. On epätavallisen äänekäs

0 1 2 105. Käyttää alkoholia tai muita huumaavia aineita

0 1 2 106. Tuhoaa ja rikkoo paljon

0 1 2 107. Päiväkastelua

0 1 2 108. Yökastelua

0 1 2 109. Marisee ja kitisee

0 1 2 110. Toivoisi olevansa vastakkaista sukupuolta

0 1 2 111. On vetäytyvä, ei liity muiden seuraan

0 1 2 112. On huolestunut

0 1 2 113. Jos lapsellasi on muita kuin edellä lueteltuja ongelmia, kirjoittaisitko ne tähän:

Ole ystävällinen ja tarkista, että oletvastannut kaikkiin kysymyksiin. Alleviivaa niitä kohtia, joista olet huolissasi, jos sellaisia on!

KIITOS VASTAUKSISTA!

Mikäli vielä haluat kertoa jotain lapsestasi, voit käyttää alla olevaa tilaa siihen

Appendix 7.

KYSELY 11-18-vuotiaille NUORILLE

Harrastukset, koulunkäynti ja ongelmat

Luottamuksellinen

Sinun nimesi:			**Vanhempien työ ja ammatti** (Mahdollisimman tarkasti - esim. automekaanikko, yläasteen opettaja, sairaanhoitaja, kotirouva, merkonomi, myyjä, myös vaikka vanhemmat eivät olisi juuri nyt työssä): Isä: _____ Äiti: _____
Sukupuolesi: ☐ Poika ☐ Tyttö	**Ikäsi:**	**Äidinkielesi:** ☐ Suomi ☐ Ruotsi ☐ Muu, mikä?	
Päiväys: pv kk v		**Sinun syntymäaikasi:** pv kk v tunnus	**Jos itse olet työssä, kerro minkälaisessa:**

Koulunkäynti tai opiskelu: ☐ En käy koulua, en opiskele

Oppilaitos: Luokka:

Vastaa seuraaviin kysymyksiin Sinun oman näkemyksesi mukaan, vaikka toiset olisivat toista mieltä. Voit tarvittaessa kirjoittaa lisäkommentteja!

I. Luettelisitko urheilulajeja, joita mieluiten harrastat (esim. uiminen, jääkiekko, voimistelu, jalkapallo jne): ☐ En harrasta yhtään urheilua	**Kuinka paljon aikaa käytät siihen muihin samanikäisiin verrattuna?**			**Kuinka hyvä olet siinä muihin samanikäisiin verrattuna?**		
	Keskimääräistä vähemmän	**Keskimääräisesti**	**Keskimääräistä enemmän**	**Keskitasoa huonompi**	**Keskitasoinen**	**Keskitasoa parempi**
a.	☐	☐	☐	☐	☐	☐
b.	☐	☐	☐	☐	☐	☐
c.	☐	☐	☐	☐	☐	☐

II. Luettelisitko muita lempiharrastuksiasi, tekemisiä ja leikkejä (esim. lukeminen, pelit, musiikki, käsityöt, postimerkkeily jne. - tv:n katselua ei lasketa mukaan): ☐ Ei tällaisia harrastuksia	**Kuinka paljon aikaa käytät siihen muihin samanikäisiin verrattuna?**			**Kuinka hyvä olet siinä muihin samanikäisiin verrattuna?**		
	Keskimääräistä vähemmän	**Keskimääräisesti**	**Keskimääräistä enemmän**	**Keskitasoa huonompi**	**Keskitasoinen**	**Keskitasoa parempi**
a.	☐	☐	☐	☐	☐	☐
b.	☐	☐	☐	☐	☐	☐
c.	☐	☐	☐	☐	☐	☐

III. Luettelisitko mihin joukkueisiin, kerhoihin, yhdistyksiin tai ryhmiin kuulut (esim. urheiluseura/joukkue, harrastuskerho, kuoro jne): ☐ Ei kerhoa tai seuraa	**Kuinka aktiivinen olet niissä muihin samanikäisiin verrattuna?**		
	Ei yhtä aktiivinen kuin muut	**Yhtä aktiivinen kuin muut**	**Aktiivisempi kuin muut**
a.	☐	☐	☐
b.	☐	☐	☐
c.	☐	☐	☐

Lastenpsykiatrian klinikka (1.5.2002)
Helsingin yliopisto
Lastenlinnantie 2, 00250 Helsinki

IV. Luettelisitko mitä töitä ja tehtäviä teet kotona (esim. oman huoneen siivous, muut kotityöt, mainosten jakaminen, lastenhoito jne): ☐ Ei mitään	**Kuinka hyvin teet ne muihin samanikäisiin verrattuna?**		
	Keskitasoa huonommin	**Keskitasoisesti**	**Keskitasoa paremmin**
a.	☐	☐	☐
b.	☐	☐	☐
c.	☐	☐	☐

V.1. Kuinka monta läheistä ystävää sinulla on? (Sisaruksia ei lasketa mukaan) ☐ Ei yhtään ☐ 1 ☐ 2 tai 3 ☐ 4 tai enemmän

2. Kuinka monta kertaa viikossa tapaat ystäviäsi koulun ulkopuolella? (Sisaruksia ei lasketa) ☐ Vähemmän kuin kerran ☐ 1 tai 2 ☐ 3 tai useammin

VI. Verrattuna muihin samanikäisiin kuinka hyvin mielestäsi:

		Huonommin	**Keskitasoisesti**	**Paremmin**	
a.	Tulet toimeen sisarustesi kanssa	☐	☐	☐	☐ Ei ole sisaruksia
b.	Tulet toimeen muiden lasten kanssa	☐	☐	☐	
c.	Tulet toimeen vanhempiesi kanssa	☐	☐	☐	
d.	Teet asioita omin päin	☐	☐	☐	

VII. Koulumenestys ☐ En käy koulua. Selitä miksi: _____

Kuinka menestyt seuraavissa aineissa verrattuna muihin samanikäisiin:
(Jos et käy enää koulua, niin vastaa sen tilanteen mukaan, kun viimeksi kävit koulua!)

		Ala-arvoisesti	**Keskitasoa huonommin**	**Keskitasoisesti**	**Keskitasoa paremmin**
a.	Äidinkieli	☐	☐	☐	☐
b.	Yleiset aineet esim. historia, uskonto	☐	☐	☐	☐
c.	Matematiikka	☐	☐	☐	☐
d.	Biologia, fysiikka, kemia	☐	☐	☐	☐
e.	Kuvaamataito	☐	☐	☐	☐
f.	Voimistelu, urheilu	☐	☐	☐	☐
g.	Joku muu, mikä?	☐	☐	☐	☐

Onko Sinulla joku sairaus, ruumillinen vamma tai terveysongelma?
☐ Ei ☐ Kyllä - kertoisitko tarkemmin:

Onko Sinulla joku ongelma tai huoli koulussa tai opiskelussa?
☐ Ei ☐ Kyllä - kertoisitko tarkemmin:

Onko Sinulla joku muu ongelma tai huoli?
☐ Ei ☐ Kyllä - kertoisitko tarkemmin:

Kuvailisitko parhaita ominaisuuksiasi:

Kerro vapaasti lisää itsestäsi tai elämäntilanteestasi:

Seuraavassa on lueteltu lapsilla ja nuorilla joskus esiintyviä ominaisuuksia ja ongelmia. Arvioi miten mikin väittämä sopii sinuun, kun ajattelet **tätä hetkeä ja viimeksi kulunutta puolta vuotta. Ympyröi** sopivin vaihtoehto (0, 1 tai 2). Ole ystävällinen ja vastaa kaikkiin kysymyksiin, myös vaikka joku väittämä ei oikein sovi sinulle.

0 = Ei sovi lainkaan **1 = Sopii jossain määrin tai toisinaan** **2 = Sopii erittäin hyvin tai usein**

0 1 2 1. Käyttäydyn ikäistäni nuoremmalla tavalla

0 1 2 2. Juon alkoholia ilman vanhempieni lupaa (Kuvaile):

_____

0 1 2 3. Väitän usein vastaan

0 1 2 4. En pysty tekemään loppuun aloittamiani tehtäviä

0 1 2 5. Vain harvat asiat tuottavat minulle nautintoa

0 1 2 6. Pidän eläimistä

0 1 2 7. Kerskailen, leuhkin, mahtailen

0 1 2 8. Olen huono keskittymään

0 1 2 9. En saa pois mielestään tiettyjä ajatuksia. (Kuvaile):

_____

0 1 2 10. Olen levoton, en pysty istumaan hiljaa

0 1 2 11. Olen liian riippuvainen aikuisista

0 1 2 12. Tunnen olevani yksinäinen

0 1 2 13. Olen hämmentynyt tai ymmälläni

0 1 2 14. Itken paljon

0 1 2 15. Olen rehellinen

0 1 2 16. Olen ilkeä, kiusaan muita

0 1 2 17. Unelmoin ja haaveilen paljon

0 1 2 18. Vahingoitan itseäni tahallisesti tai haluaisin yrittää itsemurhaa

0 1 2 19. Yritän saada paljon huomiota

0 1 2 20. Rikon omia tavaroitani

0 1 2 21. Rikon muiden tavaroita

0 1 2 22. Olen tottelematon kotona

0 1 2 23. Olen tottelematon koulussa

0 1 2 24. Syön liian huonosti

0 1 2 25. Tulen huonosti toimeen muiden lasten tai nuorten kanssa

0 1 2 26. En tunne syyllisyyttä, kun olen tehnyt jotain, mitä ei olisi pitänyt tehdä

0 1 2 27. Olen kateellinen muille

0 1 2 28. En noudata sääntöjä kotona, koulussa tai muualla

0 1 2 29. Pelkään tiettyjä eläimiä, tilanteita tai paikkoja - muuta kuin koulua. (Kuvaile):

_____

0 1 2 30. Pelkään kouluun menoa

0 1 2 31. Pelkään ajattelevani tai tekeväni jotain pahaa tai huonosti. (Kuvaile):

_____

0 1 2 32. Koen, että minun on oltava täydellinen

0 1 2 33. Minusta tuntuu, että kukaan ei pidä minusta

0 1 2 34. Minusta tuntuu, että toiset uhkaavat tai vainoavat minua

0 1 2 35. Tunnen olevani arvoton tai huonompi kuin muut

0 1 2 36. Joudun usein vahinkoihin, joissa satutan itseni

0 1 2 37. Joudun usein tappeluun

0 1 2 38. Minua kiusataan paljon

0 1 2 39. Liikun sellaisten kavereiden kanssa, jotka joutuvat usein vaikeuksiin

0 1 2 40. Kuulen ääniä, joita muiden mielestä ei ole olemassa. (Kuvaile):

_____

0 1 2 41. Toimin hetken mielijohteesta tai ajattelematta

0 1 2 42. Olen mieluummin yksin kuin muiden kanssa

0 1 2 43. Valehtelen tai petkutan

0 1 2 44. Pureskelen kynsiäni

0 1 2 45. Olen hermostunut, kireä tai jännittynyt

0 1 2 46. Minulla on hermostuneita liikkeitä tai nykimistä. (Kuvaile):

_____

0 1 2 47. Näen painajaisia

0 1 2 48. Muut nuoret eivät pidä minusta

0 1 2 49. Tiettyjä asioita teen paremmin kuin useimmat nuoret

0 1 2 50. Olen liian pelokas tai ahdistunut

0 1 2 51. Tunnen huimausta

0 1 2 52. Minulla on liian voimakkaita syyllisyydentunteita

0 1 2 53. Syön liikaa

0 1 2 54. Olen liian väsynyt

0 1 2 55. Olen ylipainoinen. Paino:_____ kg. Pituus:_____ cm.

56. Minulla on seuraavia vaivoja ilman tunnettua sairautta:

0 1 2 a. Särkyjä tai kipuja (ei päänsärky)

0 1 2 b. Päänsärkyä

0 1 2 c. Pahoinvointia

0 1 2 d. Silmävaivoja. (Kuvaile): _____

0 1 2 e. Ihottumaa tai muita iho-ongelmia.

0 1 2 f. Vatsakipuja

0 1 2 g. Oksentelua

0 1 2 h. Muuta (Kuvaile):

_____

0 1 2 57. Käyn herkästi toisten kimppuun (esim. tönäisen, lyön)

0 1 2 58. Nypin ihoani tai muita ruumiinosiani. (Kuvaile):

_____

0 1 2 59. Osaan olla ystävällinen

0 1 2 60. Minusta on hauska kokeilla uusia asioita

0 1 2 61. Selviydyn huonosti koulutyöstä

0 1 2 62. Olen kömpelö

0 1 2 63. Olen mieluiten itseäni vanhempien lasten tai nuorten

0 1 2 64. Olen mieluiten itseäni nuorempien lasten kanssa

0 = Ei sovi lainkaan **1 = Sopii jossain määrin tai toisinaan** **2 = Sopii erittäin hyvin tai usein**

0 1 2 65. Kieltäydyn puhumasta

0 1 2 66. Toistan tiettyjä toimintoja uudelleen ja uudelleen. (Kuvaile):

_____

0 1 2 67. Karkailen kotoa

0 1 2 68. Huudan paljon

0 1 2 69. Olen vaitelias, pidän asiat itselläni

0 1 2 70. Näen asioita, joita muut eivät näe. (Kuvaile):

_____

0 1 2 71. Menen helposti hämilleni

0 1 2 72. Sytyttelen tulipaloja

0 1 2 73. Osaan tehdä hyvin asioita käsilläni. (Kuvaile):

_____

0 1 2 74. Pelleilen ja yritän tehdä vaikutuksen

0 1 2 75. Olen ujo

0 1 2 76. Nukun vähemmän kuin useimmat muut lapset tai nuoret

0 1 2 77. Nukun päivällä ja/tai yöllä enemmän kuin useimmat muut lapset tai nuoret. (Kuvaile):

_____

0 1 2 78. En pysty keskittymään, häiriinnyn helposti

0 1 2 79. Minulla on puhevaikeuksia. (Kuvaile):

_____

0 1 2 80. Puolustan oikeuksiani

0 1 2 81. Varastan kotoa

0 1 2 82. Varastan kodin ulkopuolelta

0 1 2 83. Kerään tavaroita, joita en tarvitse. (Kuvaile):

_____

0 1 2 84. Teen asioita, joita muut pitävät outoina. (Kuvaile):

_____

0 1 2 85. Minulla on ajatuksia, joita muut pitävät outoina. (Kuvaile):

_____

0 1 2 86. Olen itsepäinen

0 1 2 87. Mielialani tai tunteeni vaihtelevat äkillisesti

0 1 2 88. Pidän tai nautin muiden seurassa olemisesta

0 1 2 89. Olen epäluuloinen

0 1 2 90. Kiroilen tai käytän rivoa kieltä

0 1 2 91. Ajattelen itseni tappamista

0 1 2 92. Minusta on mukava saada muut nauramaan

0 1 2 93. Puhun liian paljon

0 1 2 94. Kiusaan aika paljon muita

0 1 2 95. Olen kiivasluontoinen

0 1 2 96. Ajattelen liikaa seksiasioita

0 1 2 97. Uhkailen satuttavani muita ihmisiä

0 1 2 98. Minusta on mukava auttaa muita

0 1 2 99. Tupakoin tai käytän nuuskaa

0 1 2 100. Minulla on nukkumisongelmia. (Kuvaile):

_____

0 1 2 101. Pinnaan eräiltä tunneilta tai koulusta

0 1 2 102. Minulla ei ole paljon energiaa

0 1 2 103. Olen onneton, surullinen tai masentunut

0 1 2 104. Olen äänekkäämpi kuin muut lapset tai nuoret

0 1 2 105. Käytän alkoholia tai muita huumaavia aineita. (Kuvaile):

_____

0 1 2 106. Yritän olla reilu muita kohtaan

0 1 2 107. Pidän hyvästä pilasta

0 1 2 108. Haluan ottaa elämän kevyesti

0 1 2 109. Yritän auttaa muita kun pystyn

0 1 2 110. Toivoisin olevani vastakkaista sukupuolta

0 1 2 111. Välttelen läheisiä suhteita toisiin

0 1 2 112. Minulla on aika paljon huolia

Ole ystävällinen ja kirjoita vielä lisää itsestäsi ja elämästäsi, jos haluat:

_____

_____

_____

_____

Ole ystävällinen ja tarkista, että olet vastannut kaikkiin kysymyksiin.

Alleviivaa niitä kohtia, joista olet huolissasi, jos sellaisia on!

KIITOS VASTAUKSISTA!

Mikäli vielä haluat kertoa jotain, voit käyttää alla olevaa tilaa siihen.

Appendix 8.

MIELIALALOMAKE

Ole hyvä ja alleviivaa se vaihtoehto, joka eniten vastaa Sinun tuntemuksiasi viimeisen kuluneen viikon aikana, ei vain tämänhetkisiä tuntemuksiasi.

Viimeisten seitsemän päivän aikana

1. Olen pystynyt nauramaan ja näkemään asioiden hauskan puolen

Yhtä paljon kuin aina ennenkin
En aivan yhtä paljon kuin ennen
Selvästi vähemmän kuin ennen
En ollenkaan

2. Olen odotellut mielihyvällä tulevia tapahtumia

Yhtä paljon kuin aina ennenkin
Hiukan vähemmän kuin aikaisemmin
Selvästi vähemmän kuin aikaisemmin
Tuskin ollenkaan

3. Olen syyttänyt tarpeettomasti itseäni, kun asiat ovat menneet vikaan

Kyllä, useimmiten
Kyllä, joskus
En kovin usein
En koskaan

4. Olen ollut ahdistunut ja huolestunut ilman selvää syytä

Ei, en ollenkaan
Tuskin koskaan
Kyllä, joskus
Kyllä, hyvin usein

5. Olen ollut peloissani tai hädissäni ilman erityistä selvää syytä

Kyllä, aika paljon
Kyllä, joskus
Ei, en paljoakaan
Ei, en ollenkaan

KÄÄNNÄ!

6. Asiat kasautuvat päälleni

Kyllä, useimmiten en ole pystynyt selviytymään niistä ollenkaan
Kyllä, toisinaan en ole selviytynyt niistä yhtä hyvin kuin tavallisesti
Ei, useimmiten olen selviytynyt melko hyvin
Ei, olen selviytynyt yhtä hyvin kuin aina ennenkin

7. Olen ollut niin onneton, että minulla on ollut univaikeuksia

Kyllä, useimmiten
Kyllä, toisinaan
Ei, en kovin usein
Ei, en ollenkaan

8. Olen tuntenut oloni surulliseksi ja kurjaksi

Kyllä, useimmiten
Kyllä, melko usein
En kovin usein
Ei, en ollenkaan

9. Olen ollut niin onneton, että olen itkeskellyt

Kyllä, useimmiten
Kyllä, melko usein
Vain silloin tällöin
Ei, en koskaan

10. Ajatus itseni vahingoittamisesta on tullut mieleeni

Kyllä, melko usein
Joskus
Tuskin koskaan
Ei koskaan

KIITOS LOMAKKEEN TÄYTTÄMISESTÄ!

12. Original Communications

Journal of Affective Disorders 136 (2012) 680–692

Contents lists available at SciVerse ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research report

A longitudinal study of maternal prenatal, postnatal and concurrent depressive symptoms and adolescent well-being

Marie Korhonen [a,*], Ilona Luoma [b], Raili Salmelin [c], Tuula Tamminen [b]

[a] University of Tampere, Medical School, Finland
[b] University of Tampere, Department of Child Psychiatry, Tampere University Hospital, Finland
[c] University of Tampere, School of Health Sciences, Department of Child Psychiatry, Tampere University Hospital, Finland

ARTICLE INFO

Article history:
Received 19 August 2009
Received in revised form 6 October 2011
Accepted 6 October 2011
Available online 28 October 2011

Keywords:
Maternal depressive symptoms
Prenatal depressive symptoms
Postnatal depressive symptoms

ABSTRACT

Background: Maternal depression is known to be a risk for abnormal child development. Girls and boys have been found to respond differently to maternal depression. Although prenatal and postnatal depression has been widely studied, longitudinal studies of adolescent outcome are still rare.
Methods: The original sample of 349 mothers in this longitudinal study was collected in 1989–1990 in Tampere, Finland. At the latest stage, of the 327 contacted in 2006, 191 mothers and 192 adolescents aged 16 to 17 years participated in the study. Maternal depressive symptoms were screened using the Edinburgh Postnatal Depression Scale (EPDS) prenatally, postnatally and at the latest stage. Adolescent outcome was examined using the Child Behavior Checklist (CBCL) and the Youth Self Report (YSR).
Results: Maternal concurrent depressive symptoms were associated with adolescent behavioral and emotional problems in both genders. Maternal prenatal depressive symptoms were associated with Externalizing Problems in the YSR and boys' lower Social Competence in both the CBCL and YSR. Maternal postnatal depressive symptoms were associated with boys' lower Social Competence both in the CBCL and YSR and Externalizing Problems in the YSR.
Limitations: Being a longitudinal normal population sample, the number of symptomatic mothers and adolescents is relatively small and the number of drop-outs is relatively high. Clinical evaluation of mothers and adolescents is also lacking.
Conclusions: Maternal prenatal and postnatal depressive symptoms are a risk to adolescent boys' wellbeing and concurrent depressive symptoms a risk for both girls' and boys' well-being. This long-term influence should be noted when treating women with depressive symptoms throughout motherhood.

1. Introduction

Children of depressed mothers are at risk for abnormal development (Beardslee et al., 1998) and subsequent psychiatric problems (Lewinsohn et al., 2005; Nomura et al., 2002; Weissman et al., 2006). Maternal depression has an impact on the whole family system (Burke, 2003) and it is likely that there is a reciprocal relation between maternal depression and child adjustment problems (Elgar et al., 2004). There are many theories about why and how maternal depression has such an influence on child development (Goodman and Gotlib, 1999), and the mediating factors have been the focus of research in many recent studies (Ashman et al., 2008; Duggal et al., 2001; Elgar et al., 2007; Hammen et al., 2004; McCarty et al., 2003).

Some studies estimate that adolescent girls are more susceptible to maternal depression and distress than boys (Crawford et al., 2001; Davies and Windle, 1997; Duggal et al., 2001; Fergusson

* Corresponding author at: Tampere Medical School, Department of Child Psychiatry, FIN-33014 University of Tampere, Finland. Tel.: +358 40 5506696.
E-mail address: marie-kaarin.korhonen@uta.fi (M. Korhonen).

0165-0327/$ – see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.jad.2011.10.007

et al., 1995; Jenkins and Curwey, 2008). Contrary to this, studies of infants and children of depressed mothers suggest that boys are more susceptible to maternal depression at infancy than girls (Carter et al., 2001; Essex et al., 2003; Murray et al., 1993; Weinberg et al., 2006).

The recurrent nature of depression is known, likewise the range from subsyndromal depression or elevated depressive mood to Major Depressive Disorder (Goodman, 2007). It is also common that over time patients' diagnosis change from one depression subtype to another (Chen et al., 2000; Judd et al., 1997).

1.1. Maternal prenatal depression

Prenatal depression is beginning to attract more attention in studies of depressed mothers and child outcome, while postnatal depression was earlier the focus of research. Depression is often chronic or at least recurrent, which has led to suggestions that postnatal depression may actually often begin during pregnancy or even earlier (Verkerk et al., 2002). A study on a birth cohort in Northern Finland showed that among the male offspring of prenatally depressed mothers there was a significant increase in criminality in adulthood (Mäki et al., 2003), indicating that prenatal depression may have long-term effects on the child.

Studies of prenatal depression have lately been focused on biochemical effects of maternal depression. Studies have shown that newborns of prenatally depressed mothers replicate mother's biochemical profile by having elevated cortisol and norepinephrine levels and lower dopamine levels than the newborns of nondepressed mothers (Field et al., 2006; Weinstock, 2008). Studies have shown elevated hypothalamic pituitary adrenal (HPA)-axis activation in the newborns of prenatally depressed mothers (Field et al., 2006; Weinstock, 2008) and elevated cortisol levels even at the age of 7 years (Ashman et al., 2002) and 14–15 (Van den Bergh et al., 2008), suggesting a long-term effect of prenatal depression on the neuroendocrine functioning of the offspring. Elevated cortisol levels were found to be associated with internalizing symptoms or depression in children and adolescents, although Van den Bergh et al. (2008) found the association only among adolescent females.

There are, however, some suggestions that prenatal stress and anxiety rather than depression are a risk for behavioral/emotional problems (Luoma, 2004; O'Connor et al., 2002; Talge et al., 2007), ADHD (Van den Bergh and Marcoen, 2004), as well as HPA-axis functioning (Van den Bergh et al., 2008) in children, but it is known that stress and anxiety often co-exist and overlap with depression and depressive symptoms.

1.2. Maternal postnatal depression

Postnatal depression and its effects on child development have been widely studied. It is beginning to be well documented that postnatal depression affects not only the mother–infant relationship and infant's well-being and early development (Murray and Cooper, 1997; Weinberg and Tronick, 1998) but also the development of the child over a longer period of time (Luoma et al., 2001; Murray and Cooper, 1997; Murray et al., 1999; Sohr-Preston and Scaramella, 2006). However, only few studies have been carried out among adolescents and longitudinal studies are even rarer.

Abbott et al. (2004) find in their retrospective follow-up study that young adult offspring of mothers with severe puerperal disorder (of whom 52% with depression) are at high risk of psychiatric illness. Halligan et al. (2004) have reported that adolescents exposed to maternal postnatal depression show elevated cortisol levels and elevated rates of affective disorders by 13 years of age (Halligan et al., 2007a) and have more depression at the age of 16 (Halligan et al., 2007b). Another study on the same longitudinal sample reports heightened emotional sensitivity and raised social maturity in 13-year-old girls whose mothers had experienced postnatal depression (Murray et al., 2006). High emotional sensitivity was associated with adolescent's depressed mood. Additionally, the academic performance was poorer among 16-year-old boys whose mothers' had had postnatal depression (Murray et al., 2011). Hay et al. (2001) also documented that children of postnatally depressed mothers had poorer cognitive ability and more attention problems than other children at the age of 11. The impact was even greater for boys than for girls. This effect was already apparent at the age of four in the same community sample (Cogill et al., 1986). In another study conducted by Hay et al. (2003), postnatally depressed mothers' children were reported to be more violent at the age of 11, in addition to having problems in regulating attention and emotion.

1.3. Maternal concurrent depression

Child and adolescent well-being have been documented by various measures to be associated with maternal concurrent depression, also including other than maternal reports (Malcarne et al., 2000; Nelson et al., 2003). Children of depressed mothers are at higher risk of experiencing a depressive episode and they tend to do so in close proximity to maternal depression (Hammen et al., 1991). However, although maternal concurrent depressive symptoms affect adolescents' present life, the influence may diminish over time, especially if reduction or remission of maternal depressive symptoms is achieved (Gunlicks and Weissman, 2008).

Studying maternal concurrent depression differs from longitudinal studies of prenatal and postnatal depression. First, studies of concurrent depression are cross-sectional and therefore only possible associations between mother's depression and adolescent's symptoms can be examined, not the causal impact of mother's depression on the child. Second, concurrent depression may have an impact on mother's reports on herself and the child. Depressed mothers may see their children differently than non-depressed mothers do. There is evidence for associations between mothers' mental state and observation bias in their ratings of child problems. Although most studies support the theory of depression–distortion (Bergen-Nielsen et al., 2003; Chilcoat and Breslau, 1997; De Los Reyes et al., 2008; Najman et al., 2000), there are also opposing findings that depressed mothers are more accurate in evaluating their children (Conrad and Hammen, 1989).

The first aim of this study was to examine whether maternal prenatal, postnatal or concurrent depressive symptoms are associated with adolescent's poorer psychosocial functioning or emotional/behavioral problems. The second aim was to

examine whether there are differences in these associations between girls and boys. Including both concurrent and pre- and postnatal maternal depressive symptoms makes it possible to explore and compare both the long lasting and concurrent effects on adolescent's present psychosocial functioning level and emotional/behavioral problems. We also wanted to explore whether the possible associations between maternal prenatal, postnatal and concurrent depressive symptom are rather to be explained via the recurrence of maternal depressive symptoms. Our first hypothesis was that maternal concurrent depressive symptoms would have an effect on adolescent behavioral and emotional functioning. Our second hypothesis was that there would be a difference between adolescent boys' and girls' outcomes such that maternal depressive symptoms at infancy would have a stronger effect on adolescent boys psychosocial functioning than that of girls.

2. Method

This study is part of a longitudinal study begun in Tampere, Finland, in 1989. Study stages 1–4, including data collection points T1–T7 of the longitudinal study are shown in Fig. 1. For the purposes of this study we have used data collected prenatally during the last trimester (T1), 2 months after delivery (T3) and at the adolescent stage (T7) when the children were 16 to 17 years old. At all data collection points T1 through T6, mothers' depressive symptoms were screened by questionnaires. The fourth study stage, T7, was conducted as a postal survey during the time period January–June 2006. At this study stage the mothers' depressive symptoms and the children's psychosocial functioning and emotional/behavioral problems were also screened with questionnaires completed by the mothers and the adolescents themselves.

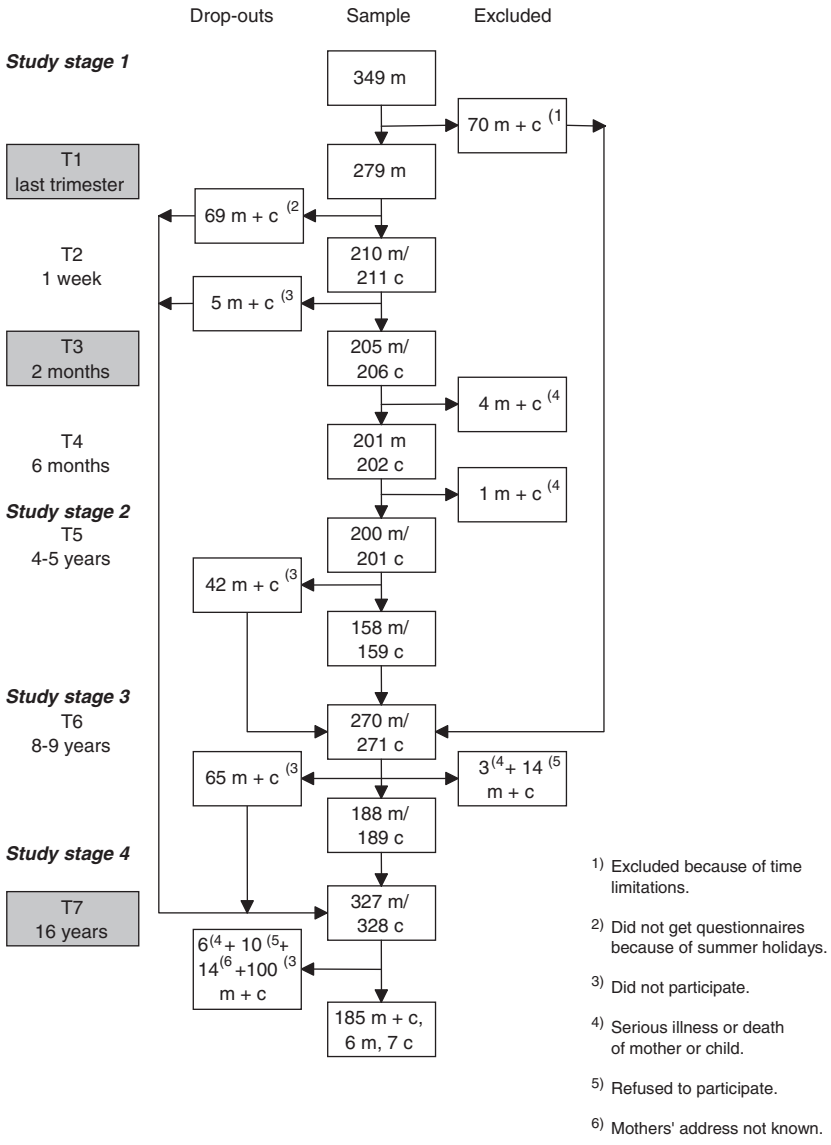

Fig. 1. The stages and sample sizes of the longitudinal study (m = mother, c = child/adolescent).

The sample at each study point is presented in Fig. 1. The original sample, consisting of 349 consecutively selected normal population mothers expecting their first child, was collected from Tampere maternity health clinics during the period 1989–1990. Less than 10% of the mothers refused to participate. By T7, altogether 22 mothers or children had died or explicitly refused to participate at earlier study stages. Thus, at T7 the questionnaires were sent to 327 mothers and their 328 adolescents (one set of twins). The questionnaire on emotional/behavioral problems (Child Behavior Checklist, CBCL for the mother and Youth Self Report, YSR for the adolescent, see later) was returned by 191 (60%) mothers and by 192 (60%) adolescents (185 mother–child dyads and six mothers only and seven adolescents only). The maternal depressive symptoms screening questionnaire (Edinburgh Postnatal Depression Scale, EPDS, see later) was returned by 183 mothers. The majority of the 130 drop-outs were mothers not returning the questionnaires despite two reminders; the rest had various explicit reasons (Fig. 1).

The drop-outs at this stage were analyzed using the information from earlier study stages, whenever available, considering the variation in the sample and drop-out groups at different study points. The drop-out group did not differ significantly from the sample of this study stage regarding mother's age, mother's marital status, mother's education, family SES, maternal depressive symptoms prenatally (T1), postnatally (T3) or at the previous study stage (T6). Boys, however, were overrepresented in the drop-out group ($p = 0.019$). There was one boy and six girls who had completed the YSR but whose mothers had not completed the CBCL. Among those girls the proportion of those exceeding the cut-point ≥ 64 in the YSR was statistically significantly higher for Total Problems ($p = 0.031$) and Externalizing ($p = 0.011$) Problems than among girls of mother–daughter dyads. Among those adolescents whose mothers had completed the CBCL but who had not themselves completed the YSR there were no differences between groups.

The characteristics of the sample are shown in Table 1.

The number of adolescents available for individual analyses varies because of missing data at different time points (Fig. 1) and incomplete questionnaires at this latest study point. The numbers of adolescents available for analysis at each study point determined by the presence of maternal depressive symptoms are shown in Table 2.

2.1. Measures

Mothers' depressive symptoms were assessed by the Finnish translation of the Edinburgh Postnatal Depression Scale (EPDS) at each time point. The EPDS is a valid, self-report questionnaire originally designed to detect postnatal depression, but has also been found to be valid in detecting depression among non-postnatal women (Cox et al., 1987, 1996). It includes ten questions on depressive symptoms, each of which has four response options describing increasing severity and scored from 0 to 3, giving a maximum sum score of 30. In this study we used the cutpoint ≥ 13, which has been reported to have satisfactory sensitivity and specificity for both postnatal and non-postnatal depression (Cox et al., 1987, 1996). In the present 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, and a sensitivity of 64% and specificity of 96% was detected (Tamminen, 1990).

The mothers assessed the psychosocial functioning and internalizing/externalizing symptoms of the index child by completing the Finnish translation of the Child Behavior Checklist (CBCL) for ages 4–18 (Achenbach, 1991a; Achenbach and Rescorla, 2001). The CBCL contains questions and statements for parents to record their child's social competence and emotional/behavioral problems. The Social Competence sum score includes scores from the activities, social skills and relationships and school performance subscales. The Problem scales contain 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 Total Problems score is a sum score of all the problem items. The Internalizing Problems score is a sum score including items concerning withdrawal, somatic complaints and anxiety/depression. The Externalizing Problems score is a sum score of items concerning social problems, rule-breaking behavior and

Table 1
Characteristics of the sample (n = 192 adolescents and 191 mothers).

Characteristic	Proportion %	Mean	SD
Gender of the adolescents			
Female	52		
Male	48		
Mothers' marital status			
Marriage or cohabitation	82		
Single	18		
Mothers' education			
Elementary, vocational school	37		
College	47		
Academic	16		
SES of the family			
Upper	59		
Lower	41		
No. of mothers' biological children			
One	13		
Two	52		
Three or more	35		
Age of the mothers (years)		44	4.0
Age of the adolescents (years)		17	0.3

Table 2
Number of adolescents at each time point in groups determined by the presence of maternal depressive symptoms.

	Prenatal (T1)		Postnatal (T3)		Current (T7)	
	NDS[1]	DS[2]	NDS	DS	NDS	DS
All						
CBCL[3]	170	13	137	11	156	19
YSR[4]	171	14	138	12	153	18
Girls						
CBCL	87	8	76	5	80	10
YSR	90	9	78	6	80	10
Boys						
CBCL	83	5	61	6	76	9
YSR	81	5	60	6	73	8

[1] Mothers with depressive symptoms below the cutpoint 12/13 of EPDS (Edinburgh Postnatal Depression Scale).
[2] Mothers with depressive symptoms above the cutpoint 12/13 of EPDS.
[3] Child Behavior Checklist.
[4] Youth Self Report.

aggressive behavior. In this report we used the Social Competence scale and the above mentioned three Problem scales.

The adolescents completed the Youth Self Reports (YSRs) for ages 11–18 (Achenbach, 1991b; Achenbach and Rescorla, 2001). The YSR Social Competence sum score as well as the Problem scores are derived from responses to 119 questions similar to those of the CBCL. The problem items include 16 items involving social desirability, and they are not included in the Problem sum score. The Social Competence, Total Problems, Internalizing Problems and Externalizing Problems sum scores were used as in the CBCL. The CBCL and the YSR raw Problem scores were converted into normalized T-scores. The cut-point ≥ 64 was used for all the problem score types to identify adolescents with clinical level problems. Sociodemographic data was collected in questionnaires designed for this study phase.

2.2. Statistical analysis

Cross-tabulations with Fisher's exact two-tailed significance test were used to examine the categorized adolescent outcome variables by maternal depression. Means, standard deviations (SD) and 95% confidence intervals (95% CI) were calculated for the CBCL and YSR Social Competence, and independent samples *t*-test was used to test differences between groups. P-values < 0.05 are considered statistically significant and values between 0.05 and 0.10 indicative.

The simultaneous effects of various explanatory variables on adolescent outcome (Social Competence score and high Total, Internalizing and Externalizing Problem scores) were examined using EPDS sum scores and the outcome variables as both dichotomous and continuous. The purpose was to see whether continuous scale would show a similar or different pattern than classified variables. In the case of dichotomous CBCL and YSR Problems scores and the EPDS sum scores, logistic regression with the Enter-method was used. When analyzing the continuous forms of emotional and behavioral problems and maternal depressive symptoms, linear regression was used. EPDS distributions were normalized by square root transformation. For Social Competence linear regression was used in the same manner, using both dichotomous and continuous EPDS scores. For logistic regression, odds ratios (ORs) and their 95% CIs and p-values are reported, and for linear regression, regression coefficients and p-values.

3. Results

The proportion of mothers scoring high on the EPDS was 7% (n = 14) prenatally, 8% (n = 12) postnatally and 11% (n = 19) concurrently. At study stage four, when the children were 16 to 17 years of age the mean Social Competence score of the boys was 45 (SD 9) in the CBCL and 44 (SD 10) in the YSR. For the girls both CBCL and YSR mean Social Competence scores were 48 (SD 10). On the problem scales the proportions of boys scoring over the cut-point ≥ 64 on the CBCL and YSR were 3% (n = 3) and 4% (n = 4) for Total Problems, 9% (n = 8) and 8% (n = 7) for Internalizing Problems and 5% (n = 5) and 10% (n = 9) for Externalizing Problems respectively. The proportions of high-scoring girls on the CBCL and YSR were 12% (n = 12) and 14% (n = 14) for Total Problems, 12% (n = 12) and 18% (n = 18) for Internalizing Problems and 6% (n = 6) and 10% (n = 10) for Externalizing Problems respectively.

3.1. Maternal prenatal depressive symptoms and adolescent outcome

In the CBCL, no associations between maternal prenatal depressive symptoms and adolescent psychosocial functioning or emotional/behavioral problems were found. In the YSR adolescents reported Externalizing Problems statistically significantly (p = 0.041) more often if their mothers had had depressive symptoms prenatally (Figs. 2 and 3).

When analyzed by gender, the CBCL Social Competence scores were statistically significantly lower among adolescent boys whose mothers had had prenatal depressive symptoms (p = 0.009, Fig. 2), whereas girls showed no significant difference between the groups. There was no statistically significant association between maternal depressive symptoms prenatally and high CBCL Problem scores in either gender (Fig. 3). In the YSR there were no statistically significant differences between the groups, but indicative associations were seen between maternal prenatal depressive symptoms and boys' Social Competence (p = 0.072, Fig. 2) and Externalizing Problems (p = 0.083, Fig. 3).

To avoid the possible bias of maternal concurrent depression, the analysis was repeated after excluding all those mothers who exceeded the cutpoint ≥ 13 in the EPDS at T7 (n = 19). However, this reduced the number of symptomatic mothers at T1 so that the analyses could not be confirmed. Excluding those mothers exceeding the EPDS cut-point for the first time at T7 (n = 13), however, confirmed the results. The association between prenatal depressive symptoms and Externalizing Problems in the YSR was still evident (p = 0.034). The association between prenatal depressive symptoms and lower Social competence among boys was still evident in the CBCL (p = 0.009) and indicatively in the YSR (p = 0.064). The association between prenatal depressive symptoms and boys' Externalizing Problems was still evident in the YSR (p = 0.020).

3.2. Maternal postnatal depressive symptoms and adolescent outcome

In the CBCL, Social Competence was statistically significantly lower among adolescents of mothers with postnatal depressive symptoms (p = 0.028). In the YSR there was an association between maternal postnatal depressive symptoms and Externalizing Problems (p = 0.012). Social Competence was lower if the mother had had depressive symptoms postnatally (p = 0.038, Figs. 2 and 3.)

When analyzed by gender, in the CBCL, Social Competence was statistically significantly lower among boys of postnatally depressed mothers (p = 0.010 Fig. 2). No significant differences were seen among girls or in any of the CBCL Problem scores in either gender (Fig. 3). In the YSR, among boys, there was a statistically significant association between maternal depressive symptoms postnatally and lower Social Competence (p = 0.010, Fig. 2). High Externalizing Problem scores were statistically significantly more common among boys whose mothers had had depressive symptoms postnatally (p = 0.002, Fig. 3). Among girls no statistically significant differences were seen.

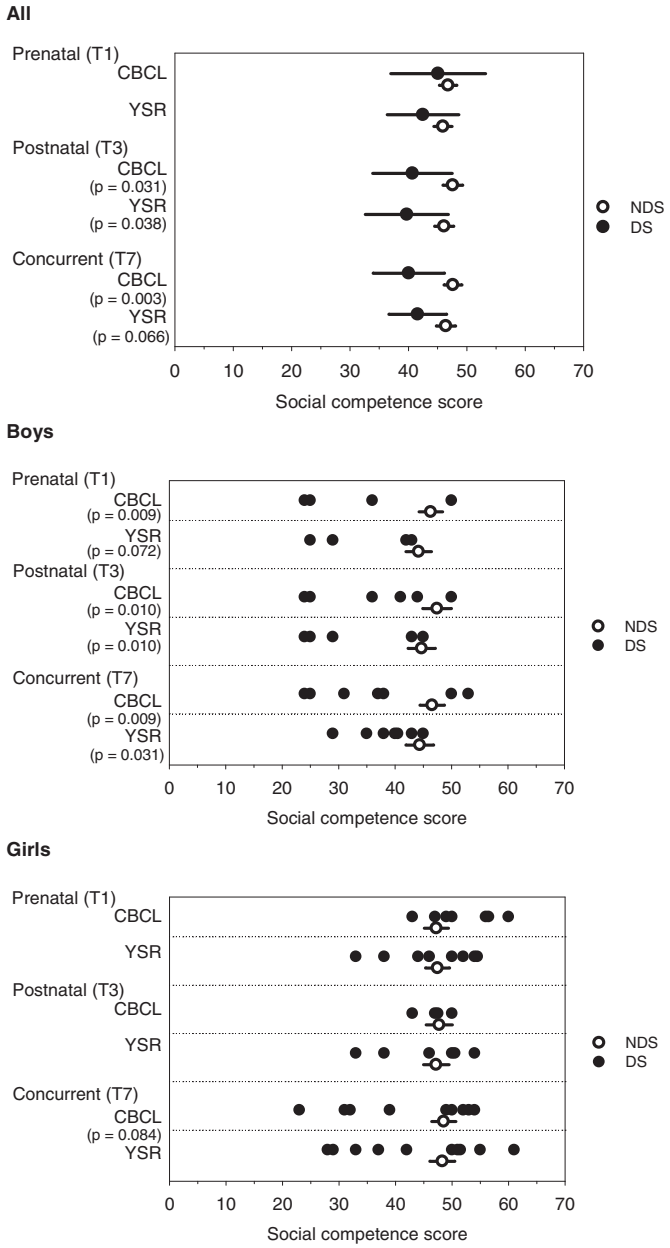

Fig. 2. Social competence in 16–17-year-olds (all, boys and girls) of mothers with low (NDS) and high level (DS) of depressive symptoms according to EPDS at different time points. In the NDS group and in the DS group of all subjects mean and 95% confidence interval is shown, while in the DS groups for boys and girls values of individual adolescents are shown.

After excluding mothers exceeding the cutpoint ≥ 13 for the first time at T7 in the EPDS, the association between postnatal depressive symptoms and lower Social Competence in the CBCL ($p = 0.038$) and indicatively in the YSR ($p = 0.058$) was still evident, as was the association between postnatal depressive symptoms and Externalizing Problems in the YSR ($p = 0.008$).The association between postnatal depressive symptoms and lower Social Competence was still evident among boys both in the CBCL ($p = 0.009$) and YSR ($p = 0.004$) and for Externalizing Problems in the YSR ($p = 0.001$).

3.3. Maternal concurrent depressive symptoms and adolescent outcome

In the CBCL, there was a statistically significant association between maternal concurrent depressive symptoms and lower Social Competence ($p = 0.003$) and higher scoring in Total Problems ($p = 0.013$), Internalizing Problems ($p = 0.001$) and Externalizing Problems ($p = 0.009$) scores. In the YSR adolescents whose mothers had depressive symptoms concurrently had statistically indicatively lower Social

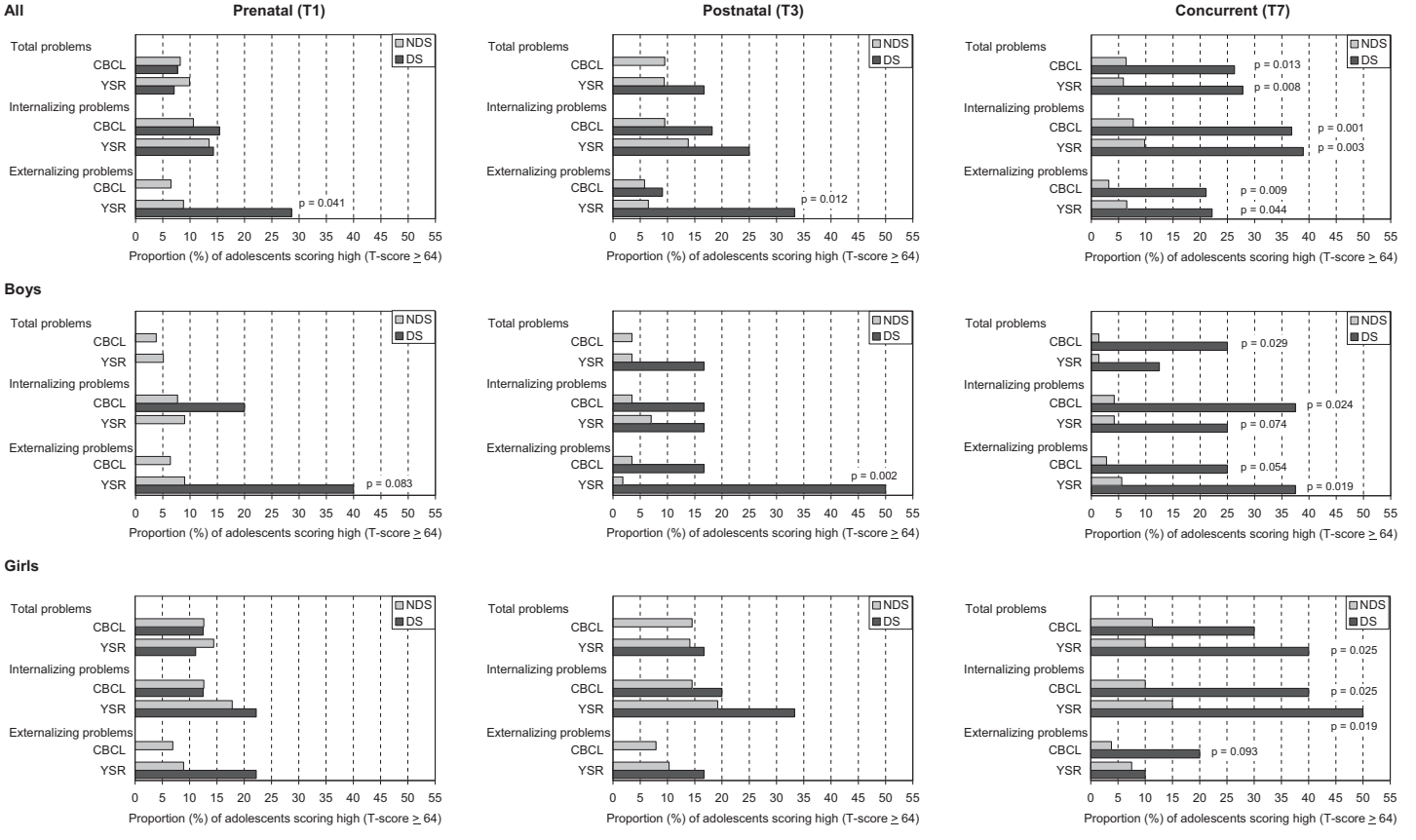

Fig. 3. Proportions (%) of 15–16-year-old boys and girls scoring high (T-score ≥ 64) in CBCL or YSR in groups of mothers with low level (NDS) and high level (DS) of depressive symptoms according to the EPDS.

Competence (p = 0.066) and they more often scored above the cut-point on Total Problems (p = 0.008), Internalizing Problems (p = 0.003) and Externalizing Problems (p = 0.044).

When analyzed by gender, there were statistically significant associations between maternal concurrent depressive symptoms and lower Social Competence (p = 0.009, Fig. 2), Total Problems (p = 0.029) and Internalizing Problems (p = 0.024) among boys in the CBCL (Fig. 3). An indicative association was found between concurrent depressive symptoms and Externalizing Problems (p = 0.054). Among girls maternal concurrent depressive symptoms were statistically significantly associated only with Internalizing Problems (p = 0.025, Fig. 3). There was however an indicative association between maternal concurrent depressive symptoms and both Social Competence (p = 0.084, Fig. 2) and Externalizing Problems (p = 0.093, Fig. 3). In the YSR, there was a statistically significant association between maternal concurrent depressive symptoms and lower Social Competence (p = 0.031, Fig. 2), Externalizing Problems (p = 0.019) and an indicative association with Internalizing Problems (p = 0.074) among boys (Fig. 3). Among girls maternal concurrent depressive symptoms were associated with Total Problems (p = 0.025) and Internalizing Problems (p = 0.019, Fig. 3).

3.4. Recurrence of maternal depressive symptoms and adolescent outcome

To take into account the influence of recurrence of maternal depressive symptoms, a variable with four groups was created, based on the number of times the mother had scored over the cut point in the EPDS: 1) never (n = 108), 2) only perinatally, i.e. pre- and/or postnatally (n = 12), 3) perinatally and concurrently (n = 4) i.e. recurrently, 4) only concurrently (n = 11). For the analysis only continuous variables of CBCL and YSR Problem scores were used, as the number of high-scoring adolescents in the groups would have been too small for categorical analysis. Separate analysis for genders could not be accomplished, either, because of the small number of adolescents in some of the abovementioned groups.

In the CBCL there was a statistically significant association between the EPDS variable and the Social Competence score (p = 0.016) and Total (p<0.001), Internalizing (p = 0.01) and Externalizing (p<0.001) Problem scores (Fig. 4). The lowest mean in the Social Competence score was among the adolescents whose mothers' had recurrent depressive symptoms. The highest mean in the Total and Externalizing Problem Scores was among those adolescents whose mothers had depressive symptoms only concurrently, while the mean in Internalizing Problem score was almost equal among the adolescents whose mothers had recurrent or only concurrent depressive symptoms. Pairwise analysis also showed statistically significant associations between maternal depressive symptoms only perinatally and higher mean in adolescent Externalizing Problems score in the CBCL (p = 0.022), compared to the group in which the mother had never scored over the EPDS cut point.

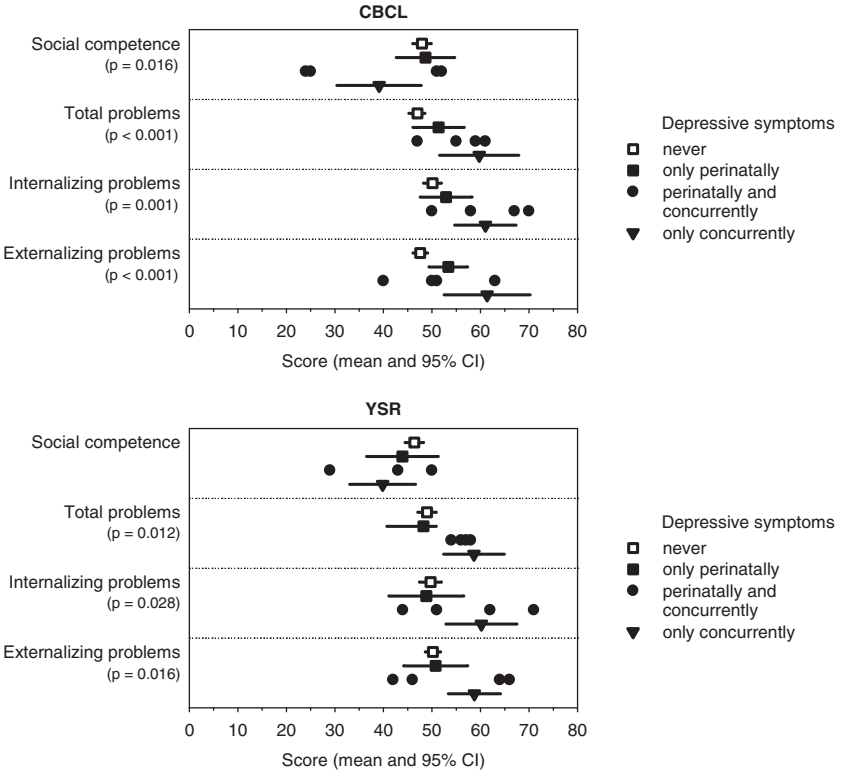

Fig. 4. The effect of recurrence of mother's depressive symptoms (according to EPDS) on the CBCL and YSR Social competence and Total, Internalizing and Externalizing problems of her 16–17-year-old child. In the group of mothers with both perinatal and concurrent depressive symptoms scores of individual adolescents are shown, while in all other groups mean and 95% confidence interval is shown.

In the YSR there was a statistically significant association between the EPDS variable and Total ($p = 0.012$), Internalizing ($p = 0.028$) and Externalizing ($p = 0.016$) Problems (Fig. 4). The highest mean in all the Problem Scores was among those adolescents whose mothers had depressive symptoms only concurrently.

3.5. Multiple risk analysis and adolescent outcome

Sociodemographic variables selected for the multiple risk analyses were mother's education level (which was strongly associated with family SES), marital status, number of biological children, categorized as in Table 1, adolescent's gender and maternal age as a continuous variable. Pairwise associations of these sociodemographic variables and adolescent outcome variables were first analyzed. Variables with statistically significant or indicative associations ($p \leq 0.10$) were simultaneously included in the models along with statistically significantly or indicatively associated maternal depressive symptoms. Even adolescent gender was added to the regression models only when it was statistically significantly or indicatively associated with adolescent outcome in pairwise analysis.

Explanatory variables entered into and the results of the linear regression analyses on Social Competence, using dichotomized EPDS variables, are shown in Table 3. Regarding better CBCL Social Competence of the adolescent, maternal concurrent depressive symptoms were a risk factor ($b = -5.5$) whereas mother's higher education level was a protective factor ($b = 4.5$). In the YSR, female gender ($b = 3.6$) and higher maternal education level ($b = 3.7$) were protective factors for better Social Competence. When using continuous EPDS variables, both in CBCL and in YSR higher scoring in the EPDS concurrently was a risk factor for better Social Competence ($b = -2.2$ in both cases; Table 4).

When analyzing dichotomized Problem scores, maternal concurrent depressive symptoms (OR 5.7) and female gender (OR 4.3) were found to be risk factors of CBCL high Total Problem Scores. Maternal concurrent depressive symptoms were associated with high scoring in Internalizing Problems (OR 5.8) and Externalizing Problems (OR 4.7) in the CBCL (Table 3). When using continuous CBCL Problem and EPDS scores, higher score on the EPDS concurrently was a risk factor for higher scoring in Total ($b = 3.6$), Internalizing ($b = 3.4$) and Externalizing ($b = 2.9$) Problem scores (Table 4).

In the YSR, with dichotomized variables, risk factors for higher Total Problems and Internalizing Problems scoring were maternal concurrent depressive symptoms (OR 4.4 and 5.4, respectively) and female gender (OR 7.0 and 3.8 respectively). Mother's older age was a protective factor (OR 0.7) for high score on Externalizing Problems. Regarding continuous YSR Problem scores and EPDS variables, scoring higher on the EPDS concurrently ($b = 3.1$) and female gender ($b = 5.5$) were risk factors for scoring higher on Total Problems, whereas mothers older age was a protective factor ($b = -0.5$). Higher scoring on the EPDS concurrently ($b = 3.0$) and female gender ($b = 6.9$) were risk factors for scoring higher on Internalizing Problems. Higher scoring on the EPDS concurrently ($b = 2.0$) was a risk factor and mothers' older age was a protective factor ($b = -0.5$) for scoring higher on Externalizing Problems.

4. Discussion

The expected finding, which supported our hypothesis, was the association between maternal concurrent depressive symptoms and adolescents' psychosocial functioning and emotional/behavioral problems, assessed by both mothers and adolescents themselves. We do not know whether adolescents' internalizing and externalizing symptoms are a reaction to mothers' depressive symptoms or something else. Perhaps there is a reciprocal relation between maternal depression and adolescent behavior as was found in the study by Gross et al. (2008) with boys externalizing and antisocial behavior and mothers' depression. An interesting notion of this sample was that all the boys scoring high in externalizing problems had a mother with concurrent depressive symptoms. The temporal associations between maternal depressive symptoms and child problems are beyond the scope of this article, but they will be considered in subsequent analyses of this longitudinal sample.

In childhood the rates of depression are equal in girls and boys but from the pre-adolescent age girls are found to respond to distress more with internalizing behavior and depression (Allgood-Merten et al., 1990; Nolen-Hoeksema, 1994; Nolen-Hoeksema and Girgus, 1994). Earlier studies reporting that girls express more internalizing and boys more externalizing behavior in response to maternal depressive symptoms were partially supported by this study: female gender was a risk for Internalizing Problems according to self-reports in regression analysis and daughters of concurrently depressed mothers expressed more internalizing behavior both in mothers' reports and self-reports (with an indicative association with externalizing behavior in mothers' reports) than daughters of mothers with no depressive symptoms. Boys of mothers with depressive symptoms concurrently expressed externalizing behavior as expected, but also internalizing behavior according to mothers' reports and self-report. An interesting notion concerning the drop-out mothers was the high prevalence of externalizing problems in self reports among their daughters. No explanation for this finding can be given, but it could imply that adolescent girls have a need to tell and express their worries and mental status and on the other hand their mothers were not willing to or did not have strength to participate.

The most interesting finding of this study was the association between maternal pre- and postnatal depressive symptoms and adolescent boys' negative outcome. At this study stage, maternal prenatal depressive symptoms were associated with boys poorer psychosocial functioning according to mother's reports and indicatively with externalizing problems in boys' self-reports. At an earlier study stage of this same sample, when the children were 8–9 years old, the association was found between prenatal depressive symptoms and externalizing and total problems in mothers' and teachers' combined reports (Luoma et al., 2001).

Postnatal depressive symptoms were associated with boys' poorer psychosocial functioning in mothers' reports and poorer psychosocial functioning and externalizing problems in adolescent boys' self-reports. Findings of the associations between maternal pre- and postnatal depressive symptoms and adolescent outcome support our hypothesis and earlier studies about boys being more sensitive to maternal depressive symptoms in

Table 3
Factors predicting adolescent's psychosocial functioning and emotional and behavioral problems at the age of 17 years. Results of linear regression for CBCL and YSR social competence and that of logistic regression for the Problem Scores: summary of the variables entered, coefficients or ORs, 95% confidence intervals (CI) and p-values.

Adolescent adjustment measure (dependent variable) and its predicted category	Explanatory variable and its categories		b	OR	95%CI	p
CBCL						
Better social competence	Maternal concurrent depressive symptoms above cutpoint		−5.5		−10.2–(−0.8)	0.022
	Maternal higher education		4.5		1.5–7.5	0.004
High total problem score	Maternal concurrent depressive symptoms	No		1.0		
	above cutpoint	Yes		5.7	1.6–20.0	0.007
	Gender of the adolescent	Male		1.0		
		Female		4.3	1.1–16.3	0.032
High internalizing problem score	Maternal concurrent depressive symptoms	No		1.0		
	above cutpoint	Yes		5.8	1.8–19.1	0.004
	Maternal education	Academic		1.0		
		College		0.4	0.1–1.8	0.220
		Elementary, vocational		1.3	0.3–5.6	0.700
High externalizing problem score	Maternal concurrent depressive symptoms	No		1.0		
	above cutpoint	Yes		4.7	1.1–20.5	0.038
	Maternal education level			–[1]	–[1]	
YSR						
Better social competence	Maternal concurrent depressive symptoms above cutpoint		−3.3		−8.3–1.6	0.185
	Maternal higher education		3.7		0.5–6.9	0.024
	Female gender of the adolescent		3.6		0.6–6.6	0.021
High total problem score	Maternal concurrent depressive symptoms	No		1.0		
	above cutpoint	Yes		4.4	1.1–17.6	0.037
	Maternal education	Academic		1.0		
		College		1.0	0.1–10.6	0.991
		Elementary, vocational		4.6	0.5–41.6	0.170
	Gender of the adolescent	Male		1.0		
		Female		7.0	1.4–34.5	0.016
High internalizing problem score	Maternal concurrent depressive symptoms	No		1.0		
	above cutpoint	Yes		5.4	1.6–18.5	0.007
	Maternal education	Academic		1.0		
		College		0.4	0.1–1.5	0.161
		Elementary, vocational		1.3	0.3–4.7	0.734
	Gender of the adolescent	Male		1.0		
		Female		3.8	1.2–11.5	0.019
High externalizing problem score	Maternal prenatal depressive symptoms	No		1.0		
	above cutpoint	Yes		6.2	0.6–63.6	0.125
	Maternal postnatal depressive symptoms	No		1.0		
	above cutpoint	Yes		0.9	0.1–16.5	0.972
	Maternal concurrent depressive symptoms	No		1.0		
	above cutpoint	Yes		4.4	0.7–28.2	0.116
	Maternal education	Academic		1.0		
		College		0.4	0.03–4.9	0.444
		Elementary, vocational		0.8	0.1–10.1	0.842
	Mothers older age			0.7	0.6–1.0	0.025

[1] The values approach infinity and are not reported.

infancy than girls (Carter et al., 2001; Murray et al., 1993, 2011; Weinberg et al., 2006).

Could the negative influence of prenatal and postnatal depression be due to the difference in HPA-axis activity, and/or the importance of the early mother–child relationship, or could the explanation be the chronic or recurrent nature of depression? Given the research evidence, a developmental model with multiple intergenerational risk mechanisms was constructed to describe the transmission of risk from mothers to children, also explaining the diverse and multiform findings of the studies (Goodman and Gotlib, 1999). Other research findings suggest that particularly chronic or recurrent maternal depression has a negative impact on subsequent child outcome both short-term and long-term (Cornish et al., 2005; Halligan et al., 2007a). Our analysis of the recurrence of maternal depressive symptoms indicated that, although maternal concurrent depressive symptoms were an important risk for adolescent present psychosocial functioning and emotional wellbeing, recurrent maternal depressive symptoms were also associated with poorer social competence and more internalizing problems. Nevertheless, some recent studies show that maternal postnatal depression is associated with adolescent internalizing problems also regardless of the later exposures to maternal depression (Fihrer et al., 2009; Halligan et al., 2007a). A study by Pawlby et al. (2009) found that although maternal depressive symptoms were highly recurrent, exposure to

Table 4
Factors predicting adolescent's psychosocial functioning and emotional and behavioral problems at the age of 17 years. Results of linear regression for CBCL and YSR summary of the variables entered, coefficients, 95% confidence intervals (CI) and p-values.

Adolescent adjustment measure (dependent variable) and its predicted category	Explanatory variable and its categories	b	95% CI	p
CBCL				
Better social competence	More maternal postnatal depressive symptoms	−0.7	−2.7–1.2	0.455
	More maternal concurrent depressive symptoms	−2.2	−4.0–(−0.4)	0.017
	Maternal higher education level	1.7	−0.6–4.1	0.145
Higher total problem score	More maternal prenatal depressive symptoms	0.2	−1.8–2.3	0.825
	More maternal postnatal depressive symptoms	0.9	−1.2–3.0	0.390
	More maternal concurrent depressive symptoms	3.6	2.0–5.2	≤0.001
Higher internalizing problem score	More maternal prenatal depressive symptoms	0.03	−2.1–2.1	0.985
	More maternal postnatal depressive symptoms	1.3	−0.8–3.5	0.217
	More maternal concurrent depressive symptoms	3.4	1.8–5.0	≤0.001
Higher externalizing problem score	More maternal postnatal depressive symptoms	0.6	−1.1–2.3	0.511
	More maternal concurrent depressive symptoms	2.9	1.3–4.4	≤0.001
	Mothers marital status	−0.3	−4.2–3.6	0.890
YSR				
Better social competence	More maternal prenatal depressive symptoms	−0.4	−2.7–1.8	0.708
	More maternal postnatal depressive symptoms	−1.3	−3.6–1.1	0.289
	More maternal concurrent depressive symptoms	−2.2	−4.0–(−0.5)	0.014
	Maternal higher education level	1.3	−1.0–3.6	0.259
	Female gender of the adolescent	3.0	−0.3–6.3	0.079
Higher total problem score	More maternal postnatal depressive symptoms	−0.3	−2.2–1.5	0.719
	More maternal concurrent depressive symptoms	3.1	1.4–4.7	≤0.001
	Mothers older age	−0.5	−0.9–(−0.1)	0.019
	Female gender of the adolescent	5.5	2.3–8.7	0.001
Higher internalizing problem score	More maternal postnatal depressive symptoms	0.5	−1.7–2.8	0.644
	More maternal concurrent depressive symptoms	3.0	1.0–5.0	0.004
	Maternal higher education level	−1.0	−3.7–1.6	0.436
	Female gender of the adolescent	6.9	3.1–10.7	≤0.001
Higher externalizing problem score	More maternal concurrent depressive symptoms	2.0	0.8–3.1	0.001
	Mothers older age	−0.5	−0.8–(−0.2)	0.002
	Female gender of the adolescent	2.3	−0.2–4.8	0.071

prenatal depression was a strong risk factor for adolescent depression and the effect was mediated by repeated exposure. Our analysis of recurrence also indicated that maternal perinatal depressive symptoms were associated with adolescent externalizing behavior problems in mothers' reports, when compared to adolescents whose mothers had never reported depressive symptoms. The question of timing and recurrence of maternal depressive symptoms can be investigated more thoroughly with this longitudinal sample and it will be the focus of our next study.

This study has many strengths. The follow-up time of the mothers and children is long. The questionnaires used here have been used extensively in research. Since the questionnaires were the same throughout the study stages, the comparisons are more reliable. In this study stage of this longitudinal follow-up study the children themselves were also able to complete questionnaires. This adds a valuable viewpoint and reduces the possible "reporter bias".

There are also potentially important limitations. One limitation of the study is that mothers and adolescents were not diagnosed by clinicians. There are, however, studies reporting that even subclinical maternal depressive symptoms are a risk for child development (Chen et al., 2000; Judd et al., 1996, 1997; Weinberg et al., 2001). As for adolescents, symptomatology and reactions to family stress are also valuable information, even if not leading to clinical diagnosis. Thus, accomplishing analysis both concentrating on clinically significant level of depressive symptoms and using the entire scale of depressive symptoms makes it possible to explore the associations of different aspects of maternal depressive symptoms to adolescent outcome. According to this study, linear regression analysis with continuous variables of adolescent outcome and maternal depressive symptoms indicated a similar pattern to categorical variables with clinically significant cut points. However, regression analysis failed to confirm the results of pre- and postnatal depression, but this could be due to the small sample size and the strong effect of maternal concurrent depression.

Because of the size of the study group the number of girls and boys with CBCL and YSR scores above the cut-point was quite small, restricting the analyze and making them less reliable. The findings between genders should therefore be considered as tentative and be further investigated with larger sample sizes. However, because of the relatively small sample size, indicative findings should not be overlooked.

The sample was population-based and the sample remained moderate in size. Partly because of the long follow-up time, the number of drop-outs is relatively high. Thus cumulative attrition increases the amount of incomplete data. Although not seen in the drop-out analysis, it is possible that there were more mothers and adolescents experiencing stressful life-events in the drop-out group than among the participants.

Risk factors other than maternal depressive symptoms and selected sociodemographic factors were not included in

this study. Earlier studies suggest that the effects of maternal depression may largely be mediated by family adversities and parenting difficulties with which they are strongly associated (Davies and Windle, 1997; Fergusson et al., 1995; Hammen et al., 2004; Seifer et al., 1996). However, despite the importance, the research frames in this study could not include all other possible risk factors into the analyses.

This study supports earlier findings that maternal depression influences the child's present and future psychosocial functioning and the occurrence of emotional/behavioral problems. It is therefore important to evaluate and effectively treat mother's depressive symptoms not only in child's infancy but also throughout motherhood. When depressed mothers are treated in adult psychiatry or other health services, it is also important to consider and take care of their children's well-being.

Role of funding source

This study was supported by grants from the Medical Research Fund of the Tampere University Hospital, the Foundation of Emil Aaltonen, the Foundation for Paediatric Research and the Academy of Finland. The funding sources had no further role in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication.

Conflict of interest

The authors report no conflicts of interest.

Acknowledgment

We thank for Mrs. Virginia Mattila who kindly redraw the grammar.

References

Abbott, R., Dunn, V.J., Robling, S.A., Paykel, E.S., 2004. Long-term outcome of offspring after maternal severe puerperal disorder. Acta Psychiatrica Scandinavica 110, 365–373.

Achenbach, T.M., 1991a. Manual for the child behavior checklist/4-18 and 1991 profile. University of Vermont Department of Psychiatry, Burlington.

Achenbach, T.M., 1991b. Manual for the youth self-report and 1991 profile. University of Vermont Department of Psychiatry, Burlington.

Achenbach, T.M., Rescorla, L.A., 2001. Manual for the ASEBA school-age forms and profiles. University of Vermont, Research Center for Children, Youth and Families, Burlington.

Allgood-Merten, B., Lewinsohn, P.M., Hops, H., 1990. Sex differences and adolescent depression. Journal of Abnormal Psychology 99 (1), 55–63.

Ashman, S.B., Dawson, G., Panagiotides, H., Yamada, E., Wilkinson, C.W., 2002. Stress hormone levels of children of depressed mothers. Development and Psychopathology 14, 333–349.

Ashman, S.B., Dawson, G., Panagiotides, H., 2008. Trajectories of maternal depression over 7 years: Relation with child psychopathology and behavior and role of contextual risks. Development and Psychopathology 20, 55–77.

Beardslee, W.R., Versage, E.M., Gladstone, T.R.G., 1998. Children of affectively ill parents: A review of the past 10 years. Journal of the American Academy of Child and Adolescent Psychiatry 37, 1134–1141.

Bergen-Nielsen, T.S., Vika, A., Dahl, A.A., 2003. When adolescents disagree with their mothers: CBCL-YSR discrepancies related to maternal depression and adolescent self-esteem. Child: Care, Health and Development 29, 207–213.

Burke, L., 2003. The impact of maternal depression on familial relationships. International Review of Psychiatry 15, 243–255.

Carter, A.S., Garrity-Rokous, F.E., Chazan-Cohen, R., Little, C., Briggs-Gowan, M.J., 2001. Maternal depression and comorbidity: Predicting early parenting, attachment security, and toddler social–emotional problems and competencies. Journal of the American Academy of Child and Adolescent Psychiatry 40, 18–26.

Chen, L.-S., Eaton, W.W., Gallo, J.J., Nestadt, G., Crum, R.M., 2000. Empirical examination of current depression categories in population-based study: symptoms, course and risk factors. The American Journal of Psychiatry 157, 573–580.

Chilcoat, H.D., Breslau, N., 1997. Does psychiatric history bias mothers' reports? An application of a new analytic approach. Journal of the American Academy of Child and Adolescent Psychiatry 36 (7), 971–979.

Cogill, S., Caplan, H., Alexandra, H., Robson, K., Kumar, R., 1986. Impact of postnatal depression on cognitive development in young children. BMJ 292, 1165–1167.

Conrad, M., Hammen, C., 1989. Role of maternal depression in perceptions of child maladjustment. Journal of Consulting and Clinical Psychology 57, 663–667.

Cornish, A.M., McMahon, C.A., Ungerer, J.A., Barnett, B., Kowalenko, N., Tennant, C., 2005. Postnatal depression and infant cognitive and motor development in the second postnatal year: The impact of depression chronicity and infant gender. Infant Behavior & Development 28, 407–417.

Cox, J.L., Holden, J.M., Sagovsky, R., 1987. Detection of postnatal depression, development of the 10-item Edinburgh Postnatal Depression Scale. The British Journal of Psychiatry 150, 782–786.

Cox, J.L., Chapman, G., Murray, D., Jones, P., 1996. Validation of the Edinburgh Postnatal Depression Scale (EPDS) in non-postnatal women. Journal of Affective Disorders 39, 185–189.

Crawford, T.N., Cohen, P., Midlarsky, E., Brook, J.S., 2001. Internalizing symptoms in adolescents: Gender differences in vulnerability to parental distress and discord. Journal of Research on Adolescence 11 (1), 95–118.

Davies, P.T., Windle, M., 1997. Gender-specific pathways between maternal depressive symptoms, family discord, and adolescent adjustment. Developmental Psychology 33, 657–668.

De Los Reyes, A., Goodman, K.L., Kliewer, W., Reid-Quiñones, K., 2008. Whose depression relates to discrepancies? Testing relations between informant characteristics and informant discrepancies from both informants' perspectives. Psychological Assessment 20 (2), 139–149.

Duggal, S., Carlson, E.A., Sroufe, L.A., Egeland, B., 2001. Depressive symptomatology in childhood and adolescence. Development and Psychopathology 13, 143–164.

Elgar, F.J., McGrath, P.J., Waschbusch, D.A., Stewart, S.H., Curtis, L.J., 2004. Mutual influences on maternal depression and child adjustment problems. Clinical Psychology Review 24, 441–459.

Elgar, F.J., Mills, R.S.L., McGranth, P.J., Waschbusch, D.A., Brownridge, D.A., 2007. Maternal and paternal depressive symptoms and child maladjustment: The mediating role of parental behaviour. Journal of Abnormal Child Psychology 35, 943–955.

Essex, M.J., Klein, M.H., Cho, E., Kraemer, H.C., 2003. Exposure to maternal depression and marital conflict: Gender differences in children's later mental health symptoms. Journal of the American Academy of Child and Adolescent Psychiatry 42 (6), 728–737.

Fergusson, D., Horwood, L.J., Lynskey, M., 1995. Maternal depressive symptoms and depressive symptoms in adolescents. Journal of Child Psychology and Psychiatry 36, 1161–1178.

Field, T., Diego, M., Hernandez-Reif, M., 2006. Prenatal depression effects on the fetus and newborn: a review. Infant Behavior & Development 29, 445–455.

Fihrer, I., McMahon, C.A., Taylor, A.J., 2009. The impact of postnatal and concurrent maternal depression on child behaviour during the early school years. Journal of Affective Disorders 119, 116–123.

Goodman, S.H., 2007. Depression in mothers. Annual Review of Clinical Psychology 3, 107–135.

Goodman, S.H., Gotlib, I.H., 1999. Risk for psychopathology in the children of depressed mothers: a developmental model for understanding mechanisms of transmission. Psychological Review 106, 458–490.

Gross, H.E., Shaw, D.S., Moilanen, K.L., 2008. Reciprocal associations between boys externalizing problems and mothers depressive symptoms. Journal of Abnormal Child Psychology 36, 693–709.

Gunlicks, M.L., Weissman, M.M., 2008. Changes in child psychopathology with improvement in parental depression: a systematic review. Journal of the American Academy of Child and Adolescent Psychiatry 47, 379–389.

Halligan, S.L., Herbert, J., Goodyer, I.M., Murray, L., 2004. Exposure to postnatal depression predicts elevated cortisol in adolescent offspring. Biological Psychiatry 55, 376–381.

Halligan, S.L., Murray, L., Martins, C., Cooper, P.J., 2007a. Maternal depression and psychiatric outcome in adolescent offspring: A 13-year longitudinal study. Journal of Affective Disorders 97, 145–154.

Halligan, S.L., Herbert, J., Goodyer, I., Murray, L., 2007b. Disturbances in morning cortisol secretion in association with maternal postnatal depression predict subsequent depressive symptomatology in adolescents. Biological Psychiatry 62, 40–46.

Hammen, C., Burge, D., Adrian, C., 1991. Timing of mother and child depression in a longitudinal study of children at risk. Journal of Consulting and Clinical Psychology 59, 341–345.

Hammen, C., Brennan, B.A., Shih, J.H., 2004. Family discord and stress predictors of depression and other disorders in adolescent children of depressed and non-depressed women. Journal of the American Academy of Child and Adolescent Psychiatry 43, 994–1002.

Hay, D.F., Pawlby, S., Sharp, D., Asten, P., Mills, A., Kumar, R., 2001. Intellectual problems shown by 11-year-old children whose mothers had postnatal depression. Journal of Child Psychology and Psychiatry 42, 871–889.

Hay, D.F., Pawlby, S., Angold, A., Harold, G.T., Sharp, D., 2003. Pathways to violence in the children of mothers who were depressed postpartum. Developmental Psychology 39, 1083–1094.
Jenkins, J.M., Curwey, T., 2008. Changes in adolescents' internalizing symptomatology as a function of sex and the timing of maternal depressive symptomatology. Journal of the American Academy of Child and Adolescent Psychiatry 47 (4), 399–405.
Judd, L.L., Paulus, M.P., Wells, K.B., Rapaport, M.H., 1996. Socioeconomic burden of subsyndromal depressive symptoms and major depression in sample of the general population. The American Journal of Psychiatry 153, 1411–1417.
Judd, L.L., Akiskal, H.S., Paulus, M.P., 1997. The role and clinical significance of subsyndromal depressive symptoms (SDD) in unipolar major depressive disorder. Journal of Affective Disorders 45, 5–18.
Lewinsohn, P.M., Olino, T.M., Klein, D.N., 2005. Psychosocial impairment in offspring of depressed parents. Psychological Medicine 35, 1493–1503.
Luoma I., 2004. From pregnancy to middle childhood. What predicts a child's socio-emotional well-being? Academic Dissertation. Acta Universitatis Tamperensis 1002, Tampere University Press, Tampere.
Luoma, I., Tamminen, T., Kaukonen, P., et al., 2001. Longitudinal study of maternal depressive symptoms and child well-being. Journal of the American Academy of Child and Adolescent Psychiatry 40, 1367–1374.
Mäki, P., Veijola, J., Räsänen, P., et al., 2003. Criminality in the offspring of antenatally depressed mothers: a 33-year follow-up of Northern Finland 1966 birth cohort. Journal of Affective Disorders 74, 273–278.
Malcarne, V.L., Hamilton, N.A., Ingram, R.E., Taylor, L., 2000. Correlates of distress in children at risk for affective disorder: exploring predictors in the offspring of depressed and nondepressed mothers. Journal of Affective Disorders 59, 243–251.
McCarty, C.A., McMahon, R.J., Conduct Problems Prevention Research Group, 2003. Mediators of the relation between maternal depressive symptoms and child internalizing and disruptive behaviour disorders. Journal of Family Psychology 17, 545–556.
Murray, L., Cooper, P.J., 1997. Postpartum depression and child development. Psychological Medicine 27, 253–260.
Murray, L., Kempton, C., Woolgar, M., Hooper, R., 1993. Depressed mothers' speech to their infants and its relation to infant gender and cognitive development. Journal of Child Psychology and Psychiatry 34, 1083–1101.
Murray, L., Sinclair, D., Cooper, P., Ducournau, P., Turner, P., Stein, A., 1999. The socioemotional development of 5-year-old children of postnatally depressed mothers. Journal of Child Psychology and Psychiatry 40, 1259–1271.
Murray, L., Halligan, S.L., Adams, G., Patterson, P., Goodyer, I.M., 2006. Socioemotional development in adolescents at risk for depression: The role of maternal depression and attachment style. Development and Psychopathology 18, 489–516.
Murray, L., Arteche, A., Fearon, P., Halligan, S., Croudace, T., Cooper, P., 2011. The effects of maternal postnatal depression and child sex on academic performance at age 16 years: a developmental approach. Journal of Child Psychology and Psychiatry 51, 1150–1159.
Najman, J.M., Williams, G.M., Nikles, J., et al., 2000. Mothers' mental illness and child behavior problems: cause–effect association or observation bias. Journal of the American Academy of Child and Adolescent Psychiatry 39, 592–602.
Nelson, D.R., Hammen, C., Brennan, P.A., Ullman, J.B., 2003. The impact of maternal depression on adolescent adjustment: the role of expressed emotion. Journal of Consulting and Clinical Psychology 71, 935–944.
Nolen-Hoeksema, S., 1994. An interactive model for the emergence of gender differences in depression in adolescence. Journal of Research on Adolescence 4 (4), 519–534.
Nolen-Hoeksema, S., Girgus, J.S., 1994. The emergence of gender differences in depression during adolescence. Psychological Bulletin 115 (3), 424–443.
Nomura, Y., Wickramaratne, P.J., Warner, V., Mufson, L., Weissman, M.M., 2002. Family discord, parental depression, and psychopathology in offspring: Ten-year Follow-up. Journal of the American Academy of Child and Adolescent Psychiatry 41 (4), 402–409.
O'Connor, T.G., Heron, J., Glover, V., 2002. Antenatal anxiety predicts child behavioural/emotional problems independently of postnatal depression. Journal of the American Academy of Child and Adolescent Psychiatry 41, 1470–1477.
Pawlby, S., Hay, D.F., Sharp, D., Waters, C.S., O'Keane, V., 2009. Antenatal depression predicts depression in adolescent offspring: Prospective longitudinal community based study. Journal of Affective Disorders 113, 236–243.
Seifer, R., Sameroff, A., Dickstein, S., et al., 1996. Parental psychopathology, multiple contextual risks, and one-year outcomes in children. Journal of Clinical Child Psychology 25, 423–435.
Sohr-Preston, S.L., Scaramella, L.V., 2006. Implications of timing of maternal depressive symptoms for early cognitive and language development. Clinical Child and Family Psychology Review 9, 65–85.
Talge, N.M., Neal, C., Glover, V., 2007. Antenatal maternal stress and long-term effects of child neurodevelopment: how and why? Journal of Child Psychology and Psychiatry 48, 245–261.
Tamminen T, 1990. (in Finnish, summary in English) Postnatal depression, breastfeeding and mother infant interaction. Academic dissertation. Acta Universitatis Tamperensis ser A vol 304. University of Tampere.
Van den Bergh, B.R.H., Marcoen, A., 2004. High antenatal anxiety is related to ADHD symptoms, externalizing problems, and anxiety in 8- and 9-year-olds. Child Development 75 (4), 1085–1097.
Van den Bergh, B.R.H., Van Calster, B., Smits, T., Van Huffel, S., Lagae, L., 2008. Antenatal maternal anxiety is related to HPA-axis dysregulation and self-reported depressive symptoms in adolescence: A prospective study on the fetal origins of depressed mood. Neuropsychopharmacology 33 (3), 536–545.
Verkerk, G.J.M., Pop, V.J.M., Van Son, M.J.M., Van Heck, G.L., 2002. Prediction of depression in the postpartum period: a longitudinal follow-up study in high-risk and low-risk women. Journal of Affective Disorders 77, 159–166.
Weinberg, M.K., Tronick, E.Z., 1998. Emotional characteristics of infants associated with maternal depression and anxiety. Pediatrics 102 (5), 1298–1304.
Weinberg, M.K., Tronick, E.Z., Beeghly, M., Olson, K.L., Kernan, H., Riley, J.M., 2001. Subsyndromal depressive symptoms and major depression in postpartum women. The American Journal of Orthopsychiatry 71, 87–97.
Weinberg, M.K., Olson, K.L., Beeghly, M., Tronick, E.Z., 2006. Making up is hard to do, especially for mothers with high levels of depressive symptoms and their infant sons. Journal of Child Psychology and Psychiatry 47 (7), 670–683.
Weinstock, M., 2008. The long-term behavioral consequences of prenatal stress. Neuroscience and Biobehavioral Reviews 32, 1073–1086.
Weissman, M.M., Wickramaratne, P., Nomura, Y., Warner, V., Pilowsky, D., Verdeli, H., 2006. Offspring of depressed parents: 20 years later. The American Journal of Psychiatry 163, 1001–1008.
Wing, J.K., Birley, J.L.T., Cooper, J.E., Graham, P., Isaacs, A.D., 1967. Reliability of a procedure for measuring and classifying "Present Psychiatric State". The British Journal of Psychiatry 113, 499–515.

informa
healthcare

Maternal depressive symptoms: Associations with adolescents' internalizing and externalizing problems and social competence

MARIE KORHONEN, ILONA LUOMA, RAILI SALMELIN, TUULA TAMMINEN

Korhonen M, Luoma I, Salmelin R, Tamminen T. Maternal depressive symptoms: Associations with adolescents' internalizing and externalizing problems and social competence. Nord J Psychiatry 2014;68:323–332.

Background: The negative effect of maternal depressive symptoms on child wellbeing has been quite extensively studied. There is, however, debate as to whether it is the timing, the recurrence or the chronicity of maternal depressive symptoms that puts the child's wellbeing at risk. *Aims:* This study explores the associations between the timing, recurrence and the patterns of maternal depressive symptoms and adolescent psychosocial functioning. *Methods:* One hundred and ninety-one mothers and 192 adolescents were followed up from the mother's pregnancy to the child's adolescence. Maternal depressive symptoms were screened with the Edinburgh Postnatal Depression Scale prenatally, postnatally, in early and middle childhood, and at adolescence. The adolescents' outcomes were screened using Child Behavior Checklists and Youth Self Reports. *Results:* The results indicate that the initial exposure to maternal depressive symptoms at pregnancy is associated with more externalizing problems in adolescence, 2 months postnatally with more internalizing problems, in early childhood with poorer social competence and concurrently with more externalizing problems. Combined analyses indicate that recurrent maternal depressive symptoms best explain adolescents' internalizing problems and the chronic pattern of maternal depressive symptoms externalizing problems. The chronic and intermittent patterns of maternal depressive symptoms best explained adolescents' poorer social competence. *Conclusions:* Recurrent or chronic maternal depressive symptoms rather than the timing predict adolescents' psychosocial problems better. The timing, however, may explain the different kinds of problems in adolescence depending on the developmental task at the time of the exposure. The findings should be noted when treating both mothers and children in psychiatric clinics and other health services.

• *Externalizing problems, Internalizing problems, Maternal depressive symptoms, Social competence.*

Marie Korhonen, M.D., School of Medicine, University of Tampere, Tampere FIN-33014, Finland, E-mail: marie-kaarin.korhonen@uta.fi; Accepted 23 August 2013.

Depression has been found to be recurrent and in women it is especially common in the childbearing years (1–4). Furthermore, women with past or current depression find their environment more stressful and have more problematic relationships with their children (3).

Maternal depressive symptoms are a risk for adolescent psychopathology and are associated in various ways with adolescent negative outcome. Studies have reported associations between maternal depressive symptoms and internalizing problems, such as depression and anxiety (5–8) as well as externalizing problems like conduct disorder (5, 9). Maternal depressive symptoms have also been found to be associated with the child's poorer cognitive skills (10), negative life events such as school drop-out and sexual intercourse at earlier age (11) as well as high levels of physical symptoms (12).

In addition to the effects of maternal depressive symptoms on child development, children are also likely to react to the mother's depressive symptoms concurrently with or closely after their mothers' depressive symptoms (13–16).

The harmful effects of maternal prenatal and postnatal depressive symptoms on child development have been quite extensively studied in longitudinal samples (5, 10, 14, 17–23). However, recent studies have considered whether maternal depressive symptoms are especially harmful to child development prenatally or during the first year of a child's life or if the negative effect is

 DOI: 10.3109/08039488.2013.838804

rather a consequence of recurrent exposures. One of the first studies to consider the effects of timing of maternal depressive symptoms on child development conducted by Hammen & Brennan (3) indicated that timing of maternal depression did not predict the risk for a diagnosis of depression when the child was 15; single exposure to maternal depression at any period from birth to the child's 10th year likewise predicted youth depression after controlling for confounding chronicity and severity. By contrast, studies conducted after Hammen & Brennan's suggest that the prenatal (18) and postnatal (10, 17, 24, 25) periods are especially susceptible to the harmful effects of maternal depressive symptoms.

The recurrent and chronic nature of depressive symptoms, however, causes most of the children to be exposed to maternal depressive symptoms several times or for a long period in their lives, especially when the initial exposure has occurred at an early age. Repeated exposures may also be associated with different kinds of developmental risks. Halligan et al. (5) found in their longitudinal study that maternal postnatal depression was associated with adolescent's anxiety disorder while postnatal depression together with later episodes of maternal depression was a risk for depression in adolescent offspring.

Subsequent exposures have also been found to mediate the harmful effects of pre- and postnatal depressive symptoms. Hay et al. (17) and Pawlby et al. (21) reported maternal prenatal depression to be associated with adolescent depression and girls' emotional problems when combined by later exposures. Fihrer et al. (26) found maternal postnatal depression to be a risk for a child's internalizing problems at 6–8 years of age, while the association between postnatal depression and externalizing problems was combined by maternal concurrent depression.

The effects of the exposure to maternal depressive episodes after the first year of a child's life have not been much studied. However, the timing of the later exposure may be critical because of the different developmental tasks at different ages. The study by Hammen & Brennan (3) referred to earlier found no differences in the adolescents' outcome regarding the timing of the exposure. Alpern & Lyons-Ruth (27) found that children exposed to maternal depression only in infancy showed more anxiety symptoms at kindergarten age, whereas children exposed only at kindergarten age showed more hyperactive symptoms. In a study by Brennan et al. (16), recent reports of maternal depressive symptoms were related to more behavioural problems in 5-year-old children than were prenatal or postnatal depressive symptoms. The results, however, are confounded by concurrent or recent maternal depressive symptoms. In a prospective study on early school-age children, initial exposure to maternal major depression in infancy was related to co-occurring internalizing and externalizing symptoms at the age of 6, whereas initial exposure at 2–4 years of age was associated with "pure" externalizing symptoms at the age of 6 (28). A recent study by Naicker et al. (29) explored the associations between the initial exposure to maternal depressive symptoms from the postnatal period to age 12–13 years and the child's emotional disorders at the age of 12–13 years. They found that adolescents who were initially exposed to maternal depressive symptoms between the ages of 2 and 3 years and 4 and 5 years had a two-fold risk of emotional disorder at the age of 12–13 years. No increased risk was observed in those initially exposed during the first postpartum year or later in childhood. Thus the findings concerning the timing of maternal depressive symptoms and child outcome are somewhat contradictory.

Aims

The first aim of this study was to examine whether there are differences in the adolescent outcome in terms of internalizing and externalizing problems and social competence depending of the initial timing of the exposure to maternal depressive symptoms. The second aim was to study whether the harmful effects of maternal depressive symptoms were due to exposure at a certain critical developmental time point or rather due to recurrence or the patterns of the maternal depressive symptom. Our first hypothesis was that the timing of the initial exposure to maternal depressive symptoms is associated with different kinds of psychosocial problems in adolescence depending on the developmental task of the child during the exposure. Our second hypothesis was that the number of exposures was a stronger predictor of adolescent negative outcome than the timing of the exposure.

Material and Methods

This study is a part of a longitudinal study, which started in Tampere, Finland, in 1989. Study stages 1–4 and data collection points (T1–T7) of the longitudinal study are shown in Fig. 1. Mothers' depressive symptoms were screened by questionnaires at each of the seven data collection points. The latest study stage (adolescence) was conducted as a postal survey during the period January–-June 2006. At T7, adolescents' psychosocial functioning and emotional/behavioural problems were screened with questionnaires completed by the mothers and the adolescents themselves. In this study, data from all the data collection points T1–T7 was used.

Sample

A flow chart of the sample is presented in Fig. 1. The original sample consisted of 349 consecutively selected normal population mothers expecting their first child. The sample was collected from maternity clinics in the Finnish city of Tampere during the period 1989–1990. Less than 10% of mothers refused to participate. For the

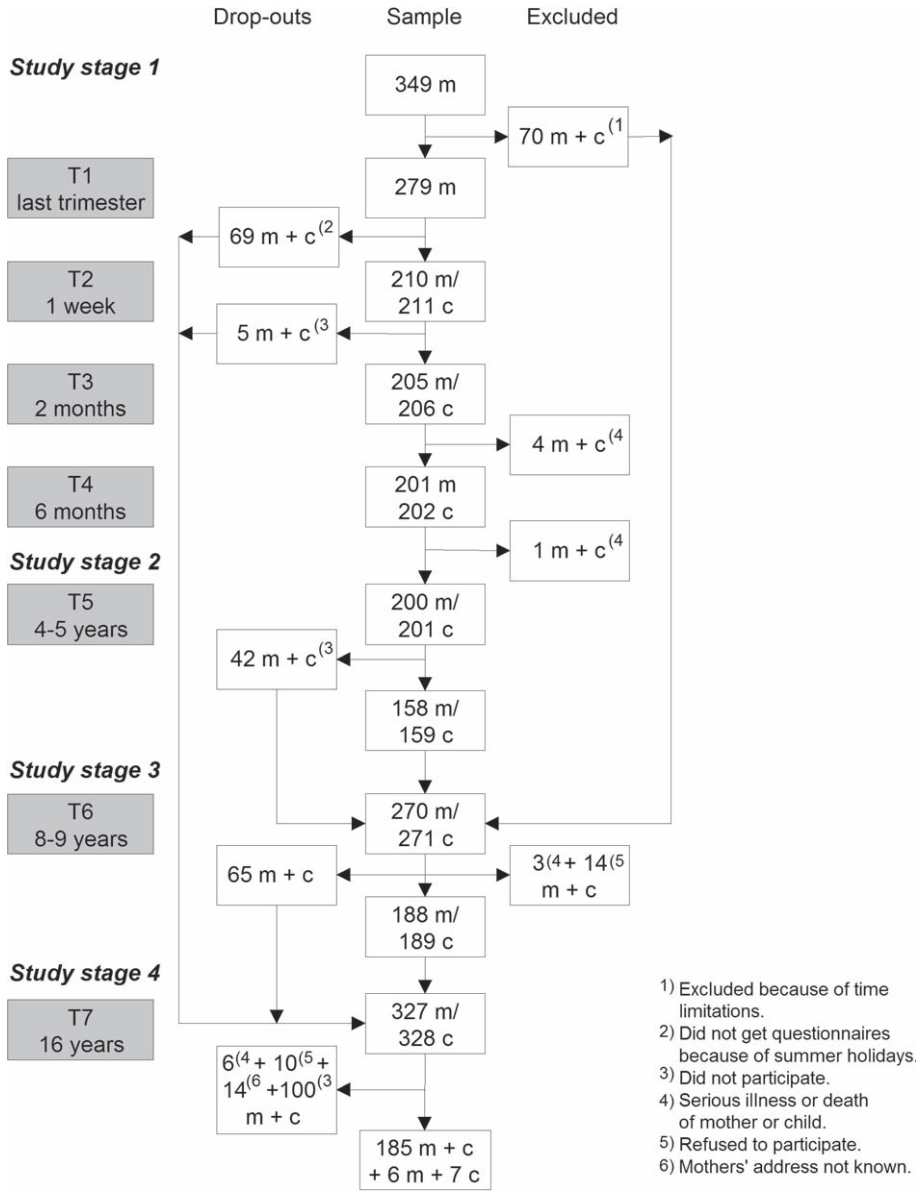

Fig. 1. Stages and sample sizes of the longitudinal study (m = mother, c = child/adolescent).

various reasons given in Fig. 1, the number of mother–child dyads included at each data collection point varied.

Consequently, there are several drop-out groups, e.g. those dropping out at any point in the entire longitudinal process and those dropping out in the current study stage, but multiple collection points make drop-out analysis possible. By using the information available from previous study stages, it was observed that the drop-out group of the latest study stage, T7, did not differ significantly from the sample of the study stage regarding mother's marital status, age or education, family SES, or maternal depressive symptoms prenatally (T1), postnatally (T2, T3 or T4) or at the childhood (T5 or T6). However, in the drop-out group, there were more boys than girls ($P = 0.019$).

The characteristics of the sample are shown in Table 1.

At study stages T1–T4, permission for the study was granted by the Ethics Committee of the City of Tampere. Study stages T5–T7 were approved by the Ethics Committee of Pirkanmaa Hospital District. At each study stage, written informed consent was obtained from the mothers and at T7 also from the adolescents.

Measures

Mothers' depressive symptoms were assessed by the Edinburgh Postnatal Depression Scale (EPDS) at each time-point (30). The EPDS is a valid, self-report questionnaire originally designed to detect postnatal depression, but it has been found to have validity in detecting

Table 1. Characteristics of the sample ($n = 192$ adolescents and 191 mothers).

Characteristic	Proportion, %	Mean	SD
Adolescent's gender			
Female	52		
Male	48		
Mother's marital status			
Married or cohabiting	82		
Single	18		
Mother's education			
Elementary, vocational school	37		
College	47		
Academic	16		
Family socio-economic status			
Upper	59		
Lower	41		
No. of mother's biological children			
One	13		
Two	52		
Three or more	35		
Mother's age (years)		44	4.0
Adolescent's age (years)		17	0.2

SD, standard deviation.

depression among non-postnatal women as well (30, 31). It includes 10 questions each of which has four response options scored from 0 to 3 giving the maximum sum score of 30. The cut-off point ≥ 10 was used to evaluate the associations between maternal depressive symptoms and adolescent outcome. The lower cut-off point was selected to ensure a sufficient number of mothers with depressive symptoms in the analysis. It has been reported to have a satisfactory sensitivity and specificity for minor depression (30–33), while the cut-off point ≥ 13 has been more commonly used. However, as the mothers in this study were not evaluated by clinicians, depression diagnosis could not be set and thus the term "depressive symptoms" is used.

The social competence and internalizing and externalizing problems of the children were assessed using the Finnish translation of the Child Behavior Checklist (CBCL) for ages 4–18 (34, 35) completed by the mothers. The Social Competence sum score includes scores from activities, social skills and relationships, and school performance subscales. The Problem scales contain 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 Internalizing Problems score is a sum score including items concerning withdrawal, somatic complaints and anxiety/depression. The Externalizing Problems score is a sum score of items concerning social problems, rule-breaking behaviour and aggressive behaviour. In this report, we used the Social Competence scale and the abovementioned two problem scales.

The adolescents completed the Youth Self Reports (YSRs) for ages 11–18 (35, 36). The YSR Social Competence sum score as well as the Problem scores are derived from responses to 119 questions similar to those of CBCL. The problem items include 16 items involving social desirability not included in the problem sum score. The Social Competence, Internalizing Problems and Externalizing Problems sum scores were used as in the CBCL.

The CBCL and the YSR Internalizing and Externalizing raw problem scores and Social Competence score were converted into normalized T-scores and used as continuous variables.

Background information on socio-demographic data was collected with questionnaires designed for this study stage.

Statistical analysis

To ascertain the effects of timing on adolescent psychosocial functioning and symptoms without the confounding association of previous depressive episodes, mothers exceeding the EPDS cut-off point for the first time at each time point were identified. The numbers of all mothers exceeding the EPDS cut-off point ≥ 10 and those exceeding the cut-off point initially at each time point are seen in Table 2. The recurrent maternal depressive symptoms were categorized as "never" ($n = 161$), "once" ($n = 81$), "twice" ($n = 37$) and "three or more" times ($n = 50$).

The patterns of maternal depressive symptoms over the follow-up period were examined by trajectory analysis (37). Models comprising three to five clusters were considered. The four-cluster model had the best fit based on the BIC values (reported in detail elsewhere). The resulting trajectories of maternal depressive symptoms were very-low ($n = 58$), low-stable ($n = 173$), intermittent ($n = 10$) and high-stable ($n = 88$) (Fig. 2.).

Means, standard deviations (SD) and 95% confidence intervals (CI) were calculated for the Internalizing and Externalizing Problems and Social Competence, and independent samples *t*-test was used to test their differences between groups. In the analysis of timing, the

Table 2. Number and proportion of mothers scoring above the cut-off point ≥ 10 on the Edinburgh Postnatal Depression Scale (EPDS) for the first time and altogether at different data collection points (among those participated at T7).

			EPDS ≥ 10			
			All		First time	
Data collection point		Total (*n*)	(*n*)	(%)	(*n*)	(%)
Prenatal	T1 (last trimester)	190	43	23	43	22
Postnatal	T2 (2 weeks)	154	39	25	20	10
Postnatal	T3 (2 months)	154	26	17	6	3
Postnatal	T4 (6 months)	155	30	19	9	5
Early childhood	T5 (4–5 years)	115	24	21	9	5
Middle childhood	T6 (8–9 years)	143	27	19	6	3
Adolescence	T7 (16–17 years)	176	36	21	13	7

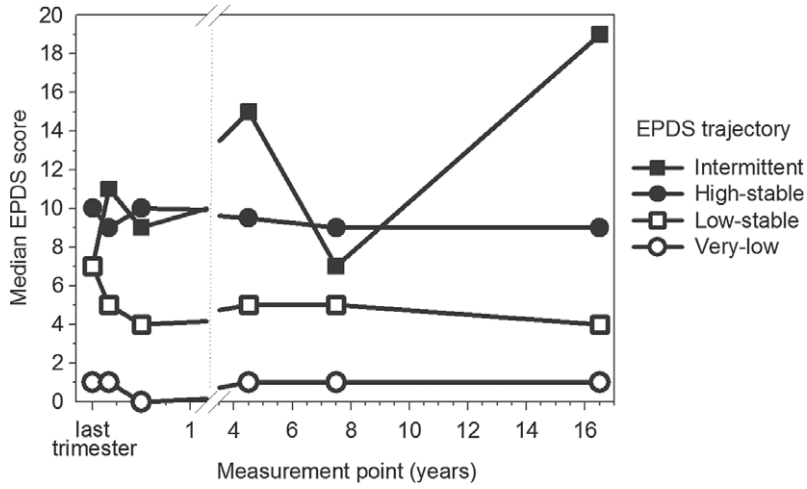

Fig. 2. Trajectories of maternal depressive symptoms.

Kruskall–Wallis test was used due to small number of cases in some of the groups.

To examine the combined effects of the initial timing, recurrence and trajectory of maternal depressive symptoms on adolescent outcome, both ordinary linear regression and generalized linear regression (with gamma distribution and log link function) were applied. As the results were similar, only those of ordinary linear regression are reported. In both analysis types, the Enter-method was used.

These analyses were performed with SPSS 15.0 and 16.0. Trajectory models were fitted using flexmix package in statistical program R, version 2.13.0.

Results

Adolescent's social competence and problems

The mean Social Competence score was 47 (95% CI 45–48) according to the CBCL and 46 (95% CI 44–48) according to the YSR. On the problem scales, the mean Internalizing Problem score was 51 (95% CI 49–52) in the CBCL and 50 (95% CI 49–52) in the YSR. The mean Externalizing Problem score was 49 (95% CI 48–50) in the CBCL and 52 (95% CI 51–53) in the YSR.

Initial exposure to maternal depressive symptoms and adolescent outcome

Maternal prenatal depressive symptoms were statistically significantly associated with more Externalizing Problems in the CBCL ($P = 0.037$; standardized effect size 0.40) and indicatively in the YSR ($P = 0.092$; standardized effect size 0.30). There were no statistically significant associations between maternal depressive symptoms two weeks postnatally (T2) and adolescent psychosocial functioning in either the CBCL or the YSR. Initial exposure to maternal depressive symptoms 2 months postnatally (T3) was associated with higher scoring in the Internalizing Problems score in the YSR ($P = 0.030$; standardized effect size 0.90). No statistically significant associations were found between the initial exposure to maternal depressive symptoms 6 months postnatally (T4) and adolescent psychosocial functioning. Initial exposure to maternal depressive symptoms at the age of 4–5 years was associated with lower scoring on the Social Competence in the YSR ($P = 0.029$; standardized effect size 0.60). No statistically significant associations were found between the initial exposure to maternal depressive symptoms at the age of 8–9 years and adolescent psychosocial functioning. Exposure to maternal depressive symptoms initially at adolescence (concurrently) were associated with higher scoring on Externalizing Problems in the YSR ($P = 0.003$; standardized effect size 1.00; Fig. 3.)

Combined effects of initial timing, recurrence and trajectories of maternal depressive symptoms on adolescent outcome

To examine the combined effects of the various aspects of maternal depressive symptoms, six sets of regression analysis were accomplished, one set for each of the adolescent outcome variables: CBCL and YSR Internalizing and Externalizing problem scores and Social Competence scores. The explanatory variables in each of the sets were the depressive symptoms trajectory the mother was assigned to, representing the pattern of maternal depressive symptoms (transformed to three dummy variables), the number of times the mother had exceeded the selected EPDS cut-off point (recurrence) and the time-point at which the mother had exceeded the cut-off point for the first time (time from first exposure), measured as months from T7 backwards. In each analysis set all individual explanatory variables were first entered alone, then in all combinations of two and finally all simultaneously into a model. The characteristics of the best models (based on

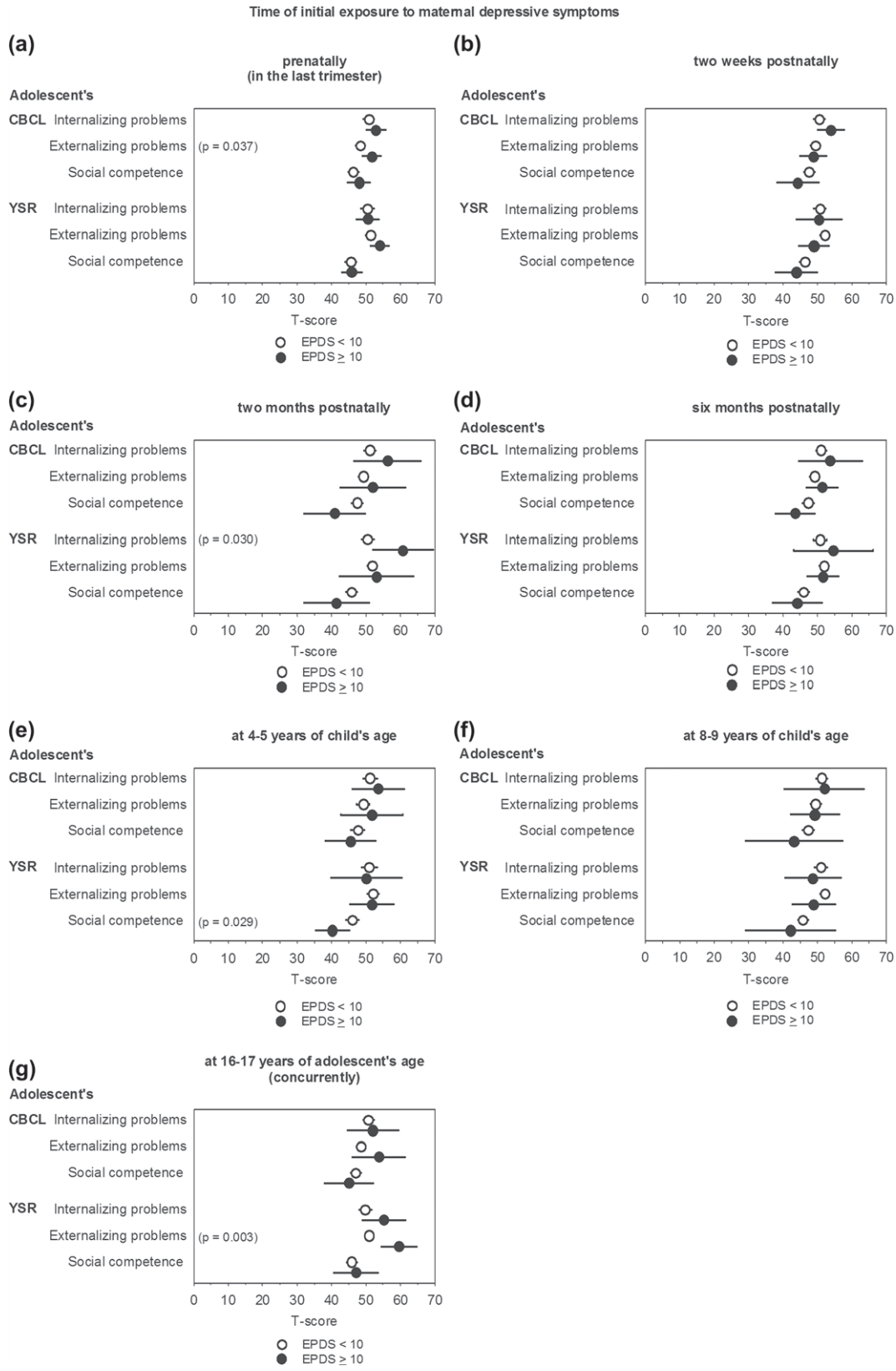

Fig. 3. Association between adolescent outcome and initial exposure to maternal depressive symptoms with the Edinburgh Postnatal Depression Scale (EPDS) cut-off point ≥ 10. Means, confidence intervals and statistically significant (≤ 0.05) *P*-values are shown.

Table 3. Characteristics of the best linear regression models on the Child Behavior Checklist (CBCL) and Youth Self Report (YSR) Internalizing and Externalizing problem scores and Social Competence score.

	CBCL			YSR		
	Internalizing problems	Externalizing problems	Social Competence	Internalizing problems	Externalizing problems	Social Competence
Raw R^2	0.089	0.090	0.046	0.033	0.029	0.071
Adjusted R^2	0.084	0.075	0.030	0.028	0.008	0.045
Regression *P*	<0.001	0.001	0.042	0.012	0.235	0.024
B (*P*)						
Trajectory group						
Intermittent		1.2 (0.743)	−8.8 (0.037)		0.03 (0.765)	−6.4 (0.182)
High stable		7.7 (<0.001)	−5.5 (0.016)		0.26 (0.040)	−5.9 (0.047)
Low stable		1.9 (0.279)	−2.6 (0.173)		0.08 (0.459)	−4.5 (0.030)
Very low		Ref.	Ref.		Ref.	Ref.
Time of exposure						0.01 (0.351)
Recurrence	2.0 (<0.001)			1.35 (0.012)	−0.09 (0.370)	−1.31 (0.140)

The explanatory variables examined were the recurrence (0–7) and trajectory group of mother's depressive symptoms as well as the time since the adolescent's first exposure to mother's depressive symptoms till the outcome measurement at adolescent's age of 16–17 years (0–199.5 months).

adjusted R^2 and *P*-value of *F* change between models) for each outcome variable are presented in Table 3.

The regression on both CBCL Internalizing and Externalizing problem scores was statistically significant for all individual explanatory variables as well as their combinations. The best model for CBCL Internalizing Problems was the one with recurrence of maternal depressive symptoms alone, more recurrent symptoms increasing the risk (Table 3). As for CBCL Externalizing Problems, the best model consisted only of the trajectory of maternal depressive symptoms. The adolescents of mothers assigned to the high-stable trajectory differed statistically significantly from those of the very-low trajectory reference. The best model for CBCL Social Competence score was the one containing only the trajectory of maternal depressive symptoms. Adolescents of mothers in the high-stable and intermittent trajectory differed significantly from the reference trajectory.

The YSR Internalizing Problems were explained solely by recurrence of maternal depressive symptoms. The best, though still non-significant model explaining YSR Externalizing Problems consisted of recurrence and trajectory of maternal depressive symptoms. The adolescents of high-stable trajectory mothers alone showed a statistically significant difference, compared with the very-low trajectory. The regression on YSR Social Competence score was statistically significant for recurrence and trajectory of maternal depressive symptoms alone as well as all combinations of the three explanatory variables. The best model consisted of all three explanatory variables, though only maternal depressive symptoms trajectory was a statistically significant predictor. Adolescents of mothers assigned to the high-stable and low-stable trajectories differed significantly from those in the very-low trajectory.

Conclusions

This longitudinal study explored the associations between the initial timing of the exposure to maternal depressive symptoms and adolescent social competence and internalizing and externalizing problems at the age of 16–17 years. Furthermore, it explored whether the harmful effects of maternal depressive symptoms were due to exposure at a certain developmental time point or rather due to the recurrence or the pattern of maternal depressive symptoms.

This study indicates that recurrent or chronic pattern of maternal depressive symptoms better explain adolescent poorer social competence and higher level of internalizing and externalizing problems. However, the initial timing of maternal depressive symptoms is associated with different kinds of adolescent psychosocial outcomes. Exposure to maternal depressive symptoms prenatally was associated with more externalizing problems in adolescence, corroborating earlier studies (20, 21, 38). The Integrative Model for the Transmission of Risk to Children of Depressed Mothers (2, 39) proposes that there are many possible mechanisms for the intergenerational transmission of the harmful effects of maternal depression. The association between maternal prenatal depressive symptoms and adolescents' externalizing problems could be mediated by the biological factors of the mother and the HPA activation of the foetus and neonate, as studies suggest (40–44).

Initial exposure to maternal depressive symptoms for the first time 2 months postnatally, but not 6 months postnatally was associated with more internalizing problems, confirming earlier studies (5, 22, 24, 25) This could indicate to a more critical postnatal period in the formation of mother–child interaction and bonding, and thus, maternal depressive symptoms at that point may be

more harmful than earlier or later in the postnatal period. This could also explain the discrepancy between this study and the study by Naicker et al. (29) referred to earlier, who found no association between the postnatal depressive symptoms and child outcome at 12–13 years of age, as in their study postnatal period was any time-point before child's first year.

Children also acquire cognitions, social skills and coping styles through social learning processes such as modelling, observational learning and reinforcement. Children of depressed mothers may thus learn depressotypic ways to cope and react (2). This depressotypic behaviour model could explain the associations found in this study between the initial exposure to maternal depressive symptoms at the age of 4–5 years, and poorer social competence in adolescence as childhood is an important period for socialization and beginning peer relations. No statistically significant associations were found between the initial exposure to maternal depressive symptoms at the age of 8–9 years and psychosocial functioning in adolescence. Perhaps at the early school age the children are not so vulnerable to maternal depressive symptoms that it would affect negatively on development? The multivariate analysis also indicated that maternal high-stable and also intermittent (in the adolescents' reports also the low-stable) depressive symptoms explained poorer social competence in adolescence. The high-stable trajectory indicates chronic, subsyndromal depressive symptoms, while the intermittent trajectory shows higher peaks 2 months postnatally, at the child's age of 4–5 years and also in adolescence. These could again indicate the sensitive periods in a child's social learning processing, and on the other hand mothers with chronic subsyndromal depressive symptoms perhaps pass on a pervasive depressotypic model through the child's development.

The initial exposure to maternal depressive symptoms at adolescence (concurrently) was associated with externalizing problems in self-reports, while an earlier study of this same sample (19) indicated that maternal concurrent depressive symptoms (possible earlier exposures included) were strongly associated with adolescents' poorer psychosocial functioning. The finding suggests that maternal concurrent depressive symptoms may thus be more harmful to a child's psychosocial functioning if there are previous depressive episodes, as earlier studies considering the recurrent maternal depressive symptoms and adolescent psychosocial outcome imply (5, 16, 26, 45, 46).

When timing, recurrence and the pattern of maternal depressive symptoms were considered, recurrent maternal depressive symptoms were found to be the best explanatory variable for adolescents' internalizing problems. Although there is no convergent consensus about the genetic heritability of depression (47), it may explain some of the intergenerational risk transmission of adolescent's internalizing problems.

On the other hand, externalizing problems were associated with the chronic trajectory of maternal depressive symptoms. This could be related to interpersonal conflicts within the family and less effective parenting of the depressed mother (2). Internalizing and externalizing problems are also likely to co-occur (35) and behavioural problems may also mirror emotional distress.

Studies also emphasize the reciprocity of maternal depressive symptoms and adolescent externalizing behaviour (48, 49). Mothers with depressive symptoms have also been found to report more emotional and behavioural problems in their adolescents than other informants (50), although some studies have found depressed mothers to be more accurate in evaluating their children's maladjustment (51). In this study, the results of multivariate analysis indicated a high cross-informant consistency. However, analyses considering the timing of the initial exposure to maternal depressive symptoms indicated a statistically significantly higher level of internalizing and externalizing problems and poorer social competence at various time points only in adolescent self-reports (unless the initial exposure had been in the prenatal period). This could indicate a more negative self-image of the adolescents exposed to maternal depressive symptoms (2).

This study has many strengths. The follow-up time of the mothers and children in this study is long. The questionnaires used here have been extensively used in research. Since the questionnaires remained the same throughout the study stages, the comparisons are more reliable. In this stage of this longitudinal follow-up study, the adolescents themselves were also able to complete the questionnaires. This enhances a valuable viewpoint and reduces possible "reporter bias".

There are also some limitations to be considered. The sample was population based and remained moderate in size. Partly because of the long follow-up time and multiple data collection points, the number of drop-outs is relatively high. Thus cumulative attrition increases the amount of incomplete data. The moderate number of symptomatic mothers also restricted the analysis and, for example, possible differences between genders could not be studied. There was also a lack of clinical evaluation of the mothers and adolescents. To determine the initial exposure to maternal depressive symptoms, we used only the data collected at the different time-points and not retrospective evaluations of mother's depressive symptoms or episodes. This study indicates that the recurrence and the pattern of maternal depressive symptoms explain better its negative effects on a child's outcome than the actual timing of the symptoms. However, there are differences in the outcome of the child depending on the timing and the pattern of maternal depressive symptoms. Maternal depressive symptoms at any time are a risk for a child's well-being and development and should be taken into account when treating both mothers and children in

psychiatric clinics. When children or adolescents show emotional or behavioural problems and their mothers report even mild or moderate depressive symptoms, the assessment for treatment planning should include both the young ones and their mothers.

Acknowledgements—We kindly thank Mrs. Virginia Mattila for checking the language. We also thank M.Sc. Mika Helminen for contributing the trajectory analysis.

Declaration of interest: This study was supported by grants from the Medical Research Fund of the Tampere University Hospital, the Emil Aaltonen Foundation, the Foundation for Paediatric Research, the Academy of Finland, Odd Fellows Organisation and the University of Tampere. The funding sources had no further role in the study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication. The writers report no disclosures of interest. The authors alone are responsible for the content and writing of the paper.

References

1. Burke L. The impact of maternal depression on familial relationships. Int Rev Psychiatry 2003;15:243–55.
2. Goodman SH. Depression in mothers. Annu Rev Clin Psychol 2007;3:107–35.
3. Hammen C, Brennan PA. Severity, chronicity, and timing of maternal depression and risk for adolescent offspring diagnoses in a community sample. Arch Gen Psychiatry 2003;60:253–8.
4. Horwitz SM, Briggs-Gowan MJ, Storfer-Isser A, Carter AS. Prevalence, correlates, and persistence of maternal depression. J Womens Health 2007;16:678–91.
5. Halligan SL, Murray L, Martins C, Cooper PJ. Maternal depression and psychiatric outcomes in adolescent offspring: A 13-year longitudinal study. J Affect Disord 2007;97:145–54.
6. Malcarne VL, Hamilton NA, Ingram RE, Taylor L. Correlates of distress in children at risk for affective disorder: Exploring predictors in the offspring of depressed and nondepressed mothers. J Affect Disord 2000;59:243–51.
7. Weissman MM, Wickramaratne P, Nomura Y, Warner V, Pilowsky D, Verdeli H. Offspring of depressed parents: 20 years later. Am J Psychiatry 2006;163:1001–8.
8. Hammen C, Brennan PA, Keenan-Miller D. Patterns of adolescent depression to age 20: The role of maternal depression and youth interpersonal dysfunction. J Abnorm Child Psychol 2008;36: 1189–98.
9. Marmorstein NR, Malone SM, Iacono WG. Psychiatric disorders among offspring of depressed mothers: Associations with paternal psychopathology. Am J Psychiatry 2004;161:1588–94.
10. Murray L, Arteche A, Fearon P, Halligan S, Croudace T, Cooper P. The effects of maternal postnatal depression and child sex on academic performance at age 16 years: A developmental approach. J Child Psychol Psychiatry 2010;51:1150–9.
11. Bohon C, Garber J, Horowitz JL. Predicting school dropout and adolescent sexual behavior in offspring of depressed and nondepressed mothers. J Am Acad Child Adolesc Psychiatry 2007;46: 15–24.
12. Lewinsohn PM, Olino TM, Klein DN. Psychosocial impairment in offspring of depressed parents. Psychol Med 2005;35:1493–503.
13. Pilowsky DJ, Wickramaratne PJ, Rush AJ, Hughes CW, Garber J, Malloy E, et al. Children of currently depressed mothers: A STAR*D ancillary study. J Clin Psychiatry 2006;67:126–36.
14. Luoma I, Tamminen T, Kaukonen P, Laippala P, Puura K, Salmelin R, et al. Longitudinal study of maternal depressive symptoms and child well-being. J Am Acad Child Adolesc Psychiatry 2001;40:1367–74.
15. Hammen C, Burge D, Adrian C. Timing of mother and child depression in a longitudinal study of children at risk. J Consult Clin Psychol 1991;59:341–5.
16. Brennan PA, Hammen C, Andersen MJ, Bor W, Najman JM, Williams GM. Chronicity, severity, and timing of maternal depressive symptoms: Relationships with child outcomes at age 5. Dev Psychol 2000;36:759–66.
17. Hay DF, Pawlby S, Waters CS, Sharp D. Antepartum and postpartum exposure to maternal depression: Different effects on different adolescent outcomes. J Child Psychol Psychiatry 2008;49: 1079–88.
18. Hay DF, Pawlby S, Waters CS, Perra O, Sharp D. Mothers' antenatal depression and their children's antisocial outcomes. Child Dev 2010; 81:149–65.
19. Korhonen M, Luoma I, Salmelin R, Tamminen T. A longitudinal study of maternal prenatal, postnatal and concurrent depressive symptoms and adolescent well-being. J Affect Disord 2012;136: 680–92.
20. Mäki P, Veijola J, Rasanen P, Joukamaa M, Valonen P, Jokelainen J, et al. Criminality in the offspring of antenatally depressed mothers: A 33-year follow-up of the Northern Finland 1966 Birth Cohort. J Affect Disord 2003;74:273–8.
21. Pawlby S, Hay DF, Sharp D, Waters CS, O'Keane V. Antenatal depression predicts depression in adolescent offspring: Prospective longitudinal community-based study. J Affect Disord 2009;113: 236–43.
22. Murray L, Arteche A, Fearon P, Halligan S, Goodyer I, Cooper P. Maternal postnatal depression and the development of depression in offspring up to 16 years of age. J Am Acad Child & Adolesc Psychiatry 2011;50:460–70.
23. Luoma I, Kaukonen P, Mäntymaa M, Puura K, Tamminen T, Salmelin R. A longitudinal study of maternal depressive symptoms, negative expectations and perceptions of child problems. Child Psychiatry Hum Dev 2004;35:37–53.
24. Bagner DM, Pettit JW, Lewinsohn PM, Seeley JR. Effect of maternal depression on child behavior: A sensitive period? J Am Acad Child Adolesc Psychiatry 2010;49:699–707.
25. Bureau JF, Easterbrooks MA, Lyons-Ruth K. Maternal depressive symptoms in infancy: Unique contribution to children's depressive symptoms in childhood and adolescence? Dev Psychopathol 2009;21:519–37.
26. Fihrer I, McMahon CA, Taylor AJ. The impact of postnatal and concurrent maternal depression on child behaviour during early school years. J Affect Disord 2009;119:116–23.
27. Alpern L. LK. Preschool children at social risk: Chronicity and timing of maternal depressive symptoms and child behaviour problems at school and at home. Dev Psychopathol 1993;5: 371–87.
28. Essex MJ, Klein MH, Miech R, Smider NA. Timing of initial exposure to maternal major depression and children's mental health symptoms in kindergarten. Br J Psychiatry 2001;179:151–6.
29. Naicker K, Wickham M, Colman I. Timing of first exposure to maternal depression and adolescent emotional disorder in a national Canadian Cohort. PLoS ONE 2012;7:e33422. doi:10.1371/journal.pone.0033422.
30. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry 1987;150:782–6.
31. Harris B, Huckle P, Thomas R, Johns S, Fung H. The use of rating scales to identify post-natal depression. Br J Psychiatry 1989;154: 813–17.
32. Matthey S, Henshaw C, Elliott S, Barnett B. Variability in use of cut-off scores and formats on the Edinburgh Postnatal Depression Scale: Implications for clinical and research practice. Arch Women Ment Health 2006;9:309–15.
33. Murray L, Carothers AD. The validation of the Edinburgh Post-natal Depression Scale on a community sample. Br J Psychiatry 1990;157:288–90.

34. Achenbach TM. Manual for the Child Behavior Checklist/4–18 and 1991 Profile. Burlington, VT: University of Vermont Department; 1991.
35. Achenbach T. Manual for the ASEBA school-age forms and profiles. 2001.
36. Achenbach TM, Edelbrock C. Manual for the Youth Self-Report and 1991 profile. Burlington, VT: University of Vermont Department of Psychiatry; 1991.
37. Nagin DS, Odgers CL. Group-based trajectory modeling in clinical research. Annu Rev Clin Psychol 2010;27:109–38.
38. Van den Bergh B,R.H., Mennes M, Oosterlaan J, Stevens V, Stiers P, Marcoen A, et al. High antenatal maternal anxiety is related to impulsivity during performance on cognitive tasks in 14- and 15-year-olds. Neurosci Biobehav Rev 2005;29:259–69.
39. Goodman SH, Gotlib IH. Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. Psychol Rev 1999;106: 458–90.
40. Field T, Diego M, Hernandez-Reif M. Prenatal depression effects on the fetus and newborn: A review. Infant Behav Dev 2006;29: 445–55.
41. O'Connor T,G., Ben-Shlomo Y, Heron J, Golding J, Adams D, Glover V. Prenatal anxiety predicts individual differences in cortisol in pre-adolescent children. Biol Psychiatry 2005;58:211–7.
42. Van den Bergh B,R.H., Van Calster B, Smits T, Van Huffel S, Lagae L. Antenatal maternal anxiety is related to HPA-axis dysregulation and self-reported depressive symptoms in adolescence: A prospective study on the fetal origins of depressed mood. Neuropsychopharmacol 2008;33:536–45.
43. Halligan SL, Herbert J, Goodyer IM, Murray L. Exposure to postnatal depression predicts elevated cortisol in adolescent offspring. Biol Psychiatry 2004;55:376–81.
44. Ashman SB, Dawson G, Panagiotides H, Yamada E, Wilkinson CW. Stress hormone levels of children of depressed mothers. Dev Psychopathol 2002;14:333–49.
45. Frye AA, Garber J. The relations among maternal depression, maternal criticism, and adolescents' externalizing and internalizing symptoms. J Abnorm Child Psychol 2005;33:1–11.
46. Ashman SB, Dawson G, Panagiotides H. Trajectories of maternal depression over 7 years: Relations with child psychophysiology and behavior and role of contextual risks. Dev Psychopathol 2008;20: 55–77.
47. Goldberg D. The aetiology of depression. Psychol Med 2006;36: 1341–7.
48. Allen JP, Manning N, Meyer J. Tightly linked systems: Reciprocal relations between maternal depressive symptoms and maternal reports of adolescent externalizing behavior. J Abnorm Psychol 2010;119:825–35.
49. Gross HE, Shaw DS, Burwell RA, Nagin DS. Transactional processes in child disruptive behavior and maternal depression: A longitudinal study from early childhood to adolescence. Dev Psychopathol 2009;21:139–56.
50. De Los Reyes A, Kazdin AE. Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. Psychol Bull 2005;131:483–509.
51. Conrad M, Hammen C. Role of maternal depression in perceptions of child maladjustment. J Consult Clin Psychol 1989;57:663–7.

Marie Korhonen, M.D., School of Medicine, University of Tampere, Tampere, Finland.
Ilona Luoma, M.D., Ph.D., School of Medicine, University of Tampere, and Department of Child Psychiatry, Tampere University Hospital, Tampere, Finland.
Raili Salmelin, M.Sc., Ph.D., School of Health Sciences, University of Tampere, and Department of Child Psychiatry, Tampere University Hospital, Tampere, Finland.
Tuula Tamminen, M.D., Ph.D., Professor, School of Medicine, University of Tampere, and Department of Child Psychiatry, Tampere University Hospital, Tampere, Finland.

Article

School Psychology International

School Psychology International
1–19

DOI: 10.1177/0143034314525511
spi.sagepub.com
SAGE

The trajectories of child's internalizing and externalizing problems, social competence and adolescent self-reported problems in a Finnish normal population sample

Marie Korhonen
University of Tampere, Finland

Ilona Luoma
University of Tampere, Finland; Tampere University Hospital, Finland

Raili K. Salmelin
University of Tampere, Finland; Tampere University Hospital, Finland

Mika Helminen
University of Tampere, Finland; Pirkanmaa Hospital District, Finland

Riittakerttu Kaltiala-Heino
University of Tampere, Finland; Tampere University Hospital, Finland

Tuula Tamminen
University of Tampere, Finland; Tampere University Hospital, Finland

Corresponding author:
Marie Korhonen, University of Tampere, School of Medicine, Department of Child Psychiatry, FIN-33014 University of Tampere, Finland.
Email: marie-kaarin.korhonen@uta.fi

Abstract

Group-based modeling techniques are increasingly used in developmental studies to explore the patterns and co-occurrence of internalizing and externalizing problems. Social competence has been found to reciprocally influence internalizing and externalizing problems, but studies on its associations with different patterns of these problems are scarce. Using data from a Finnish longitudinal normal population sample, trajectories of internalizing and externalizing problems were formed using the Child Behavior Checklist completed by the mother at the child's age of 4- to 5-years-old, 8- to 9-years-old, and 16- to 17-years-old ($N = 261$). The results indicate that adolescent's self-reported internalizing and externalizing problems based on the Youth Self Report were associated with the trajectories of internalizing and externalizing problems. Social competence both in early childhood and in adolescence was poorer among children with chronic internalizing problems and among those with adolescent-onset externalizing problems. One-third of the children who had a chronically high level of internalizing problems had an initially high but decreasing level of externalizing problems, while 33% of the adolescents with adolescent-onset externalizing problems had a chronically high level of internalizing problems. School psychologists are encouraged to screen for internalizing problems from children with behavioral, academic or social problems.

Keywords

Externalizing problems, Finland, internalizing problems, longitudinal study, social competence, trajectory analysis

Young children's ability to express emotions verbally and control their own behavior is limited compared to that of adolescents and adults. As cognitive maturation proceeds and ability in emotion regulation and verbal expression of aggression improve with age, the rates of externalizing problems tend to decrease and those of internalizing problems increase (Crijnen, Achenbach, & Verhulst, 1997; Fanti, Panayiotou, & Fanti, 2012; Rescorla et al., 2007a). In most societies girls tend to score higher on internalizing kinds of problems, especially at ages 12- to 16-years-old and boys on externalizing kinds of problems, especially at ages 6- to 11-years-old (Crijnen et al., 1997; Rescorla et al., 2007a). There are also culture-specific patterns of internalizing and externalizing problems (Savina, Coulacoglou, Sanyal, & Zhang, 2012). In the school environment, externalizing problems are more apparent than internalizing problems. However, studies conducted in the USA indicate that school psychologists find identifying, preventing, and treating internalizing problems important aspects of their work but feel poorly prepared (Miller & Jome, 2008, 2010). Understanding the patterns of individuals' internalizing and externalizing problems, their interplay and associations with social competence might help in identifying and supporting children with emotional and behavioral problems at school, an integral part of their living environment.

Multilevel modeling techniques are person-centered models to identify different developmental trajectories (Nagin & Odgers, 2010; Nagin & Tremblay, 2001; Tremblay et al., 2004). Studies using these methods have found different patterns of internalizing and externalizing problems. Most children and adolescent have low or moderate level of internalizing and externalizing problems throughout their development. However, trajectories of chronically high and/or increasing internalizing problems from childhood to adolescence are also identified in samples from the USA (Fanti & Henrich, 2010; Leve, Kim, & Pears, 2005; Sterba, Prinstein, & Cox, 2007), Canada (Brendgen, Lamarche, Wanner, & Vitaro, 2010; Brendgen, Wanner, Morin, & Vitaro, 2005), Korea (Lee & Bukowski, 2012), The Netherlands (Dekker et al., 2007) and even among war-affected adolescents in Sierra Leone (Betancourt, McBain, Newnham, & Brennan, 2013). Surprisingly, two studies including Latin origin adolescents indicated decreasing instead of increasing trajectories of internalizing problems among those who had immigrated to the US and also among those living in their home culture (Ramos-Olazagasti, Shrout, Yoshikawa, Canino, & Bird, 2013; Smokowski, Rose, & Bacallao, 2010). These different findings can at least partly be explained by methodological effects.

In addition to the low and moderate patterns, externalizing problems have been reported to have trajectories of chronically high or decreasing levels from childhood to adolescence in samples from Canada, The Netherlands, New Zealand, and the USA (Brame, Nagin, & Tremblay, 2001; Broidy et al., 2003; Cote, Zoccolillo, Tremblay, Nagin, & Vitaro, 2001; Fanti & Henrich, 2010; Miner & Clarke-Stewart, 2008; Moffitt, 1993; Monahan, Steinberg, Cauffman, & Mulvey, 2009; Odgers et al., 2008; Reef, Diamantopoulou, van Meurs, Verhulst, & van der Ende, 2011; Shaw, Lacourse, & Nagin, 2005; Tremblay et al., 2004; Zhou et al., 2007). Some studies have also reported trajectories of adolescent-onset externalizing problems, especially antisocial behavior (Monahan et al., 2009; Odgers et al., 2008; Reef et al., 2011).

Social competence may be equally important as internalizing and externalizing problems when evaluating child's strengths and difficulties and assessing prognosis (Achenbach, 1991). The continuity and changes in a child's emotional and behavioral problems and their associations with social competence have also been considered in the concept of the developmental cascade model (Masten & Cicchetti, 2010). It posits that earlier levels and changes in functioning in one domain (e.g. externalizing behavior) have an impact on later functioning in a different domain (e.g. internalizing problems or poorer social competence). Studies of the cascade model indicate that early externalizing problems may be a risk for poorer social and academic competence at early school age, which leads to an increased risk for internalizing problems later (Burt & Roisman, 2010; Masten et al., 2005; Moilanen, Shaw, & Maxwell, 2010; Obradovic, Burt, & Masten, 2010; van Lier & Koot, 2010). Obradovic and Hipwell (2010) also found a reciprocal influence of internalizing problems and poorer social competence among adolescent girls in the US (Obradovic & Hipwell, 2010). The cascade studies, however, only evaluate the level of internalizing and externalizing problems, lacking the aspect of individuals'

different developmental patterns. A North American study conducted by Kouros, Cumming, and Davies (2010) found that as on average children's externalizing problems decreased over time, significant individual differences were found in the levels of externalizing problems. In addition, the increasing trajectory of externalizing problems accounted for the longitudinal link between early trajectories of interparental conflict and children's social problems in preadolescence, supporting the developmental cascade model (Kouros, Cummings, & Davies, 2010). Another US study by Lansford et al. (2006) found that poorer social competence at kindergarten age, along with other risk factors was associated with higher levels of both internalizing and externalizing problems over time (Lansford et al., 2006).

In addition to the different developmental patterns and cascading associations, there is also high co-occurrence between internalizing and externalizing problems (Achenbach, 2001; Chen & Simons-Morton, 2009; Reinke, Eddy, Dishion, & Reid, 2012; Ritakallio et al., 2008; Wiesner & Kim, 2006). The co-occurrence has been explained in various ways. One possibility could be diagnostic overlapping, as internalizing and externalizing behaviors can have similar symptoms, such as irritability. Both internalizing and externalizing problems may also share the same environmental risk factors (e.g. parental psychopathology or hostility) which expose the child to maladjustment (Achenbach, 2001). Internalizing problems, such as depression, may also be a risk factor for externalizing problems such as antisocial behavior or vice versa, as studies of the developmental cascade model mentioned above and other studies (Lee & Bukowski, 2012; Reinke et al., 2012; Ritakallio et al., 2008) have shown. It has also been hypothesized that co-occurrence is a distinct syndrome (Fanti & Henrich, 2010; O'Connor, McGuire, Reiss, Hetherington, & Plomin, 1998). Nevertheless, co-occurrence is found to worsen the prognosis (Fanti & Henrich, 2010; Sourander et al., 2007).

To conclude, trajectory analyses are a fairly new statistical method to explore the different patterns of development in longitudinal samples. The trajectories of internalizing problems, although less studied, are more consistent, while the identified trajectories of externalizing problems are more variable. On the other hand, there are fewer studies considering externalizing problems as a broad spectrum than those focusing on narrower aspects or subgroups. A scant number of studies have explored the associations between the trajectories of internalizing and externalizing problems (e.g. Chen & Simons-Morton, 2009; Reinke et al., 2012; Wiesner & Kim, 2006) but only one has used general internalizing and externalizing problem scales (Fanti & Henrich, 2010). All of these studies are based on samples from the US. We know of no studies that have explored the associations between the trajectories of internalizing and externalizing problems and social competence measured at the same multiple time-points as the internalizing and externalizing problems on which the trajectories are based.

The aims of this study were: (1) To explore trajectories of the internalizing and externalizing problems of children based on maternal reports in a longitudinal sample from early childhood to adolescence; and (2) the associations of those trajectories with the adolescent outcome based on self-reported internalizing and

externalizing problems. We also wanted to study (3) how social competence in middle childhood as reported by mothers and in adolescence according to the mothers' reports and adolescents' self-reports is associated with the trajectories of internalizing and externalizing problems. In addition, we aimed (4) to explore the associations between the trajectories of internalizing and externalizing problems. Our first hypothesis was that both internalizing and externalizing problem trajectories would show both high-stable and low-stable trajectories, but also alteration in such a way that trajectories of decreasing externalizing problems and increasing internalizing problems from childhood to adolescence would be detected. We did not construct hypotheses regarding the adolescent-onset trajectory of externalizing problems as prior findings are contradictory. Our second hypothesis was that trajectories based on maternal reports of internalizing and externalizing problems from childhood to adolescence would be associated with self-reported internalizing and externalizing problems at adolescence. The third hypothesis was that a higher level of internalizing and externalizing problems would show associations with poorer social competence in middle childhood and adolescence. The fourth hypothesis was that the levels of internalizing and externalizing problem trajectories would be associated with each other in such a way that high or increasing levels of one problem type would be associated with high or increasing levels of the other type.

Method

Sample

This study is part of a longitudinal study which started in Tampere, Finland in 1989. The original sample was collected from Tampere maternity centers in 1989–1990. The sample consisted of 349 consecutively selected normal population first-time mothers during the third trimester of the pregnancy. Fewer than 10% refused to participate. Due to drop-outs and schedule issues the number of those included at later study stages varies. The study stages and the sample flow are described in Figure 1 provided in Supplemental Materials retrievable from the Journal website. In this study we used data from study stages T5 (child's age of 4- to 5-years-old), T6 (8- to 9-years-old), and T7 (16- to 17-years-old). At T5 questionnaires were sent to 200 mothers of the original sample and were completed by 158 recipients (79%). At T6 questionnaires were sent to 270 mothers of the original sample and were completed by 188 (70%) mothers of 189 children (one pair of twins) (Luoma et al., 2001). At T7 the questionnaires were sent to 327 mothers—the total sample of 349 mothers except those 22 mothers and children who were excluded because of the death or serious illness of mother or child or explicit refusal of participation. The questionnaires were returned by 191 (59%) mothers and 192 adolescents (59%) (Korhonen, Luoma, Salmelin, & Tamminen, 2012). The characteristics of the study are shown in Table 1.

Table 1. Characteristics of the sample and means of internalizing and externalizing problem scores and social competence scores at different data collection points.

	4–5 years (T5)			8–9 years (T6)			16–17 years (T7)		
	%	Mean	SD	%	Mean	SD	%	Mean	SD
Child's gender									
Female	53			56			52		
Male	47			44			48		
Mother's marital status									
Married or cohabiting	92			86			82		
Single	8			14			18		
Mother's education									
Elementary, vocational school	37			24			37		
College	46			60			47		
Academic	17			16			16		
No. of mother's biological children									
One	28			17			13		
Two	62			52			52		
Three or more	10			31			35		
Mother's age (years)		31.4	4.1		35.5	4.2		44.0	4.2
Child's age (years)		4.4	0.1		8.5	0.3		16.6	0.2
Internalizing problems (CBCL)		48.1	9.2		51.3	9.4		50.9	9.8
Externalizing problems (CBCL)		53.6	8.5		49.3	8.6		49.0	9.1
Social competence (CBCL)					49.7	8.5		46.7	9.6
Internalizing problems (YSR)								50.4	11.2
Externalizing problems (YSR)								52.1	8.9
Social competence (YSR)								45.8	10.2

At the first four study stages (T1–T4, i.e. from pregnancy to six months of child's age), permission for the study was granted by the Ethics Committee of the City of Tampere. Study stages T5–T7 were approved by the Ethics Committee of Pirkanmaa Hospital District. At each study stage a written informed consent was obtained from the mothers and at the last study stage also from the adolescents (T7; ref number R05174).

During the longitudinal process the group size varies at different time-points due to the varying selection of those included and to drop-outs. The drop-out analysis between study stages T5–T6 and T6–T7 showed no statistically significant differences as regards mother's age, level of education, marital status, family SES, or mean of child's internalizing and externalizing problem score between the mothers included in the analysis and those who dropped out. However, there were more mother-son-dyads in the drop-out group at both study stages T6 ($p = 0.002$) and T7 ($p = 0.019$).

Procedures

To evaluate child's psychosocial functioning and emotional and behavioral problems the Finnish translation of the Child Behavior Checklist (CBCL) (Achenbach, 1991) was used at study stages T5–T7. The CBCL is a valid questionnaire and there are different forms for children under school age (4- to 6-years-old) and of school age (6- to 18-years-old). The CBCL contains questions on child's emotional and behavioral problems for the parent to record. The CBCL for school-aged children also contains questions on the child's social competence. The internalizing problems score is a sum score including the items withdrawal, somatic complaints, and anxiety/depression. The externalizing problems score is a sum score of the items social problems, rule-breaking behavior, and aggressive behavior. The social competence sum score includes scores from activities, social skills and relationships, and school performance subscales. The CBCL internalizing and externalizing raw problem scores and social competence score were converted into normalized T-scores and used as continuous variables. In clinical use scoring between 60–62 is considered the subclinical level and $\geq$63 the clinical level.

At T7 the adolescents also completed the Youth Self Report (YSR) for ages 11- to 18-years-old (Achenbach & Edelbrock, 1991). It contains questions on emotional and behavioral problems and social competence similar to those of the CBCL for the adolescent to report. The YSR internalizing and externalizing problem scores and social competence score were also converted into normalized T-scores and used as continuous variables. Socio-demographic data were collected by questionnaires designed for this study phase.

Statistical analysis

Group-based trajectory modeling (Nagin & Odgers, 2010) was used to explore the number and type of potential clusters (trajectory groups) of internalizing and externalizing problems. The square function of time was used for modeling the scores. The trajectory analyses were based on 261 children (49% male) whose mothers completed the CBCL during at least one of the three assessment points. The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) formed an empirical basis for determining the number and shapes of the latent trajectories. The best fits according to AIC and BIC were contradictory, resulting in a two-cluster model based on BIC and a three- or five-cluster model based on AIC. Thus, due to these discrepancies, the theoretical framework and the findings of earlier studies, the model with four groups was selected to best fit and characterize the trajectories of both internalizing and externalizing problems (See Figure 2, Supplemental Materials). Trajectory models were fitted using flexmix package in statistical program R, version 2.13.0. Other statistical analyses were conducted using cross-tabulations for categorical variables. ANOVA was used in the analysis of categorical and normally distributed continuous variables.

Bonferroni corrected p-values were calculated for the subsequent multiple pairwise analyses. SPSS 15.0 was used for these analyses.

Results

Means and standard deviations of CBCL and YSR internalizing and externalizing problem and social competence T-scores at different data collection points are presented in Table 1.

Trajectories of internalizing and externalizing problems

The trajectories of the four-group model of internalizing problems are illustrated in Figure 2a, Supplemental Materials. The three lowest trajectories remained at a low or moderate level of the CBCL internalizing problems score throughout the study (low-stable, $N = 73$, 28%; moderate-decreasing, $N = 53$, 20%; moderate-increasing, $N = 107$, 41%). The highest trajectory (high-stable, $N = 28$, 11%) was above the subclinical/clinical level of internalizing problems throughout the study.

The trajectories of the four-group model of externalizing problems are illustrated in Figure 2b, Supplemental Materials. The two lowest trajectories remained at low or moderate level throughout the study (low-stable $N = 53$, 20% and moderate-decreasing $N = 151$, 58%). The third trajectory (high-decreasing $N = 45$, 17%) was above the subclinical/clinical level in childhood but below the cut-point in adolescence. The fourth trajectory (moderate-to-high $N = 12$, 5%) was below even the subclinical level in childhood but significantly above the clinical level in adolescence.

There were no statistically significant gender differences in either the internalizing or the externalizing problem trajectories. Nor were there any statistically significant associations between the trajectories of internalizing and externalizing problems and the age, marital status, or education level of the mother or the number of siblings of the index child at T7.

Trajectories of internalizing and externalizing problems and adolescent self-reported internalizing and externalizing problems

The trajectory of internalizing problems the adolescent belonged to was statistically significantly associated with the adolescent self-reports of internalizing problems at T7 ($p < 0.001$; Figure 3a, Supplemental Materials). The mean was highest among the children in the high-stable trajectory group and lowest among those in the low-stable trajectory group. The means, CIs, and p-values, overall and between the different the trajectory groups, are presented in Figure 3a, Supplemental Materials.

The association between the trajectory of internalizing problems and the adolescent-reported externalizing problems scores at T7 was also statistically significant ($p = 0.007$; Figure 3a, Supplemental Materials). The mean was highest among the children in the moderate-increasing trajectory group and lowest among those in the low-stable trajectory group.

The externalizing problems trajectory and externalizing problems scores in the adolescent self-reports were statistically significantly associated ($p < 0.001$). The mean was highest among the children in the moderate-to-high trajectory group and lowest among those in the low-stable group (means, CIs and *p*-values; see Figure 3b, Supplemental Materials).

The externalizing problem trajectory and adolescent-reported internalizing problems score were also associated ($p = 0.034$; Figure 3b, Supplemental Materials). The mean was highest among the children in the moderate-to-high trajectory group and lowest among those in the low-stable trajectory.

Trajectories of internalizing and externalizing problems and social competence in middle childhood and adolescence

Maternal report of the child's social competence in middle childhood (T6) was statistically significantly associated with the trajectory of internalizing problems ($p = 0.021$; Figure 4a, Supplemental Materials). The mean social competence score was lowest among the children in the high-stable trajectory group and highest among those in the low-stable trajectory group.

Maternal report of child's social competence in adolescence (T7) was statistically significantly associated with the trajectory of internalizing problems ($p < 0.001$; Figure 4a, Supplemental Materials). The mean social competence score was lowest among the children in the high-stable trajectory group and highest among those in the moderate-decreasing trajectory group. The means, CIs, and *p*-values (overall and between the different the trajectory groups) are presented in Figure 4a, Supplemental Materials.

Self-reported social competence in adolescence (T7) was statistically significantly associated with the trajectory of internalizing problems ($p < 0.001$). The mean was lowest among the children in the high-stable trajectory group and highest among those in the moderate-decreasing trajectory group (for means, CIs and *p*-values see Figure 4a).

The social competence variable at T7, but not at T6 reported by the mother was statistically significantly associated with the externalizing problems trajectory ($p < 0.001$; Figure 4b, Supplemental Materials). The lowest social competence score at T7 was among the children in the moderate-to-high trajectory group and highest among those in the low-stable group. Adolescent self-reported social competence at T7 was also statistically significantly associated with the trajectory of externalizing problems ($p < 0.001$). The mean social competence score was lowest among the children in the moderate-to-high trajectory group and highest

among those in the moderate-decreasing trajectory group (for means, CIs, and *p*-values see Figure 4b, Supplemental Materials).

Associations between the internalizing and externalizing problem trajectories

The internalizing and externalizing problem trajectories were statistically significantly associated with each other ($p < 0.001$). The distributions of adolescents in each trajectory group can be seen in Figures 1a and 1b.

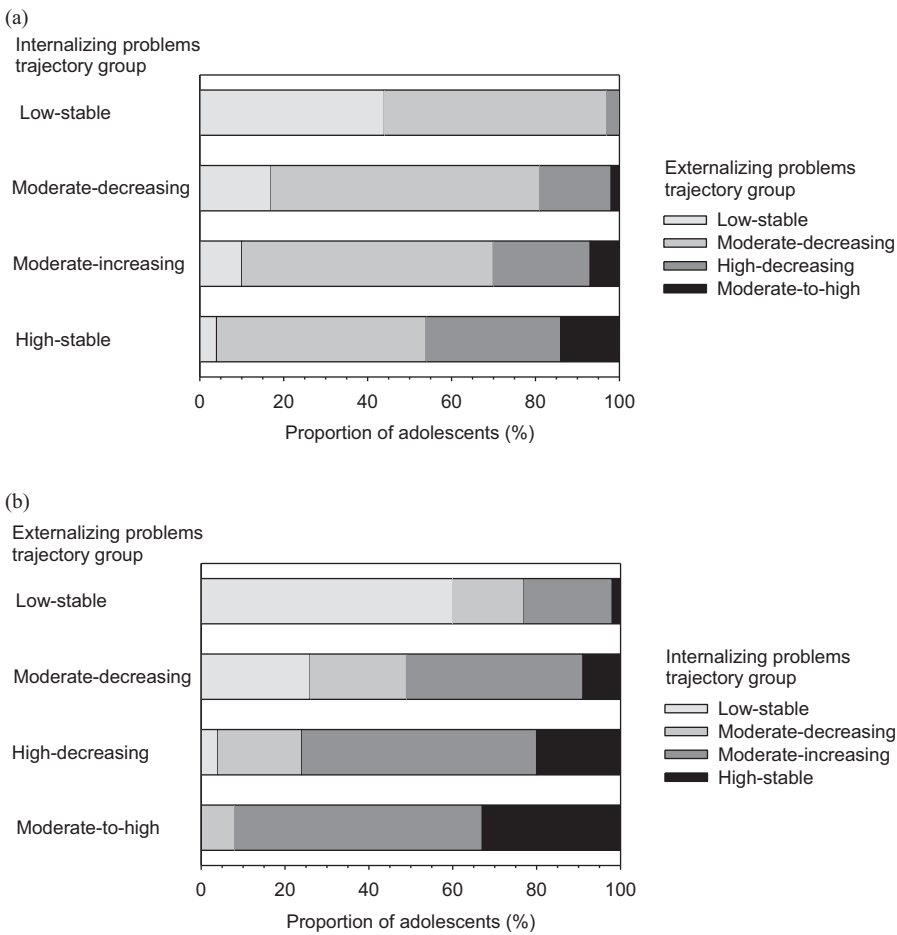

Figure 1. Distribution of a) adolescents in each of the internalizing problems trajectory groups into the externalizing problems trajectory groups and b) adolescents in each of the externalizing problems trajectory groups into the internalizing problems trajectory groups.

Discussion

The resulting trajectory model of child's internalizing problems supported the hypothesis and the findings of earlier studies (Brendgen et al., 2005, 2010; Dekker et al., 2007; Fanti & Henrich, 2010; Leve et al., 2005). In general, internalizing problems were found to increase towards adolescence and both chronically high and permanently low trajectories were identified. The biggest proportion of the adolescents belonged to the moderate-increasing group. The mean internalizing problem T-score in that group was highest in adolescence yet remained below the subclinical level. The mean in the chronically high (high-stable) trajectory was at the subclinical/clinical level from early childhood to adolescence.

As hypothesized, the mean social competence score was lowest among the children in the chronically high trajectory group regarding internalizing problems both in middle childhood and adolescence. Being assigned to the increasing trajectory group regarding internalizing problems was also associated with poorer social competence in adolescence. The findings thus confirm our hypothesis and the findings of earlier studies of the reciprocal influences of internalizing problems and social competence (Lansford et al., 2006; Obradovic & Hipwell, 2010).

Another notable finding is that the level of internalizing problems in the moderate-decreasing and moderate-increasing groups was equal in middle childhood and separated into different directions between middle childhood and adolescence. Developmental studies have found both environmental and child-related risk factors to explain the increasing trajectory of internalizing problems (BoothLaForce & Oxford, 2008; Brendgen et al., 2005; Feng, Shaw, & Silk, 2008; Leve et al., 2005). Although the level of internalizing problems in the increasing trajectory group in this study was below subclinical level and may rather indicate 'normal adolescent internalization', a longer follow-up might have revealed a subgroup of adolescents who reach the subclinical/clinical level later in adolescence or adulthood, as found in a study by Dekker et al. (2007). In addition, even a moderate level of affective problems has been found to be related to poorer outcome in young adulthood (Dekker et al., 2007).

The trajectories of externalizing problems also supported the hypothesis and the results of earlier studies. While most of the children were assigned to the moderate-decreasing trajectory of externalizing problems, high-decreasing and adolescent-onset (moderate-to-high) trajectories were also identified. As noted earlier, some studies have identified an adolescent-onset pattern of externalizing problems (Moffitt & Caspi, 2001; Monahan et al., 2009; Odgers et al., 2008; Reef et al., 2011), while others have not (Brame et al., 2001; Broidy et al., 2003; Cote et al., 2001; Fanti & Henrich, 2010; Shaw et al., 2005; Zhou et al., 2007). This could be due to the fact that studies of externalizing problems trajectories have, in fact, considered only some aspects of it (e.g. conduct problems, physical aggression, or antisocial behavior). However, the developmental trajectories of different kinds of externalizing problems may differ from each other, as found in a study by Reef et al. (2011). The age range also differs; most studies end at preadolescence,

while the adolescent-onset trajectory has been found to increase later. However, to the best of our knowledge this is the first study to have identified an adolescent-onset trajectory group of general externalizing problems.

Studies have found that compared to childhood-onset antisocial problems, adolescents with adolescent-onset problems lack the social, familial, and neurodevelopmental risk factors from childhood (Moffitt & Caspi, 2001; Odgers et al., 2008). The theory of adolescent-limited antisocial behavior suggests that the contemporary gap between biological and social maturity encourages teens to mimic antisocial behavior in ways that might be normative and adaptive rather than pathological (Moffitt, 1993). However, longitudinal studies from childhood to adulthood indicate that all types of antisocial behavior and aggression in childhood or adolescence, including the adolescent-onset and childhood-limited types, are associated with various adulthood difficulties (Odgers et al., 2008; Reef et al., 2011), the individuals with childhood-limited externalizing problems having only low to moderate levels of internalizing problems, though (Odgers et al., 2008).

This study indicates that children with adolescent-onset externalizing problems had poorer social competence in adolescence, but not in middle childhood. On the other hand, the children assigned to the high-decreasing trajectory group who had clinical/subclinical level of externalizing problems in childhood had equally good social competence both in middle childhood and adolescence as the children assigned to the low or decreasing trajectory groups with externalizing problems. Thus, the findings only partially supported our hypothesis and the findings of earlier studies (Burt & Roisman, 2010; Kouros et al., 2010; Lansford et al., 2006; Masten et al., 2005; Obradovic et al., 2010; van Lier & Koot, 2010). The current findings also suggest that a high level of externalizing problems is perhaps not a risk for poorer social competence but rapidly increasing externalizing problems might instead be accompanied by poor social competence.

The hypothesis and earlier findings (Achenbach, 2001; Chen & Simons-Morton, 2009; Reinke et al., 2012; Ritakallio et al., 2008; Wiesner & Kim, 2006) of the co-occurrence of internalizing and externalizing problems was also supported. Adolescents belonging to the increasing internalizing problem trajectory group, according to mothers' reports, reported themselves to have significantly more externalizing problems than did those from other trajectory groups. Adolescents with the adolescent-onset externalizing problems, according to mothers' reports, also reported significantly more internalizing problems in adolescent self-reports than did those from other trajectory groups.

The associations between the trajectories of internalizing and externalizing problems also indicate that 32% of the children who had chronically high levels of internalizing problems throughout the study also had high (although decreasing) levels of externalizing problems. Furthermore, 56% of the children with high levels of externalizing problems in childhood had increasing level of internalizing problems and 20% had chronically high level of internalizing problems from childhood onwards. In addition to co-occurrence, these findings imply that high level of externalizing problems in childhood may be a risk-indicator for an increasing

level of internalizing problems in adolescence. The associations between the internalizing and externalizing problem trajectories also indicate that among over one-half of the adolescents with adolescent-onset externalizing problems the level of internalizing problems also increased towards adolescence (the moderate-increasing trajectory of internalizing problems). Further, 20% of the adolescents who had adolescent-onset externalizing problems had a chronically high level of internalizing problems from early childhood onwards (high-stable). This finding has two important implications; first, chronically high level of internalizing problems may be a risk for adolescent-onset externalizing problems, and second, adolescent-onset of externalizing problems may be accompanied by an increasing level of internalizing problems.

This study also found high cross-informant consistency between the internalizing and externalizing problem trajectories according to maternal reports and adolescent self-reported internalizing and externalizing problems and social competence.

Limitations and future directions

Despite strengths and noteworthy findings, there are also limitations to be considered. Partly because of the long follow-up time, the number of drop-outs is relatively high. Thus, cumulative attrition increases the amount of incomplete data. The sample remained moderate in size but still restricted the analyses. Contrary to earlier trajectory studies, we could not identify a high-stable group of children with externalizing problems. Finnish parents and adolescents have in general been found to report fewer problems than respondents in other countries (Rescorla et al., 2007a, 2007b). There may also be more children with high levels of externalizing problems in the drop-out group between study stages T4 and T5, prior to the first evaluation of the internalizing and externalizing problems of the child.

Finland is a Western society with a rather homogenous population. This can be considered as a limitation or as a strength. Although several studies have found rather similar trajectories of internalizing problems in different cultures, there are few studies considering especially the trajectories of externalizing problems among children living in non-Western cultures—thus, further research is needed in those settings.

Although other studies have identified different kinds of trajectories for girls and boys, especially in internalizing problems (Dekker et al., 2007; Leve et al., 2005; Sterba et al., 2007) but also in their co-occurrence (Wiesner & Kim, 2006), we were unable to identify differences between the genders. This could be due to the rather small number of cases. The CBCL-T scores are also based on separate normative samples for each sex within each age range (Achenbach, 1991). Thus, separate trajectories for genders should be scrutinized in order to study differences between the genders, as other studies have also recommended (Dekker et al., 2007).

Future studies should also further explore the risk and protective factors associated with different patterns of child's emotional and behavioral problems.

Implications for practice

Child development should be seen as a pathway which is influenced by different child related and environmental risk and protective factors. Understanding the different patterns of emotional and behavioral problems enables us to identify risk groups and to plan interventions. Both chronic and increasing internalizing problems as well as adolescent-onset externalizing problems were associated with poorer social competence. Thus, social or academic problems might be seen as reflections of emotional distress or adjustment problems. Supporting children in their social contacts and academic achievements in schools might also be beneficial in relieving the effects of problems. While this is out of the scope of this article it deserves to be studied further.

In addition, this study indicates that there is not only a rather high co-occurrence between the emotional and behavioral problems but one problem type also magnifies the risk-power for the other type. When treating children and adolescents with behavioral or academic problems, emotional problems should also be screened.

Notes

We kindly thank Mrs Virginia Mattila for checking the language. We also thank Professor Tapio Nummi, PhD, for contributing his expertise to the statistical analysis.

This study was supported by grants from the Medical Research Fund of Tampere University Hospital, the Academy of Finland, the Odd Fellows and the University of Tampere. The funding sources had no role in the study design; in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the article for publication. The writers report no disclosures of interests.

References

Achenbach, T. M. (1991). *Manual for the child behavior checklist/4–18 and 1991 profile*. Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. M., & Edelbrock, C. (1991). *Manual for the youth self-report and 1991 profile*. Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. (2001). *Manual for the ASEBA school-age forms and profiles*. Burlington, VT: University of Vermont Department of Psychiatry.

Betancourt, T. S., McBain, R., Newnham, E. A., & Brennan, R. T. (2013). Trajectories of internalizing problems in war-affected Sierra Leonean youth: Examining conflict and postconflict factors. *Child Development*, *84*(2), 455–470.

BoothLaForce, C., & Oxford, M. L. (2008). Trajectories of social withdrawal from grades 1 to 6: Prediction from early parenting, attachment, and temperament. *Developmental Psychology*, *44*(5), 1298–1313.

Brame, B., Nagin, D. S., & Tremblay, R. E. (2001). Developmental trajectories of physical aggression from school entry to late adolescence. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*(4), 503–512.

Brendgen, M., Lamarche, V., Wanner, B., & Vitaro, F. (2010). Links between friendship relations and early adolescents' trajectories of depressed mood. *Developmental Psychology*, *46*(2), 491–501.

Brendgen, M., Wanner, B., Morin, A. J., & Vitaro, F. (2005). Relations with parents and with peers, temperament, and trajectories of depressed mood during early adolescence. *Journal of Abnormal Child Psychology*, *33*(5), 579–594.

Broidy, L. M., Nagin, D. S., Tremblay, R. E., Bates, J. E., Brame, B., & Dodge, K. A., et al. (2003). Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site, cross-national study. *Developmental Psychology*, *39*(2), 222–245.

Burt, K. B., & Roisman, G. I. (2010). Competence and psychopathology: Cascade effects in the NICHD study of early child care and youth development. *Development and Psychopathology*, *22*(3), 557–567.

Chen, R., & Simons-Morton, B. (2009). Concurrent changes in conduct problems and depressive symptoms in early adolescents: A developmental person-centered approach. *Development and Psychopathology*, *21*(1), 285–307.

Cote, S., Zoccolillo, M., Tremblay, R. E., Nagin, D., & Vitaro, F. (2001). Predicting girls' conduct disorder in adolescence from childhood trajectories of disruptive behaviors. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40*(6), 678–684.

Crijnen, A. A., Achenbach, T. M., & Verhulst, F. C. (1997). Comparisons of problems reported by parents of children in 12 cultures: Total problems, externalizing, and internalizing. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*(9), 1269–1277.

Dekker, M. C., Ferdinand, R. F., van Lang, N. D., Bongers, I. L., van der Ende, J., Verhulst, F. C. (2007). Developmental trajectories of depressive symptoms from early childhood to late adolescence: Gender differences and adult outcome. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *48*(7), 657–666.

Fanti, K., Panayiotou, G., & Fanti, S. (2012). Associating parental to child psychological symptoms: Investigating a transactional model of development. *Journal of Emotional and Behavioral Disorders*, doi: 10.1177/1063426611432171.

Fanti, K. A., & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: Findings from the national institute of child health and human development study of early child care. *Developmental Psychology*, *46*(5), 1159–1175.

Feng, X., Shaw, D. S., & Silk, J. S. (2008). Developmental trajectories of anxiety symptoms among boys across early and middle childhood. *Journal of Abnormal Psychology*, *117*(1), 32–47.

Korhonen, M., Luoma, I., Salmelin, R., & Tamminen, T. (2012). A longitudinal study of maternal prenatal, postnatal and concurrent depressive symptoms and adolescent well-being. *Journal of Affective Disorders*, *136*(3), 680–692.

Kouros, C. D., Cummings, E. M., & Davies, P. T. (2010). Early trajectories of interparental conflict and externalizing problems as predictors of social competence in preadolescence. *Development and Psychopathology*, *22*(3), 527–537.

Lansford, J. E., Malone, P. S., Stevens, K. I., Dodge, K. A., Bates, J. E., Pettit, G. S. (2006). Developmental trajectories of externalizing and internalizing behaviors: Factors

underlying resilience in physically abused children. *Development and Psychopathology*, *18*(1), 35–55.

Lee, E. J., & Bukowski, W. M. (2012). Co-development of internalizing and externalizing problem behaviors: Causal direction and common vulnerability. *Journal of Adolescence*, *35*(3), 713–729.

Leve, L. D., Kim, H. K., & Pears, K. C. (2005). Childhood temperament and family environment as predictors of internalizing and externalizing trajectories from ages 5 to 17. *Journal of Abnormal Child Psychology*, *33*(5), 505–520.

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. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40*(12), 1367–1374.

Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and Psychopathology*, *22*(3), 491–495.

Masten, A. S., Roisman, G. I., Long, J. D., Burt, K. B., Obradovic, J., & Riley, J. R., et al. (2005). Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 years. *Developmental Psychology*, *41*(5), 733–746.

Miller, D. N., & Jome, L. M. (2008). School psychologists and the assessment of childhood internalizing disorders: Perceived knowledge, role preferences and training needs. *School Psychology International*, *29*(4), 500–510.

Miller, D. N., & Jome, L. M. (2010). School psychologists and the secret illness: Perceived knowledge, role preferences, and training needs regarding the prevention and treatment of internalizing disorders. *School Psychology International*, *31*(5), 509–520.

Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology*, *44*(3), 771–786.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, *100*(4), 674–701.

Moffitt, T. E., & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development and Psychopathology*, *13*(2), 355–375.

Moilanen, K. L., Shaw, D. S., & Maxwell, K. L. (2010). Developmental cascades: Externalizing, internalizing, and academic competence from middle childhood to early adolescence. *Development and Psychopathology*, *22*(3), 635–653.

Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. P. (2009). Trajectories of antisocial behavior and psychosocial maturity from adolescence to young adulthood. *Developmental Psychology*, *45*(6), 1654–1668.

Nagin, D. S., & Odgers, C. L. (2010). Group-based trajectory modeling in clinical research. *Annual Review of Clinical Psychology*, *6*, 109–138.

Nagin, D. S., & Tremblay, R. E. (2001). Analyzing developmental trajectories of distinct but related behaviors: A group-based method. *Psychological Methods*, *6*(1), 18–34.

Obradovic, J., Burt, K. B., & Masten, A. S. (2010). Testing a dual cascade model linking competence and symptoms over 20 years from childhood to adulthood. *Journal of Clinical Child and Adolescent Psychology*, *39*(1), 90–102.

Obradovic, J., & Hipwell, A. (2010). Psychopathology and social competence during the transition to adolescence: The role of family adversity and pubertal development. *Development and Psychopathology*, *22*(3), 621–634.

O'Connor, T. G., McGuire, S., Reiss, D., Hetherington, E. M., & Plomin, R. (1998). Co-occurrence of depressive symptoms and antisocial behavior in adolescence: A common genetic liability. *Journal of Abnormal Psychology*, *107*(1), 27–37.

Odgers, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., & Harrington, H., et al. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology*, *20*(2), 673–716.

Ramos-Olazagasti, M. A., Shrout, P. E., Yoshikawa, H., Canino, G. J., & Bird, H. R. (2013). Contextual risk and promotive processes in Puerto Rican youths' internalizing trajectories in Puerto Rico and New York. *Development and Psychopathology*, *25*(03), 755–771.

Reef, J., Diamantopoulou, S., van Meurs, I., Verhulst, F. C., & van der Ende, J. (2011). Developmental trajectories of child to adolescent externalizing behavior and adult DSM-IV disorder: Results of a 24-year longitudinal study. *Social Psychiatry and Psychiatric Epidemiology*, *46*(12), 1233–1241.

Reinke, W. M., Eddy, J. M., Dishion, T. J., & Reid, J. B. (2012). Joint trajectories of symptoms of disruptive behavior problems and depressive symptoms during early adolescence and adjustment problems during emerging adulthood. *Journal of Abnormal Child Psychology*, *40*(7), 1123–1136.

Rescorla, L., Achenbach, T. M., Ivanova, M. Y., Dumenci, L., Almqvist, F., & Bilenberg, N., et al. (2007a). Epidemiological comparisons of problems and positive qualities reported by adolescents in 24 countries. *Journal of Consulting and Clinical Psychology*, *75*(2), 351–358.

Rescorla, L., Achenbach, T., Ivanova, M. Y., Dumenci, L., Almqvist, F., & Bilenberg, N., et al. (2007b). Behavioral and emotional problems reported by parents of children ages 6 to 16 in 31 societies. *Journal of Emotional and Behavioral Disorders*, *15*(3), 130–142.

Ritakallio, M., Koivisto, A. M., von der Pahlen, B., Pelkonen, M., Marttunen, M., Kaltiala-Heino, R. (2008). Continuity, comorbidity and longitudinal associations between depression and antisocial behaviour in middle adolescence: A 2-year prospective follow-up study. *Journal of Adolescence*, *31*(3), 355–370.

Savina, E., Coulacoglou, C., Sanyal, N., & Zhang, J. (2012). The study of externalizing and internalizing behaviours in Greek, Russian, Indian, and Chinese children using the Fairy Tale Test. *School Psychology International*, *33*(1), 39–53.

Shaw, D. S., Lacourse, E., & Nagin, D. S. (2005). Developmental trajectories of conduct problems and hyperactivity from ages 2 to 10. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *46*(9), 931–942.

Smokowski, P. R., Rose, R. A., & Bacallao, M. (2010). Influence of risk factors and cultural assets on Latino adolescents' trajectories of self-esteem and internalizing symptoms. *Child Psychiatry and Human Development*, *41*(2), 133–155.

Sourander, A., Jensen, P., Davies, M., Niemela, S., Elonheimo, H., & Ristkari, T., et al. (2007). Who is at greatest risk of adverse long-term outcomes? The Finnish From a Boy To a Man Study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *46*(9), 1148–1161.

Sterba, S. K., Prinstein, M. J., & Cox, M. J. (2007). Trajectories of internalizing problems across childhood: Heterogeneity, external validity, and gender differences. *Development and Psychopathology*, *19*(2), 345–366.

Tremblay, R. E., Nagin, D. S., Seguin, J. R., Zoccolillo, M., Zelazo, P. D., & Boivin, M., et al. (2004). Physical aggression during early childhood: Trajectories and predictors. *Pediatrics*, *114*(1), 43–50.

van Lier, P. A., & Koot, H. M. (2010). Developmental cascades of peer relations and symptoms of externalizing and internalizing problems from kindergarten to fourth-grade elementary school. *Development and Psychopathology*, *22*(3), 569–582.

Wiesner, M., & Kim, H. K. (2006). Co-occurring delinquency and depressive symptoms of adolescent boys and girls: A dual trajectory modeling approach. *Developmental Psychology*, *42*(6), 1220–1235.

Zhou, Q., Hofer, C., Eisenberg, N., Reiser, M., Spinrad, T. L., Fabes, R. A. (2007). The developmental trajectories of attention focusing, attentional and behavioral persistence, and externalizing problems during school-age years. *Developmental Psychology*, *43*(2), 369–385.

Author biographies

Marie Korhonen, MD, is a Doctoral Student at the University of Tampere, Department of Child Psychiatry, Finland. Her research explores the longitudinal associations between maternal depressive symptoms and child's psychosocial functioning and emotional and behavioral problems.

Ilona Luoma, MD, PhD, is Postdoctoral Researcher at the University of Tampere, School of Medicine and Deputy Chief Physician in the Department of Child Psychiatry, Tampere University Hospital, Finland. Her research topics are children in family context, developmental psychopathology and particularly the links between parental depressive symptoms and child adjustment during development.

Raili K. Salmelin, MSc, PhD, is a Postdoctoral Researcher at the University of Tampere, School of Health Sciences and a part-time Researcher at the Tampere University Hospital, Department of Child Psychiatry, Finland. As a member of the Child Psychiatric Research Team she is responsible for the statistical analysis of their studies, and also offers statistical consultation to researchers of other subject areas.

Mika Helminen, MSc, is a Biostatistician working at Science Centre, Pirkanmaa Hospital District and School of Health Sciences, University of Tampere, Finland. He offers statistical consultation to all researchers working in Pirkanmaa Hospital District and thus acts as a data analyst, statistical advisor, and co-author in various studies concerning health science.

Riittakerttu Kaltiala-Heino, MD, PhD is Professor of Adolescent Psychiatry in the School of Medicine at the University of Tampere, and Director of the Department of Adolescent Psychiatry in Tampere University Hospital, Finland. Her research focuses on epidemiology of psychiatric disorders in adolescence and adolescent psychiatric health services research. Special topics include pubertal development and mental health, and school bullying and mental health.

Tuula Tamminen, MD, PhD is Professor of Child Psychiatry in School of Medicine at the University of Tampere, Finland, and part-time Chief Medical Officer at the Department of Child Psychiatry in Tampere Universital Hospital, Finland. She acts as the Chair of Health Research Council in the Academy of Finland. Her main research interests focus on infant psychiatry, childhood emotional development and disorders.