Language, motor skills and behavior problems in preschool years

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Submitted for the PhD degree at the Department of Psychology,

Faculty of Social Sciences, University of Oslo, 2013

Series of dissertations submitted to the
Faculty of Social Sciences, University of Oslo
No. 465

ISSN 1504-3991

Cover: Inger Sandved Anfinsen.
Printed in Norway: AIT Oslo AS.

Produced in co-operation with Akademika publishing, Oslo.
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TABLE OF CONTENTS

Acknowledgements

This dissertation presents the results of my three-year doctoral project at the Norwegian Institute of Public Health (NIPH). Financial support was provided through Afasiforbundet, by the EXTRA funds from the Norwegian Foundation of Health and Rehabilitation. More than six years have passed since I started working on the initial grant proposal for this project. During that time several people have contributed to the completion of this thesis.

First of all, every family participating in MoBa deserves a warm appreciation. Thank you for filling out so many questionnaire pages throughout your children's development.

My gratitude also goes to the University of Oslo for providing interesting courses and for giving me the opportunity to hand in this thesis.

Major thanks go to my supervisors Leif Edvard Aarø and Arne Holte. You are both severely busy men, and our time spent together has been somewhat limited. But your enthusiasm, kindness and brilliance overshadow the lack of presence. I thank you for guiding and inspiring me, and for trusting me to be independent.

I would like to thank NIPH, and the two Directors of the Division of Mental Health during the period of writing this thesis. Arne Holte and Ellinor Major, I thank you for making Division of Mental Health the place I want to be. I would also like to thank the four heads of PHBU/PHOK during my phd-period: Kristin Mathiesen, Ragnhild Ørstavik, Espen Røysamb, and Heidi Aase. In your own ways you all contributed to making life here at the department good. Thanks also go to Liv Stene-Larsen. You know everything. I probably never would have handed in a single progression report, or travel bill without your help. Thank you!

I'd like to thank the founder of the SOL-study, Synnve Schjølberg. Thank you for introducing me to the intriguing world of research, and thank you for discussions and help throughout this process. Three of my SOL colleagues deserve a special appreciation. Imac, thank you for challenging me, discussing with me and helping me with theoretical problems, syntax trouble, interpretations and everyday challenges. Henrik, thank you for introducing me to Mplus, and for always being positive and enthusiastic. Ratib, thank you for working with me on two of the papers, for hours of endless discussions, for making me waffles on Fridays, and for being my friend. I miss all of you a lot! My gratitude also goes to all the other SOL-workers I've

collaborated with during my time in SOL, and especially to Siri and Laura for cleaning up my flawed English.

Some fantastic people deserve appreciation for always holding their doors open. Kristin Gustavson and Espen Røysamb, I thank you for understanding how to teach methods to the underprivileged – you are truly my heroes! Most importantly, I would like to thank you, Eivind Ystrøm. I am truly grateful for our collaboration, and I really enjoy working with you!

I would also like to thank all my lunch mates in PHOK and PHGM. I have no idea how many boxes of "makrell i tomat" we have consumed in the green sofas, but I know I enjoyed every one of them in your company. Thank you for following "Makrellmari" and making my working day brighter! A balanced workweek also includes several coffee breaks. Ragnhild and Helga, you are my dearest colleagues, friends and steady coffee companions. You inspire me, motivate me, encourage me, help me, and strengthen me. With lots of coffee, endless talks and analyses of life's mysteries we solve every problem we encounter. Including how to get me to hand in my thesis in time! Thank you! You are the best!

Dearest family, family in-laws, and friends outside the world of research. Thank you for being enthusiastic and supportive – whether or not you understood exactly what I was doing. Major thanks to Hege and Gjermund for making everyday life a little easier. To my parents, thank you for care, support, good genes and an excellent childhood environment, and especially for taking care of Hans Ludvig whenever needed.

Last, Ole Kristian, thank you so much for being patient with your stressed wife through several "final stages". You gave me all I needed to finish this thesis; space, time, grandiosa, spa, sleep, coffee, overbearing and love. Thank you. I love you for ever. Hans Ludvig, you inspire me with your rich fantasy, contagious laugh, and endless questions. I love you and I love being with you. Thank you for being.

I started writing these acknowledgements half a year ago, being in what I at the time believed was the final stage of the process. Four weeks before I was supposed to hand the thesis in, our unborn baby died, eight weeks before due date, and my work came to a temporary halt. I would like to take the opportunity to thank all of you one more time, for being there for me and my family in the period before and after that happened.

Mari Vaage Wang, Oslo, November 2013

Summary

Child language development is a complex process. This process cannot be understood without considering its relationship to other developmental domains. Language development in preschool years is associated with development of motor skills and behavior problems, and these associations are the focus of the current thesis. Despite a large number of studies examining the co-occurrence of such developmental delays and problems, few studies have examined the developmental relationship between these areas during preschool years in a population-based sample. The first aim (paper 1) is therefore to look at how variation in typical development of language skills and motor skills is related. We especially want to explore whether the developmental paths for language and motor skills are characterized by stability or change in early childhood (1.5 to 3 of age). The second aim (paper 2) is to follow up results from paper 1 later in preschool years (3 to 5 years of age). Further, we want to look at how much of the variation in language skills can be explained by motor skills and vice versa. The third aim (paper 3) is to investigate the causal direction of the co-occurrence of language delay and externalizing behavior problems. The relationship between difficulties in these two domains is well established, but few studies have tried to estimate the causal relationship between them. Our hypothesis is that there would be differences in causal directions for the relationship between language delay and two separate subdomains of externalizing problems, aggression and inattention, respectively.

For the purpose of the three papers included in this thesis, questionnaire data from three waves of the population based, longitudinal Mother and Child Cohort Study (MoBa) are utilized. Mothers' reports were collected when children were 1.5, 3 and 5 years of age. Paper 1 includes data on 62,944 children from the first two waves of data collection. Paper 2 includes data from the two last waves, and paper 3 includes data from all three waves. In paper 2 and 3, mother reports on 25,474 children are included in the analyses.

In paper 1 and paper 2 we used cross lagged panel models for investigating the autoregressive and cross-lagged associations between language and motor skills. Results from paper 1 show that both communication and motor skills were quite stable over time (communication skills: .40, motor skills: .80), with motor skills being significantly more stable than communication skills. However, whereas communication skills do not positively predict motor skills, motor skills are an equally strong predictor of future communication (.38) as motor skills. We conclude that the communication skills at this age are not a reliable

predictor for later motor development, whereas motor skills are. Communication and motor skills are correlated at this early age, but we argue that variation in what is considered normal language development at 1½ years is too wide to predict variation in motor skills at later stages.

In paper 2 we go on to study the relations between language and a subdivision of gross and fine motor skills between the ages of 3 and 5 years, in order to understand whether one aspects of motor skills would be more predictive of language than the other, and whether language would be predictive of motors skills at this later age. The estimated models of the relationship between language and the two domains of motor skills correspond to the one presented in paper 1. Both domains are characterized by modest to high stability rather than change (language skills: .80, gross motor skills: .56, fine motor skills: .43). However, in contrast to results from paper 1, language skills at 3 years of age have significant influence on change in both gross and fine motor skills over time, whereas motor skills no longer significantly predict later language skills. We go on to calculate how much of the shared variance is explained specifically by language and gross and fine motor skills, respectively. Results from these analyses suggest that variance explained by language alone decreases, whereas variance explained by motor skills alone increases from 3 to 5 years of age. We conclude that these domains of development are best described as specific at this age.

Seen together, results from paper 1 and paper 2 indicate stability in both domains, but also some variability across domains. Motor skills are highly stable from 1.5 to 3 years of age, and motor skills at 1.5 years predict later language skills. From 3 to 5 years of age language skills show higher stability than motor skills, and language skills at 3 years predict later both gross and fine motor skills.

In paper 3, we change focus from variation in typical development to differences between delayed and typical development. Children with language delay are thought to be at risk for a spectrum of co-occurring difficulties, and in this paper, we investigate the causal relationship between language delay and inattention and aggression, respectively. We include data from all three waves in fixed effects models. The results show that the causal relationship between language delay and inattention is quite different from the relationship between language delay and aggression. Whereas the first is explained by common factors and a reciprocal relationship between the two, the best fitting model for the relationship between language and aggression is one where language delay predicts aggression, and not the other

way around. We conclude that our results support different etiologies for the relationship between language delay and inattention and aggression, respectively.

Findings from the three papers highlight the importance of knowledge about developmental change in preschool years. These findings underline the value of utilizing data from more than one measurement occasion in order to capture how language skills are related to co-occurring skills in young children. Also, estimating different outcomes simultaneously, in the same study population enable the possibility to compare parameters directly.

The results also have implications for prevention and intervention. Co-occurrence of symptoms is common in preschool years and changes happen rapidly. What is considered normal at one point in time quickly changes to being abnormal at another time point. When assessing young children with language delays, it is important to be aware of the difficulties this child could have in other areas. Knowledge about how symptoms of different developmental delays influence each other over time is essential to adapt treatment strategies to each individual child. It is therefore important that clinicians follow development in more than one area closely, as both co-occurrence of symptoms, and a change in presentation of symptoms are common.

List of abbreviations

ADHD – Attention Deficit Hyperactivity Disorder

AIC – Akaike Information Criterion

ASQ – Ages and Stages Questionnaire

CBCL – Child Behavior Check List

CD – Conduct Disorder

CDI – Child Development Inventory

CFA – Confirmatory Factor Analysis

CFI – Comparative Fit Index

DCD – Developmental Coordination Disorder

DSM-IV – Diagnostic and Statistical Manual of Mental Disorders-IV

EM – Expected Maximum

ICD-10 – International Classification of Diseases-10

MBRN – Medical Birth Registry of Norway

ML – Maximum Likelihood

MoBa – Norwegian Mother and Child Cohort Study

MVA – Missing Value Analysis

NIPH – Norwegian Institute of Public Health

ODD – Oppositional Defiant Disorder

RMSEA – Root Mean Square Error of Approximation

SAM – Social Adaption Model

SCL-5 – Hopkins Symptom Check List-5

SDM – Social Deviance Model

SEM – Structural Equation Modeling

SLI – Specific Language Impairment

SPSS – Statistical Package for the Social Sciences

WLS – Weighted Least Squares

List of papers

Paper 1

Wang, M. V., Lekhal, R., Aarø, L. E., Schjølberg, S. (2012). Co-occurring development of early childhood communication and motor skills: results from a population based longitudinal study. *Child Care Health and Development*. DOI: 10.1111/cch.12003.

Paper 2

Wang, M. V., Lekhal, R., Aarø, L. E., Holte, A., Schjølberg, S. (*under review*). The developmental relationship between language and motor performance from 3 to 5 years of age: A prospective longitudinal population study. *Resubmitted with revision to BMC Psychology*.

Paper 3

Wang, M. V., Aarø, L.E., Ystrøm, E. (*submitted).* The causal relationship between language delay and externalizing problems in preschool: A prospective cohort study. *Submitted to Journal of the American Academy of Child and Adolescent Psychiatry*

1. INTRODUCTION

The acquisition of language is a key developmental task of children in the preschool years. Well-developed language skills help children in interactions with peers and adults. In the long term children's language skills during preschool lay the foundation for later achievements, both socially and academically (Beitchman, Wilson, Brownlie, Walters, Inglis, et al., 1996; Beitchman, Wilson, Brownlie, Walters, & Lancee, 1996). Children vary substantially in early language development, and nearly two thirds of late-talkers move into the normal range at a later stage. However, some also continue to show poorer language skills than those who never showed delayed language development (Dale, Price, Bishop, & Plomin, 2003; Rescorla, 2011). A delay in language development is one of the most common developmental difficulties seen in preschool children (Trouton, Spinath, & Plomin, 2002). Most children develop adequate language skills throughout their first years of life. Whereas up to 10-15 % of 2 year olds are considered late talkers (Rescorla, 1989), only approximately 5-10 % of 5 year old children have language disorders (Dale et al., 2003). Some of the questions researchers have wanted to answer are whether late talkers continue to have language problems, grow out of their language problem, or catch up with their peers. The frequent comorbidity with language disorders has also contributed to an interest in whether language problems are the core problem of these children, or possibly that delayed language in early preschool-years progress to be problems in other areas of development at later points.

Language delay is of importance, not only because of the consequences it bears in itself, but also because of the frequency of associated problems. As many as 40-90 % of children with language delay have additional developmental or behavioral problems (Toppelberg & Shapiro, 2000). The main aim of this thesis is to better understand language delay co-occurring problems and the developmental relationship between them. More specifically, the focus is on co-occurring motor development and externalizing difficulties. In order to understand the nature of these relationships, earlier research is reviewed and compared. The first section (chapter 1) of this thesis includes theoretical perspectives in light of previous research, and presents certain controversies encountered by this field of research. The second part presents the materials and methods used in the three papers (chapter 2 and 3), the main findings, a discussion of these, and some concluding remarks (chapter 4, 5 and 6). Finally, the three papers are appended.

1.1. THEORETICAL PERSPECTIVES

1.1.1 LANGUAGE AND MOTOR SKILLS

It is obvious that without a motoric vocal capacity, language production would not be possible. In addition to this "trivial" fact, it is also commonly found that developmental milestones in language and motor skills follow each other closely (Campos et al., 2000; Iverson, 2010). There are only a few studies that have investigated typical development (as opposed to developmental delays) in these two domains simultaneously. Research shows that delay in one domain predict delay in the other (Hill, 2001; Webster, Majnemer, Platt, & Shevell, 2005), but less is known about whether there is a qualitative difference between those with disorders in these domains and typically developing children, or if children with problems are simply located at an end of a continuum. In one study where the aim was to test the hypothesis of existence of specific developmental disorders, researchers found a marked pervasive underachievement in disordered children compared to normal low achievers, across domains. They compared children diagnosed with expressive language disorder to children from a normal population, with no suspected disorders, but low scores on language tests, and children diagnosed with Developmental Coordination Disorder (DCD) to children from a normal population with no suspected disorder but low scores on motor tests. Children with diagnosed disorders were more pervasive underachievers. Both children with language and children with motor disorders received lower scores on several language tests (Dyck & Piek, 2010). These findings argue for less distinct differences between specific diagnoses. A major reason why it is interesting to study co-development of language and motor skills in typically developing children is the hypothesis that development in one domain contributes to development also in the other (Iverson, 2010). Both the emergence of language and the onset of locomotion represent major life transitions in early development, but there is lack of knowledge about how development in one domain influences development in the other. A better understanding of how these developmental domains influence each other might also contribute to pinpointing how children with delayed development can be helped. Thus, theories on both typical and delayed development are relevant for a better understanding of co-occurrence of language and motor skills.

Theories of motor cognition

More than 60 years ago a *motor theory of speech perception* was presented by Cooper and colleagues (Cooper, Delattre, Liberman, Borst, & Gerstman, 1952). This theory was later revised by Liberman and Mattingly (1985), suggesting that speech is dependent on oral motor capacities, and that comprehension of language is, at least partly, dependent on perception of these articulatory movements (Liberman & Mattingly, 1985). Motor cognition is thus suggested to be a factor of both speech and movement.

Further the *theory of motor cognition* (Jeannerod, 2006) describes action representation as a key element in the theory. Spoken language does not give any meaning unless we know what meaning is carried in the sounds. Words must be grounded to something to carry meaning. Accordingly, theory of motor cognition suggests that specific words are connected to specific movements. This idea has been further developed in the study of mirror-neurons. It has been suggested that the mirror-neuron system is the basic neural mechanism from which language has developed, and that this system represents a strong link between language and action representation (Rizzolatti & Arbib, 1998). Researchers have found that audiovisual neurons in the premotor cortex of monkeys discharge when monkeys perform a specific action, when they hear the related sound and also sometimes when they observe the specific action. Thus neurons fire both when action is performed and heard (Kohler et al., 2002).

Theories of *embodied cognition* argue that motor systems influence our cognitive processes, and that cognition influence bodily activities. More precisely this theory claim that language comprehension is grounded in bodily activates. Mental simulation of activities requires language skills. This idea was tested by Glenberg & Kaschac (2002). Participants were to decide whether a sentence was sensible or not by pushing a button. The action of pushing the button required movement of the arm either towards or away from the participant's body. The sensible sentences involved actions that were directional either away from the body (e.g. "Close the drawer", or towards the body (e.g. "open the drawer"). Results showed that participants made slower responses when the actual bodily movements were in contrast to the content of the sentence. They suggest that motor resonance enhances language comprehension (Glenberg & Kaschak, 2002). This view was also supported in a review of literature on language and the motor system (Fischer & Zwaan, 2008).

Theories of underlying neurological deficits

An in-depth literature review from 2005 argues that specific language impairment (SLI) is associated with other functional problems, including motor impairments (Ullman & Pierpont, 2005). They argue that previous research has only accounted for the functional side of SLI, whereas few have attempted to link the cognitive impairments in SLI to the brain, or to account for the range of neural abnormalities observed in the disorder. Ullman and Pierpont (2005) present the hypothesis that lexical memory depends to a great extent on the declarative memory system, and that grammar depend on the procedural memory system. They argue that SLI is not specific to language but is rather the result of abnormal development of brain structures that constitutes the procedural memory system (Ullman & Pierpont, 2005). They predict that individuals with SLI also have motor problems due to procedural system deficits. Thus, they argue that an underlying deficit causes problems in both domains.

Pierpont and Ullmann's hypothesis of procedural deficits also include a hypothesis of timing, and slow reaction time as a mediator of the relationship between language and motor skills (Ullman & Pierpont, 2005). One study supports this hypothesis by finding that children with SLI were significantly slower than controls on three out of four motor tasks (Owen & McKinlay, 1997). Another study found that contrary to this hypothesis, timing skills in children with SLI was equivalent to that seen in typically developing children (Zelaznik & Goffman, 2010). However, children with SLI showed poorer performance in a standardized test of gross and fine motor skills than did their normally developing peers.

Researchers have found neurological similarities between language and motor skills. Scabar and colleagues (2006) investigated a population of children with severe motor deficits to identify epileptiform activity similar to what has been found in children with language delays. These electroencephalographic traits occur in more than 50% of children affected by learning difficulties without seizures. They found the same traits in more than 70% of the children with severe DCD and severe DCD in more than 30% of the children originally identified as having benign epilepsy with centro-temporal spikes (BECTS) (Scabar, Devescovi, Blason, Bravar, & Carrozzi, 2006). These findings support the hypothesis of a common neurological basis for language and motor skills.

Motor skills – an opportunity for language learning?

Joseph Campos and colleagues wrote a paper on how movement increases opportunities for learning and thus also language development (2000). In addition locomotion changes the communication between parents and children. Because the child now can reach distant objects, parents react to this, by either communicating that the child cannot play with certain objects, or they divert attention to other objects. The child then has to attend to the parent's message, and understand what the parent is referring to, which is a more complex way of communicating than what was necessary before the child was able to move around (Campos et al., 2000). With this assumption as a foundation, Dana Iverson (2010) wrote a literature review describing the developmental relationship between early motor and language skills. Iverson's main message was that language and motor development go hand in hand and influence each other over developmental milestones. This idea was not, however, tested empirically. There is a lack of studies that have tested whether the association between language and motor skills is bidirectional, or if language skills influence motor skills, or motor skills influence language skills. Although few rule out the possibility of a reciprocal relationship, most researchers present hypotheses that represent a unidirectional view. Without a causal research design it is not possible to confirm a causal relationship. However, prediction from one developmental domain to the other can provide a starting point for hypotheses of direction.

Non-verbal communication mechanisms

Research has aimed at revealing specific mechanisms that link language and motor skills. One skill often associated both with language and motor development is different forms of non-verbal communication. For example, gesture production play an important role as a building block in the development of language (Willems & Hagoort, 2007). Gestures are the foremost way of communication before language is acquired. Motor skills also influence the performance of gestures, as gesture production is dependent on movement of fingers, hands, arms, facial features, or body motions. Studies have shown that children with language delays very often have a history of problems with gestures (Iverson & Goldin-Meadow, 2005). One specific form of motor dependent non-verbal communication form that is relevant as a possible mechanism for the link between language and motor skills is action imitation. It has been found that imitation of parents'

actions and pretend play is important in early social and cognitive development (Iverson & Goldin-Meadow, 2005; Zambrana, Ystrom, Schjølberg, & Pons, 2012), and thus also language skills. These skills are clearly dependent on motor skills, and poor motor skills would also weaken the clarity of performance on nonverbal actions. Another study based on MoBa-data, found that action imitation was a better predictor of later language delay than pointing gestures (Zambrana et al., 2012). Although both action imitation and pointing gestures at 1.5 years of age were significantly correlated with language production at 3 years of age, only action imitation had a unique effect. Such diverse findings suggest that non-verbal communication as a possible mechanism for the link between language and motor skills need further research.

Specific or common developmental domains?

Bishop and Edmundson (1987) investigated the hypothesis of SLI as a maturation lag (Bishop & Edmunson, 1987). This hypothesis was posted by Rutter some years earlier (Rutter, 1984), but had never been demonstrated. Children recovered from early language delay were compared to children with persisting problems on a peg moving test. They interpreted their findings in support of a hypothesis of these skills being caused by a neurodevelopmental immaturity rather than brain damage. Their findings suggest that a delay in language is not simply a lag in language of maturation, but needs other explanations. In more recent years there has been a tendency for grouping together a number of early-onset disorders, such as language and motor difficulties under the concept of 'neurodevelopmental disorders'(Andrews, Pine, Hobbs, Anderson, & Sunderland, 2009; Viholainen et al., 2006). Such disorders have several common features (Rutter, Kim-Cohen, & Maughan, 2006), which have led some researchers to argue that neurodevelopmental dysfunction should be regarded as a syndrome rather than as a series of single diagnoses (Valtonen, Ahonen, Lyytinen, & Lyytinen, 2004). This is further supported by a longitudinal study of 8,950 children between 3 and 8 years of age, where a common factor was found to account for 42 % of the individual differences in change of correlations between linguistic, mathematic, reading, and gross and fine motor skills (Rhemtulla & Tucker-Drob, 2011).

Decades of research on the interrelatedness of language and motor skills have given us new insights, but a common understanding of why development in these domains is often associated is not yet achieved.

1.1.2. Co-occurrence of language and behavior problems

Whereas theories on the relationship between language and motor skills have emphasized common mechanisms often related to biology, the theories on co-occurrence of language delay and behavior problems are often based on environmental mechanisms. Behavior problems are often subdivided into internalizing and externalizing difficulties. Co-occurring difficulties with language delays have been found both for internalizing problems (Irwin, Carter, & Briggs-Gowan, 2002), and externalizing problems (Menting, Van Lier, & Koot, 2011). In accordance with the thematic content of the included research paper in this thesis, only theoretical perspectives on the association between language and *externalizing* behavior problems is covered here.

There is now a general consensus that there are two main types of externalizing problems. These are problems related to inattention and hyperactivity, and problems related to aggression and conduct problems. Even though these subdomains of externalizing problems are to some extent overlapping, it has been found that they are also partially independent (Hinshaw, 1987). Inattention and hyperactivity are symptoms commonly found in children with a diagnosis of attention deficits hyperactivity disorder (ADHD), whereas aggression and conduct problems are symptoms commonly found in children with oppositional defiant disorder (ODD) and conduct disorder (CD). Associations to different outcomes have been found for the two subdomains. Whereas inattention most often is associated with co-occurring difficulties with cognition, school achievements and motor performance, aggression is often associated with low socioeconomic status and social problems (Hinshaw, Han, Erhardt, & Huber, 1992). Both subdomains have been found to be associated with language delay (Beitchman, Brownlie, et al., 1996; Bonica, Arnold, Fisher, Zeljo, & Yershova, 2003). Whereas some research literature provide a differentiation in results for subdomains of externalizing problems, other report externalizing problems as one or the other (Menting et al., 2011), whereas some do not distinguish between subdomains (Zadeh, Im-Bolter, & Cohen, 2007). This makes comparison across studies difficult.

Theoretical frameworks for understanding the relationship between language delay and externalizing problems can broadly be divide into two directions. Either, one is caused by the other, or both are caused by, or are parts of, a common deficit. Redmond and Rice (1998) illustrated this distinction by presenting two conceptual models. They argue that the available literature on theoretical work is lacking, and that most researchers do not state a clear theoretical framework for interpretation of their results. The first model is called Social Adaption Model (SAM), and the second is called Social Deviance Model (SDM). SAM is an extended version of Mabel Rice's social consequences model, where Rice and colleagues investigated what judgments adults did on the basis of children's language capacities (Rice, Hadley, & Alexander, 1993). In SAM it is assumed that if the communicative demands of a situation are in conflict with the child's verbal limitations, children use aggression and other forms of unwanted behavior as compensatory. In this view behavior problems are a consequence of language delay. In SDM behavior problems are not seen as an outcome of the language delay, but rather that both behavior problems and language delay are symptoms of the same disorder.

Researchers have repeatedly investigated the predictive value of language problems on later outcomes (Beitchman, Brownlie, et al., 1996; Silva, Williams, & McGee, 1987). A review from 2012 described the link between SLI and later child and adolescent behavioral outcomes, and performed meta-analyses of previous literature. Their results revealed that relative to children with typical language development, children with SLI experience an increase in severity of several behavioral problems and more frequently show clinical levels of these problems (Yew & O'Kearney, 2013). An example of such relationship is provided by a prospective study by Brownlie and colleagues. They used structural equation modeling to predict boys' delinquency at 19 years of age from language delays at 5, and found that even though self-report about delinquency was not different for boys with a history of language delay and controls, boys with previous language delay had more convictions and arrests than controls (Brownlie et al., 2004).

Different mechanisms have been suggested for the relationship between language and aggression and language and inattention respectively. Although several studies of the

relationship between aggression and language exist, few express clear theoretical directions. One suggested mechanism explaining the association between language and aggression is peer rejection. Aggressive children are often found to be less socially competent (Frey, Hirschstein, & Guzzo, 2000), and rejection from peers leads to less language experience, and can also lead to frustration and aggression. In agreement with SDM, it is suggested that children with language delays are rejected by mainstream peers, and rejection is thus suggested as a mediator of the relationship between language and externalizing problems (Menting et al., 2011). Others found that language had a mediating role between social cognition and externalizing problems (Zadeh et al., 2007). It is suggested that children with poor language skills have problems solving social conflicts. These children might try other means to solve the conflict, using non-adaptive physical strategies, such as acting aggressive to encounter the situation. A recent study also found that inattention and hyperactivity was associated with poor social skills, but that this association was partly mediated by pragmatic language skills (Leonard, Milich, & Lorch, 2011). However, the relationship between language delay and inattention has rather been explained by cognitive deficits. Working memory impairments are suggested to be a possible cognitive correlate of attention difficulties (Martinussen & Tannock, 2006). Problems with working memory have also been found in children with language delays (Cohen et al., 2000; Ullman & Pierpont, 2005). Symptoms in both domains could therefore be influenced by working memory deficits. Thus the association between language and inattention perhaps could perhaps also, in the same way as the association between language and motor skills, be explained by a deficit in the procedural memory system.

However, less common, some mechanisms have been suggested to explain why externalizing problems should contribute to language delay, and not the other way around. Without sufficient exposure to language children will not develop adequate language skills. Research has shown that linguistic interaction between children and their parents, influence vocabulary size at school start (Hart & Risley, 1995), and parents' child directed speech (modified to the child's language level) serves a primary attentional and affective function in mother child interaction (Newport, Gleitman, & Gleitman, 1977). Children with externalizing problems might have less communication with their parents, and communication might also be less stimulating than if the child does not have

externalizing problems. Thus externalizing problems contribute to slower language development.

Neurodevelopmental immaturity has been suggested as a common factor explaining both delays in language development and externalizing problems (Andrews, Pine, Hobbs, Anderson, & Sunderland, 2009; Willinger et al., 2003). Both language delay and externalizing problems are thought to be disorders with high heritability (Bishop, 2006; Van Beijsterveldt, Bartels, Hudziak, & Boomsma, 2003). Thus it is likely that they both have genetic components. Genetic comorbidity can be explained by either one gene being the cause of different symptoms or that many genes together influence one symptom. Patterns of comorbidity arise when these genetic presentations combined forms a many-to-many relationship. This opens up for phenotypes to be correlated, or partially overlapping (Tomblin & Mueller, 2012).

1.1.3. Combining theoretical perspectives

Most research indicates that there are both environmental and genetic contributions to most developmental disorders, but few developmental disorders have a clear cause. Whereas the frequent overlap between difficulties argue in favor of common causes for different difficulties, many disorders and developmental domains also show high stability. There is little knowledge about to what extent maturational gains that children make across multiple diverse domains of functioning can be attributed to global developmental processes (Rhemtulla & Tucker–Drob, 2011). When treating children with problems we rely on specific diagnoses for specific disorders. The contradiction between the diversity of childhood symptoms and the specificity of diagnoses has led to questions about the validity of the current diagnostic system (Uher & Rutter, 2012). This makes the gap between the achievements of research and the clinical use of these results large. A combined theoretical framework for understanding psychological development and disorders does not exist, and the common overlap in causal hypotheses and symptomatology across developmental domains, makes it difficult to comprehend the frequent comorbidity of developmental disorders.

1.2. CONTROVERSIES IN RESEARCH

Several approaches have been used to get a better perspective on language problems, both regarding stability and change, and with respect to comorbidity of other problems and difficulties. Two main distinctions can be made between the various research approaches; the first between clinical and population based study designs, the second distinction can be made based on the age of the children involved.

1.2.1. CLINICAL VERSUS POPULATION BASED SAMPLES

Both clinical and population based studies have advantages that make them unique and important for research to develop. Whereas population based studies have the benefit of being generalizable, large samples are harder to obtain, and such studies are more expensive to administer. When investigating large populations, questionnaires are the most common form of measurement. In clinical samples direct observations and performance tests are used. The latter forms of measurement are thought to give more precise registrations of the assessed behavior. Clinical studies have, however, some possible disadvantages as well. There is a possibility of overestimating the severity of the disorder in question. Children seen in clinics probably have more severe problems than those who do not seek professional help. An example of this was demonstrated by Tannock and Schachar (1996), who found that children seen in clinics are more likely to have expressive language difficulties and problems with more social aspects of language, whereas children with unidentified language problems have more salient language difficulties, such as poor comprehension and reception (Tannock & Schachar, 1996). Salient language difficulties might be misattributed by parents and teachers as inattention or oppositional behavior (Howlin & Rutter, 1987). Thus when doing research on clinical population the descriptions of the disorder might be different from when looking at population samples. The variation between different types of language delays might be difficult to capture. Whereas some report a distinction between expressive and receptive language skills in research on general populations (Beitchman, Hood, Rochon, & Peterson, 1989; McCabe, 2005) others look at only one of these domains (Séguin, Parent, Tremblay, & Zelazo, 2009), and some use a general composite score rather than a subdivision (Mueller & Tomblin, 2012). Also, the more precise measures achieved by

direct observation and testing of children by trained personnel make comparison across studies easier than when comparing studies using questionnaires.

1.2.2. WHY IS RESEARCH ON YOUNG CHILDREN IMPORTANT?

The spontaneous production of words is already starting when the children are around 1 year of age (Fenson et al., 1994), and by 3 years, children typically have a vocabulary of hundreds of words (Rose, Feldman, & Jankowski, 2009). Mental development is characterized by rapid changes and some have argued that these rapid changes in development make it difficult to create meaningful clusters of symptoms corresponding to diagnoses described in the diagnostic systems - ICD-10 (WHO, 2004) and DSM-IV (APA, 2000) (Uher & Rutter, 2012). In addition, the lack of age appropriate measures makes diagnosing difficult (Luby, 2012). However, there are indicators that psychopathology among preschoolers share the same clustering of symptoms as seen in older children and adolescents (Bufferd, Dougherty, Carlson, Rose, & Klein, 2012). These clusters relate to the same acknowledged risk factors as those found for the corresponding diagnoses seen in adolescents and adults. Further, continuity between preschool behavioral problems and later psychopathology is repeatedly demonstrated. Buffered and colleagues investigated the relative stability and transience of early forms of psychopathology in a community sample of preschoolers. They found that having a disorder at age 3 was associated with an almost fivefold greater risk of having a disorder at 6. More than 50% of children meeting criteria of disorder at 6 had clinically significant symptoms at 3 years. Bufferd and colleagues argue that these findings make manifestations of symptoms meeting DSM-IV criteria for clinical disorders at age 3 a robust marker of risk for disorders at 6 years. Both homotypic and heterotypic continuity were demonstrated in this study, argued to support stability rather than transience of early forms of psychopathology (Bufferd et al., 2012). Such findings argue in favor of early identification of disorders, and diagnosing young children. There are, however, counterarguments. The other 50% of children investigated in this study meeting criteria of a disorder at 6 years of age did not have clinically significant symptoms at 3 years of age. Some argue that it is difficult to distinguish accurately between extreme ends of developmental norms and symptoms of actual behavior problems, and there is in general relatively little evidence that different mental disorders are qualitatively different from

normally distributed traits (Uher & Rutter, 2012). The frequently found diagnostic comorbidity in childhood (Angold, Costello, & Erkanli, 1999) is again an argument for less clear distinctions between diagnostic groups, and thus also an argument for less stability. Furthermore, a commonly stated argument against diagnosing young children is the stigma these children will experience (Luby, 2012). Research has shown that children seem to have negative attitudes towards children with labeled developmental diagnoses. However, little is known about whether these children would be stigmatized because of their abnormal behavior, also when not labeled with a diagnosis. We also do not know if having a diagnosis impact the child's mental health per se (Wichstrøm et al., 2012). Nevertheless, an argument for early intervention is that early developmental trajectories are characterized by high neuroplasticity (Johnston, 2005). A hypothesis forwarded by several researchers has been that with early detection of problems in different developmental areas, one can implement intervention at an early stage and possibly prevent development of full blown disorders. This principle has long been central to the treatment of general developmental disorders in childhood, such as speech and language disorders and motor disorders (Luby, 2012).

Short summary:

The challenges associated with delayed language development reach beyond language competence in itself. The frequent overlap in symptoms and co-occurrence of problems between different developmental domains has led to an increasing focus on understanding the developmental underpinnings of childhood mental disorders. It is also argued that we need new models to conceptualize disorders and to understand mechanisms of risk (Luby, 2012; Uher & Rutter, 2012). It is of interest to identified children at risk before disorders are full-blown and, in some cases become chronic (Luby, 2012). An aim for future research must be to better understand the developmental pathways of early symptoms of mental disorders of any kind, and to aim for intervening earlier in life, during periods of greater developmental change and plasticity. Seeing that language development is intertwined with several other developmental difficulties, an aim of the research presented in this thesis will be to investigate co-occurrence with language development.

2. OBJECTIVES

The aim of the present study was to investigate the relationship between language development and other areas of development during preschool years. Two main aims, with several sub-aims were tempted answered. The first aim was to entangle the developmental relationship between language and motor development. The second aim was to look into the co-occurrence of behavior problems and language delay. Two papers were written to answer the first aim of this study, and one paper was written to answer the second aim. The more specific objectives were:

(Paper 1)

To study the cross-lagged relationship between communication and motor development in early childhood. By doing this we wanted to investigate whether communication and motor skills were associated at this early age, and if skills in these domains would be stable from 1.5 to 3 years of age. Further we wanted to investigate if skills in either domain at 1.5 could predict skills in the other domain at 3 years of age, when controlling for initial co-occurrence.

(Paper 2)

To study the change in associations between language and motor skills from 3 to 5 year, and estimate the change and stability of variance in each domain from one time to the other. By doing this we wanted to investigate the stability and change between language and gross and fine motor skills, respectively from 3 to 5 years of age. We also wanted to investigate how much of the variance in language skills could be explained by gross and fine motor skills, and how much of the variance in gross and fine motor skills that could be explained by language skills.

(Paper 3)

To test the causal relationship between language delay and externalizing problems during preschool years. We wanted to examine the relationship between language delay and two subdomains of externalizing problems; inattention and aggression. First, our aim was to estimate the association between language delay and externalizing problems. The second aim was to use a fixed effects model to investigate whether the relationship was best described as caused by common factors, reciprocal, or as a causal relationship with language causing externalizing problems or vice versa, and if the relationship was different between subdomains of externalizing problems.

3. METHODS

3.1. SAMPLE

3.1.1. THE NORWEGIAN MOTHER AND CHILD COHORT STUDY

This thesis is based on data from MoBa (Magnus et al., 2006). MoBa is a prospective longitudinal study, with more than 108,000 participants. MoBa is designed to study risk factors and a diversity of health outcomes in children from pregnancy throughout childhood. The study is conducted by the Norwegian Institute of Public Health (NIPH). Becoming mothers were recruited during routine ultrasound in the 17th gestational week. Recruitment started in 1999 and gradually expanded throughout 2009 and eventually included all but two Norwegian hospitals and maternity units with more than 100 births per year. When both parents were present during the ultrasound, both parents were invited to participate. About 70% of women giving birth in this period were invited to participate. Of these, 38.7% consented to participate

3.1.2. THE MEDICAL BIRTH REGISTRY OF NORWAY

The Medical Birth Registry of Norway (MBRN) contains data registered by health personnel, on all births in Norway (Irgens, 2001). Variables related to child birth, as well as some socio-economic variables were drawn from this registry.

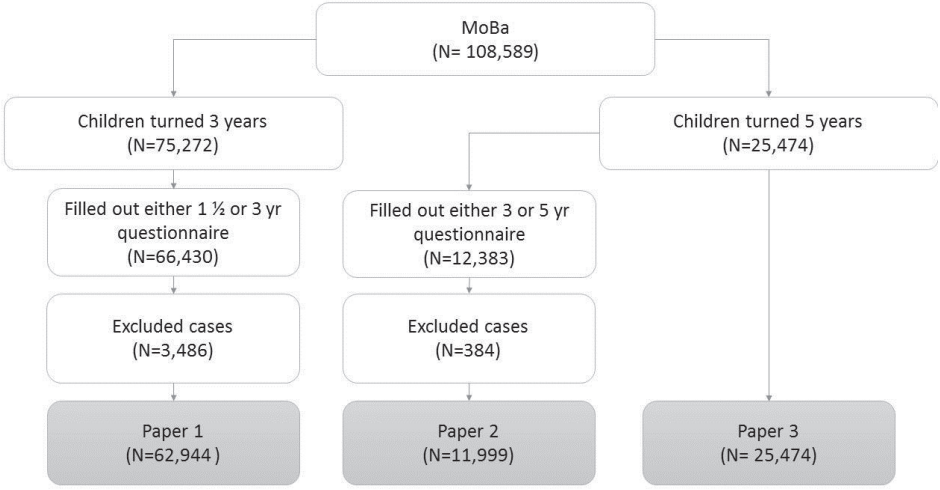
3.1.3. PARTICIPANTS

For paper 1, data from three data collection occasions were used; 17 weeks (Questionnaire 1, all questionnaires are included as an appendix to this thesis), 1.5 years (Q5), and 3 years (Q6). We also used data from MBRN. For inclusion in this study, participant children needed to have turned 3 years of age, and their mothers had to have answered the 1.5-year questionnaire, the 3-year questionnaire, or both. From the original sample (data release version 5), 3,486 children were excluded because of serious malformations, Down's syndrome or cleft palate. This gave a total number of 62,944 participants (32,080 boys and 30,864 girls).

For paper 2, data from 25,474 five year old children were included. Data from three waves of data collection were used; 17 weeks (Q1), 3 years (Q6), and 5 years (Q7), in addition to data from MBRN. For inclusion in this study, mothers must have answered both the 3-year questionnaire and the 5-year questionnaire. A total of 12,383 children satisfied this criterion. A total of 384 children were excluded because of serious physical malformations, cerebral palsy, Down's syndrome, cleft palate or because of missing information on MBRN data. This gave a total number of 11,999 participants (6 025 boys and 5 974 girls), corresponding to 47 % of the eligible 5 year olds.

For paper 3, data from the same 25 474 children eligible for inclusion in paper 2 were used. There were no exclusion criteria. Data from three waves of data collection were utilized; 1.5 years (Q5), 3 years (Q6), and 5 years (Q7). A total of 12 930 boys and12 500 girls satisfied this criterion (44 children had unknown gender). An overview of included and excluded participant for all three papers is found in figure 1.

Figure 1 *Flow-chart describing the sample of participants included in the papers*



3.2. MEASURES

3.2.1. LANGUAGE

Language skills were assessed through maternal ratings on selected items from the Ages and Stages Questionnaire (ASQ) (Janson & Squires, 2004; Squires, Bricker, & Potter, 1997). At 1.5 years of age four items from the original communication scale were included. At three years, language was measured by six ASQ items. Four of these were from the original 3 year questionnaire, while one was from the original 18 months, and one from 4 years questionnaires. This was done to ensure a wider variation. At five years, seven ASQ items were included; all six original 5 years items and the same 4 year item as in the 3 year questionnaire. All items had three response categories ("yes", "sometimes", and "not yet"). Most items had skewed distributions across response categories. The ASQ are previously validated in a Norwegian samples (Richter & Janson, 2007). In paper 1 and paper 2 the scales were used continuously (with latent variables), whereas in paper 3 a dichotomized version was used. A cut-off point capturing approximately 5% of children with the poorest language skills were introduced. At 1.5 years of age, this group included 4.8% of children. At three years, 5.7% were defined as language delayed and at 5 years of age the cut-off for language delay was 6.4%. Reliability for all included scales were calculated using polychoric ordinal alphas with the formula $\alpha = (k* r_{average})/(1+(k-1) * r_{average})$ (Gadermann, Guhn, & Zumbo, 2012). Results are shown in table 2.

3.2.2. MOTOR SKILLS

In paper 1 and 2 measures of motor skills were included. At 1.5 years of age motor skills were measured by all six mother rated items (3 items on gross and 3 on fine motor skills) from the original motor scale developed for the 18 month ASQ. Fine and gross motor skills at three years were assessed by four of the original six items from the ASQ. All items had three response categories ("yes", "sometimes", and "not yet"). At five years motor skills were measured by ten items (five items on gross and five on fine motor skills) from Child Development Inventory (CDI) (Ireton & Glascoe, 1995; Ireton, Thwing, & Currier, 1977). The distribution of responses to CDI-items was also skewed. Reliability is shown in table 2. Reliability for motor skills at 3 is a reliability measure of all four items,

including both gross and fine motor skills, since reliability for two items cannot be computed.

3.2.3. EXTERNALIZING BEHAVIOR

In paper 3 we investigated externalizing behavior problems measured with selected items from the Child Behavior Check List (CBCL) (Achenbach & Rescorla, 2000). Subscales of aggression and inattention, with three items to measure each domain, were used on all three occasions. Cut off was set to the closest possible cut-points to the 15 % bottom scores at the initial assessment when children were 1.5 years of age. The same score as indicating the bottom 15% at 1.5 years of age was used for creating cut-off scores at 3 and 5 years of age. This gave dichotomous groups with 11.7 and 12.4% scoring in the lower group on attention and aggression respectively at 1.5 years of age, 7.1 and 26 % at 3 years, and 3.8 and 8.8% at 5 years of age. The included items are presented in table 1, and estimates for reliability are shown in table 2.

Table 1 *Items included to measure inattention and aggression at 1.5, 3 and 5 years of age*

Aggression	
1	Defiant
2	Hits others
3	Gets in many fights
Inattention	
1	Can't concentrate, can't pay attention for long
2	Can't sit still, restless or hyperactive
3	Quickly shifts from one activity to another

Table 2 *Reliability estimates for all included subscales using polychoric ordinal alpha estimates*

	1.5 years of age	3 years of age	5 years of age
Language skills	.76	.86	.82
Motor skills (gross/fine)	.91/.61	.62	.76/.84
Inattention	.74	.75	.79
Aggression	.69	.68	.75

3.2.4. BACKGROUND VARIABLES

In paper 1 and 2 child and family related variables were included as covariates. Child related variables included information on the child's Apgar score five minutes after birth, birth weight, and gestation length. Information on these variables was retrieved from MBRN. Information about maternal psychological distress (anxiety and depression) was assessed using a 5-item short version of Hopkins Symptom Checklist (SCL-5) (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974), when children were both 3 (paper 1 and 2) and 5 (paper 2) years of age. The short version used has been shown to have good construct validity (Strand, Dalgard, Tambs, & Rognerud, 2003). Family related information; parents' age, income, education and Norwegian language background was measured during pregnancy (Q1).

We wanted to know to what extent age of testing was a factor contributing to the presented results. Parents receive the questionnaires at the approximate age corresponding to the questionnaire. There is no time limit for when to return the questionnaire, and this varies to some extent. Especially, the ASQ bandings are very tight which could potentially be reflected in our data. We found that 99 % of participating mothers filled out the questionnaires less than 10 weeks away from their child's supposed age of 1.5 years in Q5. The same was true for 98.9 % of participants at 3 years in Q6. Because of the large sample size we have not excluded participants because of variability in age. However, in paper 1 we included age as covariate in an alternative model, correcting for the possible

influence of age. The alternative model is presented as an appendix to the paper. There were no interesting differences from the unadjusted model. In papers 2 and 3, age adjustment was included on all measurement occasions.

In paper 3 we also chose to include gender as a control variable. Gender differences in both language competence and externalizing problems are documented by several research studies. We wanted to reduce confounding due to gender differences, and thus controlled for this variable in our analyses.

3.3. PARTICIPATION AND ATTRITION

Potential self-selection bias in MoBa has previously been examined on demographic, health-, pregnancy- and birth-related variables. This was done by examining differences in prevalence estimates and association measures between MoBa participants and all women giving birth in Norway. Nielsen and colleagues (Nilsen et al., 2009) have shown that despite risk prevalence differences between the sample and the population, estimates of exposure-outcome associations were not biased due to self-selection in MoBa. These analyses were, however done on the data from the time of recruitment. Selection bias due to later attrition may still be a confounder for findings based on analyses of these data. Analyses show that higher proportions of mothers, who *stay* in the MoBa cohort throughout the years, and fill out questionnaires, are highly educated and have a higher income compared with those who drop out. Comparing MoBa-participants to women in the corresponding age group (table 3), this finding is supported. One major limitation to this comparison is that we do not know if the comparison group of Norwegian women was mothers which MoBa participants necessarily are.

Table 3 *Comparison between education level in MoBa participants and Norwegian women in general*

	MoBa	Women in Norway (25-39 years of age)*
Completed elementary school	7.9 %	17.0 %
Completed high school	27.9 %	29.3 %
College / University less than 4 years	40.9 %	40.2 %
College / University more than 4 years	23.3 %	13.5 %

* Information about the education level of women in Norway is collected from Statistics Norway, 2012 (www.ssb.no)

3.3.1. Handling Missing

There are several ways to handle missing data. Different possibilities have different consequences. In all three papers, we used categorical factor indicators, and the Weighted Least Squares estimator, WLSMV. This estimator uses a diagonal weight matrix with standard errors and means, and variance adjusted chi square test statistics that use full weight matrix. For categorical outcomes using WLS estimation, missingness is allowed to be a function of the observed covariates but not the observed outcomes. Missingness is not allowed for the observed covariates because they are not part of the model. The model is estimated conditional on the covariates and no distributional assumptions are made about the covariates. With missing data, the standard errors for the parameter estimates are computed using the observed information matrix (Muthén & Muthén, 2007).

WLSMV with covariates works in 4 steps: univariate probit regression of each dependent variable on the covariates using all cases with data on that dependent variable (and the covariates), bivariate probit regression of each pair of dependent variables on the covariates using all cases with data for that pair, estimation of the weight matrix, and fitting the model using weighted least squares. The first 2 steps use maximum likelihood (ML) estimation. This means that this procedure is better than pairwise present data for

the dependent variables because missingness is allowed to be affected by the covariates (Muthén & Muthén, 2007).

We used missing value analysis (MVA and an expectation-maximization (EM) algorithm to impute missing values for co-variates. This was done using SPSS 20 (IBM, 2011).

3.4. ANALYSES

3.4.1. CONFIRMATORY FACTOR ANALYSIS

In paper 1 and 2 confirmatory factor analysis (CFA) was used to study the relationships between the observed variables (included items from the questionnaires) and a set of continuous latent variables (language and motor skills). We inspected Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) for evaluation of best model. CFI evaluates the fit of a specified model compared to a more restrictive baseline model, typically one where the covariances between indicators are restricted to be zero. Values close to 1 imply good model fit (Brown, 2006). RMSEA relies on a non-central χ^2-distribution, and assesses to what extent the model fits well in the population. Values of 0 indicate perfect fit, and values close to 0 suggest good model fit (Brown, 2006).

3.4.2. STRUCTURAL EQUATION MODELING

Whereas using CFA is equivalent to testing measurement models, Structural Equation Modeling (SEM) has two parts; a measurement model and a structural model. The structural models used for the different papers are described below.

In paper 1 and 2 cross-lagged panel analyses were used to investigate the relationship between language and motor skills. This was done because it was seen as the best possible way to analyze the relationship between language and motor skills when

measurements from two time points of measurement were available for two dependent variables.

In paper 3 fixed effects regression models were used to investigate the direction of causality between language delay and aggression and inattention, respectively. The principles underlying the fixed-effects regression model is the same as underlies the discordant twin design. The fixed effects model makes it possible to eliminate confounding from fixed factors (Fergusson, Boden, & Horwood, 2009). It is assumed that both time dynamic and time invariant factors influence both language delay and externalizing problems. Non-observed time invariant factors are thought to apply a constant effect on the measures of these domains respectively over time. The factors include all childhood, family and personal characteristics that have a fixed effect on outcomes over time. Such factors could be both genetic and environmental (Boden, Fergusson, & Horwood, 2010). Time dynamic components represent the effect of all other sources of variance in language delay and externalizing problems respectively that are not solely due to time invariant factors (Boden et al., 2010). In the specified model the time invariant factors are allowed to be correlated. The time dynamic factors were related by autoregressive processes, where symptoms at one measurement occasion predicted symptoms at the next measurement occasion within each domain, respectively. The time dynamic factors were reciprocally related at 3 and 5 years of age, whereas at 1.5 years of age time dynamic factors were correlated to make the model identifiable (Fergusson et al., 2009). In five steps models with different combinations of assumptions of reciprocal, time dynamic, time invariant and unidirectional effects were estimated. We used Akaike's Information Criterion (AIC) to select the most parsimonious models for language and inattention and aggression, respectively (Akaike, 1987).

3.4.3. Stability of variance

In paper 2 the paths between the latent variables were tracked to estimate the specific variance explained by each latent variable at 5 years of age. When estimations of variance are calculated there are three path tracing rules that must be followed: no loops, no going forwards then backwards, and maximum one curved arrow per path. Variance specific to language skills at five years of age was calculated by dividing the covariance between language and motor skills at five years with the variance calculated for language at five

years, and then subtracting this number from 1. The result was translated to a percentage score. The corresponding calculation was made for variance specific to motor skills.

3.4.4. Logistic regression

In paper 3, logistic regression analyses were used to estimate the odds ratio for language delay when categorized as inattentive or aggressive, and odds ratios for being inattentive or aggressive when categorized as language delayed. Odds ratios greater than one indicate that the outcome was more likely when moving one measurement unit on the predictive variables. This means, in example, that when moving from the group with children showing typical language development to the group of language delayed children, if odds are greater than one, this indicate that children have increased likelihood of also being aggressive.

3.4.5. Additional analyses

Two additional analyses, not presented in the published/submitted papers, were performed. First, calculations of polychoric ordinal alphas were conducted for all dependent variables (table 4). Second, unadjusted correlations of language and motor performance at 1.5 and 3 years of age were calculated, on basis of the sample of participants used for analyses in paper 1. In this paper we did not separate between gross and fine motor skills at 3 years of age (table 4).

Table 4 *Unadjusted correlations between language and motor performance at 1.5 and 3 years of age*

	Language 1.5	**Motor 1.5**	**Language 3**	**Motor 3**
Language 1.5	1	.72 ***	.67 ***	.42 ***
Motor 1.5		1	.65 ***	.68 ***
Language 3			1	.59 ***
Motor 3				1

*** Significant at p < .000

4. MAIN FINDINGS

4.1. PAPER 1

The purpose of paper 1 was to investigate the developmental relationship between communication and motor skills in children from 1.5 to 3 years of age. CFA confirmed that the communication items reflected one latent variable at 1.5 and 3 years of age, whereas motor skills was best fitted when divided into gross and fine motor skills. A nested factor for motor skills was made from two latent factors with indicators of gross and fine motor skills, respectively, at 1.5 years of age. Because only four items were available for measuring motor skills at 3 years of age one factor for motor skills was used. A cross-lagged model revealed that motor skills at 1.5 years of age significantly predicted communication skills at 3 years of age over and above what could be explained by the correlation at 1.5, and the stability of each domain from 1.5 to 3 years of age. Conversely communication skills at 1.5 years of age did not predict later motor skills. Our interpretation of these findings was that skills in these domains are quite stable from 1.5 to 3 years of age. Stability in communication development is stronger than the change. However, communication at 1.5 years of age does not seem to influence the development of motor skills at 3 years. It is concluded that what is considered normal variation in communication skills at 1.5 years of age is very wide. Change happen fast at this age, and having poor or good skills at this age might not be a trustworthy predictor for further development.

4.2. PAPER 2

In paper 2 we follow up the sample investigated in paper 1. We looked at the development in language and motor skills from 3 to 5 years of age. CFA suggested one language factor at 3 and 5 years of age, and separate factors for gross and fine motor skills. In this study motor skills were divided into gross and fine motor skills at both 3 and 5 years of age. We found that in opposition to what was found in paper 1, that language at 3 predicted fine motor skills (not gross) at 5, whereas motor skills at 3 did not predict language skills at 5 years of age. We found that stability within each domain was stronger than the prediction from one domain to the other. In addition to the cross-lagged

models we calculated the amount of variance explaining the stability and change between language and motor skills from 3 to 5 years of age. The main result from these analyses was that while language had less shared variance with motor skills at 5 years of age, motor skills had more share variance with language skills at 5 years than what was found at 3 years of age. The results are consistent with an idea of separated but correlated developmental pathways for language and motor skills.

4.3. PAPER 3

Paper 3 investigate the causal relationship between language problems and externalizing problems (inattention and aggression), in a longitudinal design, using fixed effects models, including measures at 1.5, 3 and 5 years of age. We found that attention and aggression have different causal relationships to language. The causal relationship between language and inattention was reciprocal, and was also explained best by a model including both time invariant and time dynamic factors influencing the relationship. The best fitted model for the relationship between language and aggression indicated that language problems caused aggression, whereas aggression did not cause language problems. The interpretation of this is that these two externalizing domains, which are commonly found to co-occur with language delay, have different etiologies. This has implications for how we encounter children with externalizing problems, both in terms of assessment, treatment, and follow up over time. In addition to clinical implications, it is important that researchers who investigate externalizing problems, both those who research externalizing problems solely, and those who look at co-occurrence with other childhood difficulties makes a clear distinction between these two subdomains. Different etiologies for these difficulties might also explain, to some extent, diverse findings in earlier literature.

5. DISCUSSION

5.1. INTERPRETATION OF FINDINGS

The main aim of this thesis was to get more knowledge about the interrelatedness of language development and other developmental domains and difficulties in preschool years. The main strength of our study was the utilization of data from a population based longitudinal sample for this purpose, and the use of structural equation modeling allows us to look at multiple outcomes in the same analyses, and for these to be directly compared. Our results complement previous research by two main findings. First, language and motor skills are correlated throughout preschool years, and even though stability of both domains is quite high, motor skills at 1.5 years predicts language skills at 3 years of age, and language skills at 3 years predict motor skills at 5 years of age. Second, the causal directions underlying language delay and inattention and aggression, respectively, reveal different etiologies for these relationships. The relationship between language delay and aggression is best explained as unidirectional, where language delay causes aggression. The relationship between language delay and inattention is best explained as a reciprocal relationship, where both language delay and inattention have a causal influence on each other, and in addition, both time dynamic and time specific factors contribute to this relationship.

5.1.1. LANGUAGE AND MOTOR SKILLS

We found that language and motor skills were associated, and that the strength of this association seemed to some degree varying, but were nevertheless of considerable strength between ages. The unadjusted correlations was .72 at 1.5, fell to .44/.56 (fine and gross motor skills respectively) at 3 years of age, and went back up to .55/.72 (fine and gross motor skills respectively) at 5 years of age. This association has been shown repeatedly also in previous studies, both in typically developing (Iverson, 2010) and in children with disorders or delays in these domains (Hill, 2001).

From 1.5 to 3 years of age both motor and language skills were quite stable, with motor skills showing highest stability (.81). Only the cross-lagged relationship from early motor to later language skills was significant and positive (.38). From 3 to 5 years of age

both gross and fine motor skills, and language skills were still quite stable. Language skills showed highest stability (.80/.79, in relation to gross and fine motor skills, respectively), and at this age only the cross-lagged relationships from early language to later gross and fine motor skills were significant (.12/.25). Whether motor skills can be seen as a precursor for communication development has also been discussed by others. Some research traditions believe that the early development of language skills is associated with the ability to explore the physical world, and that language skills is strengthened by the ability to move around (Campos et al., 2000). More specifically, researchers have argued that early gross motor skills such as crawling and independent walking (Campos et al., 2000; Iverson, 2010), as well as fine motor skills, including gestures (Iverson & Goldin-Meadow, 2005), and explicit movements such as rattle shaking (Iverson, Hall, Nickel, & Wozniak, 2007) are relevant precursor for language development (Iverson, 2010). The unadjusted correlation between motor skills at 1.5 and language skills (communication) at 3 years of age was high (.65) in our study, and also remained significant (.38) when adjusting for the association at 1.5 and the stability of both domains from 1.5 to 3 years of age. This association was also significantly stronger than the association between early communication and later motor skills. This indicates that improvement of skills in early motor development can possibly have a positive influence on language development at 3 years of age. This association was, however, not found when investigating the same skills in the same population from 3 to 5 years of age. The unadjusted correlations for fine and gross motor impairment at 3 and language at 5 years of age were, .34 and .48, respectively, but when adjusting for the correlation at 3 years of age and the stability within each domain from 3 to 5 years of age, the cross-lagged correlations dropped to .00 and -.02, respectively and were no longer significant. The predictive value of motor skills at 1.5 on language skills at 3 is in accordance with the hypotheses presented by Campos (2000) and Iverson (2010). The overwhelming motor development taking place at this early age has implications for language development. However, when these developmental milestones are reached, motor development continues, but does perhaps not provide the extreme changes in possibilities that are achieved in the first years of living, such as independent walking. This might explain why motor skills are a stronger predictor of later language performance when children are 1.5 than when they are 3 years of age.

The association that was found between communication skills at 1.5 years of age and motor skills at 3 years of age was weak, but significant, and the predicted effect was negative (-.14). The unadjusted correlation was positive and much higher (.42) and the finding was therefore surprising. Most community based studies of language and motor skills are conducted on infants, and are about babbling and preverbal communication rather than specific language skills. Few, if any studies have investigated the predictive power of language skills to later motor skills in older preschool children in the general population. Studies using diagnostic groups, however, have found that having a language disorder in preschool years is a risk marker for delayed motor development in early school of age (Miniscalco, Nygren, Hagberg, Kadesjo, & Gillberg, 2006; Webster et al., 2005). The fact that the association was negative in our study can be interpreted in several ways. One suggestion is that poor communicative skills at an early age might be compensated for by the use of gestures. Thus, the child might be dependent of motor skills to communicate. This might lead to improved motor skills at a later developmental stage. Another possible interpretation is that the positive change is largest in the children who are worse off early. The interpretation is thus not that the worse the early communication the better the subsequent motor skills. Another interpretation of the negative effect could be that communication at this early age is too fluctuating to be a relevant predictor of future skills. Poor or good skills in communication at this age do not necessarily impact later development in either this or other developmental domains. This interpretation is in line with previous findings suggesting that more than half of late-talkers catch up with their peers (Bishop & Edmundson, 1987), and is also supported by the finding that language skills are less stable from 1.5 to 3 year of age than motor skills are. The negative prediction might also be caused by a regression effect but this is purely speculative.

We found that stability of communication skills were moderate (.40), but the stability of motor skills from 1.5 to 3 was significantly higher (.81). At three years most children's language skills are quite well developed, and most three year olds can be understood by strangers and they understand what others talk about. Motor skills at 3 years are also well developed and as discussed above the extreme leaps from not being able to move around to crawling and then to independent walking are (at least in typical developing children) not present any more at this age. Being late in either motor or language skills at 3 years of age might be "worse" than being late earlier.

Further, we found that stability in each domain changes from the first to the second interval. Whereas the stability for language skills is higher from 3 to 5 years of age than from 1.5 to 3, the opposite is true for motor skills. Earlier research has found that stability ratings for both these domains are relatively low in early childhood (Darrah, Hodge, Magill-Evans, & Kembhavi, 2003). Whereas few have attempted to investigate stability of development in these domains in community samples of typically developing children at later ages (Reilly et al., 2009), it is argued that about half of children with delays in either domain at an early age, recover or catch up with peers before school entry (Bishop & Edmundson, 1987; Cantell, Smyth, & Ahonen, 2003). These results are supported by the finding that whereas variance specific to language skills decreases the variance specific to motor skills increases from 3 to 5 years of age. This also means that the variance in language skills that is explained by motor skills increases and the variance in motor skills explained by language skills decreases.

Our results show that motor and language skills are clearly intertwined throughout development in preschool years, and the associations are described as both variable and stable. We cannot argue for a casual relationship between motor and language development, but rather argue that these results strengthens the possibility of a shared underlying neurobiological link and that it is likely to find developmental similarities between these domains.

5.1.2. Language and Externalizing problems

In paper 3, we build upon a large body of research when investigating the association between cognitive deficits (here: language delay) and behavior problems. This paper, however, stands out in several ways. Again, the utilization of a population based longitudinal data set is a main strength. For the purpose of investigating causal relationships fixed effects models were estimated for the measures of language delay and externalizing problems at 1.5, 3 and 5 years of age. To our knowledge, this has not been done before.

Although both inattention and aggression are core facets of the externalizing domain, they are considerably different both in their expressions and possibly also in their origins. Whereas aggression has been argued to be a result of ‘social learning’ (Bandura,

1973), inattention is most often argued to be originated in genetic, or a combination of genetic and environmental factors (Thapar, Cooper, Jefferies, & Stergiakouli, 2012). Aggression is at the core of disruptive behaviors, whereas inattention is one out of three criteria for a diagnosis of ADHD. Aggression often co-occur in children with ADHD (Hinshaw et al., 1992), but inattentive subtype of ADHD is less commonly found to co-occur with disruptive behaviors, such as aggression than ADHD combined type (Nigg, Blaskey, Huang-Pollock, & Rappley, 2002). This differentiation is one of the reasons why these two domains are also hypothesized to have different relationships to language delay.

Language delay and inattention

Our results suggest that inattention and language delay are related in a casual manner. However, the relationship goes in both directions, language delay causes inattention and inattention causes language delay. In addition they are caused by common factors. These include both time invariant factors and time dynamic factors. Such factors could be both environmental and genetic. Both language delay and inattention are suggested to have neurological underpinnings. Cognitive impairments, such as working memory has repeatedly been suggested to be a possible link between inattention and language delay (Martinussen & Tannock, 2006). Neurodevelopmental immaturity could be a third factor underlying both language and inattention. The idea is strengthened by findings from Cohen and colleagues (1996), who found that siblings of children referred for language disorders, are at greater risk of language disorders than children with non-impaired siblings. They also found that boys were over-represented, which is yet another indication that genes might be involved in explaining the association (Cohen, Barwick, Horodezky, & Isaacson, 1996). However, a third factor could be a direct cause of two separate, but co-occurring disorders, or it could be a dysfunction that serves as a trigger for a general delay in several areas of functioning. The complex and semi-directional relationship between language delay and inattention can also be explained by the social deviance theory, presented by Redmond & Rice (1998). Inattention and language delay are both parts of a common disorder.

It has been suggested that the relationship between language delay an inattention is, at least partly, an artifact of measurement error. In a study by Charach and colleagues (2009) it was found that the risk of misdiagnosing children referred for ADHD as

language impaired was overwhelming. As many as 19 % of children incorrectly identified as having ADHD were children with language impairments, and only 9.5 % of children with comorbid language impairments and ADHD were identified as such (Charach, Chen, Hogg-Johnson, & Schachar, 2009).

Language delay and aggression

Language delay and aggression also have a causal relationship, but our results suggest that this relationship is unidirectional with no common causes explaining the relationship. The best explanation of our data is that language delay causes aggression.

The relationship between language and aggression is in compliance with theories of social adaption, where aggression is thought to be a social consequence of language delay (Redmond & Rice, 1998; Rice et al., 1993). Children with language delay cannot meet the communicative demands of their peers and other persons in their environment, and this leads to frustration, and peer rejection (Menting et al., 2011). Children get into a 'negative social spiral' (Brinton & Fujiki, 1993), where language delay make children aggressive, and the lack of learning opportunities caused by peer rejection further influence language development negatively. Our study does not reveal the mechanisms explaining why language delay should cause aggression, but it is likely that something that is specific to language, whether it is the social consequences or it is something biological, have a causal effect on aggression in preschool children.

5.1.3. General interpretations

In 1993 Rutter wrote that one of the key implications of findings from longitudinal data is that the underlying construct of mental development may remain constant but its behavior manifestations may alter with increasing age (Rutter, 1993). We have found overlap between several domains of development in preschool years, and our result support both stability and change in these domains. The large overlap in symptoms found in research on developmental difficulties in preschool is in contrast to the specificity of diagnostic criteria. A disorder in language is rarely as specific as the diagnosis suggests. Early identification and early intervention is an aim to prevent development of mental

disorders. It is therefore also important to understand the overlap between symptoms of different mental disorders common in childhood, and the associations across domains. The commonly stated myth that children "grow out of" their problems might be a result of lack of catching the rapid changes in development in preschool years, or simply that presentation of a disorder change throughout development. In better understanding the causal relationship between common preschool difficulties, such as inattention and aggression, we also better our understanding of the developmental underpinnings of disorders that these difficulties might be part of. Doing this we also contribute to identifying possibilities of early intervention before disorders are full blown (Luby, 2012).

Further it is an essential fact that children seen in clinics are often previously undiagnosed with a "second" disorder (Mueller & Tomblin, 2012). Thus, it is important for clinicians to be aware of frequently overlapping, and co-occurring difficulties. Since both subdivision of domains and operationalization of measurement vary across literature, it is important both for clinicians and researchers interpreting the literature to be aware of the different implications different subdomains have in relation to language delay (Benasich, Curtiss, & Tallal, 1993). Operationalization in itself can be a source of dissimilarity in findings across studies claiming to investigate the same research questions. Different studies use different subdivisions of externalizing problems, and different measures are included to operationalize these domains (Tomblin & Mueller, 2012). This is problematic because, as for example our results show, the association to language delay is quite different for different subdomains of externalizing problems. Another problem might be that symptoms in one domain are dependent on performance in the co-occurring domain, and thus lead to exaggerated high co-occurrence. This is also in accordance with our findings, that the interrelatedness of inattention and language are caused by common factors, in addition to influencing each other, whereas aggression seems to be a consequence of delayed language rather than aggression influencing language delay.

Most previous studies investigating the relationship between language, motor skills, and behavior problems use clinical rather than population based samples. By utilizing population based samples to investigate the relationship between language and co-occurring development and delays (Beitchman, Brownlie, et al., 1996; Mueller & Tomblin, 2012), we reduce sampling bias. It is more likely that children with more than one problem are sampled as part of a clinical population, which would artificially increase

the rate of co-occurrence. Thus, comparing population based and clinical studies without taking these differences into account could be problematic.

Discrete or common disorders

Even though the definitions of language delay, inattention and aggression used in the research papers presented in this thesis are not directly comparable to the superior diagnoses but the grouping of symptoms is corresponding. Interpreting results from the three papers, it is taken into account that our results cannot be directly compared with studies including children with diagnoses. Recently, several researchers have questioned if our current understandings of how discrete disorders are organized are reflected in real life (Krueger & Bezdjian, 2009; Uher & Rutter, 2012). The current diagnostic systems are perhaps not perfectly suited to handle developmental delays. Both the ICD- and the DSM-systems are based upon a categorical understanding of specific and distinct developmental disorders. If underlying deficits are common causes of symptoms found in different disorders, these systems have no possibility of identifying the underlying deficits. The underpinnings of separate disorders could be interchangeable and also perhaps the same. The phenomena presented in clinics are, perhaps especially regarding children, overlapping across disorders. A child referred to clinical assessment for aggressive behavior might have problems in several other areas, such as a language delay, explaining the aggressive outbursts. This makes the current classification systems less suited for research purposes as well. These systems are mostly based on clinical opinions, and the gap between basic science and clinical experience makes translation from research finding to applied assessment and intervention difficult.

We understand presentations of specific symptoms as discrete and coherent disorders. Deficits with common causes might be seen as comorbid when in fact it is one common deficit, which cause symptoms similar to criteria for two different disorders. In such cases variance explained by the diagnoses will be modest (Schumann et al., 2013). If 'working memory disorder' was a diagnosis – symptoms of language delay, inattention and perhaps also motor deficits would be present. Thus, a diagnosis might be a sum of symptoms rather than symptoms being reflections of a discrete and coherent disorder. Today most diagnoses are based upon symptoms rather than etiological assumptions

(Uher & Rutter, 2012). The system is reliable, with patients displaying the same symptoms receiving the same diagnoses across psychiatrists. However, the validity of the diagnoses might be questioned (Schumann et al., 2013). Research on the US population shows that the majority of the population receives a diagnosis of at least one mental disorder throughout their lives, and that comorbidity is the rule rather than the exception (Copeland, Shanahan, Costello, & Angold, 2011; Kessler et al., 2005; Moffitt et al., 2010). High comorbidity suggests that the interdiagnostic boundaries in the current diagnostic systems are artificial (Uher & Rutter, 2012).

Short summary:

In summarizing the findings from all three papers, we hope to know a little more about language, motor skills and behavior problems in preschool years. We have confirmed some associations found by previous researchers, and taken a few steps further in understanding how these developmental skills are associated. We have found support for stable, but associated developmental paths for language and motor skills. We have also found that delay in language skills predicts aggression in preschool children, and that the relationship between language delay and inattention is complicated. It seems like there are common causes explaining this relationship, but there is also residual correlation, meaning that they also have some effect on each other. The overall interpretation of these finding is that there are several forms of co-occurrence between developmental domains during preschool. These relations vary across domains and over time.

5.2. METHODOLOGICAL STRENGTHS AND CHALLENGES

The current study has considerable strengths. First, the utilization of a population based longitudinal data set, makes generalizations beyond clinical groups possible. Second, the use of structural equation modeling enables the possibility of investigating more than one outcome measure simultaneously, and allows for the possibility to directly compare estimates within the model. Third, fixed effects models were used to investigate causal directions between a set of variables. Nonetheless, there are methodological considerations and limitations of this thesis that needs to be addressed.

3.2.1. VALIDITY

It is important to remember that validity is not a property of the test, but rather a property of the meaning and interpretation of the test (Messic, 1995). Construct validity is therefore concerned about whether a test score can be interpreted to represent the construct it is intended to measure. In this thesis construct validity is the question of whether the content of our measurement reflects the underlying phenomena of language, motor skills and externalizing problems.

Construct validity is a central concern in measurement. Measurement includes both random and systematic errors. When using short scales, we face at least two important questions. First, do the scales address the variation expected to be found in the content of interest, or do the scales address more variation than what is unique to the content of interest? Second, is the internal structure of the scores consistent with the internal structure of the construct (John & Benet-Martínez, 2000)? The first question deals with *content validity*, which is a much debated term (Pedhazur & Schmelkin, 1991). Content validity can be defined as: "Evidence of content relevance, representativeness, and technical quality of items" (p. 352) (John & Benet-Martínez, 2000).

In all three papers included in this thesis we use ASQ for measuring communication and language skills. When measuring a complex construct such as language with four to six items, it seems unthinkable that such a scale addresses the full variation of the concepts of interest. However, when looking at the included items, they obviously cover the most prominent features of language skills. The original ASQ communication scales cover areas such as babbling, vocalization, listening and understanding (Squires et al., 1999). These areas can broadly be sorted into expressive and receptive language skills. The items included in the MoBa questionnaires cover both these domains (i.e. "Does your child use sentences made up of three or four words?" and "Without showing him/her first, does your child point to the correct picture when you say, "Where is the cat" or "Where is the dog"? Your child must only point at the correct picture."). Thus, at first glance the language measure seems to represent the content of the language construct.

Since the scales used in MoBa questionnaires are short versions or in other ways altered forms of the original ASQ scales, a natural question is whether some of the variance in the measured construct seem to vanish with the excluded items. The original ASQ 18 is composed of six rather than four items to measure communication. The excluded items, however, include information concerning the child's initiation of communication, which is not represented in the other items. However the items also seem to be intended to measure an expressive facet of the child's communication, and thus can be found covered in the remaining items. The scale used at 3 years of age includes six items. These are not all from the original ASQ communication scale (ASQ 36). There are two items excluded from the original 3 year scale. They concern expressive and receptive communication, each represented in one question, and they are replaced with two items, one from the ASQ 18 and one from ASQ 48. They are similar in content, and besides from the age fit of the questions they supposedly tap the same facets of communication as the excluded ones. At 5 years of age seven items are included in the MoBa language scale. Six of the items are from the ASQ communication scale suited for 5 year olds (ASQ 60), whereas one is from ASQ 48 and is the same question as is included at 3 years of age. The scale includes items covering both expressive and receptive language skills.

However altered, the scales used in MoBa to measure language seem to include the most important facets of the language construct. Unless these new combinations of items are tested against the original scale, we cannot state with certainty that the content of the scales are the same, and thus we do not have the construct validity argued to be found when using the original combination of items.

Since the scale is designed to be a screening instrument, the score on these measures does not represent a whole distribution of the construct intended to measure. Thus, a problem might involve underrepresentation of the variance of the construct. However, if we interpret the scores of this measurement as intended for screening (such as in paper 3), we can select a group of children with clear handicaps when it comes to language development. Further, in all papers we use robust weighted least squares estimators, and with such estimators this is not thought to be a problem. Using nominal data, there is no assumption of normality. In addition, the significant test used for comparison of the parameters is a Wald-test, which does not require a normal distribution (Flora 2004).

The second question concerns *structural validity*. This is defined as: "Evidence for internal structure of the scores that is consistent with the internal structure of the construct domain" (p. 352) (John & Benet-Martínez, 2000). This question concerns whether the scores on these measures can be interpreted to address more than what it is supposed to tap. On face validity it seems like the questions are relevant for the constructs intended to be measured. However most questions intended to tap receptive language skills include some form of physical performance to prove the understanding of the question. For example, the questions "Without giving him/her help by pointing or using gestures, ask your child to "Put the shoe on the table" and "Put the book under the chair". Does your child carry out both of these directions correctly?" requires the child to use receptive language skills, and thus the item taps what it is supposed to, but on the other hand it takes some complex motoric activity to be able to carry out the command. Children with adequate receptive language skills, but poor motor skills, might be interpreted as having weak language skills. Thus, in paper 1 and 2 included in this thesis, structural validity might be a challenge.

These issues of content and structural validity are also considered in the motor scales. At all measurement occasions, scales include items that cover both gross and fine motor skills. The items do not rely on language skills in the same way as language measures require motor skills.

Concerning the scales of aggression and inattention these included selected items from the corresponding subscales in the externalizing domain of CBCL. Face validity is considered good, as the content of the items corresponds to the phenomena of interest (see table 1). Two of the aggression items are clearly concerning overt aggression (hits/gets into fights), whereas the third item "defiant" might tap into a broader definition of externalizing problems, not limited to aggression. There are several forms of defiance, but it is argued that defiance in preschoolers often include some form of either verbal or physical aggression. The inattention domain also includes two items that clearly concern inattention specifically (shifts activity often/quickly loose attention) whereas the last item includes behavior relevant to other domains of ADHD symptomatology (hyperactivity). Thus, our conclusions concerning these domains might also be interesting in the broader subdomains of externalizing problems. However, the argument that aggression and inattention are separate domains still holds.

3.2.2. Reliability

Reliability is necessary but not sufficient for validity (Pedhazur & Schmelkin, 1991). Reliability of measurement can be defined as gaining consistent results from an instrument across time and informants (Salkind & Rainwater, 2000), and thus mean the degree to which test scores are free from errors of measurement. Measurement error consist of systematic and unsystematic error (Hammond, 2000). Systematic error is built into the test, meaning that a score on the test is systematically biased in one direction. Unsystematic error is due to external random factors, and biases the test in either direction. The most commonly used estimate of reliability is Cronbach's alpha. Cronbach's alpha is estimated based on Pearson's product moment correlations between items. An assumption underlying the use of Pearson's correlation matrix is that data are continuous. It has been suggested that when a scale is measured with categorical indicators, and has a skewed distribution across response categories, Chronbach's alpha is less useful (Gadermann et al., 2012). We therefore calculated ordinal alphas based on the polychoric correlation matrix using the formula $\alpha = (k* r_{average})/(1+(k-1) * r_{average})$ for all scales at all times, and moderate to high reliability was achieved for all measures (table 2) (Gadermann et al., 2012).

In paper 1 and paper 2 latent variables were used for measurement, whereas in paper 3 we used dichotomous groups made from sum-scores. This has different implications for reliability. A latent measurement model is reflective, meaning that the indicators are caused by the construct, rather than the construct being a sum of the indicators. Thus, using latent variables we exclude measurement error in the construct. Our reason for using latent variable is thus to make the models more robust. Hypothetically, the latent constructs cannot be measured directly, and thus we rely on observed indicators (Bollen, 2002), which in our cases is the selected items from the questionnaires. Using latent variable we have the possibility to completely explain the association of the observed variables. Using CFA we confirm that the latent variable create the associations between the indicators. Once the latent variable is held constant there is no remaining dependence (or association) among the indicators that measure it. Thus, a latent variable is by definition free from measurement error. However, only systematic error is accounted for and unsystematic error could still be an issue. In contrast, with the use of sum-scores a model is formative, meaning that the indicators cause the construct. The items are allowed to be correlated, and this correlation could be

caused by something different than the latent variable. Indicators form the factor, but change in the factor is not necessarily reflected in the indicators (Loehlin, 2004), and thus the model could include measurement error. The reliability of the scales used in paper 3 is thus not ensured to be free from measurement error. However, including control for both time-invariant and time-specific variance, we control for systematic bias also in these models.

3.2.3. Measurement

In this study, we compare variables that are measured with different items at 18 months, 3 years and 5 years. The practical reason for this is the need of measures that capture the child's developmental at the age of question. Both language and motor skills develop throughout childhood in a way that makes it difficult to compare the same developmental milestones when measured at different points in time. If parents answer "no" to the question "can your child walk without support" at 1.5 it would not evoke the concern that it would if the answer still was "no" at 3 years of age. Including items that are different over time is more appropriate than using the same items at different ages. The items are selected from scales especially composed to capture development and developmental delays at each specific age. A possible consequence is that the latent constructs are operationalized differently at different occasions. Measuring behavior problems, on the other hand, we do not encounter the same challenges. Reaching milestones is not what describes behavior development like the way it describes language and motor development. For externalizing behavior the items included to measure inattention and aggression in paper 3 in this thesis are the same over occasions. If a parent answer "yes" to the question "does your child hit other children?", it would be a concern whether the child was 1.5 or 3 years of age.

Another possible limitation is that items from different instruments are used for measuring motor skills at 3 and 5 years of age. The two main reasons for changing instruments between these two questionnaires were that items in ASQ, used at 1.5 and 3 years of age, work best if the parents follow the instruction in the instrument, and actually test out the individual items before responding to the questionnaire. This was considered by the study group to be an unduly demand in the context of a very long questionnaire.

The other reason was to include a measure showing more variability of scores in a group of 5 year olds. The intention was to make it possible to study typical development and delayed development also in the mild to moderate range and not only severe. It was, however found that the Ireton CDI items at 5 years had the same skewed distribution across response categories as the ASQ had at 1.5 and 3. On the other side, this supports the argument that the two measures can be compared. We acknowledge that if the two distributions had been very different, such a comparison would have been more ambiguous. Expectantly, using two different measures on motor skills have not affected our results.

Verbal and non-verbal IQ

The analyses in paper 1 and paper 2, could be argued to suffer from the lack of control for verbal and non-verbal IQ. It could be argued that the association could be accounted for by this potential confounder. The use of a commendably large cohort reinforces confidence that we are talking about real findings. It would, however have strengthened the study to be able to control for this. We do, however, control for socio-economic position, including mother's education, and child characteristics usually correlated with lower IQ. Our findings are further reinforced by the fact that this did not alter the results. In paper 3, all time dynamic and time invariant confounders are controlled for by using fixed effects models.

The use of cross lagged panel models

The use of cross-lagged panel models has been object to some critique. In 1980 Rogosa wrote that a cross lagged model cannot reveal spurious effects or infer causal directions, and suggests that the use of cross lagged panel models are terminated in psychological research (Rogosa, 1980). This contributed to a halt in its use by psychological researchers. Ten years later Humphreys (1991) argued that a well designed cross-lagged model was still a promising methodology for obtaining clues about causality (Humphreys, 1991). Now, the suggested use of such models is for identifying the relationship between variables over time, and shed light on longitudinal associations between variables that can further our understanding of developmental processes (Selig & Little, 2012). Thus, we do not claim to investigate a causal relationship between language and motor skills, but rather how they influence each other over time.

6. IMPLICATIONS AND FUTURE DIRECTIONS

The aim of the present study was to investigate the relationship between language development and other areas of development during preschool years. First, development of language and motor skills was found to be associated at 1.5, 3 and 5 years of age. Both domains were relatively stable from 1.5 to 3 and from 3 to 5 years of age. Motor skills at 1.5 years of age also predicted language skills at 3 years of age, and language skills at 3 years of age also predicted motor skills at 5 years of age. Second, behavior problems and language delay were associated at 1.5, 3 and 5 years of age. The causal relationships between language delay and aggression and inattention, respectively, were found to be best described as unidirectional, with language delay causing aggression, and reciprocal with language delay and inattention causing each other, in addition to being caused by both time-invariant and time-dynamic factors. These results implicate that the co-occurrence with language delay is substantial for several different areas of development. In general this means that co-occurrence is common in preschool years. More specific, our results suggest that difficulties in preschool years are less specific than is suggested by the corresponding diagnoses. Critique has been directed at several aspects of the diagnostic systems used for categorizing mental problems in childhood. Examples of critiques are the number of categories in the diagnostic systems (Uher & Rutter, 2012), the use of categories rather than continuities (Krueger & Bezdjian, 2009), and limited validity of existing categories (Krueger & Bezdjian, 2009). It has been suggested that unselected groups assessed with bottom–up approaches could pinpoint new directions for how to understand mental illness in the future (Uher & Rutter, 2012). Our results underpin these critiques.

The result in this thesis confirms what have been found by earlier studies that delays in development of language and motor skills, inattention, and aggression, are all risk markers for future problems. All predict future difficulties both within the same domain, and in other domains. It is also important to be aware that co-occurrence in itself might be a risk marker for future difficulties.

6.1. THEORETICAL IMPLICATIONS

A combined theoretical framework is necessary to renew our knowledge about developmental disorders. Prediction across developmental domains, co-occurrence of symptoms, and comorbid diagnoses are the rule rather than the exception. Results from research presented in this thesis support that language development plays a crucial role in developmental psychology as the correlate of motor development and externalizing difficulties. Delays in language development predict delays and problems in all these correlates. Even though these domains are intervened, they also are quite stable throughout preschool development, which might suggest different but correlated etiologies. Results from paper 3 further supports the possibility of different etiologies for inattention and aggression, in relation to language delay. When making research hypotheses for future research it is important to have this in mind.

6.2. CLINICAL IMPLICATIONS

When doing research on young children's mental health, the overall aims of preventing negative development, increasing well-being, identifying symptoms, and getting better treatments are all examples of what is also the motivation for research. We know that development in early ages is characterized by rapid changes and wide variability, and that even between children with severe risk experiences, a substantial proportion of children do not experience serious lasting consequences (Rutter, 1993). Children seen in clinics should be met with an awareness of that symptoms are likely to change quickly, and that comorbidity between disorders, and not the least symptoms, is common.

While our results indicate that associations between language, motor skills and behavior problems hold across large populations, the interest at an individual level might be questioned. Generalizability of results from population based studies to individuals is speculative. Our population is heterogeneous, and we can of course not claim to know how these associations look for each individual, and thus clinical implications should be interpreted with caution. Treatment strategies should be developed in line with current research, but should always be followed by close evaluation.

6.3. FUTURE DIRECTIONS

We need more knowledge, especially on the possible causal mechanisms linking difficulties together. Genetic factors influence developmental change as well as stability and mental development demonstrate heterotypic, as well as homotypic, continuity, meaning that event though the presentation of a developmental domain changes (such as with development of language and motor skills) the underlying phenomena may remain constant (Rutter, 1993).

Research on co-occurrence of developmental and behavioral phenomena in early childhood can be caused by many things. Whereas some co-occurrence might be a result of overlapping diagnostic criteria, some types of co-occurrence probably represent separate subtypes of or even separate disorders from their superior diagnoses (Angold et al., 1999). On the other hand co-occurrence of other symptoms might be epiphenomenal. Different disorders seem to share similar risk factors, which might represent a common cause for different disorders. A challenge for future research will be to entangle the co-occurrence of risk factors and symptoms of specific disorders that are not specific to these disorders. A bottom-up approach to future research on the co-occurrence of developmental delays is warranted.

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I

II

The developmental relationship between language and motor performance from 3 to 5 years of age: A prospective longitudinal population study

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Sources of support/Acknowledgements: The Norwegian Mother and Child Cohort Study is supported by the Norwegian Ministry of Health and the Ministry of Education and Research, NIH/NIEHS (contract no NO-ES-75558), NIH/NINDS (grant no.1 UO1 NS 047537-01), and the Norwegian Research Council/FUGE (grant no. 151918/S10). We would like to thank Eivind Ystrøm for contribution to the statistical analyses. We are grateful to all the participating families in Norway who take part in this ongoing cohort study. This study is supported by EXTRA funds from the Norwegian Foundation for Health and Rehabilitation (2009/0348).

Background: Previous research has found that language and motor skills are interrelated developmental areas. This observation has led to questions about the specificity of these domains, and the nature of the associations. In this study we investigated the longitudinal relationship between language and motor (gross and fine) performance at 3 years and performance in both domains at 5 years.

Methods: We tested the prediction across and within developmental domains using cross-lagged panel models. Additionally, estimates of specificity for each domain were calculated. Analyses were performed using parent reports in a sample of 11 999 children from the general population.

Results: Structural equation modelling revealed predictions from early language performance to later fine motor performance, but not to later gross motor performance. Early motor skills did not predict later language performance. Both language and motor skills were stable from 3 to 5 years of age. Motor development was more stable in boys than girls. Boys turned out to have lower scores than girls on fine motor performance, but gender differences in cross-lagged associations between language and motor performance was insignificant. The variance explained by language performance alone decreased significantly from 68% to 46% in relation to fine motor skills and from 61% to 46% in relation to gross motor skills.

Conclusion: Controlling for stability in the developmental relationship between language and motor performance reveals that from three to five years development of each domain is stable, implicating specific rather than general developmental pathways at this age.

INTRODUCTION

Associations between language and motor skills have frequently been recognized. The developmental pathways of both domains have been described in terms of rapid changes, plateaus, and wide variability [1]. Consequently, it has been difficult to disentangle the associations. Most previous research on this association has focused one-sidedly on either motor profiles in children with Specific Language Impairment (SLI) [2, 3] or language profiles in children with Developmental Coordination Disorder (DCD) [4, 5]. This is in spite of the lack of knowledge about the development and interrelatedness of these skills [1]. Research has been characterized by two main limitations. First, the literature has been dominated by focusing on one out of three perspectives, rather than combining them. These three perspectives are; 1) co-occurrence of difficulties, 2) stability of each domain across time, and 3) prediction from one domain to another across time. Second, most previous studies are hampered by small sample sizes and limited to clinical rather than population based samples, mainly with SLI or DCD. The purpose of the present study is to gain new knowledge about the developmental relationship between language and motor performance by combining the three perspectives described above in a population based longitudinal study.

Descartes claimed that cognition was entirely different from motor development [6]. Later, Piaget argued that cognitive development relies totally on motor functioning, and thus these domains could not be seen as separate [7]. More recently Churchland hypothesized the existence of a continuum of motor and cognitive functions, with lower sensorimotor functions in one end and cognition in the other [8]. Little experimental evidence exists to support either hypothesis [9]. Nowadays, researchers question the specificity of developmental disorders [10]. The frequent overlap in symptoms and co-morbid diagnoses suggests less distinction between clinical groups. When comparing children diagnosed with SLI or DCD to children

with no previously suspected disorder but with low standard language scores or low standard motor scores, it was found that diagnosed children were more pervasive underachievers on a large set of measures additional to what the specific disorder should account for [11]. This observation suggests that a broader developmental focus should be employed both in research and in clinical practice.

Arguments for grouping together neurodevelopmental disorders, such as language and motor difficulties have been put forward [5, 12]. These disorders have several common features [13]. They involve similar neural structures, and the development is characterized by a delay/deviance rather than a remission or relapse [14]. Both disorders involve some degree of cognitive impairment and have a marked male preponderance [13].The genetic influences on individual differences in both domains are quite strong [15, 16]. Language difficulties have been found to be highly hereditary [16], and children with DCD have been found to have common genetic traits to children with SLI [17]. More research is needed on potential common genetic factors influencing development of both skills. Factors such as socio-economic status [18], parental history of difficulties [19], or low birth weight [20] are known to influence both language and motor skills. Thus, a child with slow development in one of the domains will also be at risk of developing late in the other. Studying at risk populations, two literature reviews have concluded that contrary to the definition of SLI, people with SLI may exhibit non- linguistic problems, such as impairments of gross and fine motor skills, and other functional problems [21, 22]. These findings are consistent with the results from a meta-analysis of 14 clinical studies indicating an association between motor and language delay in children [23]. Comparing language profiles in children with DCD or SLI to controls, results showed that the language profiles of children with either DCD or SLI are similar in the majority of cases [24]. Also, research comparing language profiles in children with SLI or

DCD has shown that both groups are significantly lower than controls on motor scores [2]. Even though tests for assessing language and motor skills differ across studies, an overall conclusion of previous literature is that children with SLI are characterised by deficits in both gross and fine motor skills [21].

Few longitudinal studies have investigated developmental stability of language and motor skills in general populations [25], and results are inconsistent. About half of late talkers, and about half of children with motor delay catch up with their peers [25, 26].

Symptoms of delayed or deviant language development are related to a variety of different developmental outcomes such as ADHD, emotional and behavioural problems [27, 28]. Likewise, impaired motor function early in life has been found to be a precursor of problems with language acquisition later on [29, 30]. Only a few studies have analysed the relationship between language and motor development longitudinally in community samples. Piek and colleagues [31] studied the relationship of early motor development and school age motor and cognitive development in 33 typically developing children. They demonstrated that parent-reported scores on the Ages and Stages Questionnaire (ASQ), measuring gross motor skills during infancy, predicted later motor and cognitive performance [31]. These results are consistent with the claims that early locomotor experiences are an essential agent for developmental change [1, 32]. However, the association was limited to working memory and speed of processing only and no association was found between early motor and later verbal comprehension [31]. Another study of typical language development in 102 children between 9 and 23 months demonstrated large variability in both gross and fine motor scores within each infant, between infants, and across developmental domains [33]. Further, one study on 21 month old children [34], investigated various motor skills in association with language

production, comprehension, **and** complexity. Results showed associations between motor performance and some, but not all measured aspects of language development. These studies do not support a clear predictive value from one domain to the other. Some studies support separate domains while others suggest that motor skills are a prerequisite for language development [1] or that language predicts motor performance [35].

In a previous study we have investigated the relationship between language and motor skills in typically developing children from 1 ½ to 3 years of age [36]. This study explored the association between language and motor skills both concurrently and over time. The results showed that whereas both skills were quite stable, early motor performance was an equally strong predictor of later language performance as was early language performance. Early language performance did not predict later motor performance. At 1 ½ years of age typically developing children are in the beginning of rapid changes in development in both language and motor performance [33]. At the age of three, however, most children are able to use and understand basic language, and are also able to move around and manipulate their physical environment [32]. It is therefore important to see whether findings based on children at 1 ½ to 3 years can be replicated at older ages.

In the present study we investigate the co-occurrence, stability, and change in both domains from 3 to 5 years of age in a large, prospective longitudinal community study. This study is based on the sample from our previous study. Our main aim is to scrutinize the developmental relationship between language and fine and gross motor performance. More specifically we hypothesise; there are cross-sectional correlations – language and motor performance is associated at both 3 and 5 years of age; performance at three years of age predicts performance at five years of age within and across domains – change in language

performance predicts change in motor performance, and change in motor performance predicts change in language performance; there are gender differences – boys have poorer skills in both language and motor domains, and we explore whether this potential gender difference influence the relationship between and across domains over time. We also investigate the specificity of each developmental domain.

METHODS

Participants

The Norwegian Mother and Child Cohort Study (MoBa) is a prospective population-based pregnancy cohort study conducted by the Norwegian Institute of Public Health [37]. Participants were recruited from all over Norway from 1999-2008. A total of 38.5% of invited women consented to participate. The cohort now includes 109 018 children. Follow-up is conducted by questionnaires at regular intervals and by linkage to national health registries. The study was approved by the Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate.

By June 2011 (data release version 5), 25 474 children had turned five years of age and were thus eligible for the present study. Data from three waves of data collection were used; 17 weeks (Q1), 3 years (Q6), and 5 years (Q5yr). We also used data from the Medical Birth Registry of Norway (MBRN). For inclusion in this study, mothers must have answered both the 3-year questionnaire and the 5-year questionnaire. A total of 12 383 children satisfied this criterion. A total of 384 children were excluded because of serious physical malformations, cerebral palsy, Down's syndrome, cleft palate or because of missing information on MBRN

data. This gave a total number of 11 999 participants (6 025 boys and 5 974 girls), corresponding to 47 % of the eligible 5 year olds.

Demographic, health-, pregnancy- and birth-related variables have previously been examined to investigate potential self-selection bias in MoBa. Despite risk prevalence differences between the sample and the population, estimates of risk exposure and child developmental outcomes were not significantly different when MoBa participants were compared with the entire population of Norwegian mothers [38].

Measures

Language skills

Language skills were assessed through maternal ratings on selected items from the Ages and Stages Questionnaire (ASQ) [39] included in the MoBa questionnaires. The ASQ has been validated in a Norwegian sample and found to be a successful diagnostic tool for developmental difficulties [40]. At three years, language was measured by six ASQ items, and at five years, by seven ASQ items. All items had three response categories (yes, sometimes, and not yet). Because the ASQ originally was intended as a screening tool, most items had skewed distribution across response categories. One item at 5 years singled out with 99.5 % responding “yes”, meaning that virtually all children mastered the skill and was excluded (Question 3: Does your child use four- and five- word sentences? For example, does your child say, “I want the car”?). More information on the items is presented in an appendix.

Motor skills

Fine and gross motor skills at three years were assessed through maternal ratings on four items from the ASQ. All items had three response categories (yes, sometimes, and not yet). At

five years motor skills were measured by ten items (five items on gross and five on fine motor skills) from Child Development Inventory (CDI) [41]. At five years one item indicating gross motor skills was excluded because of low factor loadings to the latent variable (< .40) (question 5: Rides a two-wheeled bike, with or without training wheels). The distribution of responses to CDI-items was also skewed (See appendix for further information).

Covariates

Information on the child's APGAR scores five minutes after birth, birth weight, and gestation length, was retrieved from MBRN. Information on parents' age, income, education and Norwegian language background was gathered during pregnancy (Q1). Information about maternal psychological distress (anxiety and depression) was assessed using Hopkins Symptom Checklist-5 (SCL-5), a five-item short version of the SCL at both 3 and 5 years. The short version used has been shown to have good construct validity [42]. Information on the child's age at return of the questionnaires was included as covariate at both 3 and 5 years.

Analyses

The relationships among latent variables were examined with cross-lagged panel models. The models specified associations between language performance and motor performance at 3 years, auto-regression coefficients for each of the factors, cross-lagged regression coefficients, and association between language performance and motor performance at 5 years (see Figure 1 and 2).

The structural equation model (SEM) analyses were done using Mplus 6 [43]. Because of the non-normal distribution of several variables in the study, estimation procedures robust to

deviations from the normal distribution were utilized in all SEM analyses. Weighted least square parameter estimates using a diagonal weight matrix with standard errors and mean- and variance adjusted chi-square test statistic that use a full weight matrix (WLSMV) [43] were used.

Models including control for communication and motor skills at 1 ½ years of age were also estimated, but did not alter the relationship between language and motor skills from 3 to 5 years of age in a noteworthy manner. Results from analyses of this relationship from 1 ½ to 3 years of age is presented elsewhere [36].

Finally, analyses were done to calculate the percentage of shared and specific variance for the latent factors at three and five years.

Missing data

WLSMV estimation works in four steps and uses a procedure for handling of missing with elements from maximum likelihood estimation and pairwise present deletion. This procedure was used for outcome measures. Missing value analysis (MVA) and an expectation-maximization (EM) algorithm were used to impute missing values for co-variates using SPSS [44].

RESULTS

Measurement models

Exploratory factor analyses showed that language and motor measures represented two distinct domains at each point in time. The items clustered as expected on all latent variables, except for fine motor skills at 5 years, where one item loaded on both fine and gross motor skills (question 1: Puts together a puzzle with nine or more pieces). Responses on this item were also severely skewed across response categories, and the item was excluded from the subsequent analyses. Next, we conducted confirmatory factor analyses (CFA) on the two waves of data to validate the factor structure of the latent variables language at 3 and 5 years and gross and fine motor skills at 5 years. CFA conducted for language at 3 years of age showed that the standard estimates ranged from .71 to .88 for the six items (Comparative fit index (CFI) =.994, Tucker Lewis Index (TLI) =.989, root mean square error of approximation (RMSEA) =.024). At 5 years the standard estimates for the six items indicating language at 5 years ranged from .64 to .87, (CFA=.988, TLI=.981, RMSEA=.029). The standard estimates for the four items indicating gross motor skills at 5 years ranged from .52 to .92 , (CFA=.992, TLI=.977, RMSEA=.032) whereas the standard estimates for the four items indicating fine motor skills ranged from .74 to .83 (CFA=.997, TLI=.991, RMSEA=.034). Two items were available for indicating fine, and two for gross motor skills at 3 years. The standard estimates for these items were fixed to be equal.

Before including the latent variables in structural models, correlation estimates between all latent variables, and the observed variables for gross and fine motor skills at 3 years (see Table 1), were computed independently of each other. All correlations were highly significant.

[*Insert table 1 about here*]

Cross-lagged panel models

The latent variables from the measurement models were included in two two-wave cross-lagged panel models. The models allowed all structural parameters to be freely estimated, providing good model fit both when including measures of fine (CFI= .983, TLI=.981, RMSEA=.011), and measures of gross motor skills (CFI= .965, TLI=.960, RMSEA=.015). The first model produced $\chi^2(N = 11483) = 885.894$, $p = .000$ with 354 degrees of freedom, whereas the second produced $\chi^2(N = 11483) = 1225.438$, $p = .000$ with 354 degrees of freedom. The structural models are presented in figure 1 and 2.

Language and fine motor skills

At 3 years, children's language was positively associated with fine motor performance, with the correlation between language and fine motor skills being .44. The regression coefficient for language from 3 to 5 years was .79, and the regression coefficient for fine motor performance from 3 to 5 years was .43. A Wald chi-square test showed that these regression coefficients were significantly different ($p=.000$). The cross-lagged coefficient for language on fine motor performance was .24 ($p=.000$), indicating that language performance at 3 years predicted fine motor performance at 5 years. The cross-lagged coefficient for fine motor on language performance was .00 (ns). A Wald test showed that the cross-lagged coefficients were significantly different ($p=.000$), indicating a weaker prediction from early fine motor performance to later language performance than from early language to later fine motor performance. A Wald test comparing the regression coefficients of early language and fine motor performance on later language performance showed a significant difference ($p=.000$), indicating that early language is better than early fine motor performance at predicting later

language performance. A Wald test comparing the regression coefficients of early language and fine motor performance on later fine motor performance was significant (*p=.000*), indicating that early fine motor performance were a better predictor of later fine motor performance than were early language performance.

Language and gross motor skills

The correlation coefficient for language and gross motor skills at 3 years were .30, and .11 at 5 years. The regression coefficient for language from 3 to 5 years was .80, and for gross motor the regression coefficient was .56. These coefficients were not significantly different (*p=000*). The cross-lagged coefficient for early language on later gross motor skills was .13, and was significantly different from the cross-lagged coefficient for early gross motor on later language skills -.03 (*p=000*). Language at 3 years of age was a significantly better predictor of later language performance than gross motor skills (*p=.000*) and gross motor skills at 3 years of age was a significantly better predictor of later gross motor skills than language performance at 3 years of age (*p=.000*).

[*Insert figure 1 about here*]

Longitudinal domain specificity

Also a significant increase of shared variance with both fine and gross motor development was found for language development (table 2). An in-significant decrease of shared variance with language development was found for both fine and gross motor development from 3 to 5 years of age (overlapping confidence intervals). In relation to fine motor skills, the variance specific to language decreased from 68% to 46%, whereas in relation to gross motor the decrease was from 61% to 46%. For fine motor skills the variance specific to this domain

increased from 43% at 3 years to 53% at 5 years, and for gross motor skills the variance specific to this domain increased from 33 to 59% from 3 to 5 years of age.

[Insert table 2 about here]

Gender differences

Girls performed better than boys on all indicators both for language and motor skills at both ages. The largest differences were found in fine motor skills at 5 years (see appendix). To investigate whether there were differences in the relationships between the latent variables in the final model a multi-group analysis was performed to compare boys and girls on all relevant parameters. Wald chi-square tests revealed significant gender differences both in the cross-lagged model for fine and for gross motor skills. (Table 3). All parameters except the regression coefficient for early motor skills (both gross and fine) on later language skills were significant for both boys and girls in the multi-group analyses. A decomposition of variance similar to the one shown in table 2 was also done for girls and boys separately (table not shown). No gender differences proved significant, except for a decrease in shared variance with language for gross motor skills in boys.

[Insert table 3 about here]

[Insert table 4 about here]

DISCUSSION

The aim of this study was to examine the development of language and motor performance in children from 3 to 5 years of age and associations between the two domains cross-sectionally as well as prospectively. Our main finding was that the autocorrelations for both language and motor performance is high and stable over time. However, the predictive power from one domain to the other found by earlier research [35] was weak in our study. Earlier studies have shown that a large proportion of children with impairments in one area also have impairments in the other [24]. This has led to the conclusion that these difficulties are not as specific as the diagnoses presume. Our results challenge this assumption and indicate that between 3 and 5 years of age in the general population the stability within is much higher than the effect one domain has on the other. Further, we found that language is more stable than motor development at this age. Whereas language had a significant increase in shared variance with motor performance, the variance motor performance share with language performance over time decreased.

The direct effect of motor performance at 3 on later motor performance was high. The zero order correlation between motor performance at 3 years and later language performance was also quite high. However, when controlling for the early correlation between motor performance and language performance as well as direct effects of motor and language performance from 3 to 5 years, early motor performance was no longer associated with later language performance.

The direct effect of language skills at 3 on language skills at 5 years of age was also high. In contradiction to the predictive power of fine motor skills on language skills, language at three

years of age were associated with later fine motor performance over and above what was explained by the correlation at three years and the stability of each domain from three to five years of age. This indicates that something specific about language at three years is indicative of fine motor performance at five years of age. This finding is supported by the overall most common finding in previous literature, that as many as half of the children with language delays in pre-school years later develop motor difficulties [35]. Early language development thus seems to have a unique contribution to later motor development. This finding can also be indicative of a more general and common underlying developmental process. However, the association is not very strong, and the same relationship was not found for gross motor skills.

As expected [45], we found that boys to some degree had lower scores on the measures of language and motor performance than girls. Yet, the relationships between the latent variables were not significantly different, except for the correlation at three years of age. This implies that in spite of differences in performance level, the developmental relationship of language and motor skills is similar across gender.

The previous study on this population (from 1 ½ to 3 years of age) also used methods adjusting for stability when investigating the developmental relationship across these domains [36]. The main results from the current study were consistent with the earlier results with some exceptions. Whereas from 3 to 5 years of age language predicted motor development, this association was not significant from 1 ½ to 3. On the other hand motor performance from 3 to 5 did not predict language at five, whereas this was a significant association from 1 ½ to 3. Wide individual variability in typical development at 1 ½ makes defining late development more problematic. In contrast, defining a late developer at three is easier. In motor development however, more visible milestones like independent walking, occur early. At

three years of age the easiest assessable milestones are reached [46], and the variation in performance no longer predicts performance in language skills at five. Thus it seems that development before the age of three is different from development after three years of age in both domains.

Conclusions from these results should be considered in light of the strengths and limitations of the study. A major strength of the current study is the prospective-longitudinal design and the community-based sample [47]. Another strength is the examination of the relationship in a cross-lagged panel model where relations between domains are controlled for development within each domain [48]. Most previous findings on the association between language and motor performance come from studies using clinical samples and have, therefore, been subject to help seeking biases [49]. Disorders in both domains have their onsets in early to late childhood. When doing research on clinical groups, some cases might be left out or, as shown by Dyck and Piek, [11] children seen by specialists have more severe symptoms than undiscovered cases. Furthermore, if there is a true association between these domains, children seen by specialists are already at risk of cognitive problems because of their motor problems or vice versa [9]. Thus, population based samples are necessary to find the true developmental relationship between these domains.

Some limitations should also be considered. First, although sampled from all women giving birth all over Norway, the MoBa cohort may not represent the whole Norwegian population. Both participation rate and response rate are somewhat low. This may have led to a selected sample of participants. Second, since a large scale study makes it difficult to assess each child on clinical measures, questionnaires must serve as the information source. When observation is not possible, measures of children's skills and performances must be based on

mother's reports. Mothers have been found to be trusted raters of their child's language skills [50]. However, we must also concider the possibility that some of the shared variance found in this study was due to verbal instructions being used for getting children to perform on the motor tasks in the both the ASQ and the CDI. Third, different measures are used across different studies, and this makes it difficult to compare results from one study to the other. In the current study different measurements are used across time. This might impact the results (For more information on included items, see appendix). Further, even though there is variation in both domains, there is a ceiling effect, especially for girls. Thus, the variability captured in this study might best describe the variation of a population of children at risk rather than children in the higher end of language and motor performance. Nevertheless, longitudinal studies contribute to better understanding of the progress and decline of development.

The clinical implication of findings in the current study is that identification of difficulties at one point in time alone does not necessarily tell anything about potential future difficulties. Motor performance at 1 ½ years predicted both language and motor performance at three [36], but motor performance at 3 did not predict language performance at five. The opposite was true for language performance. This shows that the cross-correlations were different between the two studies. However, we found high stability within each domain, and a high association between the two at all time-points. Additionally we find an increase in the variance motor skills share with language skills over time. Thus, it seems like the two domains develop to be more interrelated over time. Assessment of both difficulties at more than one occasion is recommended.

CONCLUSION

The trend in research has turned from focusing on specific motor and/or language impairments to conceptualizing problems co-occurring in developmentally disordered children. Children with highly specific deficits are the exception rather than the rule [12]. This picture can be further nuanced by results from the current study. This study is among the first to investigate the developmental relationship between the two domains during childhood. In general, the results confirm what has been found earlier, namely that the two domains are related. But the picture seems to be more complex. First, our results indicate that the relationship is dependent of age. We clearly see a developmental relationship of language and motor performance in but the relationship changes from early to later preschool years. Second, we find that controlling for the direct effects over time within each domain is necessary to uncover the true relationships across these two domains. Third, both domains show stability outperforming the prediction from one domain to the other from three to five years of age. This is consistent with the idea of two separate but associated developmental pathways, and is in contrast to the hypothesis of delays in these domains being general in nature rather than separate disorders.

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Table 1 *Unadjusted correlations between language and motor performance at 3 and 5 years of age*

	Lang 3	**Gross 3**	**Fine 3**	**Lang 5**	**Gross 5**	**Fine 5**
Language 3	1	.57 ***	.42***	.78 ***	.42 ***	.41***
Gross motor 3		1	.67***	.48 ***	.67 ***	.39***
Fine motor 3			1	.34***	.53***	.53***
Language 5				1	.72 ***	.55***
Gross motor 5					1	.55***
Fine motor 5						1

*** Significant at p<.000

Table 2 *Variance that each developmental domain share with the other at each time point*

	3 years of age Var (95% CI)	**5 years of age Var (95% CI)**
Language:	0.323 (.288-.359)	0.540 (.500-.581)
Fine motor:	0.576 (.501-.650)	0.470 (.426-.451)

	3 years of age Var (95% CI)	**5 years of age Var (95% CI)**
Language:	0.398 (.349-.446)	0.544 (.488-.601)
Gross motor:	0.674 (.541-.807)	0.413 (.340-.486)

Table 3 *Gender differences on model parameters*

Language and fine motor skills	**Boys**	**Girls**	***p*-value**
B L3-L5	.732	.849	.041*
B L3-FM5	.235	.944	.057
B FM3-FM5	.396	1.749	.040*
B FM3-L5	.024	.045	.800
cov L3-FM3	.187	.218	.299
res cov L5-FM5	.157	.507	.077
var L3	.695	.641	.825
res var L5	.263	.240	.363
var FM3	.344	.336	.825
res var FM5	.570	3.749	.224
Language and gross motor skills	**Boys**	**Girls**	***p*-value**
B L3-L5	.725	.858	.061
B L3-GM5	.037	.116	.491
B GM3-GM5	.940	.346	.015*
B GM3-L5	.045	-.001	.653
cov L3-GM3	.250	.400	.003**
res cov L5-GM5	.129	.066	.124
var L3	.704	.663	.489
res var L5	.266	.241	.477
var GM3	.343	.631	.004**
res var GM5	.472	.133	.003**

B= regression coefficients, cov= covariance coefficients, res cov= residual covariance coefficients, var= variance, res var= residual variance, L3=language skills at 3 years, L5=language skills at 5 years, FM3= fine motor skills at 3 years, FM5=fine motor skills at 5 years, GM3=gross motor skills at 3 years, GM5=gross motor skills at 5 years. All parameters are unstandardized estimates.

Figure 1 Results from cross-lagged panel analysis. Correlations, auto regressive-, and cross, lagged correlations between language and fine motor performance at 3 and 5 years of age.

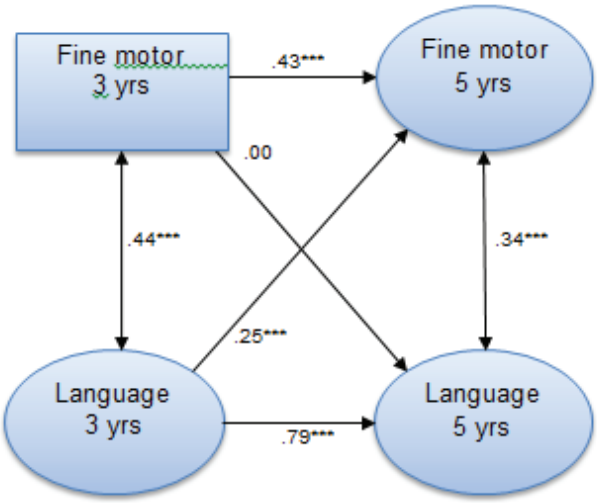
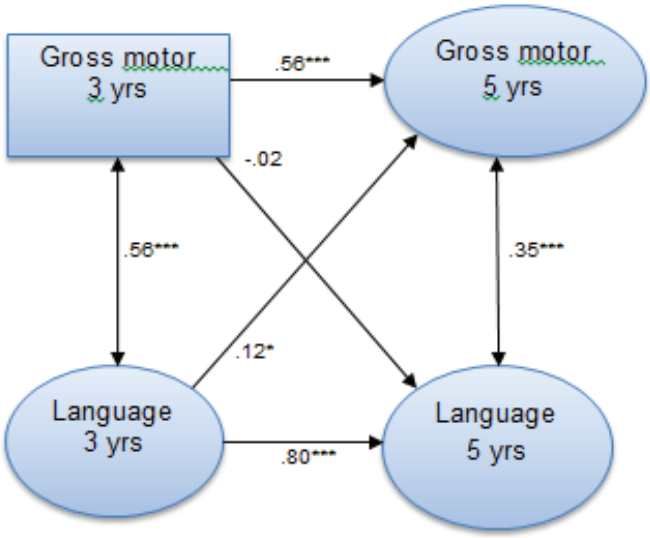


Figure 2 Results from cross-lagged panel analysis. Correlations, auto regressive-, and cross, lagged correlations between language and gross motor performance at 3 and 5 years of age.



III

APPENDIX I

Questionnaire 1
15th week of pregnancy

den norske Mor & barn undersøkelsen

Questionnaire 1

This questionnaire will be processed by a computer. It is therefore important that you follow these instructions:

- Please use a blue or black ballpoint pen.
- Put a cross in the box that is most relevant like this:
- Should you put a cross in the wrong box correct it by
- In the large green boxes write a number or a capital l
  It is important that you only write in the white area of

Please do not use this questionnaire. Contact us at morbarn@fhi.no or phone + 47 53 20 40 40 if you need a questionnaire.

Number: 0 1 2 3 4 5 6 7 8 9 Letter: A B C D

- When filling in a single figure in boxes containing two or more squares, please use the square to the right. Example: 5
- A number of questions in this questionnaire concern the week of pregnancy. For example, fill in week 5 for something that occurred 5 weeks after your last period.
- Specific information concerning, for example, medication or profession should be written in the boxes or on the lines provided. Please write clearly in CAPITAL LETTERS.
- Remember to provide the date when you completed the questionnaire.

Please return the completed questionnaire in the stamped addressed envelope provided.

Date on which the questionnaire was completed ☐☐ Day ☐☐ Month ☐☐☐☐ Year (write the year with 4 numbers, e.g. 2000)

Menstruation

1. How old were you when you had your first menstrual period?

☐☐ Years

2.How many days are there usually between the first day in your menstrual period and the first day in your next menstrual period?

☐☐ Days

3. Are you usually depressed or irritable before your period?

☐ No
☐ Yes, but just slightly
☐ Yes, noticeably
☐ Yes, very much

4. If yes, does this feeling disappear after you get your period?

☐ No
☐ Yes

5. Were your periods regular the year before you became pregnant?

☐ No
☐ Yes

6. During the last year before you became pregnant, did you lose your period for more than three months?

☐ No
☐ Yes, due to an earlier pregnancy
☐ Yes, for other reasons

7. Date of first day of last menstrual period.

☐☐ Day ☐☐ Month ☐☐☐☐ Year

8. Did your last menstrual period come at the expected time?

☐ No
☐ Yes

9. Are you certain about the date of first day of last menstrual period?

☐ Certain
☐ Uncertain

10. Describe the duration, amount of bleeding and menstrual pains of your last period ?

	As usual	More than usual	Less than usual
Duration	☐	☐	☐
Amount of bleeding	☐	☐	☐
Menstrual pains	☐	☐	☐

Contraception and pregnancy

11. Have you/your partner at any time during the last year used the following methods to avoid becoming pregnant? (Fill in all that apply.)

- ☐ Condom
- ☐ Diaphragm
- ☐ IUD
- ☐ Hormone IUD
- ☐ Hormone injection
- ☐ Mini pill
- ☐ Pill
- ☐ Spermicides (foam, suppositories, cream)
- ☐ Safe period
- ☐ Withdrawal
- ☐ No such methods
- ☐ Other_____

12. If you have used the pill/mini-pill, how long altogether have you used them?

	Pill	Mini-pill
Less than one year	☐	☐
1-3 years	☐	☐
4-6 years	☐	☐
7-9 years	☐	☐
10 years or more	☐	☐

13. If you have used the pill/mini-pill, how old were you when you first used it?

☐☐ Years old

14. Were you taking the pill/mini-pill during the last 4 months before this pregnancy?

- ☐ No
- ☐ Yes

15. If yes, how long before your last menstrual period did you stop taking the pill/mini-pill?

☐☐ Weeks

16. Was this pregnancy planned?

- ☐ No
- ☐ Yes

17. If yes, how many months did you have regular intercourse without contraception before you became pregnant?

- ☐ Less than I month
- ☐ 1-2 months
- ☐ 3 months or more

☐☐ Number of months if more than 3

18. Did you become pregnant even though you or your partner used contraceptives?

- ☐ No (proceed to question 21)
- ☐ Yes

19. If yes, which type? (Fill in all that apply.)

- ☐ Condom
- ☐ Diaphragm
- ☐ IUD
- ☐ Hormone IUD
- ☐ Hormone injection
- ☐ Mini pill
- ☐ Pill
- ☐ Spermicides (foam, suppositories, cream)
- ☐ Safe period
- ☐ Withdrawal
- ☐ Other_____

20. If you became pregnant while using an IUD, has it now been removed?

- ☐ No
- ☐ Yes

21. How long have you and the baby's father had a sexual relationship?

☐☐ months or ☐☐ years

22. How often did you have sexual intercourse during the four weeks before you became pregnant and during the last four weeks?

	Before	Now
Every day	☐	☐
5-6 times a week	☐	☐
3-4 times a week	☐	☐
1-2 times a week	☐	☐
1-2 times every two weeks	☐	☐
Less than 1-2 times every 2 weeks	☐	☐
Never	☐	☐

23. Have you ever been treated for infertility?

- ☐ No
- ☐ Yes

24. If yes, was it in connection with this pregnancy or an earlier pregnancy and what type of treatment did you have? (Fill in all that apply.)

	Earlier Pregnancy	This Pregnancy
Fallopian tube surgery	☐	☐
Other surgery	☐	☐
Medication for endometriosis	☐	☐
Hormone treatment	☐	☐
Insemination (injection of sperm)	☐	☐
IVF (test tube) method	☐	☐
Other	☐	☐

25. Have you been given information about having an amniocentesis performed?

- ☐ No
- ☐ Yes

26. What was your blood pressure at your first antenatal visit? (Check your medical card.)

☐☐☐/☐☐☐ E.g. 150/95

27. What did you weigh at the time you became pregnant and what do you weigh now (in kilograms)?

When I became pregnant : ☐☐ kg Now: ☐☐ kg

28. How tall are you?

☐☐ cm

29. How tall is the baby's father?

☐☐ cm

30. How much does the baby's father weigh (in kilograms)?

☐☐ kg

Previous pregnancies

31. Have you been pregnant before? (Include all pregnancies that ended in abortion, miscarriage or stillbirth as well)

☐ No (proceed to question 36)
☐ Yes

32. If yes, fill in for all earlier pregnancies. Include all pregnancies that ended in abortion, miscarriage or stillbirth as well as ectopic pregnancies. State the year the pregnancy began, how many kilos you gained during the pregnancy and the number of months you breast-fed each baby. State whether or not you smoked during earlier pregnancies.

Pregnancy Number	Year pregnancy started	Live infant born	Spontaneous abortion/ stillbirth	Termination of pregnancy	Ectopic pregnancy	Week of pregnancy for abortion/ still birth	Number of months breast feeding	Weight gain during pregnancy (in kg)	Smoked during pregnancy
1		☐	☐	☐	☐				☐
2		☐	☐	☐	☐				☐
3		☐	☐	☐	☐				☐
4		☐	☐	☐	☐				☐
5		☐	☐	☐	☐				☐
6		☐	☐	☐	☐				☐
7		☐	☐	☐	☐				☐
8		☐	☐	☐	☐				☐
9		☐	☐	☐	☐				☐
10		☐	☐	☐	☐				☐

33. Have you had any of the following problems during previous pregnancies? (Fill in all that apply.)

	No	Yes
1. Pelvic girdle pain requiring medical leave	☐	☐
2. Pelvic girdle pain requiring bed rest	☐	☐
3. Serious nausea and vomiting	☐	☐
4. Pre-eclampsia during pregnancy	☐	☐
5. Pregnancy diabetes	☐	☐
6. Sugar in urine	☐	☐
7. Problems with incontinence	☐	☐

34. If you had pelvic girdle pain in a previous pregnancy that led to bed rest or medical leave, when did the pain start?

☐☐ months after start of pregnancy

35. When did the pain stop?

☐☐ months after pregnancy
☐ still have pain

Illnesses and health problems during this pregnancy

36. Have you had bleeding from the vagina once or more during this pregnancy?

☐ No
☐ Yes

37. If yes, describe the first and last bleeding. Give the date the bleeding started, how many days the bleeding lasted and how much you bled.

	Date when bleeding started			No. of days variation	(Enter a cross in a box indicating the amount of blood (trace blood means a few drops) Amount		
	Day	Month	Year				
First bleeding	☐☐	☐☐	☐☐☐☐	☐☐	☐ Trace of blood	☐ More than just a trace	☐ Clots
Last bleeding	☐☐	☐☐	☐☐☐☐	☐☐	☐ Trace of blood	☐ More than just a trace	☐ Clots

If more than two episodes of bleeding write in the number of times ☐☐

38. Have you experienced any of the following illnesses or problems during this pregnancy? If you have used medication in connection with these problems give the name of the medicine, the weeks you took the medicines and how many days you took them. (Include all types of medication, both prescription and over the counter medicines in addition to alternative and herbal remedies. Do not include vitamins and dietary supplements as these are discussed elsewhere.)

Illness/health problem during this pregnancy					Use of medication during this pregnancy					
	Week of pregnancy					Week of pregnancy				Number of days taken
Illness/health problem	0-4	5-8	9-12	13+	Name of medicine taken	0-4	5-8	9-12	13+	
1 Pelvic girdle pain	☐	☐	☐	☐		☐	☐	☐	☐	
2 Abdominal pain	☐	☐	☐	☐		☐	☐	☐	☐	
3 Back pain	☐	☐	☐	☐		☐	☐	☐	☐	
4 Neck and shoulder pain	☐	☐	☐	☐		☐	☐	☐	☐	
5 Nausea	☐	☐	☐	☐		☐	☐	☐	☐	
6 Nausea with vomiting	☐	☐	☐	☐		☐	☐	☐	☐	
7 Vaginal thrush	☐	☐	☐	☐		☐	☐	☐	☐	
8 Vaginal catarrh/unusual discharge	☐	☐	☐	☐		☐	☐	☐	☐	
9 Pregnancy itch	☐	☐	☐	☐		☐	☐	☐	☐	
10 Constipation	☐	☐	☐	☐		☐	☐	☐	☐	
11 Diarrhoea/gastric flu	☐	☐	☐	☐		☐	☐	☐	☐	
12 Unusual tiredness/sleepiness	☐	☐	☐	☐		☐	☐	☐	☐	
13 Sleeping problems	☐	☐	☐	☐		☐	☐	☐	☐	
14 Heartburn/reflux	☐	☐	☐	☐		☐	☐	☐	☐	
15 Oedema	☐	☐	☐	☐		☐	☐	☐	☐	
16 Fever with rash	☐	☐	☐	☐		☐	☐	☐	☐	
17 Fever over 38.5 C	☐	☐	☐	☐		☐	☐	☐	☐	
18 Common cold	☐	☐	☐	☐		☐	☐	☐	☐	
19 Throat infection	☐	☐	☐	☐		☐	☐	☐	☐	
20 Sinusitis/ear infection	☐	☐	☐	☐		☐	☐	☐	☐	
21 Influenza	☐	☐	☐	☐		☐	☐	☐	☐	
22 Pneumonia/bronchitis	☐	☐	☐	☐		☐	☐	☐	☐	
23 Sugar in urine	☐	☐	☐	☐		☐	☐	☐	☐	
24 Protein in urine	☐	☐	☐	☐		☐	☐	☐	☐	

Previous and current illnesses and health problems

39. Do you have or have you had any of the following illnesses or health problems? If you have taken medication (tablets, mixtures, suppositories, inhalers, creams, etc.) in conjunction with the illness or health problem give the name(s) of the medication(s) and when you took them.

Illness/health problem during this pregnancy		Use of medication						
Illness/health problem	Before Pregnancy	During Pregnancy	Name of medicines	Last 6 months before pregnancy	Pregnancy week 0-4	5-8	9-12	13+	Number of days used
Asthma/Allergy/Skin disorders									
1 Asthma	☐	☐	_____	☐	☐	☐	☐	☐	
2 Hay fever, pollen allergy	☐	☐	_____	☐	☐	☐	☐	☐	
3 Animal hair allergy	☐	☐	_____	☐	☐	☐	☐	☐	
4 Other allergy	☐	☐	_____	☐	☐	☐	☐	☐	
5 Atopic dermatitis (childhood eczema)	☐	☐	_____	☐	☐	☐	☐	☐	
6 Urticaria (hives)	☐	☐	_____	☐	☐	☐	☐	☐	
7 Psoriasis	☐	☐	_____	☐	☐	☐	☐	☐	
8 Other eczema	☐	☐	_____	☐	☐	☐	☐	☐	
9 Cold sores (herpes)	☐	☐	_____	☐	☐	☐	☐	☐	
10 Acne/pimples (serious)	☐	☐	_____	☐	☐	☐	☐	☐	
Diabetes									
11 Diabetes treated with insulin	☐	☐	_____	☐	☐	☐	☐	☐	
12 Diabetes not treated with insulin	☐	☐	_____	☐	☐	☐	☐	☐	
Heart/Blood/Metabolism/Blood vessels									
13 Congenital heart defect	☐	☐	_____	☐	☐	☐	☐	☐	
14 Other heart disease	☐	☐	_____	☐	☐	☐	☐	☐	
15 High cholesterol	☐	☐	_____	☐	☐	☐	☐	☐	
16 High blood pressure	☐	☐	_____	☐	☐	☐	☐	☐	
17 Hypothyroidism or hyperthyroidism	☐	☐	_____	☐	☐	☐	☐	☐	
18 Anaemia/low haemoglobin	☐	☐	_____	☐	☐	☐	☐	☐	
19 B-12/folic acid insufficiency	☐	☐	_____	☐	☐	☐	☐	☐	
Gastrointestinal									
20 Hepatitis/jaundice	☐	☐	_____	☐	☐	☐	☐	☐	
21 Gall stones	☐	☐	_____	☐	☐	☐	☐	☐	
22 Duodenal/stomach ulcer	☐	☐	_____	☐	☐	☐	☐	☐	
23 Crohn's disease/ulcerative colitis	☐	☐	_____	☐	☐	☐	☐	☐	
24 Celiac sprue (gluten sensitivity)	☐	☐	_____	☐	☐	☐	☐	☐	
25 Other gastro-intestinal problems	☐	☐	_____	☐	☐	☐	☐	☐	
Muscle/Skeleton/Connective tissue									
26 Arthritis (rheumatoid arthritis)/ Bechterev's reflex	☐	☐	_____	☐	☐	☐	☐	☐	

Illness/health problem during this pregnancy			Use of medication					
Illness/health problem	Before Pregnancy	During Pregnancy	Name of medicines	Last 6 months before pregnancy	Pregnancy week 0-4	5-8	9-12	13+	Number of days used
27 Lupus (SLE)	☐	☐		☐	☐	☐	☐	☐	
28 Sciatica	☐	☐		☐	☐	☐	☐	☐	
29 Fibromyalgia	☐	☐		☐	☐	☐	☐	☐	
Genital and urinary tract									
30 Ovary/fallopian tube infection	☐	☐		☐	☐	☐	☐	☐	
31 Endometriosis	☐	☐		☐	☐	☐	☐	☐	
32 Uterus prolaps	☐	☐		☐	☐	☐	☐	☐	
33 Ovarian cyst	☐	☐		☐	☐	☐	☐	☐	
34 Myoma	☐	☐		☐	☐	☐	☐	☐	
35 Cervical cell changes	☐	☐		☐	☐	☐	☐	☐	
36 Herpes	☐	☐		☐	☐	☐	☐	☐	
37 Venereal warts/condyloma	☐	☐		☐	☐	☐	☐	☐	
38 Gonorrhea	☐	☐		☐	☐	☐	☐	☐	
39 Chlamydia	☐	☐		☐	☐	☐	☐	☐	
40 Kidney stones	☐	☐		☐	☐	☐	☐	☐	
41 Kidney infection/pyelonephritis	☐	☐		☐	☐	☐	☐	☐	
42 Urinary tract infections/cystitis	☐	☐		☐	☐	☐	☐	☐	
43 Incontinence	☐	☐		☐	☐	☐	☐	☐	
Other illnesses/health problems									
44 Anorexia/bulimia/other eating disorders	☐	☐		☐	☐	☐	☐	☐	
45 Migraine	☐	☐		☐	☐	☐	☐	☐	
46 Other headache	☐	☐		☐	☐	☐	☐	☐	
47 Epilepsy	☐	☐		☐	☐	☐	☐	☐	
48 Multiple sclerosis	☐	☐		☐	☐	☐	☐	☐	
49 Cerebral palsy	☐	☐		☐	☐	☐	☐	☐	
50 Cancer	☐	☐		☐	☐	☐	☐	☐	
51 Depression	☐	☐		☐	☐	☐	☐	☐	
52 Anxiety	☐	☐		☐	☐	☐	☐	☐	
53 Other long illness or health problems	☐	☐		☐	☐	☐	☐	☐	

Which .....

40. Do you have a congenital malformation/birth defect?

☐ No
☐ Yes

41. If yes, which? _____

42. Do your gums bleed when you brush your teeth at present?

☐ No, rarely or never
☐ Yes, sometimes
☐ Yes, often
☐ Yes, almost always

43. If you had diabetes before you became pregnant, what was your last long-term blood sugar level (HbA1c) before you became pregnant?

☐ Less than 7.5
☐ 7.5 - 12
☐ More than 12
☐ Don't Know

Other medicines

44. Have you used other medication not previously mentioned? If yes, which and when did you take them?

Name of medication (e.g. Valium, Rohypnol, Paracetamol)	Use of medication during pregnancy weeks: Last 6 months before pregnancy	0-4	5-8	9-12	13+	Number of days used
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	

Vitamins, minerals and dietary supplements

45. Do you take vitamins, minerals or other dietary supplements?

☐ No (proceed to question 49)
☐ Yes

46. If yes, fill in the table below for the vitamins and minerals found in the contents list on the vitamin package/bottle. (For instance, if you have taken cod liver oil for the last six months before becoming pregnant, enter a cross for each period under "When" (i.e. 7 crosses) and enter a cross in "Daily" under "How often").

	When did you take the supplements? Last 6 months before pregnancy: 26-9 weeks	8-5 weeks	4-0 weeks	During pregnancy: 0-4 weeks	5-8 weeks	9-12 weeks	13+ weeks	In this period how often did you take this? Daily	4-6 times a week	1-3 times a week
1 Folate/folic acid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2 Vitamin B1 (Thiamine)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3 Vitamin B2 (Riboflavin)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4 Vitamin B6 (Pyridoxine)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5 Vitamin B12	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6 Niacin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7 Pantothenic acid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8 Biotin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9 Vitamin C	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10 Vitamin A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11 Vitamin D	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12 Vitamin E	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13 Iron	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14 Calcium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15 Iodine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16 Zinc	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17 Selenium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18 Copper	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19 Chromium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20 Magnesium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21 Cod liver oil	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22 Omega-3 fatty acid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

47. Give the complete name(s) of all vitamins and dietary supplements you take. Include alternative/herbal remedies and diet products. (Write clearly in CAPITAL LETTERS.)

E.g. VITAPLEX WITH IRON

1

2

3

4

5

6

48. If you use multivitamins (with or without minerals) do these contain folic acid?

☐ Yes
☐ No
☐ Don't Know

Civil status and education

49. What is your civil status?

☐ Married
☐ Cohabitant
☐ Single
☐ Divorced/separated
☐ Widow
☐ Other

50. What education do you and the baby's father have? (Enter a cross indicating the highest level of education you both have completed and current studies if you are still studying.)

	You		Baby's Father	
	Completed	On-going	Completed	On-going
1 9-year secondary school	☐	☐	☐	☐
2 1-2 year high school	☐	☐	☐	☐
3 Technical high school	☐	☐	☐	☐
4 3-year high school general studies, junior college	☐	☐	☐	☐
5 Regional technical college, 4-year university degree (Bachelor's degree, nurse, teacher, engineer)	☐	☐	☐	☐
6 University, technical college, more than 4 years (Master's degree, medical doctor, PhD)	☐	☐	☐	☐
7 Other education	☐	☐	☐	☐

Work and leisure

51. What was your and the baby's father's work situation when you became pregnant? (Fill in one or several boxes for each.)

	You	Baby's Father
1 Student	☐	☐
2 At home	☐	☐
3 Intern/apprentice	☐	☐
4 Military service	☐	☐
5 Unemployed/laid off	☐	☐
6 Rehabilitation/disabled	☐	☐
7 Employed in public sector	☐	☐
8 Employed in private sector	☐	☐
9 Self-employed	☐	☐
10 Family member without steady income in family company (e.g. Farming, business)	☐	☐
11 Other	☐	☐

52. Did you have an extra job (with or without salary) when you became pregnant? (For example, accountant, hair dresser, singer in a dance band, club leader)

☐ No

☐ Yes, describe_____

53. Have you been absent from your usual work more than two weeks altogether during this pregnancy?

☐ No

☐ Yes

54 Are you absent from your work at the present time?

☐ No

☐ Yes

55. If yes, what is the reason for your absence? (Fill in one or several boxes.)

☐ Medical leave

☐ Leave of absence

☐ Sick child

☐ Other _____

56. The usual number of paid working hours a week before you became pregnant and at present.

Before the pregnancy: ☐☐,☐ Hours

During the pregnancy : ☐☐,☐ Hours

(Questions about current work situation to be answered by anyone in paid employment, even if they are temporarily absent due to illness, being on leave or for similar reasons.)

57. Describe the type of work carried out at your and the baby's father's place of work as accurately as possible.
(Write for example, hospital department for children with cancer, body shop at a garage for diesel vehicles, farming with grain and swine, work in the home.)

58. Occupation/title at this workplace?
(Write for example, staff nurse, mechanic, foreman, lecturer, student, cleaning assistant, housewife/at home.)

You	Baby's Father

59. Indicate the appropriate answer for each of the following questions concerning your present work situation. (Fill in only one box in each line.)

	Yes every day more than half of the working day	Yes every day less than half of the working day	Yes, periodically but not daily	Seldom or never
Do you sometimes have so much to do that your work situation becomes taxing?	☐	☐	☐	☐
Do you have to turn or bend many times in the course of an hour?	☐	☐	☐	☐
Do you work with your hands up at shoulder level or higher?	☐	☐	☐	☐
Do you work standing or walking?	☐	☐	☐	☐
Can you choose to work a little faster some days and a little slower on other days?	☐	☐	☐	☐
Are you subjected to a lot of uncomfortable background noise?	☐	☐	☐	☐
Are you subjected to a lot of background noise that makes you have to raise your voice when talking to others, even at a distance of one metre?	☐	☐	☐	☐

60. How do the following statements describe your work situation? (Fill in only one box in each line.)

	Agree	Agree mostly	Disagree mostly	Disagree completely
I have physically heavy work.	☐	☐	☐	☐
My work is very stressful	☐	☐	☐	☐
I learn a lot at work	☐	☐	☐	☐
My work is very monotonous	☐	☐	☐	☐
My work demands a lot of me.	☐	☐	☐	☐
I am able to decide how my work is to be carried out.	☐	☐	☐	☐
There is a good team spirit at my place of work.	☐	☐	☐	☐
I enjoy my work	☐	☐	☐	☐

61. When are your working hours? (Fill in one or several boxes.)

☐ Permanent day work

☐ Permanent afternoon or evening work

☐ Permanent night work

☐ Shift work or shift rotations

☐ No set times (extra help, extra shifts, temporary employment, etc.)

☐ Other

62. During your pregnancy do you lift anything that weighs more than 10 kg (10 kilos is the equivalent of a full bucket of water.)

	At Home	At Work
Seldom or never	☐	☐
Yes, less than 20 times a week	☐	☐
Yes, more than 20 times a week	☐	☐
Yes, 10-20 times a day	☐	☐
Yes, more than 20 times a day	☐	☐

63. How often have you worked with radio transmitters or radar after becoming pregnant?

- ☐ Seldom/Never
- ☐ A few times a week
- ☐ Daily
- ☐ On average more than an hour daily

64. How often do you talk on a cell phone?

- ☐ Seldom/Never
- ☐ A few times a week
- ☐ Daily
- ☐ On average more than an hour daily

65. Do your cell phone calls last more than 15 minutes?

- ☐ Never
- ☐ Seldom
- ☐ Often

66. How often have you worked with a computer monitor, laser printer or copying machine (at a distance of less than two metres) after you became pregnant?

	Computer monitor	Laser printer	Copying machine
Seldom/Never	☐	☐	☐
A few times per week	☐	☐	☐
Daily	☐	☐	☐
On average more than an hour daily	☐	☐	☐

67. How often have you worked with X-ray equipment (at a distance of less than two metres) after you became pregnant?
(This does not include treatment as a patient)

- ☐ Seldom/Never
- ☐ A few times a week
- ☐ Daily
- ☐ On average more than an hour daily

68. Have you been in contact with any of the following substances either at work or in your leisure time during the last six months? (Fill in each line.)

	No	Yes	If Yes, number of days the last 6 months (daily = 180 days)	Fill in if you have used a hood for gases or breathing protection	Fill in if you have used protective gloves
1 Lead vapours, lead dust, lead particles or lead alloys	☐	☐		☐	☐
2 Chrome, arsenic, cadmium or combinations of these	☐	☐		☐	☐
3 Gasoline or exhaust (does not apply to filling gasoline in your own car)	☐	☐		☐	☐
4 Mercury vapours, mercury or work with amalgam fillings (does not apply to your own dental treatment)	☐	☐		☐	☐
5 Disinfectants, vermin poisons	☐	☐		☐	☐
6 Weed killers, insecticides, fungicides	☐	☐		☐	☐
7 Oil-based paint	☐	☐		☐	☐
8 Water-based or latex paint	☐	☐		☐	☐
9 Paint thinner, paint-lacquer-glue remover or other solvents (e.g. lynol, turpentine, toluene, carbon tetrachloride)	☐	☐		☐	☐
10 Industrial dyes or ink	☐	☐		☐	☐
11 Motor oil, lubrication oil or other types of oil	☐	☐		☐	☐
12 Photographic chemicals (fixatives or developers)	☐	☐		☐	☐
13 Substances used in welding	☐	☐		☐	☐
14 Substances used in soldering	☐	☐		☐	☐
15 Formalin/formaldehyde	☐	☐		☐	☐
16 Chemotherapeutic substances/chemotherapy treatment (does not apply to your own medical treatment)	☐	☐		☐	☐
17 Laughing gas or other anaesthetic gases (does not apply to your own treatment as a patient)	☐	☐		☐	☐
18 Other substances and conditions, describe_____	☐	☐		☐	☐

69. How often have you been to a discotheque since you became pregnant?

- ☐ 1-2 times a week
- ☐ Less often
- ☐ Never

70. Are you in contact with animals either at work or in your leisure time?

- ☐ No
- ☐ Yes

71. If yes, what sort of animals and how often are you in contact with them on a weekly basis?

	Daily	3-6 times a week	1-2 times a week	Less than 1 time a week
1 Dog	☐	☐	☐	☐
2 Cat	☐	☐	☐	☐
3 Guinea pig	☐	☐	☐	☐
4 Hamster	☐	☐	☐	☐
5 Rabbit	☐	☐	☐	☐
6 Canary or other bird	☐	☐	☐	☐
7 Aquarium fish	☐	☐	☐	☐
8 Cow	☐	☐	☐	☐
9 Pig	☐	☐	☐	☐
10 Sheep, goat	☐	☐	☐	☐
11 Horse	☐	☐	☐	☐
12 Poultry	☐	☐	☐	☐
13 Other	☐	☐	☐	☐

Housing and household

72. With whom do you live? (Fill in one or several boxes.)

- ☐ Spouse/partner
- ☐ Parents
- ☐ Parents-in-law
- ☐ Children
- ☐ No one
- ☐ Other describe_____

73. How many people including you live in your home?

Number of people over 18 years . . . . . ☐☐

Number of people between 12 - 18 years . . . . . ☐☐

Number of people between 6 - 11 years . . . . . ☐☐

Number of people under 6 years . . . . . ☐☐

74. How many children are at nursery school/day care?

☐ children

75. Do you or the baby's father have a mother tongue other than Norwegian?

- ☐ No
- ☐ Yes

76. If yes, which language?

	You	Baby's Father
Sámi	☐	☐
Urdu	☐	☐
English	☐	☐
Other	☐	☐

If other, which?_____

77. Do your parents or the baby's father's parents have a mother tongue other than Norwegian?

- ☐ No
- ☐ Yes

78. If yes, which language?

	Your Mother	Your Father	Mother of the child's father	Father of the child's father
Sámi	☐	☐	☐	☐
Urdu	☐	☐	☐	☐
English	☐	☐	☐	☐
Other	☐	☐	☐	☐

If other, which? _____

79. What is your and the baby's father's yearly gross income? (Include child support, unemployment benefits and other allowances.)

Your gross income	Child's father's gross income
☐ No income	☐ No income
☐ Under 150.000 NOK	☐ Under 150.000 NOK
☐ 150-199.999 NOK	☐ 150-199.999 NOK
☐ 200-299.999 NOK	☐ 200-299.999 NOK
☐ 300-399.999 NOK	☐ 300-399.999 NOK
☐ 400-499.999 NOK	☐ 400-499.999 NOK
☐ over 500.000 NOK	☐ over 500.000 NOK
	☐ Don't know

80. Is it possible for your household to manage financially without your income?

- ☐ No
- ☐ Yes, but with difficulty
- ☐ Yes, without difficulty

81. What type of house do you live in?

- ☐ Detached house
- ☐ Farm
- ☐ Semi detached
- ☐ Four-flat house
- ☐ Maisonette
- ☐ Terraced flat
- ☐ Basement flat
- ☐ Apartment building
- ☐ Townhouse/tenement
- ☐ Which floor? ☐☐
- ☐ Other_____

82. Has there been damp damage, visible signs of fungus/mildew or a smell of mildew in your home in the past 3 months? (Fill in one or several boxes.)

- ☐ No
- ☐ Yes, damp damage
- ☐ Yes, signs of fungus and mould
- ☐ Yes, a smell of mildew

83. Where does your drinking water come from?

- ☐ Public or private water company
- ☐ Water from a local source (e.g. own well)

84. How many times have you moved in the last 3 years?

☐☐ times

85. Has anyone in your home had influenza, a prolonged cough, childhood disease or an illness with fever and a rash after you became pregnant?

- ☐ No
- ☐ Yes

86. If yes, which illness? (fill in one or several boxes)

- ☐ German measles
- ☐ Chicken pox
- ☐ Measles
- ☐ Roseola infantum
- ☐ Other fever with rash
- ☐ Influenza
- ☐ Prolonged cough
- ☐ Tuberculosis
- ☐ Hand, foot and mouth disease
- ☐ Other

Living habits

87. Did your mother smoke when she was pregnant with you?
☐ No
☐ Yes
☐ Don't Know

88. Are you exposed to passive smoking at home?
☐ No
☐ Yes

89. If yes, how many hours a day are you exposed to passive smoking?
☐☐ hours per day

90. Are you exposed to passive smoking at work?
☐ No
☐ Yes

91. If yes, how many hours a day are you exposed to passive smoking?
☐☐ hours per day

92. Did the baby's father smoke before you became pregnant?
☐ No
☐ Yes

93. Does he smoke now?
☐ No
☐ Yes

94. Have you ever smoked?
☐ No (proceed to question 104)
☐ Yes

95. Do you smoke now (after you became pregnant)?
☐ No
☐ Sometimes ☐☐ cigarettes per week
☐ Daily ☐☐ cigarettes per day

96. Did you smoke during the last 3 months before you became pregnant this time?
☐ No
☐ Sometimes ☐☐ cigarettes per week
☐ Daily ☐☐ cigarettes per day

97. How old were you when you started to smoke on a daily basis?
☐☐ Years

98. Have you stopped smoking completely?
☐ No
☐ Yes

99. If yes, how old were you when you stopped smoking?
☐☐ Years

100. If you stopped smoking after you became pregnant, in which week of pregnancy did you stop?
☐☐ week of pregnancy

101. How long after you get up in the morning until you light your first cigarette?
☐ 5 minutes
☐ 6-29 minutes
☐ 30-60 minutes
☐ More than one hour

102. Do you smoke when you are ill?
☐ No
☐ Yes

103. Do you smoke more often during the first few hours after you wake up than you do during the rest of the day?
☐ No
☐ Yes

104. If you have used other kinds of nicotine indicate which and when you used them.

	Before pregnancy	During pregnancy
Chewing tobacco/snuff	☐	☐
Nicotine chewing gum	☐	☐
Nicotine adhesive patch	☐	☐
Nicotine inhaler	☐	☐

105. What was your fluid consumption (number of cups/glasses) per day before and during pregnancy? (1 mug = 2 cups, 1 small plastic bottle (0.5 litre) = 4 cups, 1 large plastic bottle (1.5 litres) = 12 cups)

	Number of cups/glasses: Before pregnancy	Number of cups/glasses: Now	Decaffeinated (Enter a cross)
1 Filter coffee	☐☐	☐☐	☐
2 Instant coffee	☐☐	☐☐	☐
3 Boiled coffee	☐☐	☐☐	☐
4 Tea	☐☐	☐☐	☐
5 Herbal tea	☐☐	☐☐	☐
6 Coca Cola/Pepsi etc.	☐☐	☐☐	☐
7 Other fizzy drinks	☐☐	☐☐	☐
8 Diet Coca Cola/Pepsi	☐☐	☐☐	☐
9 Other diet fizzy drinks	☐☐	☐☐	☐
10 Tap water	☐☐	☐☐	☐
11 Bottled water	☐☐	☐☐	☐

	Before pregnancy	Now	Ecological (Enter a cross)
12 Juice/squash	☐☐	☐☐	☐
13 Diet juice/squash	☐☐	☐☐	☐
14 Milk (skim, low fat, whole)	☐☐	☐☐	☐
15 Yogurt, all types	☐☐	☐☐	☐
16 Yogurt/active Lactobacillus	☐☐	☐☐	☐
17 Other type of cultured milk - Kefir	☐☐	☐☐	☐
18 Other	☐☐	☐☐	☐

106. Have you used any of the following substances?

	Never	Previously	Last month before pregnancy	During pregnancy
1 Hash	☐	☐	☐	☐
2 Amphetamine	☐	☐	☐	☐
3 Ecstasy	☐	☐	☐	☐
4 Cocaine	☐	☐	☐	☐
5 Heroin	☐	☐	☐	☐

107. Have you ever consumed alcohol?

☐ No (proceed to question 117)
☐ Yes

Alcohol units are used to compare the different types of alcoholic beverages. 1 alcohol unit (= 1.5 cl. pure alcohol) is equivalent to:

1 bottle/can energy drink or cider
1 glass (1/3 litre) of beer
1 wine glass red or white wine
1 sherry glass sherry or fortified wine
1 snaps glass spirits or liqueur

108. How often did you consume alcohol in the 3 months before you became pregnant and how often do you consume alcohol during the pregnancy?

	Last 3 months before pregnancy	During pregnancy
1 Approximately 6-7 times a week	☐	☐
2 Approximately 4-5 times a week	☐	☐
3 Approximately 2-3 times a week	☐	☐
4 Approximately once a week	☐	☐
5 Approximately 1-3 times a month	☐	☐
6 Less than once a month	☐	☐
7 Never	☐	☐

109. What type of alcohol do you usually drink? (Fill in one or several boxes.)

1 Light beer	☐
2 Beer	☐
3 Red wine	☐
4 White wine	☐
5 Low alcohol sodas	☐
6 Fortified wines (sherry, port, Madeira)	☐
7 Spirits (vodka, gin, snaps, cognac, whisky, liqueur)	☐

110. Did you drink 5 units or more at least once during the last 3 months before pregnancy or during pregnancy?

	Last 3 months before pregnancy	During pregnancy
1 Several times per week	☐	☐
2 Once a week	☐	☐
3 1-3 times a month	☐	☐
4 Less than once a month	☐	☐
5 Never	☐	☐

111. How many units of alcohol do you usually drink when you consume alcohol?

	Last 3 months before pregnancy	During pregnancy
10 or more	☐	☐
7-9	☐	☐
5-6	☐	☐
3-4	☐	☐
1-2	☐	☐
Less than 1	☐	☐

112. How many units of alcohol do you have to drink before you feel any effect?

☐☐ units

113. Have other people irritated you or hurt your feelings by criticising how much you drink?

☐ No
☐ Yes

114. Have you ever felt that you ought to drink less alcohol?

☐ No
☐ Yes

115. Have you ever drunk alcohol in the morning to calm your nerves or to get rid of a hangover?

☐ No
☐ Yes

116. Have you ever experienced any of the following problems during the last year in relation to your alcohol consumption?

	Never	Once	Several times
Argued with or had negative feelings for a family member	☐	☐	☐
Suddenly found yourself somewhere without knowing how you got there	☐	☐	☐
Been absent from work or school	☐	☐	☐
Fainted or passed out suddenly	☐	☐	☐
Had a sad period	☐	☐	☐

Weight and weight control

117. Do you think you were overweight just before this pregnancy?

☐ Yes, a lot
☐ Yes, a little
☐ No

118. Are you worried about putting on more weight than necessary during this pregnancy?

☐ Yes, very worried
☐ Somewhat worried
☐ No, not especially worried

119. Has anyone said that you were too thin while you felt that you were overweight during the last 2 years?

☐ Yes, often
☐ Yes, occasionally
☐ No

120. Have you ever felt that you lost control while eating and were not able to stop before you have eaten far too much?

	Last 6 months before this pregnancy	Now
No	☐	☐
Infrequently	☐	☐
Yes, at least once a week	☐	☐

121. Have you ever used any of the following methods to control your weight?

	Last 6 months before this pregnancy		Now	
	At least once a week	Seldom/ Never	At least once a week	Seldom/ Never
Vomiting	☐	☐	☐	☐
Laxatives	☐	☐	☐	☐
Fasting	☐	☐	☐	☐
Hard physical exercise	☐	☐	☐	☐

122. Is it important for your self-image that you maintain a certain weight?

☐ Yes, very important
☐ Yes, quite important
☐ No, not especially important

Physical activity

123. How often do you exercise? (Fill in each line for both before and during this pregnancy.)

	Last 3 months before this pregnancy					During this pregnancy				
	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week
1 Walking	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2 Brisk walking	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3 Running/jogging/orienteering	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4 Bicycling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5 Training studio/weight training	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6 Special gymnastics/aerobics for pregnant women	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7 Aerobics/gymnastics/dance without running and jumping	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8 Aerobics/gymnastics/dance with running and jumping	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9 Dancing (swing/rock/folk)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10 Skiing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11 Ball sports	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12 Swimming	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13 Riding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14 Other	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

124. How often do you do exercises for the following muscle groups? (Fill in each line for both before and during this pregnancy.)

	Last 3 months before pregnancy					During pregnancy				
	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week
Abdominal muscles	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Back muscles	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pelvic floor muscles (muscles around the vagina, urethra, anus)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

125. How often are you so physically active in your leisure and/or at work that you get out of breath or sweat?

	Last 3 months before this pregnancy		During this pregnancy	
	Leisure	At work	Leisure	At work
Never	☐	☐	☐	☐
Less than once a week	☐	☐	☐	☐
Once a week	☐	☐	☐	☐
2 times a week	☐	☐	☐	☐
3-4 times a week	☐	☐	☐	☐
5 times a week or more	☐	☐	☐	☐

A little more about yourself and how you are keeping now

126. Do you agree or disagree with the following statements? (Fill in only one box in each line.)

	Disagree completely	Disagree	Disagree somewhat	Don't agree or disagree	Agree somewhat	Agree	Agree completely
My life is largely what I wanted it to be	☐	☐	☐	☐	☐	☐	☐
My life is very good	☐	☐	☐	☐	☐	☐	☐
I am satisfied with my life	☐	☐	☐	☐	☐	☐	☐
To date, I have achieved what is important for me in my life	☐	☐	☐	☐	☐	☐	☐
If I could start all over, there is very little I would do differently	☐	☐	☐	☐	☐	☐	☐

127. How do these statements describe your relationship? (Only answer if you have a partner.) (Fill in only one box in each line.)

	Agree Completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Disagree completely
My husband/partner and I have a close relationship	☐	☐	☐	☐	☐	☐
My partner and I have problems in our relationship	☐	☐	☐	☐	☐	☐
I am very happy in my relationship	☐	☐	☐	☐	☐	☐
My partner is usually understanding	☐	☐	☐	☐	☐	☐
I often think about ending our relationship	☐	☐	☐	☐	☐	☐
I am satisfied with my relationship with my partner	☐	☐	☐	☐	☐	☐
We often disagree about important decisions	☐	☐	☐	☐	☐	☐
I have been lucky in my choice of a partner	☐	☐	☐	☐	☐	☐
We agree about how children should be raised	☐	☐	☐	☐	☐	☐
I think my partner is satisfied with our relationship	☐	☐	☐	☐	☐	☐

128. Do you have anyone other than your husband/partner you can ask for advice in a difficult situation?

- ☐ No
- ☐ Yes 1-2 people
- ☐ Yes more than 2 people

129. How often do you meet or talk on the telephone with your family (other than those you live with) or close friends?

- ☐ Once a month or less
- ☐ 2-8 times a month
- ☐ More than twice a week

130. Do you often feel lonely?

- ☐ Almost never
- ☐ Seldom
- ☐ Sometimes
- ☐ Usually
- ☐ Almost always

131. Have you been bothered by any of the following during the last two weeks? (Enter a cross for each line.)

	Not bothered	A little bothered	Quite bothered	Very bothered
Feeling fearful	☐	☐	☐	☐
Nervousness or shakeiness inside	☐	☐	☐	☐
Feeling hopeless about the future	☐	☐	☐	☐
Feeling blue	☐	☐	☐	☐
Worrying too much about things	☐	☐	☐	☐

132. Have you ever in your adult life been slapped, hit, kicked or bothered in any way physically? (fill in one or several boxes)

	During this pregnancy	Last 6 months before pregnancy	Earlier
No	☐	☐	☐
Yes	☐	☐	☐
Don't remember	☐	☐	☐

133. Have you ever been pressured or forced to have sexual intercourse? (Fill in one or several boxes.)

	During this pregnancy	Last 6 months before pregnancy	Earlier
No, never	☐	☐	☐
Yes, pressured	☐	☐	☐
Yes, forced with violence	☐	☐	☐
Yes, raped	☐	☐	☐

134. How do you feel about yourself? (Enter a cross for each line.)

	Agree completely	Agree	Disagree	Disagree completely
I have a positive attitude toward myself	☐	☐	☐	☐
I feel completely useless at times	☐	☐	☐	☐
I feel that I do not have much to be proud about	☐	☐	☐	☐
I feel that I am a valuable person, as good as anyone else	☐	☐	☐	☐

135. Have you ever experienced the following for a continuous period of 2 weeks or more? (Fill in each line.)

	No	Yes
Felt depressed, sad	☐	☐
Had problems with appetite or eaten too much	☐	☐
Been bothered by feeling weaker or a lack of energy	☐	☐
Really blamed yourself and felt worthless	☐	☐
Had problems with concentration or had problems making decisions	☐	☐
Had at least 3 of the problems named above simultaneously	☐	☐

136. If you have had 3 or more of these problems at the same time, how many weeks did the longest period last?

☐☐ weeks

137. Was there a particular reason for this?

- ☐ No, no particular reason
- ☐ Yes (e.g. death, divorce, miscarriage, accident)

We would be grateful if you would write anything else you would like to tell us about this pregnancy or previous births/pregnancies that are not addressed in this questionnaire on the next page.

Comments

Have you remembered to fill in the date on which you completed the questionnaire on page 1?

Thank you very much for your help!

Please return the completed questionnaire in the stamped addressed envelope provided.

Avd. for medisinsk fødselsregister
Kalfarveien 31
5018 Bergen

Bording

APPENDIX II

Questionnaire 5
18 months postpartum

den norske **Mor & barn undersøkelsen**

Questionnaire 5 – Your child at 18 months

In this questionnaire we will ask you some questions which you may recognise from previous questionnaires. We do this because we want to continue following your and your child's progress. It will help if you have child's Health card to hand so that you can use the information contained in it.

If you feel that a question is too upsetting or difficult to answer you can skip this question and go on to the next one.

The questionnaire will be processed by a computer. *It is therefore important that you following these instructions when completing it:*

- Use a blue or black ballpoint pen.
- Put a *cross* in the box that is most relevant like this: ☒
- If you put a cross in the wrong box, correct it by filling in
- Write numbers in the large green *boxes.*

It is important that you only write in the white area of each box like this:

Number: 1 2 3 4 5 6 7 8 9 0

Please do not use this questionnaire. Contact us at morbarn@fhi.no or phone + 47 53 20 40 40 if you need a questionnaire.

- Numbered boxes have two or more squares. When you enter a single-digit number, use the square on the right. *Example: 5 is entered as follows* | | 5 |
- Specific information concerning, *for example, medication* should be written on the lines provided. *Write clearly in CAPITAL LETTERS.*
- Remember to fill in the date on which you completed the questionnaire

As soon as you have completed this questionnaire, return it to us in the stamped addressed envelope provided.

Specify the day, month and year when the questionnaire was completed

Day ☐☐ Month ☐☐ Year ☐☐☐☐ *(write the year in full, e.g. 2005)*

ABOUT YOUR CHILD

Food and drink

1. What type of milk has your baby been given since he/she was 6 months old?
(You can enter more than one cross.)

Milk type	Child's age in months 6 - 8	9 - 11	12 - 14	15 - 18
1. Breast milk	☐	☐	☐	☐
2. Formula	☐	☐	☐	☐
3. Formula in the case of milk intolerance	☐	☐	☐	☐
4. Whole milk (sweet)	☐	☐	☐	☐
5. Low-fat milk normal (sweet)	☐	☐	☐	☐
6. Extra low-fat milk (sweet)	☐	☐	☐	☐
7. Skimmed milk (sweet)	☐	☐	☐	☐
8. Yogurt with active Lactobacillus, all types	☐	☐	☐	☐
9. Other yogurt	☐	☐	☐	☐
10. Other types of sour milk	☐	☐	☐	☐

Sp.skj. 5 Engelsk 5D MB - 1.000 - 0508 - Bording

2. How often do you give your child the following to drink now that he/she is 18 months old? Select the frequency which is most applicable on average.
(Enter a cross in a box for each item.)

	Never	Less than once a week	1-3 times a week	4-6 times a week	1-2 times in 24 hrs	3-4 times in 24 hrs	5 or more times in 24 hours
1. Breast milk	☐	☐	☐	☐	☐	☐	☐
2. Formula	☐	☐	☐	☐	☐	☐	☐
3. Whole milk	☐	☐	☐	☐	☐	☐	☐
4. Low-fat milk	☐	☐	☐	☐	☐	☐	☐
5. Extra low-fat milk	☐	☐	☐	☐	☐	☐	☐
6. Skimmed milk	☐	☐	☐	☐	☐	☐	☐
7. Yogurt with active Lactobacillus, all types	☐	☐	☐	☐	☐	☐	☐
8. Yogurt, natural	☐	☐	☐	☐	☐	☐	☐
9. Yogurt with fruit	☐	☐	☐	☐	☐	☐	☐
10. Other types of sour milk	☐	☐	☐	☐	☐	☐	☐
11. Tap water	☐	☐	☐	☐	☐	☐	☐
12. Bottled water	☐	☐	☐	☐	☐	☐	☐
13. Cordial, sweetened	☐	☐	☐	☐	☐	☐	☐
14. Cordial, artificially sweetened	☐	☐	☐	☐	☐	☐	☐
15. Juice	☐	☐	☐	☐	☐	☐	☐
16. Fizzy drinks	☐	☐	☐	☐	☐	☐	☐
17. Diet fizzy drinks	☐	☐	☐	☐	☐	☐	☐
18. Other: _____	☐	☐	☐	☐	☐	☐	☐

3. Do you give your child the following to drink during the night now that he/she is roughly 18 months old?
(Enter a cross in a box for each item.)

	Never/ seldom	Now and then	Yes, most nights
1. Water	☐	☐	☐
2. Milk or cordial from a cup	☐	☐	☐
3. Milk or cordial from a bottle	☐	☐	☐
4. Breast milk	☐	☐	☐

4. How often do you give your child the following to eat now that he/she is 18 months old? Select the frequency which is most applicable on average.
(Enter a cross in a box for each item.)

	Never	Less than once a week	1-3 times a week	4-6 times a week	1-2 times in 24 hrs	3 or more times in 24 hrs
1. Liver paste sandwich	☐	☐	☐	☐	☐	☐
2. Meat sandwich	☐	☐	☐	☐	☐	☐
3. Fish sandwich (e.g. sardines, mackerel)	☐	☐	☐	☐	☐	☐
4. Cheese sandwich	☐	☐	☐	☐	☐	☐
5. Jam/honey sandwich	☐	☐	☐	☐	☐	☐
6. Sandwich with other filling	☐	☐	☐	☐	☐	☐
7. Baby porridge (instant)	☐	☐	☐	☐	☐	☐
8. Home-made porridge	☐	☐	☐	☐	☐	☐
9. Meat, sausages, meat balls, etc.	☐	☐	☐	☐	☐	☐
10. Fish, fish balls, fish pudding, etc.	☐	☐	☐	☐	☐	☐
11. Pancakes	☐	☐	☐	☐	☐	☐
12. Potatoes	☐	☐	☐	☐	☐	☐
13. Pasta	☐	☐	☐	☐	☐	☐
14. Rice	☐	☐	☐	☐	☐	☐
15. Peas, beans	☐	☐	☐	☐	☐	☐
16. Other cooked vegetables	☐	☐	☐	☐	☐	☐
17. Raw vegetables	☐	☐	☐	☐	☐	☐
18. Fruit	☐	☐	☐	☐	☐	☐
19. Cakes/waffles/biscuits	☐	☐	☐	☐	☐	☐
20. Dessert/ice cream	☐	☐	☐	☐	☐	☐
21. Chocolate	☐	☐	☐	☐	☐	☐
22. Other sweets, jelly beans, other confectionery	☐	☐	☐	☐	☐	☐

5. Do you give your child a home-made dinner or readymade (processed) baby food in a jar?

- ☐ Only home-made
- ☐ Mostly home-made
- ☐ About half and half of each
- ☐ Mostly ready-made
- ☐ Only ready-made

6. How often do you give your child organic food/drink?
(Enter a cross in a box for each item.)

	Never	Sometimes	Often	Almost always
Sweet milk	☐	☐	☐	☐
Buttermilk/yogurt . .	☐	☐	☐	☐
Vegetables/fruit . . .	☐	☐	☐	☐
Porridge/flour/bread	☐	☐	☐	☐
Meat	☐	☐	☐	☐

7. Does your child have a reaction to certain foods?

- ☐ No
- ☐ Yes
- ☐ Don't know

8. If yes, what type of food does your child have a reaction to? *(You can enter a cross in more than one box.)*

1. ☐ Whole milk
2. ☐ Skimmed milk/low-fat milk
3. ☐ Cream
4. ☐ Yogurt/buttermilk
5. ☐ Ice cream
6. ☐ Cheese
7. ☐ Raw egg (e.g. egg flip)
8. ☐ Boiled or fried egg
9. ☐ Fish/fish products
10. ☐ Additives
11. ☐ Wheat
12. ☐ Nuts
13. ☐ Soya
14. ☐ Fruit, berries
15. ☐ Vegetables/potatoes
16. ☐ Chocolate
17. ☐ Other sweets
18. ☐ Sugar
19. ☐ Other: _____

9. Are there any foods which you specifically avoid giving your child?

- ☐ No
- ☐ Yes

10. If yes, which foods do you try to avoid and how strict are you with your child's diet?

	Some reduced use compared to normal diet	Not used unmixed but allowed a little bit in different dishes	Use completely avoided (also "hidden" in dishes)
1. Milk	☐	☐	☐
2. Eggs	☐	☐	☐
3. Fish/fish products	☐	☐	☐
4. Meat/meat products	☐	☐	☐
5. Wheat	☐	☐	☐
6. Sugar	☐	☐	☐
7. Other: _____	☐	☐	☐

11. Do you give your child cold liver oil, vitamins, iron or any other dietary supplement?

- ☐ No
- ☐ Yes

12. If yes, specify which product(s) and how often you give them to your child. How old was your child when you first started giving him/her the product?

	How often do you give it to your child?		How old was your child when you first gave him the product?
	Every day	sometimes	Number of months
1. Cod liver oil	☐	☐	
2. Biovit	☐	☐	
3. Sanasol	☐	☐	
4. Nycoplus Multi-Vitamin mixture for children	☐	☐	
5. Fluoride tablets	☐	☐	
6. Iron supplement, specify: _____	☐	☐	
7. Other dietary supplement, specify:_____	☐	☐	

Growth, health and illness

Consult your child's health card and use the information contained in it to complete the following questions.

13. How many times have you been to the mother and child health centre since his/her birth?

- ☐ 0 - 4
- ☐ 5 -10
- ☐ 11 -15
- ☐ 16 or more

14. Do you want your child to be given the vaccinations that are recommended for children in Norway?

- ☐ Yes, all the recommended vaccinations
- ☐ Yes, some vaccinations
- ☐ No, no vaccinations

15. Indicate whether your child has had any vaccinations. If yes, how many times, and indicate if there have been any sideeffects requiring a doctor or hospital to be contacted. *(Enter a cross in a box for each item.)*

Vaccinations	No	Yes	If yes, how many times? 1	2	3	Side-effect resulting in extra contact with a doctor? No	Yes	Side-effect resulting in examination/admission to hospital? No	Yes
1. DTP (diphtheria, tetanus, whooping cough)	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Hib (Haemophilus influenzae type b)	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Polio	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. MMR (measles, mumps, rubella)	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. DT (diphtheria, tetanus - sometimes given instead of DTP)	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Hepatitis B	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. BCG (tuberculosis)	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Pneumococcus (Prevenar)	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. Other vaccination:_____	☐	☐	☐	☐	☐	☐	☐	☐	☐

The following questions concern any illnesses or health problems your child has had. We will first ask you about more long-term problems, then about illnesses and problems of a more acute nature.

16. Does your child have or has he/she had any of the following health problems? If yes, has your child been referred for a specialist examination? *(Enter a cross in a box for each item.)*

Health problem	No	Yes, has now	Yes, had previously	If yes, has child been referred for a specialist examination? No	Yes
1. Dislocated hip (hip problem)	☐	☐	☐	☐	☐
2. Reduced hearing	☐	☐	☐	☐	☐
3. Impaired vision	☐	☐	☐	☐	☐

(cont.)

Health problem	No	Yes, has now	Yes, had previously	If yes, has child been referred for specialist examination? No	Yes
4. Delayed motor development (e.g. sits/walks late)	☐	☐	☐	☐	☐
5. Too little weight gain	☐	☐	☐	☐	☐
6. Too much weight gain	☐	☐	☐	☐	☐
7. Abnormal head circumference	☐	☐	☐	☐	☐
8. Heart defect	☐	☐	☐	☐	☐
9. Testicles not descended into scrotum	☐	☐	☐	☐	☐
10. Asthma	☐	☐	☐	☐	☐
11. Atopic eczema (childhood eczema)	☐	☐	☐	☐	☐
12. Urticaria (hives)	☐	☐	☐	☐	☐
13. Food allergy/intolerance	☐	☐	☐	☐	☐
14. Late or abnormal speech development	☐	☐	☐	☐	☐
15. Sleep problems	☐	☐	☐	☐	☐
16. Behavioural problems	☐	☐	☐	☐	☐
17. Social problems	☐	☐	☐	☐	☐
18. (Other) malformations: _____	☐	☐	☐	☐	☐
19. Other: _____	☐	☐	☐	☐	☐

17. If a specialist referral was made, what did this examination show?

- ☐ Everything was fine
- ☐ Still some doubts/further examinations needed
- ☐ Has not been for any examination yet
- ☐ Diagnosis I: _____
- ☐ Diagnose II: _____
- ☐ Diagnose III: _____

18. Has your child been treated with a "cushion" for a hip problem?

- ☐ No
- ☐ Yes How long? ☐☐ months

19. Has your child had any of the following illnesses/health problems between 6 and 11 months and/or 12 and 18 months? Specify how many times and whether your child has been admitted to hospital for this health problem. *(Enter a cross in a box for each item.)*

Illness/health problem	At 6 –11 months No	At 6 –11 months Yes	Number of times	At 12 -18 months No	At 12 -18 months Yes	Number of times	Was admitted to hospital for this? No	Was admitted to hospital for this? Yes
1.Common cold	☐	☐	☐☐	☐	☐	☐☐	☐	☐
2. Throat infection with confirmed streptococcal infection	☐	☐	☐☐	☐	☐	☐☐	☐	☐
3. Other type of sore throat	☐	☐	☐☐	☐	☐	☐☐	☐	☐
4. Ear infection	☐	☐	☐☐	☐	☐	☐☐	☐	☐
5. Pseudocroup	☐	☐	☐☐	☐	☐	☐☐	☐	☐
6. Bronchitis/RS virus/pneumonia	☐	☐	☐☐	☐	☐	☐☐	☐	☐
7. Gastric flu/diarrhoea	☐	☐	☐☐	☐	☐	☐☐	☐	☐
8. Urinary tract infection	☐	☐	☐☐	☐	☐	☐☐	☐	☐
9. Conjunctivitis	☐	☐	☐☐	☐	☐	☐☐	☐	☐

(cont.)

Illness/health problem	At 6 –11 months No	At 6 –11 months Yes	Number of times	At 12 -18 months No	At 12 -18 months Yes	Number of times	Was admitted to hospital for this? No	Was admitted to hospital for this? Yes
10. Febrile convulsions	☐	☐		☐	☐		☐	☐
11. Other convulsions (without any fever)	☐	☐		☐	☐		☐	☐
12. Chickenpox	☐	☐		☐	☐		☐	☐
13. Injury or accident	☐	☐		☐	☐		☐	☐
14. Other: _____	☐	☐		☐	☐		☐	☐

20. Has your child been to see the doctor or to the hospital between 6 and 11 months and/or 12 and 18 months? If yes, specify how many times. *(Enter a cross in a box for each item.)*

	At 6 – 11 months No	At 6 – 11 months Yes	At 6 – 11 months Number of times	At 12-18 months No	At 12-18 months Yes	At 12-18 months Number of times
GP (excluding mother and baby health centre)	☐	☐		☐	☐	
Casualty doctor	☐	☐		☐	☐	
Private specialist	☐	☐		☐	☐	
Hospital outpatient clinic	☐	☐		☐	☐	
Admitted to hospital	☐	☐		☐	☐	

21. Has your child been referred to any of the following services?

	No	Yes
Habilitation service	☐	☐
Educational psychology service	☐	☐
Child psychiatric outpatient clinic/department	☐	☐

22. If your child has been examined at or admitted to hospital, give the name of the hospital:

Hospital name: _____

Hospital name: _____

Hospital name: _____

23. Has your child had any of the following symptoms since the age of 6 months? If yes, at what age? *(Enter a cross in a box for each item.)*

	Had symptoms? No	Had symptoms? Yes	If yes, at what age? 6-8 mth	9-11 mth	12-14 mth	15 mth or more
1. Wheezing/whistling in the chest	☐	☐	☐	☐	☐	☐
2. Tightness in the chest	☐	☐	☐	☐	☐	☐
3. Coughing at night	☐	☐	☐	☐	☐	☐
4. Runny nose without a cold	☐	☐	☐	☐	☐	☐
5. Constipation	☐	☐	☐	☐	☐	☐
6. Diarrhoea	☐	☐	☐	☐	☐	☐
7. Itchy rash that comes and goes	☐	☐	☐	☐	☐	☐

24. Has your child ever been tested for allergies?

☐ No
☐ Yes

25. If yes, what allergens were tested for and what was the result?
(You can enter a cross in more than one box.)

Test:		Was the test positive? No	Yes	Don't know
1. ☐	Milk	☐	☐	☐
2. ☐	Egg	☐	☐	☐
3. ☐	Fish	☐	☐	☐
4. ☐	Mould	☐	☐	☐
5. ☐	Mites	☐	☐	☐
6. ☐	Animals	☐	☐	☐
7. ☐	Pollen	☐	☐	☐
8. ☐	Other: _____	☐	☐	☐

26. Have you ever tried any kind of so-called alternative medicine on your child since he/she was 6 months old?

☐ No
☐ Yes ☐☐ times

27. If yes, what kind of alternative medicine?

_____
_____
_____
_____
_____

28. Has your child received any medication since the age of 6 months? *(This means any type of medication, including natural medicines and herbal remedies)*

☐ No
☐ Yes

29. If yes, give the name of the medication and what age your child was when he took it. *(Include all types of medication, as well as natural medicines)*

Name of medicine *(WRITE IN CAPITALS, e.g. APOCILLIN, PARACET)*	How old was your child when he/she took this medication? 6-8 mth	9-11 mth	12-14 mth	15-18 mth
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐

30. What were your child's length, weight and head circumference when he/she was around 8 months, 1 year and the last time they were measured (15–18 months)?
(Refer to your child's health card)

	Date of measurement Day	Month	Year	Length	Head circumference	Weight
Around 8 mth	☐☐	☐☐	☐☐	☐☐,☐ cm	☐☐,☐ cm	☐☐☐☐☐ g
Around 1 year	☐☐	☐☐	☐☐	☐☐,☐ cm	☐☐,☐ cm	☐☐☐☐☐ g
15 - 18 mth	☐☐	☐☐	☐☐	☐☐,☐ cm		☐☐☐☐☐ g

Development and behaviour

In this section you will find some questions repeated in a different form. However, please answer all the questions as well as you can.

31. Can your child walk unaided? No ☐ Yes ☐

If yes, how old was your child when he/she could first walk unaided? **Number:** ☐☐ months.

32. The questions that follow are about your child's development at around the age of 18 months. *(Enter a cross in a box for each item.)*

	Yes	Sometimes	Not yet
1. When you ask him/her, does your child go into another room to find a familiar toy or object? (When you ask, for instance: "Where's your ball?", "Go and get your coat" or "Go and get your blanket")	☐	☐	☐
2. Does your child say eight or more words, in addition to "mamma" and "dadda"?	☐	☐	☐
3. Without showing him/her first, does your child point to the correct picture when you say "Show me the cat" or "Where is the dog"?	☐	☐	☐
4. Does your child move around by walking, rather than by crawling on his/her hands and knees?	☐	☐	☐
5. Can your child walk well and seldom fall?	☐	☐	☐
6. Does your child walk down stairs if you hold onto one of his/her hands?	☐	☐	☐
7. Does your child throw a small ball or toy with a forward arm motion? (If he/she simply drops the ball, enter a cross under "Not yet")	☐	☐	☐
8. Does your child stack a small block or toy on top of another? (For example, small boxes or toys about 3 cm in size)	☐	☐	☐
9. Does your child turn the pages in a book by himself/herself? (He/she may turn over more than one page at a time.)	☐	☐	☐
10. Does your child hug dolls or cuddly toys when playing with them?	☐	☐	☐
11. Does your child try to get your attention show you something by pulling your hand or clothes?	☐	☐	☐
12. Does your child come to you when he/she needs help, such as with opening a box?	☐	☐	☐
13. Does your child copy the activities you do, such as wiping up a spill, sweeping, shaving or combing hair?	☐	☐	☐

33. More about your child's development *(Enter a cross in a box for each item.)*

	Yes, usually	Very seldom	Not yet
1. Does your child use sounds or words together with gestures (e.g. uses sounds when pointing or reaching towards toys or objects)?	☐	☐	☐
2. When you look at a distant object and, surprised and excited, say: "Waoo...what's that?", – does he/she turn his/her head in the same direction as you?	☐	☐	☐
3. When you enthusiastically say: "Where is the ball (or other toy)?", will your child point towards the toy, even if it is more than 1 metre away?	☐	☐	☐
4. Does your child show you a toy by looking at you and holding the toy up towards your face (from a distance just so you can look at it)?	☐	☐	☐

34. How typical is the following behaviour of your child? *(Enter a cross in a box for each item.)*

	Very typical	Quite typical	Neither/ nor	Not so typical	Not typical
1. Your child cries easily	☐	☐	☐	☐	☐
2. Your child is always on the go.	☐	☐	☐	☐	☐
3. Your child prefers playing with others rather than alone.	☐	☐	☐	☐	☐
4. Your child is off running as soon as he/she wakes up in the morning	☐	☐	☐	☐	☐
5. Your child is very sociable.	☐	☐	☐	☐	☐
6. Your child takes a long time to warm to strangers	☐	☐	☐	☐	☐
7. Your child gets upset or sad easily	☐	☐	☐	☐	☐
8. Your child prefers quiet, inactive games to more active ones.	☐	☐	☐	☐	☐
9. Your child likes to be with people	☐	☐	☐	☐	☐
10. Your child reacts intensely when upset.	☐	☐	☐	☐	☐
11. Your child is friendly towards and trusting of strangers	☐	☐	☐	☐	☐
12. Your child complains that certain garments are too tight	☐	☐	☐	☐	☐
13. Your child becomes distressed by having his/her face or hair washed	☐	☐	☐	☐	☐

35. About your child's behaviour We are asking you about how your child usually is. If something happens seldom (for instance, if you have only seen it one or twice), enter a cross under "No". *(Enter a cross in a box for each item.)*

	Yes	No
1. Is your child interested in different sorts of toys or objects and not for instance mainly in cars or buttons?	☐	☐
2. When your child expresses his/her feelings, for instance by crying or smiling, do you usually understand why your child is laughing or crying?	☐	☐
3. Does your child react in a normal way to sensory stimulation, such as coldness, warmth, light, pain or tickling?	☐	☐
4. Can you easily tell from the face of your child how he/she feels?	☐	☐
5. When your child has been left alone for some time, does he/she try to attract your attention, for instance, by crying or calling?	☐	☐
6. Is your child's behaviour without stereotyped repetitive movements, e.g. banging his/her head against the wall or rocking his/her body back and forth?	☐	☐
7. Does your child like to be cuddled?	☐	☐
8. Does your child ever laugh directly at you or at other people?	☐	☐
9. Does your child react when spoken to, for instance, by looking, listening, smiling, speaking or babbling?	☐	☐
10. Does your child ever try to comfort you if you are sad or hurt?	☐	☐
11. Has your child ever had things that he/she seemed to have to do in a very particular way or order, or rituals that he/she has to have you do?	☐	☐
12. Does your child ever do things to get you to laugh?	☐	☐

36. More about your child's play and behaviour. We are asking you again about how your child usually is. If something seldom happens (for instance, if you have only seen it one or twice), enter a cross under "No". *(Enter a cross in a box for each item.)*

	Yes	No
1. Does your child enjoy being swung, bounced on your knee, etc.?	☐	☐
2. Does your child take an interest in other children?	☐	☐
3. Does your child like climbing on things, such as up stairs?	☐	☐
4. Does your child enjoy playing peek-a-boo/hide-and-seek?	☐	☐
5. Does your child ever pretend, for example, to talk on the phone or take care of dolls, or pretend other things?	☐	☐
6. Does your child ever use his/her index finger to point, to ask for something?	☐	☐
7. Does your child ever use his/her index finger to point, to indicate interest in something?	☐	☐
8. Can your child play properly with small toys (e.g. cars or bricks) without just mouthing, fiddling or dropping them?	☐	☐
9. Does your child ever bring objects over to you to show you something?	☐	☐
10. Does your child look you in the eye for more than a second or two?	☐	☐
11. Does you child ever seem oversensitive to noise (e.g. plugging ears)?	☐	☐
12. Does your child smile in response to your face or your smile?	☐	☐
13. Does your child imitate you (e.g. you make a face - will your child imitate it?)?	☐	☐
14. Does your child respond when you call his/her name?	☐	☐
15. If you point at a toy across the room, does your child look at it?	☐	☐
16. Does your child look at things you are looking at?	☐	☐
17. Does your child make unusual finger movements near his/her face?	☐	☐
18. Does your child try to attract your attention to his/her own activity?	☐	☐
19. Have you every wondered if your child is deaf?	☐	☐
20. Does your child understand what people say?	☐	☐
21. Does your child sometimes stare at nothing or wander with no purpose?	☐	☐
22. Does your child look at your face to check your reaction when faced with something unfamiliar?	☐	☐

37. To what extent are the following statements true of your child's behaviour during the last two months? *(Enter a cross in a box for each item.)*

	Not true	Somewhat or sometimes true	Very true or often true
1. Can't concentrate, can't pay attention for long	☐	☐	☐
2. Quickly shifts from one activity to another	☐	☐	☐
3. Can't sit still, restless or hyperactive	☐	☐	☐
4. Gets into everything	☐	☐	☐

(cont.)

	Not true	Somewhat or sometimes true	Very true or often true
5. Is mostly happy and contented	☐	☐	☐
6. Clings to adults or too dependent	☐	☐	☐
7. Gets too upset when separated from parents	☐	☐	☐
8. Gets into many fights	☐	☐	☐
9. Hits others	☐	☐	☐
10. Is defiant	☐	☐	☐
11. Doesn't seem to feel guilty after misbehaving	☐	☐	☐
12. Punishment doesn't change his/her behaviour	☐	☐	☐
13. Doesn't eat well	☐	☐	☐
14. Likes almost every kind of food	☐	☐	☐
15. Resists going to bed at night	☐	☐	☐
16. Doesn't want to sleep alone	☐	☐	☐
17. Afraid to try new things	☐	☐	☐
18. Disturbed by any change in routine	☐	☐	☐
19. Too fearful or anxious	☐	☐	☐

38. How often does your child usually wake during the night?

- ☐ 3 or more times every night
- ☐ Once or twice every night
- ☐ A few times a week
- ☐ Seldom or never

39. How many hours in total does your child sleep in 24hrs?

- ☐ 10 hours or less
- ☐ 11 - 12 hours
- ☐ 13 -14 hours
- ☐ 15 hours or more

40. About your worries *(Enter a cross in a box for each item.)*

	No	Yes	Don't know
1. Are you worried about your child's physical development?	☐	☐	☐
2. Are you worried about your child's behaviour?	☐	☐	☐
3. Are you worried because your child is demanding and difficult to cope with?	☐	☐	☐
4. Are you worried because your child is so uninterested in other children?	☐	☐	☐
5. Have you any other worries with regard to your child's health	☐	☐	Specify_____

(Use the last page if you need more space to write)

Your child's daily routine

41. Where has your child been cared for during the day? Enter a cross for the various age groups. *(Enter a cross in a box for each item.)*

	At home with his/her mother his/her father	At home with unqualified childminder	At a childminder's	In a day nursery
1. 0–6 months	☐	☐	☐	☐
2. 7-9 months	☐	☐	☐	☐
3. 10-12 months	☐	☐	☐	☐
4. 13-15 months	☐	☐	☐	☐
5. 16-18 months	☐	☐	☐	☐

42. How many hours a week is your child looked after in the current childcare scheme (other than by his/her mother and father)?

☐☐ hours

43. How many children in total are looked after in this childcare scheme (if day-care centre, how many in the department)?

☐☐ children

44. Do you and your child live with your child's father?

- ☐ Yes
- ☐ No

45. If your child does not live with his/her father, how much time does your child spend with him?

- ☐ At least half the time
- ☐ At least once a week
- ☐ At least once a month
- ☐ Less often than once a month
- ☐ Never

46. How many times have you moved house since your child was born?

☐☐ times

47. Roughly how many square metres is the living area where you currently live?

☐☐☐ m²

48. Are the rooms where your child is heated by electrical underfloor heating?

☐ No ☐ Yes

49. If yes, which rooms? *Enter a cross in more than one box, if appropriate)*

- ☐ Living room
- ☐ Kitchen
- ☐ Child's room
- ☐ Bedroom
- ☐ Hall
- ☐ Bathroom
- ☐ Other rooms

50. Has their been any damage caused by damp, any visible fungal/mould growth or mouldy smell in your home during the last year *(You can enter a cross in more than one box.)*

- ☐ No
- ☐ Yes, damage caused by damp
- ☐ Yes, visible fungal/mould growth
- ☐ Yes, mouldy smell

51. What type of drinking water do you have where you live?

- ☐ Water from a public or private water company
- ☐ Water from your own water supply (e.g. own well)
- ☐ Don't know

52. Do you live close to high-voltage lines?

- ☐ No
- ☐ Yes, closer than 50 metres
- ☐ Yes, 50–100 metres away
- ☐ Yes, but more than 100 metres away

53. Are there pets where your child lives or at the childminder's?

- ☐ No
- ☐ Yes, at home
- ☐ Yes, at the childminder's

54. If yes, what kind of pets?
(You can enter a cross in more than one box.)

- ☐ Dog
- ☐ Cat
- ☐ Guinea pig, rabbit, mouse, rat, etc.
- ☐ Budgie, other type of bird
- ☐ Other type of animal:_____

55. Is your child ever present in a room where someone smokes?

- ☐ Yes, every day Number of times per day ☐☐
- ☐ Yes, several times a week
- ☐ Yes, sometimes
- ☐ Don't know
- ☐ No

56. How many months old was your child when he/she got his/her first tooth?

Number of months ☐☐

- ☐ Don't remember

57. How often are your child's teeth brushed?

- ☐ Twice a day or more
- ☐ Once a day
- ☐ sometimes
- ☐ Never

58. Do you use fluoride toothpaste when brushing your child's teeth?

- ☐ No
- ☐ Sometimes
- ☐ Yes, usually

59. How often is your child outside at the moment?

- ☐ Seldom
- ☐ Often, but less than one hour a day on average
- ☐ 1 - 3 hours a day on average
- ☐ More than 3 hours a day

60. How many hours on average does your child sit in front of a TV/video every day?

- ☐ 4 hours
- ☐ 3 hours
- ☐ 1 -2 hours
- ☐ Less than 1 hour
- ☐ Seldom/never

61. Does your child go to or has been to swimming classes for babies?

- ☐ No
- ☐ Yes

If yes, how long has your child been going? ☐☐ months

62. Does your child use a dummy/pacifier now at 18 months?

- ☐ Seldom or never
- ☐ Only when he/she goes to sleep
- ☐ Quite often
- ☐ Most of the time

ABOUT YOURSELF

Health, illness and use of medication

63. What is your civil status at the moment?

- ☐ Married
- ☐ Cohabiting
- ☐ Single
- ☐ Separated/divorced
- ☐ Widowed
- ☐ Other

64. Are you pregnant at the moment?

- ☐ No
- ☐ Yes

If yes, how many weeks? ☐☐

65. Are you suffering from a long-term illness that has started during the last 12 months?

- ☐ No
- ☐ Yes, specify _____

66. Have you yourself been admitted to hospital during the last 12 months?

- ☐ No
- ☐ Yes, which hospital? _____

67. Are you taking at the moment any cod liver oil, vitamins or other dietary supplements?

- ☐ No
- ☐ Yes, specify

1. _____
2. _____
3. _____
4. _____

68. What is your current weight?

☐☐,☐ kg

69. Have you during the last 6 months or at any time previously: *(Enter a cross in a box for each item.)*

	Last 6 months			Previously		
	Yes	Perhaps	No	Yes	Perhaps	No
1. Felt yourself that you were too fat?	☐	☐	☐	☐	☐	☐
2. Been really afraid of putting on weight or becoming too fat?	☐	☐	☐	☐	☐	☐
3. Heard others say you were too thin, while you yourself thought that you were too fat?	☐	☐	☐	☐	☐	☐
4. Felt that it was extremely important for your self-image to maintain a particular weight?	☐	☐	☐	☐	☐	☐

70. Have you at some time during the last 6 months or previously in your life - for a period lasting at least 3 months - experienced any of the following situations, and if so, how frequently was this? (Select the period you were affected the most.) *(Enter a cross in a box for each item.)*

	Last 6 months			Previously		
	At least twice a week	1-4 times a mth	Seldom/ never	At least twice a week	1-4 times a mth	Seldom/ never
1. Felt that you were losing control when eating and couldn't stop before you had eaten too much?	☐	☐	☐	☐	☐	☐
2. Used vomiting to control your weight?	☐	☐	☐	☐	☐	☐
3. Used laxatives to control your weight?	☐	☐	☐	☐	☐	☐
4. Used fasting to control your weight?	☐	☐	☐	☐	☐	☐
5. Used hard physical exercise to control your weight?	☐	☐	☐	☐	☐	☐

71. Have you at some time during the last six months or previously in your life gone at least three months without any periods (without you being pregnant or giving birth/breast-feeding) in connection with a period when you had eating problems?

- ☐ No, never
- ☐ Yes, during the last 6 months
- ☐ Yes, previously

72. Have you experienced pain during the last 12 months in any of the following places? *(Enter a cross in a box for each item.)*

	Seldom/never	Slight pain	Some pain	Major pain
1. Stomach	☐	☐	☐	☐
2. Arms/legs	☐	☐	☐	☐
3. Neck/shoulders	☐	☐	☐	☐
4. Head	☐	☐	☐	☐
5. Back	☐	☐	☐	☐
6. Pelvis (pelvic girdle pains)	☐	☐	☐	☐

73. Have you experienced any pain in your back or pelvis during the last 12 months. Enter a cross to indicate how much pain you have felt in different places:

	Some pain	Major pain
1. In the small of the back	☐	☐
2. One of the pelvic//sacroiliac joints at the back	☐	☐
3. Both pelvic/sacroiliac joints at the back	☐	☐
4. Over the coccygeal bone	☐	☐
5. In the buttocks	☐	☐
6. Over the pubic bone	☐	☐
7. Groin	☐	☐
8. Other back pains	☐	☐
9. Other pains	☐	☐

74. Currently, do you wake during the night because of pelvic pain?

- ☐ No, never
- ☐ Yes, but seldom
- ☐ Yes, often

75. Do you have such problems walking at the moment because of pelvic pains that you have to use a stick or crutches?

- ☐ No, never
- ☐ Yes, but not every day - the pain varies from day to day
- ☐ Yes, must use a stick or crutches every day

76. Did you receive any treatment for pelvic pain after your last birth?

- ☐ No
- ☐ Yes

77. If yes, what type of treatment did you receive? *(You can enter a cross in more than one box.)*

- ☐ Physiotherapy
- ☐ Chiropractic
- ☐ Medication
- ☐ Other:_____

78. Do you have any of the following problems at the moment? *(Enter a cross in a box for each problem.)*

	How often do you have problems?					How much at a time?	
Problems:	Never	1–4 times a month	1–6 times a week	Once a day	More than Once a day	Drops	Large amounts
1. Incontinence when coughing, sneezing or laughing	☐	☐	☐	☐	☐	☐	☐
2. Incontinence during physical activity (running/jumping)	☐	☐	☐	☐	☐	☐	☐
3. Incontinence with a strong need to urinate	☐	☐	☐	☐	☐	☐	☐
4. Problems retaining faeces	☐	☐	☐	☐	☐		
5. Problems retaining flatus	☐	☐	☐	☐	☐		

79. Do you regularly take medication? *(This means any type of medication, including natural medicines.)*

- ☐ No
- ☐ Yes

80. If yes, give the name of the medicines and how often you take them. *(Include all types of medication, as well as natural medicines.)*

Name of medicine *(e.g. APOCILLIN, PARACET)*	How often do you take them? Every day	Every day for certain periods	Sometimes
_____	☐	☐	☐
_____	☐	☐	☐
_____	☐	☐	☐
_____	☐	☐	☐

Finances – lifestyle

81. How much leave did you and the child's father take after the birth? *(Specify either the number of months or weeks.)*

	Months		Weeks
Yourself	☐☐	or	☐☐
Child's father	☐☐	or	☐☐

82. Are you in paid employment?

☐ No
☐ Yes

83. If so, how many hours do your work a week?

☐☐,☐ hours

84. If you are in paid employment, have you taken any time off sick since you went back to work? If yes, specify how many days you were off sick.

	Number of days
☐ No	
☐ Yes, due to own illness.	☐☐☐
☐ Yes, due to your child being ill.	☐☐☐

85. Would your current finances allow you to cope with an unexpected bill of NOK 3,000 for a dental visit or a repair, for instance?

☐ No
☐ Yes
☐ Don't know

86. Have you found it difficult sometimes during the last six months to cope with running expenses for food, transport, rent, etc.?

☐ No, never
☐ Yes, but infrequently
☐ Yes, sometimes
☐ Yes, often

87. How often are you so physically active (during your spare time or at work) that you get out of breath and sweat?

	Spare time	At work
1. Never	☐	☐
2. Less than once a week	☐	☐
3. Once a week	☐	☐
4. Twice a week	☐	☐
5. 3-4 times a week	☐	☐
6. 5 times or more a week	☐	☐

88. How often do you exercise at present? *(Enter a cross in a box for each item.)*

Activity	Never	1-3 times a month	Once a week	Twice a week	3 times or more a week
1. Walking	☐	☐	☐	☐	☐
2. Brisk walking	☐	☐	☐	☐	☐
3. Running/jogging/orienteering	☐	☐	☐	☐	☐
4. Cycling	☐	☐	☐	☐	☐
5. Training studio/weight training	☐	☐	☐	☐	☐
6. Aerobics/gymnastics/dance without running and jumping	☐	☐	☐	☐	☐
7. Aerobics/gymnastics/dance with running and jumping	☐	☐	☐	☐	☐
8. Dancing (swing/rock/folk)	☐	☐	☐	☐	☐
9. Skiing	☐	☐	☐	☐	☐
10. Ball sports	☐	☐	☐	☐	☐
11. Swimming	☐	☐	☐	☐	☐
12. Riding	☐	☐	☐	☐	☐
13. other	☐	☐	☐	☐	☐

89. What are your and your partner's smoking habits at home at the moment?

	Yourself	Your partner/ husband
1. Don't smoke	☐	☐
2. Smoke sometimes	☐	☐
3. Smoke every day	☐	☐
4. If every day, number of cigarettes per day	☐☐	☐☐

90. How often do you consume alcohol at the moment?

- ☐ Roughly 6–7 times a week
- ☐ Roughly 4–5 times a week
- ☐ Roughly 2-3 times a week
- ☐ Roughly once a week
- ☐ Roughly 1-3 times a month
- ☐ Less often than once a month
- ☐ Never

91. How many units do you usually drink when you consume alcohol? (Enter a cross for both weekends and weekdays). *(See explanation below.)*

	Weekend	Weekdays
10 or more	☐	☐
7-9	☐	☐
5-6	☐	☐
3-4	☐	☐
1-2	☐	☐
Less than 1	☐	☐

Alcohol units

In order to compare different types of alcohol, we ask for the number of alcohol units (= 1.5 cl of pure alcohol). This means the following in practice:

1 glass (1/3 litre) of beer	= 1 unit
1 wine glass of red or white wine	= 1 unit
1 sherry glass of sherry or other fortified wine	= 1 unit
1 brandy glass of spirits or liqueur	= 1 unit
1 bottle of alcopop/cider	= 1 unit

A little more about yourself and how you are keeping now

92. If you have a husband/boyfriend/partner, to what extent do you agree with the following descriptions? *(Enter a cross in a box for each item.)*

	Totally agree	Agree	Slightly agree	Slightly disagree	Disagree	Totally disagree
1. My husband/partner and I have a close relationship	☐	☐	☐	☐	☐	☐
2. My partner and I have problems in our relationship	☐	☐	☐	☐	☐	☐
3. I am very happy in my relationship	☐	☐	☐	☐	☐	☐
4. My partner is usually understanding	☐	☐	☐	☐	☐	☐
5. I often think about ending our relationship	☐	☐	☐	☐	☐	☐
6. I am satisfied with my relationship with my partner	☐	☐	☐	☐	☐	☐
7. We often disagree about important decisions	☐	☐	☐	☐	☐	☐
8. I have been lucky in my choice of partner	☐	☐	☐	☐	☐	☐
9. We agree on how children should be raised	☐	☐	☐	☐	☐	☐
10. I think my partner is satisfied with our relationship	☐	☐	☐	☐	☐	☐

93. Do you have anyone other than your-spouse/boyfriend/partner whom you can seek advice from in a difficult situation?

- ☐ No
- ☐ Yes, 1 or 2 people
- ☐ Yes, more than 2 people

94. How often do you see or talk on the telephone to your family (apart from your household) or close friends?

- ☐ Once a month or less often
- ☐ 2-8 times a month
- ☐ More than twice a week

95. Do you often feel lonely?

- ☐ Almost never
- ☐ Seldom
- ☐ Sometimes
- ☐ Generally
- ☐ Almost always

96. How accurate are these statements to you? *(Enter a cross in a box for each item.)*

	Not accurate	Slightly accurate	Almost accurate	Totally accurate
1. I always manage to solve difficult problems if I try hard enough	☐	☐	☐	☐
2. If anyone opposes me, I find a way to get what I want	☐	☐	☐	☐
3. I am sure that I can cope with unexpected events	☐	☐	☐	☐
4. I am calm when I encounter difficulties because I trust my ability to cope	☐	☐	☐	☐
5. When I am in a difficult situation, I usually find a solution	☐	☐	☐	☐

97. In your daily life, how often do you *(Enter a cross in a box for each item.)*

	Seldom/ never	Fairly seldom	Sometimes	Often	Very often
1. Feel pleased about something	☐	☐	☐	☐	☐
2. Feel happy	☐	☐	☐	☐	☐
3. Feel joyful, as though everything is going your way	☐	☐	☐	☐	☐
4. Feel that you will scream at someone or hit something.	☐	☐	☐	☐	☐
5. Feel angry, irritated or annoyed	☐	☐	☐	☐	☐
6. Feel mad at somebody	☐	☐	☐	☐	☐

98. How do you feel about yourself? *(Enter a cross in a box for each item.)*

	Totally agree	Agree	Disagree	Totally disagree
1. I have a positive attitude towards myself	☐	☐	☐	☐
2. I feel completely useless at times	☐	☐	☐	☐
3. I feel that I do not have much to be proud of	☐	☐	☐	☐
4. I feel that I'm a valuable person, as good as anyone else	☐	☐	☐	☐

99. Have you been bothered by any of the following feelings during the past 2 weeks? *(Enter a cross in a box for each item.)*

	Not bothered	A little bothered	Quite bothered	Very bothered
1. Feeling fearful	☐	☐	☐	☐
2. Nervousness or shakiness inside	☐	☐	☐	☐
3. feeling hopeless about the future	☐	☐	☐	☐
4. Feeling blue	☐	☐	☐	☐
5. Worrying too much about things	☐	☐	☐	☐
6. Feeling everything is an effort	☐	☐	☐	☐
7. Feeling tense or keyed up	☐	☐	☐	☐
8. Suddenly scared for no reason	☐	☐	☐	☐

100. Have you experienced any of the following situations in the last year (since the previous questionnaire)? If yes, how painful and difficult was this for you? *(Enter a cross in a box for each item.)*

			If yes		
	No	Yes	Not so bad	Painful/ difficult	Very painful/ difficult
1. Have had problems at work or where you study	☐	☐	☐	☐	☐
2. Have had financial problems	☐	☐	☐	☐	☐
3. Have been divorced, separated or ended your relationship with your partner	☐	☐	☐	☐	☐
4. Have had problems or conflicts with your family, friends or neighbours	☐	☐	☐	☐	☐
5. Have been seriously worried that there is something wrong with your child	☐	☐	☐	☐	☐
6. Have been seriously ill or injured (your self)	☐	☐	☐	☐	☐
7. Has anyone close to you been seriously ill or injured	☐	☐	☐	☐	☐
8.Have been involved in a serious accident, fire or robbery	☐	☐	☐	☐	☐
9. Have lost someone close to you	☐	☐	☐	☐	☐
10. Have been pressurized into having sexual intercourse	☐	☐	☐	☐	☐
11. Other	☐	☐	☐	☐	☐

101. How would you rate your quality of life?

- ☐ Very poor
- ☐ Poor
- ☐ Neither poor nor good
- ☐ Good
- ☐ Very good

+

102. How satisfied are you with your health?

- ☐ Very dissatisfied
- ☐ Dissatisfied
- ☐ Neither satisfied nor dissatisfied
- ☐ Satisfied
- ☐ Very satisfied

+

103. The following questions ask about how much you have experienced certain things in the last two weeks. *(Enter a cross in a box for each item.)*

	Not at all	A little	A certain amount	A lot/ very	Totally/ extremely
1. To what extent do you feel that (physical) pain prevents you from doing what you need to do?	☐	☐	☐	☐	☐
2. To what extent do you need medical treatment to be able to function in your daily life?	☐	☐	☐	☐	☐
3. How much do you enjoy life?	☐	☐	☐	☐	☐
4. To what extent do you feel your life to be meaningful?	☐	☐	☐	☐	☐
5. How well are you able to concentrate?	☐	☐	☐	☐	☐
6. How safe do you feel in your daily life?	☐	☐	☐	☐	☐
7. How healthy is your physical environment?	☐	☐	☐	☐	☐

104. The following questions ask about how completely you experienced or were able to do certain things in the last two weeks. *(Enter a cross in a box for each item.)*

	Not at all/None	A little	To a certain extent	Mostly Almost	Always
1. Do you have enough energy for everyday life?	☐	☐	☐	☐	☐
2. Are you able to accept your bodily appearance?	☐	☐	☐	☐	☐
3. Have you enough money to meet your needs?	☐	☐	☐	☐	☐
4. How accessible is the information that you need in your day-to-day life?	☐	☐	☐	☐	☐
5. To what extent do you have the opportunity for leisure activities?	☐	☐	☐	☐	☐

+

105. How well are you able to get around?

- ☐ Very badly
- ☐ Badly
- ☐ Neither well nor badly
- ☐ Well
- ☐ Very well

106. The following questions ask you to say how good or satisfied you have felt about various aspects of your life over the last two weeks. *(Enter a cross in a box for each item.)*

	Very dissatisfied	Dis-satisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
1. How satisfied are you with your sleep?	☐	☐	☐	☐	☐
2. How satisfied are you with your ability to perform your daily living activities?	☐	☐	☐	☐	☐
3. How satisfied are you with your capacity for work?	☐	☐	☐	☐	☐
4. How satisfied are you with yourself?	☐	☐	☐	☐	☐
5. How satisfied are you with your personal relationships?	☐	☐	☐	☐	☐
6. How satisfied are you with your sex life?	☐	☐	☐	☐	☐
7. How satisfied are you with the support you get from your friends?	☐	☐	☐	☐	☐
8. How satisfied are you with the conditions where you live?	☐	☐	☐	☐	☐
9. How satisfied are you with your access to health services?	☐	☐	☐	☐	☐
10. How satisfied are you with your transport?	☐	☐	☐	☐	☐

+ +

107. The following question relates to how often you have experienced or had negative feelings during the last two weeks?

	Never	Seldom	Quite often	Very often	Always
How often do you have negative feelings, such as blue mood, despair, anxiety, depression?	☐	☐	☐	☐	☐

COMMENTS:

CHILD'S MEASUREMENTS AND WEIGHT

108. If any of the measurements in Question 30 are missing from the child's health card, can we contact the well baby clinic for them?

☐ No

☐ Yes Name of well baby clinic _____

Post code or district _____

Have you remembered to fill in on page 1 the date on which you completed the questionnaire?

Thank you very much for your help!

Please return the completed questionnaire in the stamped addressed envelope provided to:

Den norske Mor og Barn undersøkelsen
Nasjonalt folkehelseinstitutt
Avd. for medisinsk fødselsregister
Kalfarveien 31
5018 Bergen

APPENDIX III

Questionnaire 6
36 months postpartum

den norske **Mor & barn undersøkelsen**

Questionnaire 6 – Your child at 36 months

In this questionnaire we will ask you some questions which you may recognise from previous questionnaires. We do this because we want to continue following your and your child's development. You are welcome to consult your child's Health card so that you can use the information contained in it.

If you feel that a question is too upsetting or difficult to answer you can skip this question and go on to the next one.

The questionnaire will be processed by a computer. It is therefore important that you follow these instructions when completing it:

- Use a blue or black ballpoint pen.
- Put a *cross* in the box that is most relevant like this: ☒
- If you put a cross in the wrong box, correct it by filling in the box completely like this: ■
- Write *numbers* in the large boxes. ***It is important that you only write in the white area of each box like this:***

  Number: 1 2 3 4 5 6 7 8 9 0

- Numbered boxes have two or more squares. When you enter a single-digit number, use the square on the right.

  Example: 5 is entered as follows | | 5 |
- Specific information concerning, *for example, medication* should be written on the lines provided. *Write clearly in CAPITAL LETTERS.*
- Remember to fill in the date on which you completed the questionnaire

As soon as you have completed this questionnaire, return it to us in the stamped addressed envelope provided.

Specify the day, month and year when the questionnaire was completed

Day | Month | Year

(write the year in full, e.g. 2005)

Your child's development, health and history of illness

1. What is your child's height and weight (without clothes) at 3 years? If you know your child's height and weight at 2 years and 15-18 months, enter these measurements too. (If you don't know them, go on to the next question.) Give the date when the measurements were taken and enter a cross to indicate whether they were taken by you.

	Date of measurement (Day / Month / Year)	Height	Weight	Own measurement
Approx. 3 years		. cm	. kg	☐
Approx. 2 years		. cm	. kg	☐
Approx. 15-18 months		. cm	. kg	☐

2. How many months old was your child when he/she took his/her first steps unaided? mth ☐ Still not walking unaided.

The following questions concern any illnesses or health problems your child has had. We will first ask you about longer-term problems and then about illnesses and problems of a more acute nature.

3. Has your child suffered any long-term illness or health problems since the age of 18 months?

Health problem	No	Yes, has now	Yes, had previously	If so, has child been referred to a specialist: No	Yes
1. Impaired hearing	☐	☐	☐	☐	☐
2. Impaired vision	☐	☐	☐	☐	☐
3. Delayed motor development (e.g. sits/walks late)	☐	☐	☐	☐	☐
4. Cerebral palsy	☐	☐	☐	☐	☐
5. Joint problems	☐	☐	☐	☐	☐
6. Diabetes	☐	☐	☐	☐	☐
7. Gained too little weight	☐	☐	☐	☐	☐
8. Gained too much weight	☐	☐	☐	☐	☐
9. Heart defect	☐	☐	☐	☐	☐
10. Testicles not descended into scrotum	☐	☐	☐	☐	☐
11. Asthma	☐	☐	☐	☐	☐
12. Allergy affecting eyes or nose, e.g. hay fever	☐	☐	☐	☐	☐
13. Atopic eczema (childhood eczema)	☐	☐	☐	☐	☐
14. Other type of eczema	☐	☐	☐	☐	☐
15. Frequent diarrhoea	☐	☐	☐	☐	☐
16. Frequent stomach pains	☐	☐	☐	☐	☐
17. Food allergy/intolerance	☐	☐	☐	☐	☐
18. Other gastrointestinal problems	☐	☐	☐	☐	☐
19. Late or abnormal speech development	☐	☐	☐	☐	☐
20. Sleep problems	☐	☐	☐	☐	☐
21. Trouble relating to others	☐	☐	☐	☐	☐
22. Hyperactivity	☐	☐	☐	☐	☐
23. Autistic traits	☐	☐	☐	☐	☐
24. Other behavioural problems	☐	☐	☐	☐	☐
25. Other long-term illness/condition	☐	☐	☐	☐	☐

Specify _____

4. If your child has been to see a specialist or to the hospital, what did the investigation show?

☐ Everything was fine
☐ Still some doubts/further investigations needed
☐ Has not been for any investigation yet

☐ Received diagnosis I:_____

_____

☐ Received diagnosis II: _____

_____

☐ Received diagnosis III:_____

_____

5. If your child has a serious or long-term illness, describe it, if possible, in more detail:

_____

_____

6. Has your child ever been exposed to or involved in a serious incident?

☐ No ☐ Yes

7. If yes, give a description:

_____

_____

_____

_____

_____

_____

8. Do you think that this has affected your child's behaviour or development?

☐ No ☐ Yes

9. Has your child suffered any acute illness/health problem since the age of 18 months?
(Specify how many times and whether your child has been admitted to or examined at a hospital for this health problem.)

	No	Yes	Number of times	If yes, has child been admitted to or examined in hospital? No	Yes
1. Common cold	☐	☐		☐	☐
2. Throat infection with a confirmed streptococci	☐	☐		☐	☐
3. Other type of throat infection	☐	☐		☐	☐
4. Ear infection	☐	☐		☐	☐
5. Pseudocroup	☐	☐		☐	☐
6. Bronchitis	☐	☐		☐	☐
7. Pneumonia	☐	☐		☐	☐
8. Gastric flu/diarrhoea	☐	☐		☐	☐
9. Urinary tract infection	☐	☐		☐	☐
10. Encephalitis/meningitis	☐	☐		☐	☐
11. Febrile convulsions	☐	☐		☐	☐
12. Other convulsions (without any fever)	☐	☐		☐	☐
13. Injury or accident	☐	☐		☐	☐
14. Other _____	☐	☐		☐	☐

10. If your child has been examined in or admitted to hospital, give the name of the hospital:

Hospital name: _____

Hospital name: _____

Hospital name: _____

11. Has your child been referred to the following services since the age of 18 months?

	No	Yes
Habilitation service	☐	☐
Educational psychology service	☐	☐
Child psychiatric clinic/department	☐	☐

12. Has your child taken any medication during the last 12 months? *(This means any type of medication, including fever-reducing medicines, alternative medicines and herbal remedies)*

☐ No ☐ Yes

13. If yes, give the name of the medicines and indicate how long your child took these medicines for altogether and whether he/she is still taking them now.

Name of medicine: (CAPITALS)	Duration of use					Still being taken now?	
	0-2 weeks	3-4 weeks	1-2 mth	3-6 mth	7-12 mth	No	Yes
_____	☐	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐	☐	☐

14. Has your child been given any vaccinations since you completed the previous questionnaire (at around 18 months or 6 months)? ☐ No ☐ Yes

15. If yes, specify which vaccinations and when your child received them.

Type of vaccination: Date given:

_____ ☐☐ ☐☐ ☐☐

_____ ☐☐ ☐☐ ☐☐

Day Month Year

16. Is your child taking at the moment any cod liver oil, vitamins or other dietary supplements?

	Yes, daily	Sometimes	No
1. Cod liver oil	☐	☐	☐
2. Fluoride tablets	☐	☐	☐
3. Vitamin preparations, specify _____	☐	☐	☐
4. Iron supplement, specify _____	☐	☐	☐
5. Other dietary supplements, specify_____	☐	☐	☐

Your child's development and ability to cope

In this section you will find some questions repeated in a different form. We do this so that we can compare your child's development with other similar studies and try out the best way to ask the question. The questions will relate to children who have reached different stages of development. Answer all the questions as well as you can, even if everything does not necessarily apply to your child.

17. About your child's motor development. *(Enter a cross in a box for each item.)*

	Yes	A few times	Not yet
1. Can your child kick a ball by swinging his/her leg forward without holding onto anything for support?	☐	☐	☐
2. Can your child catch a large ball with both hands?	☐	☐	☐
3. When drawing, does your child hold a pencil, crayon or pen between his/her fingers and thumb like an adult does?	☐	☐	☐
4. Can your child undo one or more buttons?	☐	☐	☐

18. About your child's language skills. *(Enter a cross for the option which best describes the way your child talks.)*

☐ Not yet talking
☐ He/she is talking, but you can't understand him/her
☐ Talking in one-word utterances, such as "milk" or "down"
☐ Talking in 2- to 3-word phrases, such as "me got ball" or "give doll"
☐ Talking in fairly complete sentences, such as "I got a doll" or "can I go outside?"
☐ Talking in long and complicated sentences, such as "when I went to the park, I went on the swings" or "I saw a man standing on the corner"

19. Your child's body language. *(Enter a cross in the box of the answer that fits your child best for each statement.)*

	Yes, usually	Very seldom	Not yet
1. When you enthusiastically say: "Where is the ball (or other toy)?", will your child point towards the toy, even if it is more than 1 metre away?	☐	☐	☐
2. When you look at a distant object and, surprised and excited, say: "Waoo...what's that?", - does he/she turn his/her head in the same direction as you?	☐	☐	☐
3. Does your child use sounds or words together with gestures? (for example, uses sounds when pointing or reaching towards toys or objects)	☐	☐	☐
4. Does your child show you toys by looking at you and holding the toy up towards you? (from a distance just so you can look at it)	☐	☐	☐

20. About your child's social skills.
(Enter a cross in a box for each statement to indicate whether you agree or disagree.)

	Disagree	Partially agree	Totally agree
1. Your child shares readily with other children (treats, toys, pencils, etc.)	☐	☐	☐
2. Your child is helpful if someone is hurt, upset or feeling ill	☐	☐	☐
3. Your child is considerate of other people's feelings	☐	☐	☐
4. Your child is kind to younger children	☐	☐	☐
5. Your child often volunteers to help others (parents, teachers, other children)	☐	☐	☐
6. Your child pays careful attention when you try to teach him/her something new	☐	☐	☐

21. Understanding what others say and being able to communicate
(Enter a cross in the box of the answer that fits your child best for each statement.)

	Yes	A few times	Not yet
1. Without showing him/her first, does your child point to the correct picture when you say, "Where is the cat" or "Where is the dog"? Your child must only point at the correct picture.	☐	☐	☐
2. When you ask your child to point at his/her eyes, nose, hair, feet, ears, etc., does he/she point correctly at least seven parts of the body? (The child can point at himself/herself, you or a doll.)	☐	☐	☐
3. Does your child use sentences made up of three or four words?	☐	☐	☐
4. Without giving him/her help by pointing or using gestures, ask your child to "Put the shoe on the table" and "Put the book under the chair". Does your child carry out both of these directions correctly?	☐	☐	☐
5. When looking at a picture book, does your child tell you what is happening or what action is taking place in the picture? (For example, "Barking", "Running", "Eating" and "Crying"?) You may ask, "What is the dog (or boy) doing?"	☐	☐	☐
6. Can your child tell you at least two things about an object he/she is familiar with? If you say, for example, "Tell me about your ball", will your child answer by saying something like "It is round, I can throw it, it is big"?	☐	☐	☐

22. About body language and other ways of communicating with others. *(We are asking you about how your child usually is. If the behaviour is rare , e.g. you have only seen it once or twice, enter a cross in the 'No' box. Enter a cross in a box for each question.)*

	Yes	No
1. Does your child respond to his/her name one of the first two times you call?	☐	☐
2. Does your child ever bring objects over to you to show you something?	☐	☐
3. Does your child imitate you (e.g. you make a face - will your child imitate it?)?	☐	☐
4. Does your child ever use his/her index finger to point, to indicate interest in something?	☐	☐
5. Does your child take an interest in other children?	☐	☐
6. If you point at a toy across the room, does your child look at it?	☐	☐
7. Is it easy to make eye contact with your child?	☐	☐
8. Does your child react when spoken to, for instance, by looking, listening, smiling, speaking or babbling?	☐	☐
9. Does you child ever seem oversensitive to noise (e.g. plugging ears)?	☐	☐
10. Does you child only choose a very small number of particular toys or objects, even if you try to make him/her interested in more things?	☐	☐
11. Does your child wave to people to greet or say goodbye to them?	☐	☐
12. Can your child hurt himself/herself a lot without seeming to be bothered (has a high pain threshold)?	☐	☐

23. About talking with others. *(Enter a cross in a box for each question to indicate whether you think it applies to your child or not.)*

	Yes	No
1. Does your child talk using short phrases or sentences?	☐	☐
2. Do you have a to-and-fro "conversation" with your child that involves taking turns or building on what you have said?	☐	☐
3. Does your child ever use odd phrases or say the same thing over and over again in almost exactly the same way? (either phrases that the child hears other people use or ones that he/she makes up)	☐	☐
4. Does your child ever use socially inappropriate questions or statements? For example, does your child ever regularly ask personal questions or make personal comments at awkward times?	☐	☐
5. Does your child ever get his/her pronouns mixed up (i.e. saying "you" or "he/she" instead of "I")?	☐	☐
6. Does your child ever use words that he/she seems to have invented or made up himself/herself, put things in odd, indirect ways or use metaphorical ways of saying things? (e.g. saying "hot rain" for "steam")	☐	☐
7. Does your child ever say the same thing over and over in exactly the same way or insist that you say the same thing over and over again?	☐	☐
8. Does your child ever have things that he/she seems to have to do in a very particular way or order, or rituals that the child insists that you go through?	☐	☐

24. About behaviour and specific things that children can think of doing. *(Enter a cross in a box for each question to indicate whether you think it applies to your child or not.)*

	Yes	No
9. Does your child's facial expression usually seem appropriate to the particular situation, as far as you can tell?	☐	☐
10. Does your child ever use your hand like a tool or as if it were part of his/her own body (e.g. pointing with your finger or putting your hand on a doorknob to get you to open the door)?	☐	☐
11. Does your child ever have any interests that preoccupy him/her and might seem odd to other people (e.g. traffic lights, drainpipes or timetables)?	☐	☐
12. Does your child ever seem to be more interested in parts of a toy or an object, rather than in using the object as it was intended (e.g. spinning the wheels of a car)?	☐	☐
13. Does your child ever have any special interests that are unusual in their intensity, but otherwise appropriate for his/her age and peer group (e.g. trains or dinosaurs)?	☐	☐
14. Does your child ever seem to be unusually interested in the sight, feel, sound, taste or smell of things or people?	☐	☐
15. Does your child ever have any mannerisms or odd ways of moving his/her hands or fingers, such as flapping or moving his/her fingers in front of his/her eyes?	☐	☐
16. Does your child ever have any complicated movements of his/her whole body, such as spinning or repeatedly bouncing up and down?	☐	☐
17. Does your child ever injure himself/herself deliberately, such as by biting his/her arm or banging his/her head?	☐	☐
18. Does your child ever have any objects that he/she has to carry around (other than a soft toy or comfort blanket)?	☐	☐

25. About your child's social development and interest in others. *(Enter a cross in a box for each question to indicate whether you think it applies to your child or not.)*

	Yes	No
19. Does your child have any particular friends or a best friend?	☐	☐
20. Does your child ever talk with you just to be friendly (rather than to get something)?	☐	☐
21. Does your child ever spontaneously copy you (or other people) or what your are doing (such as vacuuming, gardening or mending things)?	☐	☐
22. Does your child ever spontaneously point at things around him/her just to show you things (not because he/she wants them)?	☐	☐
23. Does your child ever use gestures, other than pointing or pulling your hand, to let you know what he/she wants?	☐	☐
24. Does your child nod his/her head to indicate yes?	☐	☐
25. Does your child shake his/her head to indicate no?	☐	☐
26. Does your child usually look at you directly in the face when doing things with you or talking with you?	☐	☐
27. Does your child smile back if someone smiles at him/her?	☐	☐
28. Does your child ever show you things that interest him/her to engage your attention?	☐	☐

cont. next page

	Yes	No
29. Does your child ever offer to share things other than food with you?	☐	☐
30. Does your child ever seem to want you to join in his/her enjoyment of something?	☐	☐
31. Does your child ever try to comfort you when you are sad or hurt?	☐	☐
32. If your child wants something or wants help, does he/she look at you and use gestures with sounds or words to get your attention?	☐	☐
33. Does your child show a normal range of facial expressions?	☐	☐
34. Does your child ever spontaneously join in and try to copy the actions in social games, such as "The Mulberry Bush" or "London Bridge is Falling Down"?	☐	☐
35. Does your child play any pretend or make-believe games?	☐	☐
36. Does your child seem interested in other children of approximately the same age whom he/she does not know?	☐	☐
37. Does your child respond positively when another child approaches him/her?	☐	☐
38. If you come into a room and start talking to your child without calling his/her name, does he/she usually look up and pay attention to you?	☐	☐
39. Does your child ever play imaginative games with another child in such a way that you can tell that each child understands what the other is pretending?	☐	☐
40. Does your child play cooperatively in games that need some form of joining in with a group of other children, such as hide-and-seek or ball games?	☐	☐

26. Loss of skills. *(Is there something your child used to be able to do, but has lost the ability to do?)*

	No	Yes	Not sure
1. Has your child lost any language skills? (For example, used single words or sentences for a time and then stopped using the words)	☐	☐	☐
2. Has your child lost any social skills? (For example, could wave or say "Hi" to greet someone, then lost this skill)	☐	☐	☐
3. Has your child turned out to be less sociable? (For example, he/she is more difficult to have eye contact with, is less interested in other people now)	☐	☐	☐
4. Has your child lost any motor skills? (For example, could run and jump while remaining steady, but falls over much more now)	☐	☐	☐

Your child's temperament and behaviour

27. To what extent do the following statements apply to your child's behaviour during the last two months? *(Enter a cross in a box for each item.)*

	Very typical	Quite typical	Neither/ nor	Not so typical	Not at all typical
1. Your child cries easily	☐	☐	☐	☐	☐
2. Your child is always on the go	☐	☐	☐	☐	☐
3. Your child prefers playing with others rather than alone	☐	☐	☐	☐	☐
4. Your child is off and running as soon as he/she wakes up in the morning	☐	☐	☐	☐	☐
5. Your child is very sociable	☐	☐	☐	☐	☐
6. Your child takes a long time to warm up to strangers	☐	☐	☐	☐	☐
7. Your child gets upset or sad easily	☐	☐	☐	☐	☐
8. Your child prefers quiet, inactive games to more active ones	☐	☐	☐	☐	☐
9. Your child likes to be with people	☐	☐	☐	☐	☐
10. Your child reacts intensely when upset	☐	☐	☐	☐	☐
11. Your child is very friendly with strangers	☐	☐	☐	☐	☐
12. Your child finds other people more fun than anything else	☐	☐	☐	☐	☐
13. Your child complains that certain garments are too tight	☐	☐	☐	☐	☐
14. Your child is distressed by having his/her face or hair washed	☐	☐	☐	☐	☐

28. The following list contains statements describing children's behaviour and manner from the age of 2-3. Some of these features are temporary while others continue for a longer period of time. To what extent are the following statements true of your child's behaviour during the last two months? *(Enter a cross in a box for each item.)*

	Not true	Somewhat or sometimes true	Very true or often true
1. Afraid to try new things	☐	☐	☐
2. Can't concentrate, can't pay attention for long	☐	☐	☐
3. Can't sit still, restless or hyperactive	☐	☐	☐
4. Can't stand waiting, wants everything now	☐	☐	☐
5. Clings to adults or too dependent	☐	☐	☐
6. Constipated, doesn't move bowels	☐	☐	☐
7. Defiant	☐	☐	☐
8. Demands must be met immediately	☐	☐	☐
9. Disturbed by any change in routine	☐	☐	☐
10. Doesn't want to sleep alone	☐	☐	☐
11. Doesn't eat well	☐	☐	☐
12. Doesn't seem to feel guilty after misbehaving	☐	☐	☐
13. Eats or drinks things that are not food (don't include sweets)	☐	☐	☐
14. Gets in many fights	☐	☐	☐
15. Gets into everything	☐	☐	☐
16. Gets too upset when separated from parents	☐	☐	☐
17. Hits others	☐	☐	☐
18. Poorly coordinated or clumsy	☐	☐	☐
19. Punishment doesn't change his/her behaviour	☐	☐	☐
20. Quickly shifts from one activity to another	☐	☐	☐
21. Resists going to bed at night	☐	☐	☐
22. Stomach aches or cramps (without medical cause)	☐	☐	☐
23. Sudden changes in moods or feelings	☐	☐	☐
24. Too fearful or anxious	☐	☐	☐
25. Vomiting, throwing up (without medical cause)	☐	☐	☐
26. Doesn't seem to be happy eating food (don't include sweets)	☐	☐	☐

29. Some more statements follow about your child's behaviour and manner. We are again asking to what extent you feel the statements are true of your child during the last two months? *(Enter a cross in a box for each item.)*

	Not true	Somewhat or sometimes true	Very true or often true
1. Becomes distracted or diverted by outside stimuli (sounds or events)	☐	☐	☐
2. Finds it difficult waiting his/her turn	☐	☐	☐
3. Has problems keeping focused on tasks or activities	☐	☐	☐
4. Is excessively talkative	☐	☐	☐
5. Doesn't differentiate between adults; behaves the same way to all of them	☐	☐	☐
6. Will wander after other adults, even if they are strangers	☐	☐	☐
7. Doesn't seem to listen when he/she is being spoken to	☐	☐	☐
8. Has a habit of rolling his/her head around or making humming sounds	☐	☐	☐
9. Mood can vary greatly from day to day	☐	☐	☐
10. Is extremely passive, needs help to get going	☐	☐	☐
11. "Tests" other children to see whether they get angry	☐	☐	☐
12. Becomes aggressive when he/she is frustrated	☐	☐	☐
13. His/her body is affected by twitches or contortions that seem difficult to control (e.g. eyes, mouth, nose or legs)	☐	☐	☐
14. Hits, shoves, kicks and bites other children (not including siblings)	☐	☐	☐
15. Is very anxious about getting dirty	☐	☐	☐
16. Wants things to be clean and tidy	☐	☐	☐
17. Places toys or other objects in a certain order/sequence over and over again	☐	☐	☐
18. Wakes up in the night and needs help to get back to sleep	☐	☐	☐
19. Gets distressed when you go out and he/she is going to be looked after by family or a babysitter he/she knows	☐	☐	☐

cont. next page

	Not true	Somewhat or sometimes true	Very trueor often true
20. Does things he/she is not allowed to do to attract attention from adults	☐	☐	☐
21. Seems to have less fun than other children	☐	☐	☐
22. Is extremely noisy. Shouts and screams a lot	☐	☐	☐
23. Is disobedient or defiant (e.g. refuses to do anything you ask)	☐	☐	☐
24. Comes over to you when something happens that makes him/her afraid or anxious	☐	☐	☐
25. Runs off when you are outside	☐	☐	☐
26. Seems to have less energy	☐	☐	☐
27. Is very fussy when it comes to food	☐	☐	☐
28. Seems to be unhappy, sad or depressed	☐	☐	☐
29. Wakes up several times during the night	☐	☐	☐

30. About your child's eating habits and appetite and your attitude to it.

	Totally disagree	Slightly disagree	Neither/ nor	Slightly agree	Totally agree
1. I have to be sure that my child does not eat too many sweet things (sweets, ice cream, cakes or pastries)	☐	☐	☐	☐	☐
2. I have to be sure that my child does not eat too many high-fat foods	☐	☐	☐	☐	☐
3. I have to be sure that my child does not eat too much of his/her favourite food	☐	☐	☐	☐	☐
4. I intentionally keep some foods out of my child's reach	☐	☐	☐	☐	☐
5. I offer sweet things (sweets, ice cream, cakes, pastries) to my child as a reward for good behaviour	☐	☐	☐	☐	☐
6. I offer my child his/her favourite foods in exchange for good behaviour	☐	☐	☐	☐	☐
7. If I did not guide or regulate my child's eating he/she would eat too many junk foods	☐	☐	☐	☐	☐
8. If I did not guide or regulate my child's eating he/she would eat too much of his/her favourite foods	☐	☐	☐	☐	☐
9. My child should always eat all of the food on his/her plate	☐	☐	☐	☐	☐
10. I have to be especially careful to make sure that my child eats enough	☐	☐	☐	☐	☐
11. If my child says: "I'm not hungry", I try to get him/her to eat anyway	☐	☐	☐	☐	☐
12. If I did not guide or regulate my child's eating, he/she would eat much less than he/she should.	☐	☐	☐	☐	☐

31. About your concerns.

	No	Yes
1. Are you concerned because your child is demanding and difficult to cope with?	☐	☐
2. Have you every wondered if your child's hearing is impaired?	☐	☐
3. Have others (family, nursery, health visitor) expressed concerns about your child's development?	☐	☐
4. Are your concerned because your child is hardly interested at all in playing with other children?	☐	☐
5. Do you have any other concern about your child's health?	☐	☐

If so, specify _____

Your child's everyday life and environment

32. Do you live with your child's father?

☐ No ☐ Yes

33. If no, how much time does your child spend with his/her mother and father respectively?

	Mother	Father
More than half the time	☐	☐
Roughly half the time	☐	☐
At least once a week	☐	☐
At least once a month	☐	☐
Less often than once a month	☐	☐
Never	☐	☐

34. How often does your child have his/her teeth brushed?

☐ Twice a day or more
☐ Once a day
☐ Sometimes
☐ Never

35. Does your child use fluoride toothpaste?

☐ No
☐ Sometimes
☐ Yes, usually

36. Is your child ever present in a room where someone smokes?

- ☐ Yes, every day — Number of hours a day: ☐☐
- ☐ Yes, several times a week
- ☐ Yes, sometimes
- ☐ Don't know
- ☐ No

37. How often is your child outside at present?

- ☐ Seldom
- ☐ Frequently, but less than 1 hour a day on average
- ☐ 1-3 hours a day on average
- ☐ More than 3 hours a day

38. How many hours on average does your child sit in front of a TV/video every day?

- ☐ 4 hours or more
- ☐ 3 hours
- ☐ 1-2 hours
- ☐ Less than 1 hour
- ☐ Seldom/never

39. How is your child cared for during the day at the moment? *(You can enter a cross in more than one box.)*

- ☐ At home with his/her mother
- ☐ At home with his/her father
- ☐ At home with an unqualified childminder
- ☐ At a childminder's/family creche
- ☐ In an outdoor nursery
- ☐ In a nursery

40. How many hours a week is your child looked after during the day by someone other than his/her mother or father?

☐☐

Diet

41. How often does your child drink or eat the following at present? *(Select the frequency which is most applicable on average.)*
(Enter a cross in a box for each item.)

	Seldom/ less than once a week	1-3 times a week	4-6 times a week	Once in 24 hrs	Twice in 24 hrs	3 times in 24 hrs	4 or more times in 24 hrs
1. Whole milk, sweet/sour	☐	☐	☐	☐	☐	☐	☐
2. Low-fat, extra low-fat, skimmed milk, sweet/sour	☐	☐	☐	☐	☐	☐	☐
3. Yogurt, natural	☐	☐	☐	☐	☐	☐	☐
4. Yogurt / yogurt drink with fruit	☐	☐	☐	☐	☐	☐	☐
5. Yogurt with active Lactobacillus, all types							
6. Juice	☐	☐	☐	☐	☐	☐	☐
7. Cordial / nectar / squash / fizzy drinks, sweetened	☐	☐	☐	☐	☐	☐	☐
8. Cordial / squash / fizzy drinks, with artificial sweeteners	☐	☐	☐	☐	☐	☐	☐
9. Meat filling (liver paste, ham, etc.)	☐	☐	☐	☐	☐	☐	☐
10. Fish filling (mackerel, caviar, etc.)	☐	☐	☐	☐	☐	☐	☐
11. Brown cheese, brown cheese spread	☐	☐	☐	☐	☐	☐	☐
12. Other types of cheese	☐	☐	☐	☐	☐	☐	☐
13. Jam, honey, chocolate spread, other sweet spread	☐	☐	☐	☐	☐	☐	☐
14. Eggs, boiled, fried, scrambled	☐	☐	☐	☐	☐	☐	☐
15. Other filling_____	☐	☐	☐	☐	☐	☐	☐
16. Fruit	☐	☐	☐	☐	☐	☐	☐
17. Raisins	☐	☐	☐	☐	☐	☐	☐
18. Ice cream	☐	☐	☐	☐	☐	☐	☐
19. Ice lolly	☐	☐	☐	☐	☐	☐	☐
20. Biscuits	☐	☐	☐	☐	☐	☐	☐
21. Buns, cakes, waffles	☐	☐	☐	☐	☐	☐	☐
22. Chocolate	☐	☐	☐	☐	☐	☐	☐
23. Sweets, jelly babies, etc.	☐	☐	☐	☐	☐	☐	☐
24. Crisps, potato snacks	☐	☐	☐	☐	☐	☐	☐

42. How many slices of bread/crispbread does your child eat every day? ☐☐

How many of these include fibre-rich bread/ crispbread (e.g. rye bread, Fedons bread) ☐☐

43. How often does your child eat the following at present? *(Select the frequency which is most applicable on average.) (Enter a cross in a box for each item.)*

	Once a mth or less often	2-3 times a month	Once a week	Twice a week	3 times a week	4 times a week	5 or more times a week
1. Meat, rissoles, sausages, etc.	☐	☐	☐	☐	☐	☐	☐
2. Oily fish (salmon, herring, etc.)	☐	☐	☐	☐	☐	☐	☐
3. White fish (cod, coley, etc.)	☐	☐	☐	☐	☐	☐	☐
4. Fish pudding, fish cakes, fish balls, etc.	☐	☐	☐	☐	☐	☐	☐
5. Soup	☐	☐	☐	☐	☐	☐	☐
6. Pancakes	☐	☐	☐	☐	☐	☐	☐
7. Potatoes	☐	☐	☐	☐	☐	☐	☐
8. Pasta, spaghetti, noodles	☐	☐	☐	☐	☐	☐	☐
9. Pizza	☐	☐	☐	☐	☐	☐	☐
10. Rice	☐	☐	☐	☐	☐	☐	☐
11. Cooked vegetables	☐	☐	☐	☐	☐	☐	☐
12. Raw vegetables, salad	☐	☐	☐	☐	☐	☐	☐

Questions about yourself

44. What is your civil status at present?

☐ Married
☐ Cohabiting
☐ Single
☐ Separated/divorced
☐ Widowed
☐ Other

45. Are you in paid employment at the moment?

☐ No *(go to question 49)*
☐ Yes Usual number of hours per week: ☐☐,☐

46. What type of working pattern do you have? *(You can enter a cross in more than one box.)*

☐ Permanent day work
☐ Shift work/rota system
☐ Permanent afternoon/evening work
☐ Non-permanent (relief cover, relief on-call, supply, etc.)
☐ Permanent night work

47. How many days altogether were you absent from work last year (excluding holidays and time off in lieu)?

☐☐☐ days

48. What was the reason for this? *(You can enter a cross in more than one box.)*

☐ Leave
☐ Own illness, specify_____
☐ Sick child
☐ Other

49. Do you often feel lonely?

☐ Almost never
☐ Seldom
☐ Sometimes
☐ Generally
☐ Almost always

50. Do you have anyone other than your spouse /boyfriend/partner whom you can seek advice from in a difficult situation?

☐ No
☐ Yes, 1 or 2 people
☐ Yes, more than 2 people

51. How often do you see or talk on the telephone to your family (apart from your household) or close friends?

☐ Once a month or less
☐ 2-8 times a month
☐ More than twice a week

52. Have you ever experienced the following, since you became pregnant with this child, for a consecutive period of two weeks or more..... *(Enter a cross in a box for each item.)*

	No	Yes, during pregnancy	Yes, during first year after birth	Yes, during the last 2 years
1. Felt depressed, sad, down?	☐	☐	☐	☐
2. Had problems with your appetite or eaten too much?	☐	☐	☐	☐
3. Been affected by lethargy or a lack of energy?	☐	☐	☐	☐
4. Really got down on yourself and felt worthless?	☐	☐	☐	☐
5. Had problems concentrating or found it difficult to make decisions?	☐	☐	☐	☐
6. Had at least 3 of the problems mentioned above at the same time?	☐	☐	☐	☐

53. Are you pregnant now?

☐ No ☐ Yes

54. Have you had any long-term illness or health problems which have occurred during the last 3 years?

Physical problem:

☐ No

☐ Yes, before, describe: _____

☐ Yes, now, describe: _____

Mental problem:

☐ No

☐ Yes, before, describe: _____

☐ Yes, now, describe: _____

55. Have you yourself been examined at the hospital during the last 3 years?

☐ No

☐ Yes, which hospital? _____

56. Do you have any of the following problems at present; if so, how often and how much at a time? *(Enter a cross in a box for each item.)*

	How often do you have problems?					How much at a time?		
Problems:	Never	1–4 times a month	1–6 times a week	Once a day	More than once a day	Drops	Small gushes	Large amounts
1. Incontinence when coughing, sneezing or laughing	☐	☐	☐	☐	☐	☐	☐	☐
2. Incontinence during physical activity (running/jumping)	☐	☐	☐	☐	☐	☐	☐	☐
3. Incontinence with a strong need to urinate . .	☐	☐	☐	☐	☐	☐	☐	☐
4. Problems retaining faeces	☐	☐	☐	☐	☐			
5. Problems with flatulence								

57. How physically active are you? We are asking you here about the duration of activities where you get out of breath or sweat. How often does this happen? Include activities both at home and at work. *(Enter a cross in a box for each item.)*

	How often					
Duration of activity where you get out of breath or sweat	Never	Less than once a week	Once a week	Twice a week	3-4 times a week	5 times or more a week
Less than 30 minutes	☐	☐	☐	☐	☐	☐
Between 30 and 60 minutes	☐	☐	☐	☐	☐	☐
More than 60 minutes	☐	☐	☐	☐	☐	☐

58. Overall, how would you describe your physical health?

☐ Very good
☐ Good
☐ Poor
☐ Very poor

59. Do you smoke at present?

☐ Don't smoke

☐ Smoke sometimes - no. cigarettes per week: ☐☐☐

☐ Smoke every day - no. cigarettes per day: ☐☐☐

60. Do you take:

☐ Chewing tobacco/snuff
☐ Nicotine chewing gum
☐ Nicotine patches
☐ Nicotine inhaler

61. How often do you consume alcohol at present?

☐ Roughly 6–7 times a week
☐ Roughly 4–5 times a week
☐ Roughly 2-3 times a week
☐ Roughly once a week
☐ Roughly 1-3 times a month
☐ Less than once a month
☐ Never

62. How many alcohol units do you usually drink when you consume alcohol? *(Enter a cross for both weekends and weekdays)* (See explanation below about alcohol units.)

	Weekend	Weekdays
10 or more	☐	☐
7–9	☐	☐
5–6	☐	☐
3–4	☐	☐
1–2	☐	☐
Less than 1	☐	☐

Alcohol units

In order to compare different types of alcohol, we ask for the number of alcohol units (= 1.5 cl of pure alcohol). This means the following in practice:

1 glass (1/3 litre) of beer	= 1 unit
1 wine glass of red or white wine	= 1 unit
1 wine glass of sherry or other fortified wine	= 1 unit
1 brandy glass of spirits or liqueur	= 1 unit
1 bottle of alcopop/cider	= 1 unit

63. Have you experienced any of the following during the last 3 years:

	No	Yes
Being hit, kicked or attacked physically in any other way?	☐	☐
Being pressured into having sexual intercourse?	☐	☐

64. Have you during the last 18 months:
(Enter a cross in a box for each item.)

	No	Yes
1. Thought yourself that you were too fat?	☐	☐
2. Been really afraid of putting on weight or becoming too fat?	☐	☐
3. Heard others say that you were too thin, while you yourself thought that you were too fat?	☐	☐
4. Thought that it was extremely important for your self-image to maintain a particular weight?	☐	☐

65. Have you at some time during the last 18 months or previously in your life - for a period lasting at least 3 months - experienced any of the following situations, and if so, how frequently was this? *(Enter a cross in a box for each item.)*

	At least twice a week	1-4 times a month	Seldom/ never
1. Felt that you were losing control when eating and couldn't stop before you had eaten far too much?	☐	☐	☐
2. Used vomiting to control your weight?	☐	☐	☐
3. Used laxatives to control your weight?	☐	☐	☐
4. Used fasting to control your weight?	☐	☐	☐
5. Used hard physical exercise to control you weight?	☐	☐	☐

66. Have you at some time during the last 18 months gone at least three months without a period in connection with a time when you have been having eating problems? *(without being pregnant)*

☐ No ☐ Yes

67. What is your current weight? ☐☐,☐ kg

How tall are you? ☐☐☐ cm

68. Feeling of anxiety and restlessness. *(Enter a cross in a box for the items that apply to you best during the last 6 months.)*

	Never	Seldom	Sometimes	Often	Very often
1. How often do you have problems completing the final aspects of a task when the challenging part is already done?	☐	☐	☐	☐	☐
2. How often do you have problems putting things in the right order when you are involved in tasks that require organisation?	☐	☐	☐	☐	☐
3. When you have a task which requires a great deal of careful preparation, how often do you avoid or put off starting it?	☐	☐	☐	☐	☐
4. How often do you have problems remembering appointments or engagements?	☐	☐	☐	☐	☐
5. When you have to sit still for a long time, how often do you move your hands and feet in an anxious, restless way?	☐	☐	☐	☐	☐
6. How often do you feel hyperactive and obliged to do things, as if you are being driven by an engine?	☐	☐	☐	☐	☐

69. If you have a husband/boyfriend/partner, to what extent do you agree with the following descriptions? *(Enter a cross in a box for each item.)*

	Totally agree	Agree	Slightly agree	Slightly disagree	Disagree	Totally disagree
1. My partner and I have problems in our relationship	☐	☐	☐	☐	☐	☐
2. I am very happy in my relationship	☐	☐	☐	☐	☐	☐
3. My partner is generally understanding	☐	☐	☐	☐	☐	☐
4. I am satisfied with the relationship with my partner	☐	☐	☐	☐	☐	☐
5. We agree on how children should be brought up	☐	☐	☐	☐	☐	☐

70. Have you been bothered during the last 2 weeks by any of the following? *(Enter a cross in a box for each item.)*

	Not bothered	A little bothered	Quite bothered	Very bothered
1. Feeling fearful	☐	☐	☐	☐
2. Nervousness or shakiness inside	☐	☐	☐	☐
3. Feeling hopeless about the future	☐	☐	☐	☐
4. Feeling blue	☐	☐	☐	☐
5. Worrying too much about things	☐	☐	☐	☐
6. Feeling everything is an effort	☐	☐	☐	☐
7. Feeling tense or keyed up	☐	☐	☐	☐
8. Suddenly scared for no reason	☐	☐	☐	☐

71. Have you experienced during the last 18 months any of the following situations? If yes, how painful and difficult was this for you?
(Enter a cross in a box for each item.)

	No	Yes	Not so bad	Painful/ difficult	Very painful/ difficult
1. Have you had problems at work or where you study?	☐	☐	☐	☐	☐
2. Have you had financial problems?	☐	☐	☐	☐	☐
3. Have you been divorced, separated or ended your relationship with your partner?	☐	☐	☐	☐	☐
4. Have you had problems or conflict with family, friends or neighbours?	☐	☐	☐	☐	☐
5. Have you been seriously worried that there is something wrong with your child?	☐	☐	☐	☐	☐
6. Have you been seriously ill or injured?	☐	☐	☐	☐	☐
7. Has anyone close to you been seriously ill or injured?	☐	☐	☐	☐	☐
8. Have you been involved in a serious accident, fire or robbery?	☐	☐	☐	☐	☐
9. Have you lost someone close to you?	☐	☐	☐	☐	☐
10. Other	☐	☐	☐	☐	☐

72. In your daily life, how often do you *(Enter a cross in a box for each item.)*

	Seldom/ never	seldom	A few times	Fairly Often	Very often
1. Feel glad about something	☐	☐	☐	☐	☐
2. Feel happy	☐	☐	☐	☐	☐
3. Feel joyful, like everything is going your way, everything is rosy	☐	☐	☐	☐	☐
4. Feel like screaming at somebody or hitting things	☐	☐	☐	☐	☐
5. Feel angry, irritated or annoyed	☐	☐	☐	☐	☐
6. Feel mad at somebody	☐	☐	☐	☐	☐

73. Indicate with a cross whether you agree or disagree with the following statements *(Enter a cross for each statement.)*

	Totally disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Totally agree
1. My life is largely what I wanted it to be	☐	☐	☐	☐	☐	☐	☐
2. My life is very good	☐	☐	☐	☐	☐	☐	☐
3. I'm satisfied with my life	☐	☐	☐	☐	☐	☐	☐
4. I've achieved so far what's important to me in my life	☐	☐	☐	☐	☐	☐	☐
5. If I could start all over, there is very little I would do differently	☐	☐	☐	☐	☐	☐	☐
6. I really enjoy my work	☐	☐	☐	☐	☐	☐	☐

74. What kind of perception do you have of yourself? *(Enter a cross in a box for each item.)*

	Totally agree	Agree	Disagree	Totally disagree
1. I have a positive attitude towards myself	☐	☐	☐	☐
2. I feel completely useless at times	☐	☐	☐	☐
3. I feel that I don't have much to be proud of	☐	☐	☐	☐
4. I feel that I am a valuable person, as good as anyone else	☐	☐	☐	☐

75. Bringing up your child *(Enter a cross to indicate whether you agree or disagree with the following statements. Enter a cross in a box for each item.)*

	Totally disagree	Partially disagree	Neither/ nor	Partially agree	Totally agree
1. What I do has little influence on my child's behaviour	☐	☐	☐	☐	☐
2. My child is used to getting what he/she wants in any case, so there's no point in even trying to refuse him/her	☐	☐	☐	☐	☐
3. Cuddles and hugs are an important way of showing my child that I love him/her	☐	☐	☐	☐	☐
4. If my child and I have a disagreement it is usually easy to divert him/her	☐	☐	☐	☐	☐
5. My life is mainly becoming controlled by my child	☐	☐	☐	☐	☐
6. I think it is very important for my child to learn to deal with the fact he/she cannot get their own way on everything	☐	☐	☐	☐	☐
7. It is often easier to let my child get his/her own way rather than having to put up with a tantrum	☐	☐	☐	☐	☐
8. Sometimes when I'm tired I let my child get to do things that I usually would not have allowed otherwise	☐	☐	☐	☐	☐
9. It isn't so important what strategies you use to bring up your children; if you love your children they will develop well	☐	☐	☐	☐	☐

Comments

Have you remembered to fill in on page 1 the date on which you completed the questionnaire?

Thank you very much for your help!

Please return the completed questionnaire in the stamped addressed envelope provided to:

Den norske Mor og Barn undersøkelsen
Nasjonalt folkehelseinstitutt
Avd. for medisinsk fødselsregister
Kalfarveien 31
5018 Bergen

APPENDIX IV

Questionnaire 7
5 years old

Den norske **mor- og barn**-undersøkelsen

Questionnaire before starting school – at approximately 5 years old

The questionnaire will be processed by a computer. It is therefore important to us use a blue or black ballpoint pen and write clearly.

- In the small boxes you should put a cross in the box that is most relevant like this: [x]
- If you think that you have put a cross in the wrong box, correct it by filling in the box completely like this: ■

Specify the day, month and year when the questionnaire was completed: day ____ month ____ year ____ *(write the year in full, e.g. 2010)*

About the child

1. What is your child's height and weight nowadays?

Height ____ cm Weight ____ , ____ kg

Date of measurement ____ month ____ year

2. Who do you live with?

- ☐ Spouse
- ☐ Coihabitant
- ☐ Other adults
- ☐ Children of others
- ☐ None

3. If children lives with you, how many and what ages?
(Also include the child you are filling out this form for)

Number of children 5 years old or older ____

Number of children 3 or 4 years old ____

Number of children from 0 to 3 years old ____

4. Do you live with the child's father?

☐ Yes ☐ No ☐ Have never lived with the child's father

If NO, how old was the child when you separated/ moved apart ____ , ____ år

Childcare

5. Where is the child looked after in the daytime these days?
(You may tick several boxes)

	No. hours per week
☐ Nanny/ au pair/ outdoor nursery	____
☐ Family kindergarten	____
☐ Private kindergarten	____
☐ Public kindergarten	____
☐ Family members other than mother/father	____

6. If your child is attending kindergarten, is it organized in traditional units or as bases/large groups?

- ☐ Unit-kindergarten
- ☐ Base-kindergarten

7. If the child is looked after another place than home, how many adults are looking after the child (e.g number of adults in the unit/base)?

____ adults

8. How many other children are cared for in the same child care? (If kindergarten, state the number of children in the same unit/base) ____ children

9. How many times has the child changed child care? (Do not include change of unit within the kindergarten) ____ times

10. How old was the child when he/she started in current child care? ____ months

11. Does your child receive, or has received any extra resources in the kindergarten?

☐ No ☐ Yes Number of hours per week ____

12. How does your child like being in the current child care?

Not at all	Not much	Both likes and dislikes	Mostly	Very much
☐	☐	☐	☐	☐

5b år Måba 7.000 09.2011 WJ

13. If your child is looked after some other place than at home or with a child minder, to what extent are you satisfied with different aspect of the child care? *(Cross off one response to each statment, from dissatisfied to very satisfied)*

	Dissatisfied	More dissatisfied than satisfied	Both satisfied and dissatisfied	More satisfied than dissatisfied	Very satisfied
1. Types of activities in the kindergarten	☐	☐	☐	☐	☐
2. The way the kindergarten prepare activities of importance for starting school	☐	☐	☐	☐	☐
3. The expertise of the kindergarten staff for doing a goodjob with your child	☐	☐	☐	☐	☐
4. The food served in the kindergarten (healthy, appropriate nutritional meals)	☐	☐	☐	☐	☐
5. Information about how your child is doing	☐	☐	☐	☐	☐

Media and games

14. Does your child have a TV in his/her own room? ☐ NO ☐ Yes

15. How many hours does the child watch TV/DVD or play PC/TV-games?

	Never	Less than 1 hour	From 1 up to 3 hours	From 3 up to 5 hours	5 hours or more
1. On a typical weekday	☐	☐	☐	☐	☐
2. On a typical day during the weekend	☐	☐	☐	☐	☐

16. How often does the child use...

	Daily	4-6 days a week	2-3 days a week	1 day a week	Never/ rarely
1. PC/ computer at home?	☐	☐	☐	☐	☐
2. TV-games/ handheld electronic games (e.g. Playstation, Game Boy, PSP)?	☐	☐	☐	☐	☐
3. PC /TV games where the purpose is educational (learn things that are relevant for school)?	☐	☐	☐	☐	☐
4. Books as an activity and entertainment?	☐	☐	☐	☐	☐
5. Drawing/painting etc.as activity and entertainment?	☐	☐	☐	☐	☐

Child development and illnesses

17. The following questions concern any illnesses or health problems you child has had. Has your child ever suffered, or is currently suffering from any of the following long-term illnesses or health problems?

	No	Yes	If yes, was the illness/problem confirmed by a doctor/psychologist? No	If yes, was the illness/problem confirmed by a doctor/psychologist? Yes	If yes, does the child still have the illness/problem? No	If yes, does the child still have the illness/problem? Yes
1. Asthma	☐	☐	☐	☐	☐	☐
2. Pollen allergy/hayfever	☐	☐	☐	☐	☐	☐
3. Obstructed/wheesing in chest	☐	☐	☐	☐	☐	☐
4. Epilepsy	☐	☐	☐	☐	☐	☐
5. Cerebral palsy	☐	☐	☐	☐	☐	☐
6. Impaired hearing	☐	☐	☐	☐	☐	☐
7. Delayed motor development or clumsy	☐	☐	☐	☐	☐	☐
8. Delayed or deviant language development	☐	☐	☐	☐	☐	☐
9. Unusually restless/hyperactive/ADHD	☐	☐	☐	☐	☐	☐
10. Attention problems/difficulties concentrating	☐	☐	☐	☐	☐	☐
11. Autism/autistic traits	☐	☐	☐	☐	☐	☐
12. Asperger syndrome	☐	☐	☐	☐	☐	☐
13. Behavioral problems (difficult and unruly)	☐	☐	☐	☐	☐	☐
14. Emotional difficulties (sad and worried)	☐	☐	☐	☐	☐	☐
15. Impaired vision (patch treatment/need for daily use of glasses)	☐	☐	☐	☐	☐	☐
16. Other, specify_____			☐	☐	☐	☐

18. More about the childs health

	No	Yes	
1. Has the child had an injury, resulting in a diagnosis?	☐	☐	Describe: _____
2. Does the child have a learning disability or mental development delay?	☐	☐	Describe: _____
3. Does the child have a syndrome or suspected of having a syndrome?	☐	☐	Describe: _____
4. Has the child had other serious, but **short term** illnesses?	☐	☐	Describe: _____
5. Has the child ever been a witness to close familiy being subject to violence?	☐	☐	Describe: _____

19. Developmental milestones

	No	Yes
1. Did your child say his/her first words before 2 years of age (do not include mum and dad)?	☐	☐
2. Did your child start combining words before 2,5 years of age (combine 2-3 words into sentences)?	☐	☐
3. Did your child stop using diapers in the daytime before 4 years of age (tick yes if less than 3 accidents per month)?	☐	☐

20. Has a professional ever assessed your child as having reduced hearing?

☐ No ☐ Yes

If yes, at what age? (Enter a cross in several boxes if necessary)

- ☐ Before 18 months
- ☐ 18 - 36 months
- ☐ later than 36 months

21. Has your child been referred to the following services?

	No	Yes
Habilitation services	☐	☐
Child psychiatric clinic/ department	☐	☐
Educational psychology services	☐	☐

If yes, what was the reason for the referral?

_____

22. Has your child been assessed for language delay or other difficulties with language/speech or communication?

☐ No ☐ Yes

If yes: What was the conclusion after the assessment?
(You may enter several crosses)

- 1. Everything was fine, no difficulties ☐
- 2. Only delay in spoken language, good language comprehension ☐
- 3. Delay in both using spoken language and ability to understand spoken language ☐
- 4. Difficulties in pronunciation ☐
- 5. Stammer or stutters when talking ☐
- 6. Other language issues ☐

Describe: _____

_____

23. Has anyone in the child's close family ever had any of the following problems? *(Only include the child's biological relatives)*

We are especially interested in the child's siblings, parents, grandparents, uncles, aunts or cousins.

	No	Yes	
1. Been a late talker as a child	☐	☐	If Yes, specify the relationship: _____
2. Had difficulties learning to read and write	☐	☐	If Yes, specify the relationship: _____
3. Had difficulties in pronouncing sounds as a child (preschool)	☐	☐	If Yes, specify the relationship: _____

24. About the child's pronounciation

(Enter a cross in a box from 1-5 with 1 being very difficult and 5 being very easy.)

	Very difficult 1	2	Varies 3	4	Very easy 5
1. How easy it is for you to understand what your child's speech?	☐	☐	☐	☐	☐
2. How easy it is for strangers to understand what your child's speech?	☐	☐	☐	☐	☐

Food supplements and eating habits

25. Is your child taking any of the following dietary supplements? *(Enter a cross in a box for each line, for both frequency and amount and fill in brand name.)*

Liquid dietary supplements	No	Numer of times per week 6-7	4-5	1-3	<1	Amount per time 1 tsp	1 csp	1 ss
Cod liver oil	☐	☐	☐	☐	☐	☐	☐	☐
Omega 3, brand name: _____	☐	☐	☐	☐	☐	☐	☐	☐
Sanasol/Biovit	☐	☐	☐	☐	☐	☐	☐	☐
Other liquid dietary supplement, brand name: _____	☐	☐	☐	☐	☐	☐	☐	☐

Capsules/tablets	No	Times a week 6-7	4-5	1-3	<1	Amount per time 1	2	3+
Omega 3, brand name: _____	☐	☐	☐	☐	☐	☐	☐	☐
Cod liver oil	☐	☐	☐	☐	☐	☐	☐	☐
Multivitamines, brand name: _____	☐	☐	☐	☐	☐	☐	☐	☐
Fluoride tablets	☐	☐	☐	☐	☐	☐	☐	☐
Other dietary supplements, brand name: _____	☐	☐	☐	☐	☐	☐	☐	☐

26. How often does your child eat breakfast (at home or in the kindergarten)?

Rarely/ never	Once a week	2-3 times per week	4-6 times per week	Every day
☐	☐	☐	☐	☐

27. Is the following correct for your child for the last 6 months?

	No	Yes
1. Has your child ever eaten what most people would consider a really large amount of food?	☐	☐
2. Have you ever had the impression that your child could not stop eating or that he/she could not control what or how much he/she was eating?	☐	☐

	Twice a week or more	Once a week	More rarely	Never
3. How often has your child been eating a really large amount of food where you at the same time had the impression that the child did not have control?	☐	☐	☐	☐

Language and preschool activities

28. The child's ability to understand and tell

Here are some questions about children's oral language andwhat they understand. Maybe your child already has done some of the ativities described here, and some the child has not started doing yet. Tick the box for each question you find suitable for your child.

	Yes	Some-times	Not yet
1. Can the child tell you at least two thing about a familiar object? If you f.ex.. say: "Tell me about the ball" can the child answer something like "It is round and I can throw it and it is big"	☐	☐	☐
2. Without giving your child help by pointing or repeating directions, does your child follow three direction that are unrelated to one another? Give all three directions before your child starts. For example, you may ask your child to "Clap your hands, walk to the door and sit down" or "Give me the pen, open the book and stand up"	☐	☐	☐
3. Does your child use four- and five- word sentences? For example, does your child say, "I want the car"?	☐	☐	☐
4. When talking about something that already happened, does your child use word that end in "ed" such as walked, jumped or played? Ask your child questions such as "How did you get to the store?" ("We walked") "What did you do at your friends house?" ("We played").	☐	☐	☐
5. Does you child use comparison words such as heavier, stronger or shorter? Ask your child questions, such as "A car is big, but a bus is _____" (bigger"); "A cat is heavy, but a man is ____" (heavier); A TV is small, but a book is ____ " (smaller).	☐	☐	☐
6. Does your child answer the following questions:1. "What do you do when you are hungry?" (Acceptable answers include: "Get food", "Eat", " Ask for something to eat", and "Have a snack".) 2. "What do you do when you are tired?" (Acceptable answers include: "Take a nap", "Rest", "Go to sleep", "Go to bed", "Lie down", and "Sit down").	☐	☐	☐
7. Does your child repeat the sentences shown below back to you, without any mistakes? You may repeat each sentence one time. Mark "yes" if your child repeats both sentences without mistakes or "sometimes" if your child repeats one sentence without mistakes. "Jane hides her shoes for Maria to find" - "Al read the blue book under his bed"."	☐	☐	☐

29. What is the mother tongue of the child's mother and father and what language(s) does the child speak?

	Mother's mother tongue	Father's father tongue	What language(s) does the child speak? *(you may enter several crosses)*
1. Norwegian, Danish or Swedish	☐	☐	☐
2. Other Nordic languages (Icelandic, Finish) or Sami	☐	☐	☐
3. Western European languages (for example German, English, Spanish).	☐	☐	☐
4. Other languages (Eastern European, Asian, Turkish, African)	☐	☐	☐

30. About the child's language experiences.

	Only Norwegian	More Norwegian than other language	As much Norwegian as other language	More other language than Norwegian	Only other language
1. What language(s) do you speak with your child?	☐	☐	☐	☐	☐
2. What language(s) does your spouse/partner speak with your child?	☐	☐	☐	☐	☐
3. What language(s) does the child speak with his/her siblings?	☐	☐	☐	☐	☐

31. Factors of importance for language skills.

Relatiely to other children of the same age, to which degree does the following questions serve to dercribe the child's language performance? Use the scale from 1 to 5 to express your view.

	Quite wrong 1	2	Both yes and no 3	4	Quite right 5
1. Forgets words she/he knows the meaning of	☐	☐	☐	☐	☐
2. Mixes up words with similar meaning	☐	☐	☐	☐	☐
3. Has difficulties in understanding the meaning of common words	☐	☐	☐	☐	☐
4. Has difficulties in responding to questions just as quickly as others	☐	☐	☐	☐	☐
5. Is often searching for the right words	☐	☐	☐	☐	☐
6. Has difficulties in using complete sentences	☐	☐	☐	☐	☐
7. Is using short sentences when s/he is responding to questions	☐	☐	☐	☐	☐
8. Has difficulties in retelling a story s/he has heard	☐	☐	☐	☐	☐
9. Is quickly getting tired in tasks demanding attention to language	☐	☐	☐	☐	☐
10. It doesn't seem like what s/he is learning is remembered	☐	☐	☐	☐	☐
11. Has difficulties in remembering things	☐	☐	☐	☐	☐
12. Difficulties in understands what others are saying	☐	☐	☐	☐	☐
13. Misconceive instructions and when told to	☐	☐	☐	☐	☐
14. Has problems with remembering messages	☐	☐	☐	☐	☐
15. Misunderstands context and what is going on	☐	☐	☐	☐	☐
16. Is difficult to understand	☐	☐	☐	☐	☐
17. Has difficulties in expressing wishes and needs	☐	☐	☐	☐	☐
18. Is not understood by others	☐	☐	☐	☐	☐
19. Is not initiating communication and are active in use of language	☐	☐	☐	☐	☐
20. Has difficulties in pronunciation	☐	☐	☐	☐	☐
21. Is able to have a dialogue with peers	☐	☐	☐	☐	☐
22. Avoids talking to other people than close family	☐	☐	☐	☐	☐

32. About the child's language competence.

How typical is the statement for your child:

	Rarely or never	Some-times	Regulary	Often or always
1. It is hard to make sense of what he/ she is saying, even though the words are clearly spoken.	☐	☐	☐	☐
2. Gets the sequence of events muddled up when trying to tell a story or describe a recent event. E.g., if describing a film, might talk about the end before the begining	☐	☐	☐	☐
3. Uses terms like "he" or "it" without making it clear what he/she is talking about. For instance, when talking about a film, might say "he was really great" without explaining who "he" is.	☐	☐	☐	☐
4. Talks clearly about what he/she plans to do in the future (e.g. what he/she will do tomorrow, or plans for going on holiday)	☐	☐	☐	☐
5. Can be hard to tell if he/ she is talking about something real or make-believe.	☐	☐	☐	☐
6. Explains a past event clearly (e.g. what he/she did at school, or what happened at a football game).	☐	☐	☐	☐

	No	Yes
7. Does the child talk about things that is going to happen in the near future, like the weekend, e.g. " Tomorrow, we'll go to the movies".	☐	☐
8. Does the child talk about things that has already happened, e.g. "Yesterday, we took the bus to kindergarten"	☐	☐
9. Does the child talk about things that could or can happen, e.g." If he touches the stove top, he could burn himself"	☐	☐
10. Does the child talk in a special way when pretending to be someone else, e.g. "Now you were the king and I was the queen".	☐	☐

33. About the child's pre-school activities

	Very poor/ poor	Average	Good/ very good
1. How would you rate your child's ability to tell a story?	☐	☐	☐
2. How would you rate your child's ability to communicate his/ her own needs in a way understandable to adults and friends?	☐	☐	☐

During a typical week:

	Never	Seldom	Sometimes	Often	Very often
3. How often do you teach your child how to print letters and words?	☐	☐	☐	☐	☐
4. How often do you help your child read letters and sounds?	☐	☐	☐	☐	☐

	Nei	Ja
5. Would you say that your child is interested in writing letters?	☐	☐
6. Would you say that your child is generally interested in books?	☐	☐
7. Would you say that your child is able to read simple words?	☐	☐
8. Would you say that your child is able to read simple sentences?	☐	☐
9. Would you say that your child is able to write his/ her name?	☐	☐

10. About how many minutes does your child like to sit still when you read for him/her?

Does not like it at all	☐
Less than 5 minutes	☐
6-15 minutes	☐
16-45 minutes	☐
More than 45 minutes	☐
Will not be read to	☐

Child's skills and behavior

34. Child's play

The following scale examines various behaviors that children may engage in during indoor free play. Although it is true that childrens' behaviors may be quite variable, please try to make a general evaluation of the child's 'everyday' behavior.

	Never	Hardly ever	Some-times	Often	Very often
1. Talks to other children during play	☐	☐	☐	☐	☐
2. Plays by himself/herself, examining an object or toy	☐	☐	☐	☐	☐
3. Plays 'rough-and tumble' with other children	☐	☐	☐	☐	☐
4. Takes on the role of onlooker or spectator	☐	☐	☐	☐	☐
5. Plays 'make-believe' with other children	☐	☐	☐	☐	☐
6. Engages in group play	☐	☐	☐	☐	☐
7. Engages in pretend play by hilself/herself	☐	☐	☐	☐	☐
8. Plays alone, building things with blocks and/or other toys	☐	☐	☐	☐	☐
9. Wanders around aimlessly	☐	☐	☐	☐	☐
10. Plays in goups with (not just beside) other children	☐	☐	☐	☐	☐
11. Plays 'make-believe' but not with other children	☐	☐	☐	☐	☐
12. Watches, or listens to other children without trying to join in	☐	☐	☐	☐	☐
13. Engages in playful/mock fighting with other children	☐	☐	☐	☐	☐
14. Plays by himself/herself, drawing, painting pictures or doing puzzles	☐	☐	☐	☐	☐
15. Engages in active conversations with other children during play	☐	☐	☐	☐	☐
16. Engages in pretend play with other children	☐	☐	☐	☐	☐
17. Plays alone, exploring toys or objects, trying to figure out how they work	☐	☐	☐	☐	☐
18. Remains alone and unoccupied, perhaps staring off into space	☐	☐	☐	☐	☐
19. Plays by him/herself, engaging in simple motor activities (e.g. running)	☐	☐	☐	☐	☐
20. Plays just for a short while with each toy, does not settle with any toy	☐	☐	☐	☐	☐

35. Activities and restlessness

Please rate each item according to your child's behavior in the last month..

	Not true at all	Just a little true	Pretty much true	Very much true
1. Inattentive, easily distracted	☐	☐	☐	☐
2. Short attention span	☐	☐	☐	☐
3. Fidgets with hands or feet or squirms in seat	☐	☐	☐	☐
4. Messy or disorganized at home or in the kindergarten	☐	☐	☐	☐
5. Only attends if it is something he/she is very interested in	☐	☐	☐	☐
6. Distractibility or attention span a problem	☐	☐	☐	☐
7. Avoids, expresses reluctance about, or has difficulties engaging in tasks that require sustained mental effort (such as activities in kindergarten or helping out at home)	☐	☐	☐	☐

	Not true at all	Just a little true	Pretty much true	Very much true
8. Gets distracted when given instructions to do something	☐	☐	☐	☐
9. Has trouble concentrating in kindergarten	☐	☐	☐	☐
10. Leaves seat in kindergarten or in other situations in which remaining seated is expected.	☐	☐	☐	☐
11. Does not follow through on instructions and fails to finish tasks in kindergarten, chores or duties at home (not due to oppositional behavior or failure to understand instrucions)	☐	☐	☐	☐
12. Easily frustrated in efforts	☐	☐	☐	☐

36. About motor skills

Enter a cross for each line if your child masters these activities.

	No	Yes
1. Do you think your child walks, runs, and climbs like other children at the same age?	☐	☐
2. Able to stand on one foot for at least 5 sec without problems keeping balance	☐	☐
3. Hops, on one foot , many times, without support	☐	☐
4. Plays "catch" with other children; throwing to him/her and catching the ball at least half the time	☐	☐
5. Swings on a swing, pumping by self	☐	☐
6. Rides a two-wheeled bike, with or without training wheels	☐	☐
7. Puts together a puzzle with nine or more pieces	☐	☐
8. Draws or copies a square with straight corners	☐	☐
9. Cuts with scissors, following a simple outline or pattern	☐	☐
10. Draw pictures of complete people that have at least head: with eyes-nose-mouth; body. Arms and legs, hands and feet (need to do all seven for a yes)	☐	☐
11. Coloures withing the lines in a colouring book	☐	☐
12. Does your child show interest in and likes to participate in sports or active games requiring good motor skills?	☐	☐

37. About temperament and personal style

How typical are the following statements for your child's behavior? *(Enter a cross in a box for each line)*

	Very typical	Quite typical	Neither/ nor	Not so typical	Not at all typical
1. Your child is always on the go	☐	☐	☐	☐	☐
2. Your child is off and running as soon as he/she wakes up in the morning	☐	☐	☐	☐	☐
3. Your child prefers quiet, inactive games to more active ones	☐	☐	☐	☐	☐
4. Your child cries easily	☐	☐	☐	☐	☐
5. Your child gets upset (or sad) easily	☐	☐	☐	☐	☐
6. Your child reacts intensely when upset	☐	☐	☐	☐	☐
7. Your child is very sociable	☐	☐	☐	☐	☐
8. Your child takes a long time to warm up to strangers	☐	☐	☐	☐	☐
9. Your child is very friendly with strangers	☐	☐	☐	☐	☐
10. Your child prefer playing with others rather than alone	☐	☐	☐	☐	☐
11. Your child likes to be with people	☐	☐	☐	☐	☐
12. Your child finds other people more stimulating than anything else	☐	☐	☐	☐	☐

38. About the child's abilities and skills compared to peers.

Enter a cross from 1 - 5 for each line according to how well the statement fits your child.

	Very much lower 1	2	Typical for age 3	4	Very much higher 5
1. My child's ability to ask questions properly is:	☐	☐	☐	☐	☐
2. My child's ability to answer questions properly is:	☐	☐	☐	☐	☐
3. My child's ability to say sentences clearly enough to be understood by strangers is:	☐	☐	☐	☐	☐
4. The number of words my child knows is:	☐	☐	☐	☐	☐
5. My child's ability to use his/her words correctly is:	☐	☐	☐	☐	☐
6. My child's ability to get his/her message across to others when talking is:	☐	☐	☐	☐	☐
7. My child's ability to use the proper words when talking to others is:	☐	☐	☐	☐	☐
8. My child's ability to get what he/she wants by talking is:	☐	☐	☐	☐	☐
9. My child's ability to start a conversation, or start talking with other children is:	☐	☐	☐	☐	☐
10. My child's ability to keep a conversation going with other children is:	☐	☐	☐	☐	☐
11. The length of this child's sentences is:	☐	☐	☐	☐	☐
12. My child's ability to make "grown up" sentences is:	☐	☐	☐	☐	☐
13. My child's ability to correctly say the sounds in individual words is:	☐	☐	☐	☐	☐

39. About the child's behavior

The following list contains statements describing children's behavior and manners. To what extent are the following statements true of your child's behavior for the last 2 months

	Often/ typical	Sometimes	Never/ rarely
1. Afraid to try new things	☐	☐	☐
2. Can't concentrate, can't pay attention for long	☐	☐	☐
3. Can't sit still, restless or hyperactive	☐	☐	☐
4. Can't stand waiting; wants everything now	☐	☐	☐
5. Clings to adults or too dependent	☐	☐	☐
6. Cries a lot	☐	☐	☐
7. Defiant	☐	☐	☐
8. Demands must be met immediately	☐	☐	☐
9. Disturbed by any change in routine	☐	☐	☐
10. Doesn't eat well	☐	☐	☐
11. Doesn't seem to feel guilty after misbehaving	☐	☐	☐
12. Fears certain animals, situations or places	☐	☐	☐
13. Gets in many fights	☐	☐	☐
14. Gets into everything	☐	☐	☐
15. Gets too upset when separated from parents	☐	☐	☐
16. Hits others	☐	☐	☐
17. Nervous, highstrung, or tense	☐	☐	☐
18. Punishment doesn't change his/her behavior	☐	☐	☐
19. Quickly shifts from one activity to another	☐	☐	☐
20. Stomach aches or cramps (without medical cause)	☐	☐	☐
21. Too fearful or anxious	☐	☐	☐
22. Unhappy, sad or depressed	☐	☐	☐
23. Vomiting/ throwing up (without medical cause)	☐	☐	☐
24. Poorly coordinated or clumsy	☐	☐	☐
25. The child is teased/bullied by others	☐	☐	☐
26. Feelings are easily hurt	☐	☐	☐
27. Self-conscious or easily embarrassed	☐	☐	☐

40. How often does your child wake up during the night?

- ☐ 3 or more times per night
- ☐ 1-2 times per night
- ☐ A few times per week
- ☐ Seldom, never

41. Approximately, how many hours does the child usually sleep per night on weekdays?

- ☐ 8 hours or less
- ☐ 9 hours
- ☐ 10 hours
- ☐ 11 hours
- ☐ 12 hours or more

42. About your concerns

	No	Yes
1. Do you have any concerns about how your child speak and pronounce sounds?	☐	☐
2. Are you concerned because your child is demanding and difficult to cope with?	☐	☐
3. Are you concerned because your child is hardly interested at all in playing with other children?	☐	☐
4. Do you have any concerns because your child's activity level is so high?	☐	☐
5. Have others (family, nursery, health visitor) expressed concerns about your child's development?	☐	☐
6. Are you concerned because your child is hardly interested at all in playing with other children?	☐	☐

If Yes:	No	Yes a bit	Yes a lot
1. Is the child bothered or disturbed by the difficulties?	☐	☐	☐
2. Do the difficulties affect the child's daily life in any of the following areas:			
- At home/in the family	☐	☐	☐
- With friends/ peers	☐	☐	☐
- In the kindergarten/ outdoor nursery/ with child minder	☐	☐	☐
3. Do the difficulties cause strain on you or the family as a whole?	☐	☐	☐

4. If the child has difficulties, how old was the child when the difficulties started? ☐☐ ,

Questions about yourself

43. What is your current weight?

Weight ☐☐☐,☐ kg

+

44. Are you pregnant now?

☐ No ☐ Yes

45. What are the smoking habits in your houshold?

	You	Your partner/ spouse
1. Do not smoke	☐	☐
2. Smoke sometimes	☐	☐
3. Smoke daily	☐	☐
4. If daily - no. Of sigarettes per day	☐☐	☐☐

+

46. How often do you consume alcohol at present?

- ☐ Roughly 6-7 times a week
- ☐ Roughly 4-5 times a week
- ☐ Roughly 2-3 times a week
- ☐ Roughly once a week
- ☐ Roughly 1-3 times a month
- ☐ Less than once a month
- ☐ Never

+

47. How many alcohol units do you usually drink when you consume alcohol? Enter a cross for both weekends and weekdays. *(See explanation below about alcohol units.)*

	Weekends	Weekdays
10 or more	☐	☐
7-9	☐	☐
5-6	☐	☐
3-4	☐	☐
1-2	☐	☐
Less than 1	☐	☐

Alcohol units:
In order to compare different types of alcohol, we ask for the number of alcohol units (1,5 cl of pure alcohol). This means the following practice:

1 glass (1/3 litre) of beer	= 1 unit
1 wine glass of red or white wine	= 1 unit
1 wine glass of sherry or other fortified wine	= 1 unit
1 brandy glass of spirits of liqueur	= 1 unit
1 bottle of alcopop/cider	= 1 unit

48. Have you had a serious illness or health problems which has arisen during the last 5 years (Heart disease, cancer, muscle disease, serious chronic disease such as diabetes, mental illness, disability or other illness)?

☐ No ☐ Yes If No, go to question 50

If Yes,

Report which illness(es) and cross off whether a diagnosis has been given by a medical doctor and if you have been hospitalized for this illness.

Write the name of the illness/disorder	Doctor given a diagnosis		Hospitali-zation		If you are well, about how old were you?
	No	Yes	No	Yes	
1. _____	☐	☐	☐	☐	☐☐ year
2. _____	☐	☐	☐	☐	☐☐ year
3. _____	☐	☐	☐	☐	☐☐ year
4. _____	☐	☐	☐	☐	☐☐ year

49. Has this or these illnesses/ problems made it difficult for you to function in your daily life, the last 5 years?

No	Yes a little	Yes a great deal	Yes very much
☐	☐	☐	☐

+

50. Have you ever had problems with your physical or mental health which has limitated in your work or social activities with friends or family?

☐ No ☐ Yes

+

If yes, how much have the problems affected you?

	Very much	A great deal	Some	A little	Not at all
1. Physical health	☐	☐	☐	☐	☐
2. Mental health	☐	☐	☐	☐	☐

51. Have you been bothered during the last 2 weeks by any of the following? *(Enter a cross for each line.)*

	Not bothered	A little bothered	Quite bothered	Very much bothered
1. Feeling fearful	☐	☐	☐	☐
2. Nervousness or shakiness inside	☐	☐	☐	☐
3. Feeling hopeless about the future	☐	☐	☐	☐
4. Feeling blue	☐	☐	☐	☐
5. Worrying too much about things	☐	☐	☐	☐
6. Feeling everything is an effort	☐	☐	☐	☐
7. Feeling tense or keyed up	☐	☐	☐	☐
8. Suddenly scared for no reason	☐	☐	☐	☐

52. If you have a husband/ boyfriend/ partner, How much do you agree with these descriptions of your relationship with your husband/ partner? *(Enter a cross for each line.)*

	Completely agree	Agree	Agree somewhat	Disagree somewhat	Disagree	Totally disagree
1. My partner and I have problems in our relationship	☐	☐	☐	☐	☐	☐
2. I am very happy in my relationship	☐	☐	☐	☐	☐	☐
3. My partner is generally understanding	☐	☐	☐	☐	☐	☐
4. I am satisfied with the relationship with my partner	☐	☐	☐	☐	☐	☐
5. We agree on how children should be raised	☐	☐	☐	☐	☐	☐

53. How often does this happen in your home? *(Enter a cross for each line)*

	Never	Almost never	Some-times	Often	Always
1. You let your child know when he/she is doing a good job with something	☐	☐	☐	☐	☐
2. You threaten to punish your child and then do not actually punish him/her	☐	☐	☐	☐	☐
3. You have a friendly talk with your child	☐	☐	☐	☐	☐
4. Your child talkes him/herself out of being punished after he/she has done something wrong	☐	☐	☐	☐	☐
5. You ask you child about his/her day in childcare	☐	☐	☐	☐	☐
6. You compliment your child when he/she does something well	☐	☐	☐	☐	☐
7. You praise your child if he/she behaves well	☐	☐	☐	☐	☐
8. You talk to your child about his/her friends	☐	☐	☐	☐	☐
9. You let your child out of a punishment early (E.g. Lift restrictions earlier than you originally said)	☐	☐	☐	☐	☐

54. Make a cross whether you agree or disagree with the following statements
(Enter a cross for each line from totally disagree to totally agree.)

	Totally disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Totally agree
1. In most ways my life is close to my ideal	☐	☐	☐	☐	☐	☐	☐
2. The conditions of my life are excellent	☐	☐	☐	☐	☐	☐	☐
3. I'm satisfied with my life	☐	☐	☐	☐	☐	☐	☐
4. So far I have gotten the important things I want in life	☐	☐	☐	☐	☐	☐	☐
5. If I could live my life over, I would change almost nothing	☐	☐	☐	☐	☐	☐	☐
6. I really enjoy my work	☐	☐	☐	☐	☐	☐	☐

55. Have you, during the last year, experienced any of the following situations?

	No	Yes, during the last year	Yes, 2-5 years ago
1. Have you had problems at work or where you study?	☐	☐	☐
2. Have you had financial problems?	☐	☐	☐
3. Have you been divorced, separated or ended your relationship with your partner?	☐	☐	☐
4. Have you had problems or conflicts with family, friends or neighbors?	☐	☐	☐
5. Have you been seriously worried that there is something wrong with the child?	☐	☐	☐
6. Have you been seriously ill or injured?	☐	☐	☐
7. HHas anyone close to you been seriously ill or injured?	☐	☐	☐
8. Have you been involved in a serious accident, fire or robbery?	☐	☐	☐
9. Have you been the victim of maltreatment or abuse?	☐	☐	☐
10. Have you lost someone close to you?	☐	☐	☐
11. Other dramatic events/experiences you have had:	☐	☐	☐

Describe: _____

56. Has any of the events listed in the questions aboveaffected you so that you have been on sick leave or not been able to function in your daily life/ work?

☐ No ☐ Yes

The list below consists of many statements that may fit or not fit as a description of you/your person. Cross off on each line for how you think each statement fit as a description of yourself. If you think a question is difficult to answer, you can skip it and continue with the next question.

57. Describe yourself the way you usually are: *(Enter a cross for each line)*

	Strongly disagree	disagree somewhat	Neither nor	Agree somewhat	Strongly agree
1. Liven up in a party	☐	☐	☐	☐	☐
2. Care little about others	☐	☐	☐	☐	☐
3. Am always well prepared	☐	☐	☐	☐	☐
4. Become easlily distressed	☐	☐	☐	☐	☐
5. Have a rich vocabulary	☐	☐	☐	☐	☐
6. Do not say much	☐	☐	☐	☐	☐
7. Am interested in other people	☐	☐	☐	☐	☐
8. Leave things lying around	☐	☐	☐	☐	☐
9. Am usually relaxed	☐	☐	☐	☐	☐
10. Have problems understanding abstract ideas	☐	☐	☐	☐	☐
11. Feel at ease with other people	☐	☐	☐	☐	☐
12. Offend people	☐	☐	☐	☐	☐
13. Am attentive to detail	☐	☐	☐	☐	☐
14. Worry about many things	☐	☐	☐	☐	☐
15. Have a lively imagination	☐	☐	☐	☐	☐
16. Stay in the background	☐	☐	☐	☐	☐
17. Have empathy with other people	☐	☐	☐	☐	☐
18. Mess things up	☐	☐	☐	☐	☐
19. Rarely feel in low spirits	☐	☐	☐	☐	☐
20. Am not interested in abstract ideas	☐	☐	☐	☐	☐
21. Initiate conversations	☐	☐	☐	☐	☐
22. Am not interested in other peoples' problems	☐	☐	☐	☐	☐
23. Complete tasks at once	☐	☐	☐	☐	☐
24. Am easily interrupted	☐	☐	☐	☐	☐
25. Have excellent ideas	☐	☐	☐	☐	☐
26. Have little to say	☐	☐	☐	☐	☐
27. Am good-natured	☐	☐	☐	☐	☐
28. Often forget to put things back	☐	☐	☐	☐	☐
29. Become easily upset	☐	☐	☐	☐	☐
30. Har ikke god forestillingsevne	☐	☐	☐	☐	☐
31. Do not have a good imagination	☐	☐	☐	☐	☐
32. Am not interested in other people	☐	☐	☐	☐	☐
33. Like order and tidiness	☐	☐	☐	☐	☐
34. Lot of mood changes	☐	☐	☐	☐	☐
35. Am quick to understand things	☐	☐	☐	☐	☐
36. Do not like to attract attention	☐	☐	☐	☐	☐
37. Take time to help others	☐	☐	☐	☐	☐
38. Shirk from responsibilities	☐	☐	☐	☐	☐
39. Often have mood swings	☐	☐	☐	☐	☐
40. Often use difficult words	☐	☐	☐	☐	☐
41. Have nothing against being the centre of attention	☐	☐	☐	☐	☐
42. Am sensitive to other peoples' feelings	☐	☐	☐	☐	☐
43. Perform according to plan	☐	☐	☐	☐	☐
44. Become easily irritated	☐	☐	☐	☐	☐
45. Use time to think things over	☐	☐	☐	☐	☐

	Strongly disagree	disagree somewhat	Neither nor	Agree somewhat	Strongly agree
46. Am quiet in company with strangers	☐	☐	☐	☐	☐
47. Put others at their ease	☐	☐	☐	☐	☐
48. Am thorough in my work	☐	☐	☐	☐	☐
49. Often feel down	☐	☐	☐	☐	☐
50. Am full of ideas	☐	☐	☐	☐	☐

58. We wish to prepare for child care research in MoBa, and want to look at the connections between child care quality and health. We therefore ask you to name the child's present or previous kindergarten, when the child went there, and in what municipality the kindergarten is placed. This will enable us to gather information from a public kindergarten register (BASIL) so that we can compare different kindergartens based on number of employees, number of employees with Early Childhood Education, kindergarten size, and other resources.

My child has never attended kindergarten ☐

Start with the first kindergarten the child attended

Name of the kindergarten	Municipality				
(F.eks Kløverenga barnehage)	*(Nes)*	*(Fall* X	*Spring* ☐	*Year*	*2 0 0 9)*
1.	.....	Fall ☐	Spring ☐	Year	
2.	.....	Fall ☐	Spring ☐	Year	
3.	.....	Fall ☐	Spring ☐	Year	
4.	.....	Fall ☐	Spring ☐	Year	

Comments

Have you remembered to fill in the date on which you completed the questionnaire on page 1?

Thank you very much for your continued participation in The Norwegian Mother and Child Cohort Study.