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Marie Flem Sørbø

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Prevalence of abuse reported by pregnant women - impact on postpartum depression and breastfeeding

A prospective population-based analysis in the Norwegian Mother and Child Cohort Study

NTNU
Norwegian University of Science and Technology Thesis for the Degree of Philosophiae Doctor
Faculty of Medicine
Department of Public Health and General Practice

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Omfang av vold mot kvinner i Norge –
og voldens innvirkning på fødselsdepresjon og amming

Vold mot kvinner er brudd på menneskerettighetene og et stort samfunnsproblem. Det har lenge vært kjent at vold har negative konsekvenser for fysisk, seksuell og psykisk helse, både på kort og lang sikt, selv etter volden har opphørt. Derimot vet vi mindre om sammenhengen mellom vold og helseeffekter som er viktig for kvinners og barns helse og velvære etter fødsel. Hensikten med våre studier var å undersøke hvor stort omfang av vold (fysisk, seksuell og psykisk) som ble rapportert av 65,393 gravide kvinner fra Mor og Barn studien. I tillegg undersøkte vi sammenhengen mellom vold og henholdsvis fødselsdepresjon og amming, og om det var forskjell på vold fra kjent versus ukjent utøver.

Hovedfunn

Totalt 32% av kvinnene hadde vært utsatt for vold minst en gang i løpet av livet, 20% som voksen og 19% som barn. Fem prosent rapporterte vold siste året. Hele 30% av de voldsutsatte hadde opplevd to eller flere typer vold. Psykisk vold var hyppigst rapportert både som voksen (16%) og som barn (14%), mens like mange hadde opplevd fysisk vold i barndom eller som voksen (6%). Derimot var seksuell vold rapportert hyppigere som barn (7%) sammenlignet med som voksen (5%). Kjent utøver var vanligst for alle typer vold.

Analyser viste at kvinner som hadde opplevd vold som voksen, uansett om det var fysisk, psykisk eller seksuell vold, en eller flere typer, i mye større grad rapporterte fødselsdepresjon enn de som ikke hadde opplevd vold. Kvinner som hadde opplevd vold i løpet av siste året hadde høyest risiko for fødselsdepresjon.

Flere voldsutsatte kvinner sluttet å amme ved fire måneders alder sammenlignet med kvinner uten voldserfaring, uavhengig av når voldseksponeringen hadde skjedd. Størst risiko for tidlig ammeslutt hadde kvinner som hadde opplevd tre typer vold. Denne studien er en av de første som viser en sammenheng mellom psykisk vold alene eller i kombinasjon med andre typer vold, og tidlig ammeslutt. Funnene om vold og tidlig ammeslutt er uavhengig av tidligere depresjon, fødselsdepresjon eller andre justeringsfaktorer.

Konklusjon

Vold er en vanlig erfaring blant kvinner i Norge, og utøves i hovedsak av en kjent person. Ulike typer vold, enkeltvis eller i kombinasjon med andre typer, gir økt risiko for

fødselsdepresjon og tidlig ammeslutt. Dette understreker at vold er en stor byrde i forhold til kvinners og barns helse. I tillegg viser den sterke sammenhengen mellom psykisk vold og tidlig ammeslutt, at studier om vold også bør inkludere psykisk vold alene, og i kombinasjon med andre typer. Vold er ikke uunngåelig, og funnene fra våre studier støtter at helsearbeidere bør ta vold mot kvinner mer alvorlig. Større fokus på tiltak, sammen med andre sektorer, er nødvendig for å initiere tiltak som forebygger og hindrer vold.

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Appendix

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Most of all I thank my beloved daughter Julie for reminding me what is most important. You bring so much joy into my life!

2. List of papers

Paper I

Sørbø MF, Grimstad H, Bjorngaard JH, Schei B, Lukasse M. Prevalence of sexual, physical and emotional abuse in the Norwegian mother and child cohort study. BMC Public Health 2013, 13:186. doi: 10.1186/1471-2458-13-186.

Paper II

Sørbø MF, Grimstad H, Bjorngaard JH, Schei B, Lukasse M. Adult physical, sexual, and emotional abuse and postpartum depression, a population based, prospective study of 53,065 women in the Norwegian Mother and Child Cohort Study. BMC Pregnancy Childbirth 2014; 14:316. doi: 10.1186/1471-2393-14-316.

Paper III

Sørbø MF, Lukasse M, Brantsaeter AL, Grimstad H. Past and recent abuse is associated with early cessation of breastfeeding. Results from a large prospective cohort in Norway. Accepted for publication in BMJ Open*,* 19th of October 2015.

3. Acronyms and abbreviations

ACE	Adverse Childhood Experiences
CI	Confidence Interval
EDS	Edinburgh Depression Scale
MoBa	Mother and Child Cohort Study
MBRN	Medical Birth Registry of Norway
OR	Odds Ratio
WHO	World Health Organization

4. Summary

Background: Abuse of women is a violation of human rights, and has adverse impact on physical, mental and reproductive health. Yet, there is limited population based knowledge about the effect on postpartum health and breastfeeding. There is also need for increased understanding about the impact of abuse from different perpetrators. Large scale, population based, prospective studies are requested to assess the public health impact of abuse.

Aims: To investigate the prevalence of adult sexual, physical and emotional abuse, and its relation to socio demographics and other characteristics. To examine the association between abuse and postpartum depression and early breastfeeding cessation and whether a potential association differed between known and unknown perpetrators in a population based sample.

Methods: Our studies included pregnant women participating in the Norwegian Mother and Child Cohort study. The information was based on self reported questionnaires and was linked to the Medical Birth Registry of Norway. Paper I had a cross-sectional design and included 65,393 women. Papers II and III were prospective, and included 53,065 and 53,934, respectively.

Results: Overall, 32% reported any lifetime abuse, whereas 20% had experienced adult abuse and 19% childhood abuse. Recent abuse was reported by 5% of the women. Emotional abuse was the most common type of abuse both for adults and children, and 30% of the abused reported two or more types of abuse. For all types of abuse, known perpetrator was more commonly reported. Logistic regression analyses found that all types of adult abuse, as singular or combined exposures, were significantly associated with postpartum depression. The highest risk was seen among those exposed to recent adult abuse, compared with no adult abuse. Past and recent abuse was associated with cessation of breastfeeding before four months, and highest risk of cessation was seen in women exposed to three types of abuse. This is one of the first studies to document the association between emotional abuse, as singular or combined exposure, and early breastfeeding cessation. The increased risk of early breastfeeding cessation was independent of prior depression, postpartum depression and other confounders.

Conclusion: Norwegian women reported high prevalence rates of abuse. Different types of abuse, as singular and combined exposures, whether recent or past, were associated with

postpartum depression and early cessation of breastfeeding; which underscore the huge burden of abuse on women's health. The strong association between emotional abuse and breastfeeding cessation highlights that emotional abuse alone, or in combination with other types of abuse, should be assessed for. Abuse is not inevitable, accordingly, higher attention and effort from health care providers, in order to initiate interventions to end abuse is crucial.

5. Introduction

5.1 Topic

This thesis examines the prevalence of abuse and the association between abuse history and outcomes affecting health and well-being of both mother and child.

The thesis provides extensive prevalence data of sexual, physical and emotional abuse, including different time frames and data of the perpetrators. Postpartum depression and breastfeeding behaviour are the two main themes in this thesis; and the relationship between abuse and these outcomes is investigated prospectively. The data is based on information from a large population of pregnant women in the Norwegian Mother and Child Cohort Study.

5.2 Rationale

The World Health Organization (WHO) characterizes abuse of women as fundamental violation of human rights and a serious public health problem that affects every society in the world. Although there is an increasing body of research documenting short and long term consequences of abuse, important gaps of knowledge still remain, including the impact on postpartum health and breastfeeding behaviour. Current knowledge is often based on clinical populations with small samples and cross-sectional design. Intimate partner violence is more studied than non-partner abuse, albeit partner abuse is more common. More information about other types of abuse and assailants is required to better understand the magnitude and complexity of abuse and its long-term consequences. There is evidence that those exposed to abuse often suffer from more than one type of abuse, which also increases the health burden. Yet, few former studies have investigated various and overlapping types of abuse. Consequently, population-based studies are requested for many purposes. They usually comprise large samples and include information on socio-demographics, lifestyle and health data applicable to a general population. Linking population-based studies to national health registries enables different study designs and provides extensive health information. Nonetheless, few prior population-based studies have included questions on abuse.

This thesis aims to contribute new knowledge regarding abuse prevalence and adverse health consequences in a general population. It provides prevalence data and information about health outcomes obtained from one of the world's largest prospective population-based pregnancy cohorts.

Studies of prevalence of abuse and the associations with socio-demographics and other factors are valuable for many reasons. Firstly, knowledge about the scope of the problem and associated factors is essential to provide relevant prevention strategies and health care interventions, both at an individual and at a societal level. Secondly, prevalence surveys help in identifying the way in which women use criminal justice and social services in their communities. Finally, they enable evaluation of interventions, thus promoting improvement of the work in this field.

This thesis comprises self-reported information about abuse as well as various perpetrators of abuse from 65,393 pregnant Norwegian women. To the best of my knowledge, this is the largest study of abuse prevalence in Europe.

Postpartum depression is a pregnancy complication affecting 10% to 15% of women worldwide with adverse short and long term implications both for the mother and the child. However, few prior studies have prospectively examined the role of abuse experience and subsequent postpartum depression in a population-based cohort. Further, it is well recognized that breastfeeding has beneficial health benefits for the child as well as for the mother. Nearly all women in Norway initiate breastfeeding and as many as 80% still breastfeed six months postpartum. However, there is little knowledge on whether experience of abuse negatively influences breastfeeding duration. This thesis addresses the possible adverse impact of abuse on postpartum depression and breastfeeding behaviour, conditions that greatly affect both mother and child. The data also enabled examining the impact of abuse on breastfeeding taking postpartum depression into account.

Personal motivation

My personal motivation to carry out this work arose during my work as a specialist in General Practice. There, I followed up many women for antenatal care and postpartum check-ups, and found interest in which factors were important for a healthy mother-infant relationship. Further, abuse and related health consequences were highly evident in a refugee camp where I worked for the International Red Cross in Darfur, Sudan. Raped and beaten women were

commonly attending the clinic; hence prevention of unwanted pregnancies and sexually transmitted diseases became one important task. I have also worked at an assault centre for beaten and raped people in Norway (both men and women). Furthermore, I experienced that patients with musculoskeletal pain attending outward at Clinic for Physical Medicine and Rehabilitation where I have been working the last few years, often reported exposure of abuse or other adverse experiences. In light of my work experience as a medical doctor in different areas, I find the topics examined in this thesis highly relevant for both women and children and I feel privileged to have had the opportunity to write this thesis.

5.3 Central concepts

The approach and attitude towards abuse of women have changed considerably the last decades, initiated by the feminist movement in Norway and other Western countries in the 1970s. Gradually, the increased awareness of the scope of the problem contributed to alter the prevailing perception from abuse against women being a private problem to be considered a public health issue. Since the World conference on Human rights and the United Nations' Declaration of violence against women in 1993, abuse of women has been acknowledged as a public health and human right concern (1). The Beijing World Conference of Women in 1995 further strengthened this recognition (2). Looking at abuse of women from a public health view offers a multi sectorial approach and sound statistical data is critical for the development of appropriate policies, legislation and services for women affected by abuse. A great effort has been made to establish reliable and comparable methods in research of prevalence and health effects of abuse against women. Furthermore, important initiatives are also apparent in the legislative field both in Norway and internationally. Acts of "domestic violence" or "abuse in private zones" are considered as criminal acts and a public matter, although this is not always reflected by the resources spent on either the investigation or the subsequent prosecution.

5.3.1 Definition of abuse

There is no universal definition of abuse against women and how researchers define abuse varies considerably. However, the WHO defines abuse of women as: "any act of gender-based violence that results in, or is likely to result in, physical, sexual or mental harm or suffering to

women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life" (3).

5.3.2 Measurement of abuse

Abuse of women is prevalent worldwide. Still, there exist significant variations across and within nations, highlighting that abuse is not inevitable, and that it can be prevented. Comparing abuse data across countries enables us to describe actual differences in abuse prevalence, as well as to focus on potential methodological discrepancies and gender differences in understanding and reporting of abuse. There is growing evidence about which factors explain the global variation observed and that diversity in methodology plays a major role. Hence, comparisons of prevalence estimates are difficult due to variations in definitions, the type of abuse examined (sexual, physical or emotional) and the time frames examined (childhood, adulthood, recent, in pregnancy). Further, the relation to, and gender of, who committed the abuse, variations in the selection criteria for study participants; such as age, marital status and risk factors, and discrepancies in research design are relevant factors. A recent review concluded that use of screening tools resulted in higher reporting rates of abuse during pregnancy, and that repeatedly screening further increased the rates (4). It is well known that exposure to abuse is more frequently reported in clinical samples compared to population based samples (5). The WHO's guide for researching abuse against women recommends using as broad criteria as possible when defining study populations to minimize potential selection bias (6). Furthermore, the way in which the questions are expressed may influence the prevalence; e.g. by using description of abusive acts rather than the more general expression "abuse", may result in higher prevalence (7). Likewise, asking for several types of abuse, compared to one type only, may obtain higher rates of abuse. Accordingly, there has been a huge development the last decades in improving and acknowledging the importance of using validated instruments for screening and research of abuse.

The WHO developed a multi-country study that included ten countries and was carried out between 2000 and 2003 (8). One aim was to find cross-culturally acceptable definitions of abuse of women, particularly focusing on sexual, physical and emotional partner abuse. The Nordic research network constructed the NorVold Abuse Questionnaire (NorAq), a measure of sexual, physical and emotional abuse, and abuse in the health care system (9). The aim was to define questions of abuse of women that could be used interchangeably in the Nordic countries. NorAq was validated in a Swedish population in 1999-2000, and showed good

reliability and validity (9). This was the first validation study of an instrument in the Nordic countries. The Abuse Assessment Screen was created to detect abuse perpetrated against pregnant women (10). It is a five item tool and includes information from intimate partner or other known persons and sexual, physical and emotional abuse; however, it is not yet validated.

5.3.3 Global prevalence of lifetime and recent abuse

The WHO recently presented the first systematic global prevalence report on two forms of abuse; sexual and/or physical abuse against women by partners and sexual abuse by non-partners (11). Population data from all over the world was evaluated, and concluded that abuse of women was extremely prevalent. Overall, 35% of women worldwide reported sexual and/or physical abuse from partner or non-partner sexual abuse, and abuse from partner was the most common type, affecting 30% (11). Large variations of prevalence between regions existed, with Africa and Latin America reporting the highest prevalence and Europe and Asia the lowest. While there are many other forms of abuse that women may be exposed to, this already represents a huge burden and affects a large proportion of the world's women.

The previously mentioned WHO multi-country study reported that lifetime prevalence of physical and/or sexual partner abuse among ever partnered women varied from 15% to 71% (8). A substantial overlap between physical and sexual abuse (between 30% and 56%) was found, and sexual and/or physical abuse during the past year was reported by 4% to 54% of the women (8).

The first European population based multi-country study to investigate the prevalence of lifetime emotional, physical and sexual abuse reported by pregnant women, was conducted between 2008 and 2010 (12). Women from six countries responded to a questionnaire based on the NorAQ about mid-way in pregnancy. Any lifetime abuse was reported by 34.8%, with a range from 23% to 45%, which compares with the lifetime prevalence in other studies from Sweden 19.4% (13), Denmark 34.5% (14) and England 23.5% (14).

5.3.4 Norwegian and Nordic prevalence studies

Due to a Norwegian Governmental action plan against abuse, a cross sectional study on lifetime sexual, physical and emotional abuse of women and men was conducted in 2013 (15). Altogether, 2435 women and 2092 men between 18 to 75 years were interviewed by phone.

One in three women and one in ten men reported lifetime sexual abuse and 11.2% of the women and 13.9% of the men had experienced severe physical abuse after the age of 18. More women (15.4%) than men (11.2%) reported emotional abuse from parents during childhood. The study found a substantial overlap between various types of abuse in childhood; e.g. 70% of women who reported physical abuse from parents in childhood also reported emotional abuse from the parents. A large overlap between physical and/or sexual abuse in childhood and physical and/or sexual abuse in adulthood was also found; e.g. one out of three women who were raped before the age of 18, was also raped as an adult. The report concluded that women seemed to have a heavier burden of abuse compared to men, and the vast majority of victims of sexual abuse knew the perpetrator.

The first major Swedish population based study of abuse against women, perpetrated by men, was carried out in 2000 (16). It comprised 6,926 women receiving questionnaires by post. The study revealed that nearly 50% had been subjected to abuse from a man since their fifteenth birthday and 56% had been sexually harassed. Past year exposure of physical abuse was 5%, whereas sexual abuse and threats were 7% and 4%, respectively (16).

An overview of male abuse against women in Denmark was presented in 2004 (17). It was based on a review of data from various sources; information about the abuse reported to the police, reports from the hospitals of number of abuse related incidents, and health studies. It found that 4% of the women had experienced physical abuse past year, of which two third were abused from current or previous partner. Fifty percent of rapes or attempted rapes was perpetrated by a stranger or a brief acquaintance (17). A follow-up study concluded that the number of women exposed to physical abuse past year did not significantly increase between the two reports (18). Partner abuse seemed to have decreased, as 66% of the abuse was reported to be perpetrated by intimate partner in the first study, compared to 40% in the latter. However, work related abuse increased from 10% to 20% (18).

A cross-sectional multicentre study of 4,729 women attending gynaecology departments in five Nordic countries was carried out in order to assess the abuse prevalence and whether the patients had told their gynaecologist or not (19). The women responded to the NorAq received by mail between 1999 and 2001. Overall, any lifetime abuse (sexual, physical and/or emotional) was reported by 47.7% of the women; with a range from 53.6% in Denmark, 66.2% in Finland, 40.4% in Iceland, 44.2% in Norway and 37.5% in Sweden. Most women (92-98%) had not talked to their gynaecologist of abuse experiences at their latest visit.

5.3.5 Prevalence of pregnancy related abuse

In recent years, attention has focused on abuse during pregnancy, due to its high prevalence, adverse health consequences and intervention potential. Multiple studies show that abuse during pregnancy is a common experience worldwide, and more prevalent than some recognized maternal health conditions that are regularly screened for; e.g. pre-eclampsia, which complicates 2% to 8% of pregnancies globally (20).

The proportion of ever-pregnant women in the WHO multi-country study reported being physically abused during at least one pregnancy exceeded 5% in 11 of the 15 settings (21). The WHO data suggested differences between rural and urban areas. Among those reporting abuse, between 11% and 44% were assaulted during pregnancy and about half of the women physically abused during pregnancy were kicked or punched in the abdomen, which is particularly serious when pregnant. In all sites, over 90% were abused by the biological father of the child the woman was carrying. These findings are mainly comparable to the prevalence found in a review from 19 countries (22). The abuse was not specified by type, other than intimate partner abuse during pregnancy among ever pregnant women. The prevalence showed a range between 2% (Australia, Denmark, Australia, Philippines and Cambodia) and 13.5% (Uganda) of abuse. More than half the surveys showed estimates between 3.5% and 8.8%. The abuse prevalence appeared to be higher in the African and Latin American countries relative to the European and Asian countries (22). The survey further reported that countries with high levels of severe abuse did not necessarily report high levels of abuse during pregnancy, suggesting that cultural factors may be important determinants of the prevalence of abuse during pregnancy.

Pregnant women from six European countries reported low prevalence of past year abuse; as sexual abuse was reported by 0.4%, 2.2% reported physical abuse, and 2.7% emotional abuse (12). The latter results corresponded with past year abuse exposure measured during pregnancy in England (1-5%) (14), Belgium (3.4%) (23), Denmark (2.5% exposed during pregnancy) (24), and Sweden (1% exposed during pregnancy) (25). These findings were in contrast to the prevalence revealed in a recent African review comprising 13 studies, where partner abuse during pregnancy ranged from 2% to 57%, with an overall prevalence of 15.2% (26).

5.3.6 Abuse and gender

Abuse exposure

Both women and men can experience abuse, yet there exist controversy about prevalence. A recent cross sectional population-based Norwegian study found that men and women were at the same risk of mild partner abuse, while women are more likely to suffer severe partner abuse (15). The same study showed that rape was mainly perpetrated against women, whereas men suffered higher risk of physical abuse, indicating that the abuse men and women experience is different (15). Yet, most research indicates that women are at a higher risk of abuse than men, especially severe forms of partner abuse and recurrent incidents (27-29). The proven existing gender differences make the epidemiology and consequences of the abuse distinctly different for women and men (8, 15). A WHO report from 2014 on global status of abuse prevention confirmed that women, children and elderly people bear the main burden of non-fatal physical, sexual and emotional abuse (30).

Perpetrators

The research on perpetrators of abuse is scarce and the little research performed has mainly focused on partners or former partners. However, results from both Norwegian and international studies show that a woman is at the highest risk of being exposed to abuse by someone she knows, in particular a partner or a previous partner, than by other perpetrators (8, 15); whilst men are more exposed to abuse from a male stranger (15). A recent report by WHO requested more research about abuse from other than partners (31).

5.3.7 Abuse of women as a public health concern

Abuse of women is a significant public health problem worldwide, reflected both by its high prevalence and adverse health implications. It is well documented that abuse has both long and short term health consequences, persisting beyond the period of abuse. These consequences can be manifested as poor health status, poor quality of life, high use of health services, social, and economic costs (32). There is a growing body of evidence emphasizing a dose-response relationship between frequency of abuse exposure and health effects and behaviours (32, 33). Thus, it is beyond the scope of this thesis to review all adverse outcomes associated with abuse of women. Rather, a brief overview of the health effects considered most relevant is presented in the following section.

Causal pathways between abuse and adverse health effects

The likely causal pathways between different forms of abuse and adverse health outcomes have started to be documented and better understood (31). However, these multiple pathways are complex, context-specific and not fully understood. The direct pathway from physical abuse to injury and death is understandable and obvious, whereas other indirect pathways leading to short and long term consequences, including neuroendocrine and immune responses, need more attention.

The Adverse Childhood Experiences (ACE) study was the first large-scale study demonstrating a link between adverse childhood experiences (e.g. childhood abuse, violent treatment of mother, mental illness, substance use or criminal behaviour among someone in the household) and health conditions and behaviour in adulthood such as death, cardiovascular diseases, cancer, depression, self-rated poor health, smoking and alcohol drinking (32). A dose-response relationship was found between the number of adverse childhood experiences and their impact on adult health. Furthermore, risk behaviour such as smoking, alcohol and drug abuse, overeating or sexual behaviour may be coping mechanisms in response to adverse experiences, and possibly a linking cause to adverse health in adulthood (32).

There is a growing body of evidence of the underlying biological changes through neuroendocrine and immune responses to acute and chronic stress linking abuse exposure to posttraumatic stress disorder, cardiovascular disease, chronic pain conditions, sleep disturbance and gastrointestinal disorders (34-36). In response to threat, acute or chronic stress, the hypothalamic-pituitary-adrenal-axis responds with a chemical cascade that may result in elevated or abnormal low levels of cortisol; the latter may be a result of sustained stress exposure (35). Rising cortisol levels during pregnancy have been linked with low birth weight infants, because high cortisol level leads to constriction of blood vessels, limiting blood flow to the uterus (37). Hypothalamic-pituitary-adrenal-axis response may also trigger premature labour and birth through contractions in the uterus (38). Other studies indicate that prolonged stress may have implications for structural changes in the hippocampus, amygdala and prefrontal cortex, and may affect mental and physical health, such as cardiovascular disease, hypertension and diabetes, as well as compromising the immune system, thus contributing to spreading of cancer, viral infections and autoimmune disorders (39, 40).

Physical health effects

Several studies link abuse to a number of adverse physical outcomes. Minor outcomes such as bruises, abrasions, cuts, punctures and bites are results of direct physical abuse; whereas serious injuries can be fractures, damage to internal organs, facial traumas and loss of consciousness due to strangulations or other violent incidents (41, 42). Abuse of women may even result in lethal injuries; globally as many as 38% of all murders are committed by intimate partners (43).

Abuse may also have long term impact of women's physical health, even long after the abuse ended. A number of studies have established higher rates of chronic pain among abused women compared to those not abused, e.g. headaches and musculoskeletal pain are common among abused women and may cause disability and reduced social activity, thus contributing to reduced quality of life (43-47). A history of lifetime physical and/or sexual abuse has been associated with gastrointestinal or pelvic pain in women (48, 49). Further, other adverse health consequences are increased risk of cardiovascular disease proposed through adverse stress-related endocrine and immune reactions (50).

Mental health effects

Previous research has firmly established that abuse has an adverse effect of mental health, in particular depression and posttraumatic stress disorder (44). Although current evidence mostly focus on clinical research on partner abuse, rather than population-based studies and non-partner abuse (43, 50, 51), recent systematic reviews have found that non-partner sexual abuse can lead to health consequences similar to those for abuse from partner (31). This includes mental health disorders, such as depression, anxiety and alcohol abuse (31). There is also evidence of that abuse both in adulthood and in childhood are linked to psychiatric symptoms and diagnoses, including depression, anxiety, posttraumatic stress disorder and postpartum depression (43, 52-57). Furthermore, suicidal thoughts and attempts have been strongly linked to abuse experience in the WHO study (58).

Reproductive effects

Abuse is also identified to have an impact of reproductive health in different ways, of which only some are mentioned here. Outcomes from *direct* physical abuse during pregnancy are increased rates of abortion, premature labour and preterm delivery, which can result in serious complications and death (59-61). Further, abuse is negatively associated with low birth-

weight, smaller gestational weight-gain and foetal loss (31, 62). Abuse exposure prior to pregnancy may have an impact on health during pregnancy. Two Norwegian studies, one population based (n=55,776) and one clinical case control (n=178) of childhood sexual abuse, showed that abused women reported more pregnancy related complaints (63, 64). The latter study also found more non-scheduled contacts with the antenatal clinic, than their counterparts (64). A cohort study comparing women exposed to child sexual abuse (n=85) with women with no such exposure (n=170), found that exposed women were significantly more hospitalized during pregnancy and reported more complications such as premature contractions, cervical insufficiency and premature birth than their counterparts (65). Further, abuse is linked to negative health behaviour such as smoking, alcohol and substance use and delay in prenatal care (44). Possible explanations may be that smoking and drinking are being used as self-medication to cope with the stress, shame and suffering because of abuse. Delays in prenatal care might be due to abusive partners preventing women from leaving the house.

In a 23 year longitudinal study it was found that those exposed to child sexual abuse had earlier onset of puberty, more teen motherhood, premature deliveries, drug and alcohol abuse and abuse re-victimization (66). A large prospective cohort study (n=65,505) found that severity of childhood sexual abuse was associated with early onset of menarche, and physical abuse was associated with both early and late onset of menarche (67).

5.3.8 Postpartum depression

Postpartum depression is a serious mental health problem affecting 10-15% of women worldwide within the first year postpartum (68). Postpartum depression is recognized as a major public health problem due to the high prevalence and its profound effect of functioning and the likelihood of recurrence (69, 70). As about 60,000 children are born in Norway annually, postpartum depression affects 6,000 to 9,000 women, with subsequent effects to their infants and families. Postpartum depression shows emerging evidence of negative effects on the mother's and infant's health in short and long perspectives (71). Apart from emotional suffering, postpartum depression undermines the mother's confidence, impairs her social functioning and quality of life, and, in serious cases, contributes to infant abuses and suicidal behaviour (72). Results from a longitudinal study indicated increased risk of anxiety disorders in adolescence in offspring of mothers suffering from postpartum depression; whereas offspring of mothers with recurrent episodes of depression were also at increased risk of depression (73). Postpartum depression negatively influences breastfeeding and experiences

of motherhood (74). The adverse impact on breastfeeding contributes to a "double burden" of adverse health effects, as breastfeeding is well known to provide health benefits to both mother and child. Important known risk factors of postpartum depression are previous depression, lack of social support, poor marital relationship and support, and stressful life events (52, 69, 75-79), and previous or current abuse has been associated with postpartum depression (79-83). Further, emotional abuse during pregnancy, in the absence of physical and/or sexual abuse, increased the prevalence of postpartum depression and adverse mental health postpartum in two smaller population-based studies (79, 83).

5.3.9 Breastfeeding

Breastfeeding has long been acknowledged as the optimal infant nutrition conferring beneficial short and long term health effects for both infants and mothers (84-86). The WHO has since 2001, recommended exclusive breastfeeding for the first six months of life (87-89), and this is adopted by the Norwegian Health Authorities (90). Norway has one of the highest breastfeeding rates in the world and almost all mothers initiate breastfeeding (91, 86). Even though the majority of women in Norway breastfeed for at least six months, a large decline in full breastfeeding occurs between three and four months, and some also stop breastfeeding before six months (92). Given the overwhelming evidence of the positive effects of breastfeeding, knowledge about factors affecting breastfeeding behavior is essential. Factors known to have a positive impact of breastfeeding in Norway are higher educational level of the mother, higher maternal age, being married and multi parity; whereas smoking and obesity have been shown to influence negatively (93, 94).

Abuse of women is common worldwide and is well acknowledged to have a negative impact on mental, physical and reproductive health of women (11, 95). However, little is known about the impact of singular or combined exposures of emotional, sexual, and physical abuse on breastfeeding. Only a few studies have been published and these are preliminary and inconclusive. Most studies have assessed one type of abuse only, i.e. sexual or physical, although these often occur simultaneously; and studies that included perpetrators mainly focused on abuse from partners only (96-99). Few studies have examined emotional abuse and breastfeeding (97, 99). In addition, comparison between studies is difficult due to differences in assessment of abuse questions, time periods of breastfeeding, sample size and study design.

5.3.10 Setting

Participants in this thesis are pregnant women from all over Norway participating in the Norwegian Mother and Child Cohort study. All antenatal and child health care are free of charge. Norway has a long parental leave, of 57 weeks at 80% benefit, or 47 weeks at 100% benefit, which supports the possibility of breastfeeding the first year of life (100).

6. Aims of the study

The overall aim of the study was to provide knowledge about the association between exposure to abuse and adverse consequences related to reproductive health. This is important in order to enhance better care of women exposed to abuse and to contribute with useful information needed for making public prevention strategies. This thesis focused particularly on adult emotional, sexual, and physical abuse committed by known or unknown perpetrator, reported by pregnant women in Norway.

The objectives in the specific papers were:

1 The primary aim was to investigate the prevalence of sexual, physical and emotional abuse reported by a large pregnant population. The secondary aim was to investigate the identity of the perpetrator, and to compare women reporting adult abuse with those who did not, with regard to socio-demographics and other characteristics (Paper I).

2 The first objective was to investigate the association between different types of adult abuse, emotional, sexual and physical, as singular or combined exposures, and postpartum depression. Secondly, we wanted to explore whether the associations differed if the perpetrator was known or unknown to the women (Paper II).

3 The first aim of our study was to investigate whether exposure to adult emotional, sexual or physical abuse, as a singular or combined exposure was associated with early breastfeeding cessation. Secondly, we wanted to assess whether a potential association differed for adult recent and non-recent abuse and for known or unknown perpetrator. Thirdly, we wanted to examine the association between child abuse and early breastfeeding cessation (Paper III).

7. Methods

7.1 The Study Design

This thesis is based on data from women participating in the Norwegian Mother and Child Cohort Study. Paper I is a prevalence article and included logistic regression analyses examining the associations between exposure to adult abuse, socio-demographics and other characteristics. It was presented in a cross-sectional design. The design in Papers II and III were prospective. The exposure variables (abuse) in all papers were collected from questionnaire 3 (Q3) answered in week 30 of gestation, while the outcome variables in Papers II and III were collected from Q4 answered six months postpartum. The socio-demographics were mainly collected from Q1 in all studies, responded to at week 18 of gestation.

Table 1 Study designs in the respective papers

	Paper I	**Paper II**	**Paper III**
Design	Cross sectional	Prospective	Prospective
Data sources	MoBa and MBRN*	MoBa and MBRN*	MoBa and MBRN*
MoBa questionnaires	Q1 and Q3	Q1, Q3 and Q4	Q1, Q3 and Q4

*MBRN: Medical Birth Registry of Norway

7.2 The Norwegian Mother and Child Cohort Study

The Norwegian Mother and Child Cohort Study (MoBa) is one of the largest prospective population based pregnancy and birth cohorts in the world. It includes 114,500 children, 95,200 mothers and 75,200 fathers. The study was planned and initiated by researches from the Medical Birth Registry of Norway and the Norwegian Institute of Public Health in the 1990s. The study's primary goal was to identify environmental and genetic factors or interaction of these, for diseases in pregnancy and childhood, aiming at prevention (101). Participants were recruited from all over Norway, from 1999 to 2008. Pregnancy is the unit of observation and women could participate in the study with more than one pregnancy. Each pregnancy is given an identification number and all other data from the mother, father, or the child, are linked to this number (101). There were no exclusion criteria other than language as the questionnaires were only in Norwegian. The women were recruited through a postal invitation prior to the routine ultrasound appointment at their local hospital that is offered free

of charge to all pregnant women in Norway around week 18 of gestation. Together with the ultrasound appointment, the woman received an invitation that included an informed consent form, the first questionnaire and an information brochure. A detailed protocol of the study including the consent can be found online at http://www.fhi.no/morogbarn. During pregnancy the mother received three extensive questionnaires and the father received one. The first questionnaire (Q1: 16 pages), received in pregnancy weeks 13-17, asked for data on medical history before and during pregnancy (both physical and mental health), outcome data of previous pregnancies, life style habits, socio-demographics as occupation, civil status and others. A food frequency questionnaire (Q2: 14 pages) was sent to participants at about week 22 of pregnancy. The third questionnaire (Q3: 16 pages), sent at 30 weeks, covered the women's health status during pregnancies as well as changes in work situation and habits. The first questionnaire after birth was at 6 months (Q4: 16 pages) and focused on child health and nutrition, as well as maternal disorders, well-being, work situation, private life and mental health.

In the current study we use information from Q1, Q3 and Q4. Because the MoBa administration modified the inclusion criteria during the period of this project, the response rates reported in our papers differ from 38.5% in the first paper, to 40.6% in Papers II and III, respectively. This change is due to permission given by the Data Inspectorate to include women despite missing consent forms, if they had donated biological material and/or returned questionnaires, so called "passive" consent (102).

7.3 The Medical Birth Registry of Norway

Data from the questionnaires in the MoBa study are linked to pregnancy and birth records in the Medical Birth Registry of Norway. The Medical Birth Registry of Norway has collected information from all births in Norway since 1967. The registry is based on notification of all live births and stillbirths from 16 weeks (since 2002, from 12 weeks) of gestation. A standardized notification form is completed by midwives or obstetricians shortly after delivery. Notification to the birth registry is compulsory and the form contains information about maternal health before and during pregnancy, previous reproductive history, complications during pregnancy and delivery, and pregnancy outcomes (103).

7.4 Participants

The study sample selection for the studies is illustrated in Figure 1. All studies are based on version IV of the quality-assured MoBa data files released for research in 2009. To be eligible for inclusion in Paper I women had to be registered in the Medical Birth Registry and have responded to Q1 and Q3 (n=75,173), for Papers II and III, they also had to have responded to Q4 (n=64,714). Women who had participated in MoBa with more than one pregnancy were included only with their first participation. Women with multiple pregnancies and women not responding to any of the abuse questions were excluded. Less than one percent did not respond to any of the abuse questions. In addition, 869 women who did not respond to any of the postpartum depression questions were excluded in Paper II. The final study population was 65,393 in Paper I, 53,065 in Paper II and 53,934 in Paper III.

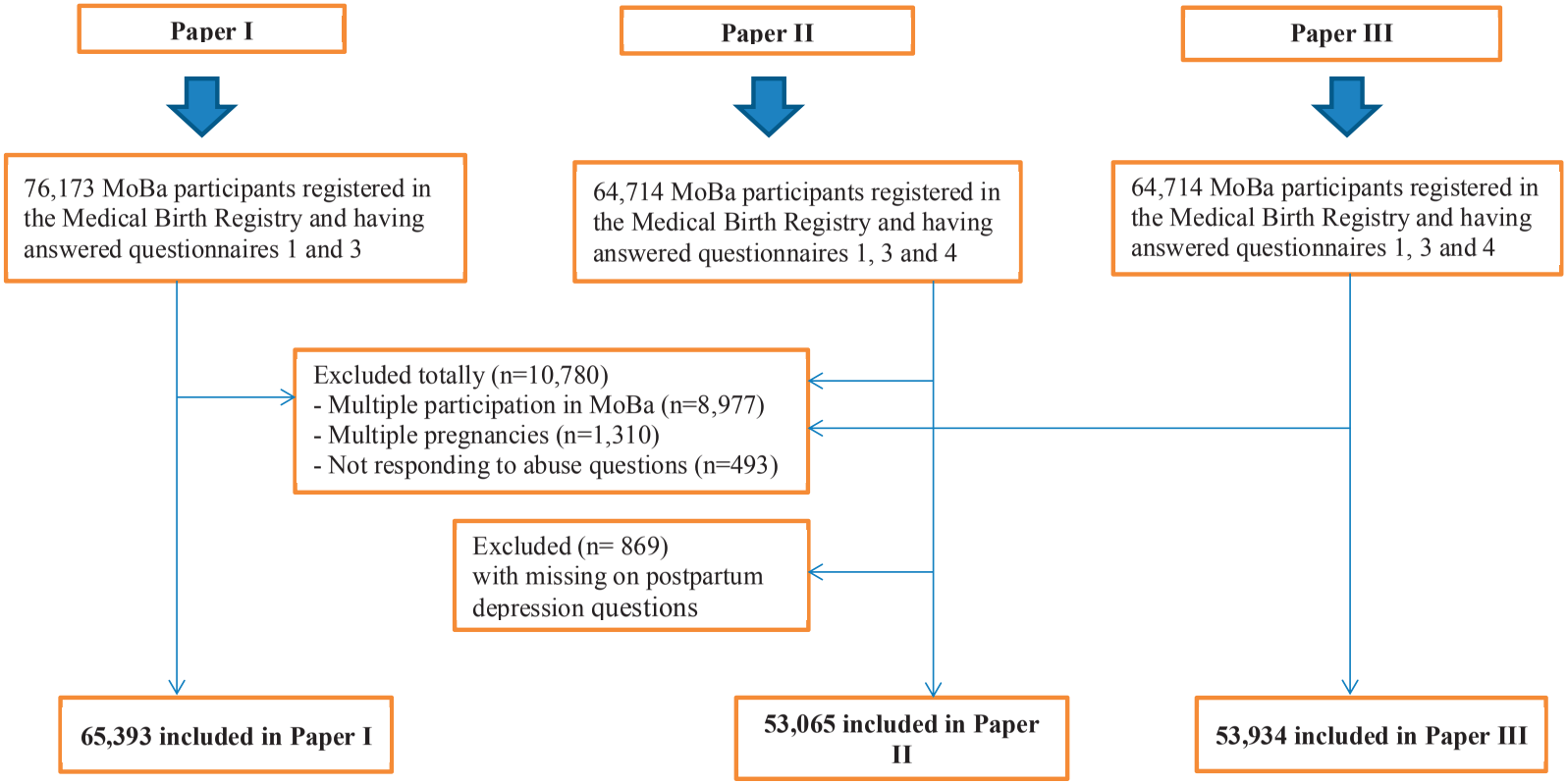

Figure 1 Flow chart of inclusion in the different papers

7.5 Variables

An overview of the different variables in the three Papers is shown in Table 2.

Table 2 Variables used in papers I-III

Variables	I	II	III
Exposure:			
Type and combinations of abuse:			
Any adult abuse	x	x	x
Sexual only		x	x
Physical only		x	x
Emotional only		x	x
Emotional and physical		x	x
Emotional and sexual		x	x
Sexual and emotional		x	x
Sexual, physical and emotional		x	x
Time of exposure:			
Lifetime abuse	x	x	x
Recent adult abuse	x	x	x
Child abuse	x		x
Perpetrators and type of abuse:			
Known and adult abuse	x		
Known and child abuse	x		
Unknown and adult abuse	x		
Unknown and child abuse	x		
Known only and adult abuse		x	x
Unknown only and adult abuse		x	x
Known and unknown and adult abuse		x	x
Outcome:			
Prevalence of abuse	x		
Abuse and relation to socio-demographics	x		
Postpartum depression		x	
Breastfeeding cessation			x
Socio-demographics and risk factors:			
Age	x	x	x
Education	x	x	x
Civil status	x	x	x
Parity	x	x	x
BMI	x		x
Smoking first trimester	x		x
Alcohol first trimester	x		x
Other:			
Prior depression		x	x
Social support		x	x
Mode of delivery			x
Preterm delivery			x

7.5.1 Abuse variables

The main exposure variable in this thesis was any adult abuse, which was defined as responding positively to any of the four questions of abuse "over 18 years" as described in Figure 2. In all Papers we defined "over 18 years" to include women at 18 years or older. Those responding to any type of abuse "under 18 years", were defined as suffer from any childhood abuse. Women responding "yes" to either any childhood and/or any adult abuse were defined as being exposed to any lifetime abuse. As we presented prevalence rates of abuse in Paper I, the categories of abuse and perpetrators differ slightly from Papers II and III. In addition, childhood abuse as exposure was included in analyses in Paper III.

Have you ever experienced any of the following? (Fill in for each statement.)

	No, never	Yes, as a child (under 18)	Yes, as an adult (over 18)	Who was responsible for this?			Has this occurred during the last year?	
				A stranger	Family or relative	Another known person	No	Yes
Someone has over a long period of time systematically tried to subdue, degrade or humiliate you	□	□	□	□	□	□	□	□
Someone has threatened to hurt you or someone close to you	□	□	□	□	□	□	□	□
You have been subjected to physical abuse	□	□	□	□	□	□	□	□
You have been forced to have sexual intercourse	□	□	□	□	□	□	□	□

Figure 2 Questions and response options on abuse and perpetrators in questionnaire 3

Categories of adult and child abuse

Based on the response options in Figure 2, adult abuse was classified into singular and combined groups; sexual abuse only, physical abuse only and emotional only. Furthermore, abuse was classified in combination of two types of abuse (sexual and emotional abuse, sexual and physical abuse, and emotional and physical abuse) and lastly, exposure from all three types of abuse. Child abuse was used as an exposure variable in Paper III, and was grouped into two non-overlapping categories: "emotional and/or physical, not sexual" and "sexual alone or in combination with emotional and/or physical".

Pregnancy related abuse or recent abuse

Women responding "yes" to exposure of any kind of abuse during the last year were defined as suffering from pregnancy related abuse in Paper I and recent abuse in Papers II and III. The time frame of the question was the last 12 months responded to in week 30 in pregnancy, hence, this included the period between three months prior conception and until week 30 of gestation (Figure 2).

Perpetrators of adult abuse

Figure 2 describes three response alternatives of perpetrators: stranger, family/relative, or other known. In our analyses the two latter groups were merged into known perpetrator. Furthermore, we categorized perpetrators of adult abuse into three categories; those reporting only known perpetrator into "only known", those reporting only unknown perpetrator into "only unknown" perpetrator, and those reporting exposure from both known and unknown into "known and unknown" perpetrators, respectively.

7.5.2 Measurement of postpartum depression

Postpartum depression was the outcome in Paper II and it was measured six months postpartum. The Edinburgh Postpartum Depression Scale is a 10-item self-rating scale (EDS-10) designed to identify postpartum depression (104). This scale was developed because the established screening instruments were assumed to be suboptimal when applied to postnatal women, as common postnatal symptoms may be interpreted as depressive symptoms. It is referred to as the Edinburgh Depression Scale (EDS) (104, 105). A short matrix-version of the EDS has been constructed for research purposes and comprise five items (EDS-5), it has evidence of good psychometric properties and has been translated into Norwegian and has been validated (106, 107). In the MoBa questionnaire six questions are listed, of which, however, only four are identical to the items in the research version. In our study we chose to use the four items identical to the items in the research version, 1, 2, 4 and 5, which are shown in Figure 3. The score ranges from 0-3 on each item, the latter indicating higher depression symptom score. We used a cut off score ≥6 which corresponded with a cut off at ≥10 in the EDS-10, and indicates a moderate level of postpartum depression (106).

Have you ever experienced any of the following feelings last week? (Enter just one cross in a box for each item.)

	Yes, almost all the time	Yes, now and then	Not very often	No, never
1 Really reproached yourself when something went wrong	□	□	□	□
2 Have been anxious or worried for no reason	□	□	□	□
3 Have been afraid or panicked for no reason	□	□	□	□
4 Have been so unhappy that you've had problems sleeping	□	□	□	□
5 Felt down or unhappy	□	□	□	□
6 Have been so unhappy that you've cried	□	□	□	□
We included questions number 1, 2, 4 and 5 in our analyses.				

Figure 3 Questions on Postpartum Depression in questionnaire 4

7.5.3 Breastfeeding cessation

Breastfeeding cessation was the outcome variable in Paper III. The data were based on three questions about infant nutrition in the questionnaire completed six months postpartum. The questions asked about what type of milk (breastfeeding or formula feeding) or other liquid the baby had been given in the first week of life in monthly intervals up until and the date of completion (median 27 weeks/190days). A question also asked about infant age (in months) at the time of introduction of semisolid food or solid food. Full breastfeeding was defined as predominant breastfeeding without any formula or solids, but allowing water and vitamins, whereas any breastfeeding included both full breastfeeding as well as partial breastfeeding (i.e. breastfeeding with concomitant formula or solid foods given). The breastfeeding categories used in the analyses are based on WHO's definitions (108).

7.5.4 Socio-demographics and other characterstics

Most of the data concerning socio-demographics and other characteristics were obtained from Q1 in MoBa; maternal age, education, civil status, parity, body mass index (BMI), smoking, alcohol consumption, prior depression and social support. Information about delivery mode and preterm delivery was collected from the Medical Birth Registry.

Age

Data on maternal age was grouped into five categories: 14-19, 20-24, 25-29, 30-34 and ≥ 35 years.

Education

Education was surveyed with the question "What education is the highest you have completed? The women should indicate both completed level and/or ongoing studies. There were originally seven response alternatives: 9 years primary school, 1-2 years secondary school, secondary school for "practical subjects", 3 years theoretical secondary school, less than 4 years at college/university, or 4 years or more at college/university, and other education. The response alternatives were assembled in four categories: Completed primary school, completed secondary school, and less than 4 years at college/university, or 4 years or more of college/university.

Civil status

Information of civil status was divided into six groups in the MoBa questionnaire. In Papers I and III this was categorized into three: married, cohabiting, or not married/cohabiting; while in Paper II it was dichotomized into either married/cohabiting or not married/cohabiting.

Parity

The number of previous deliveries after 21 weeks of gestation were indicated by the women, and was further categorized into nulliparous (P0) and multiparous (P+1).

Body mass index

BMI was calculated from two questions about weight and height, and in our study categorized into four groups: <20, 20-24.9, 25-29.9 and ≥30.

Smoking

Cigarette smoking was assessed by the question "Do you smoke now (after you became pregnant)?" with response alternatives: "No", "sometimes" and "daily". Smoking was dichotomized into yes or no.

Alcohol drinking

Alcohol was examined by questions asking respondents how often they had consumed alcohol during the last three months prior pregnancy and how often they consumed alcoholic beverages at the time of answering the questionnaire (i.e. gestational weeks 18). There were originally seven response alternatives, which were grouped into three; never, less than once a week, and 2-7 times a week.

Prior depression

Women were asked to respond yes or no to whether, earlier in life, they had suffered from depression in a period of two weeks or more.

Social support

This was assessed by the question: "Do you have anyone except your partner/husband to ask for advice in a difficult situation?" with three answering options: "No", "Yes, 1-2 persons" and "yes, more than two persons", which was dichotomized yes or no in our study.

Mode of delivery

The data had originally three categories; spontaneous delivery, induced delivery and caesarean section. This was assembled in two categories; vaginal birth and caesarean section.

Preterm delivery

The data was based on ultrasound measurements. In the few cases without ultrasound information (<2%), gestational length was calculated from the first day of last menstrual period. Preterm delivery was defined as giving birth before 37th week of gestation.

7.6 Statistical analyses

An overview of the statistics in the respective papers is shown in Table 3.

Table 3 Overview of statistics in the respective papers

Statistics		Paper number		
		I	I	III
Method	Cross tabulation	x	x	x
	Pearson Chi-square test			x
	Binary logistic regression	x	x	x
	Sensitivity analysis, stratification			x
Outcome measure	Prevalence of different types of abuse and perpetrators	x		
	Abuse and relation to socio- demographics and risk factors	x		
	Postpartum depression		x	
	Breastfeeding cessation			x
Package	PASW statistical 18	x		
	PASW statistical 20		x	
	SPSS 22			x

Paper I

In Paper I descriptive statistics were presented for all women by any adult abuse. Logistic regression analyses were performed on any adult abuse as unadjusted and adjusted odds ratios (ORs). In the adjusted model, the various categories of socio-demographics characteristics (age, education, civil status, and parity) and other lifestyle and risk factors (BMI, smoking, alcohol consumption and child abuse) were included. The results were presented with 95% confidence intervals (95% CIs) and analysed for complete cases only.

Paper II

In Paper II descriptive statistics of the women exposed to adult abuse were calculated by cross tables. Binary logistic regression analyses were performed to assess the associations between different types of adult abuse and postpartum depression, to estimate associations between perpetrators (known and unknown) of adult abuse and postpartum depression, and finally, to estimate associations between the time of abuse (recent or not) and postpartum depression. We used three different models to adjust for possible confounding factors. In model 1 we adjusted for age and parity. In model 2 we adjusted for age, parity, education, civil status and any child abuse. Finally, in model 3 all variables from model 2 were included along with depression prior to pregnancy and social support. The reference group for all analyses were

women reporting no adult abuse. Adjusted ORs were presented for the different models with 95% CI and analysed for complete cases only.

Paper III

Paper III applied Pearson's Chi-square tests to compare characteristics of women by adult abuse. We used binary logistic regression to examine the associations between adult abuse and early cessation of breastfeeding. The reference group for all analyses of adult abuse were women without adult abuse. Crude and adjusted ORs with 95% CI were presented and analysed for complete cases only. We included potential confounding variables based on previous knowledge of variables associated with either the exposure or the outcome. We identified confounders through directed acyclic graph (DAG) analyses, see Figure 4 (109).

DAGs provide a method to identify potential confounders and decide which to adjust for. Many of the variables associated with both the exposure and the outcome in this study were intermediate variables rather than confounding variables. The minimal sufficient adjustment variables for estimating the total effect between adult abuse and breastfeeding behaviour were: maternal age, education, civil status and any child abuse, and these variables were included in all adjusted models. In addition, we evaluated the change in estimate when including intermediate variables: smoking, alcohol consumption, parity, social support, mode of delivery, BMI, preterm delivery and depression prior to pregnancy.

Further, we conducted a sensitivity analysis in which we stratified women according postpartum depression to evaluate whether the association between adult abuse and breastfeeding behaviour was mediated primarily through postpartum depression. Finally, analyses examining the association between child abuse and breastfeeding were performed, although less comprehensively compared to those of adult abuse. The reference group to child abuse was no child abuse.

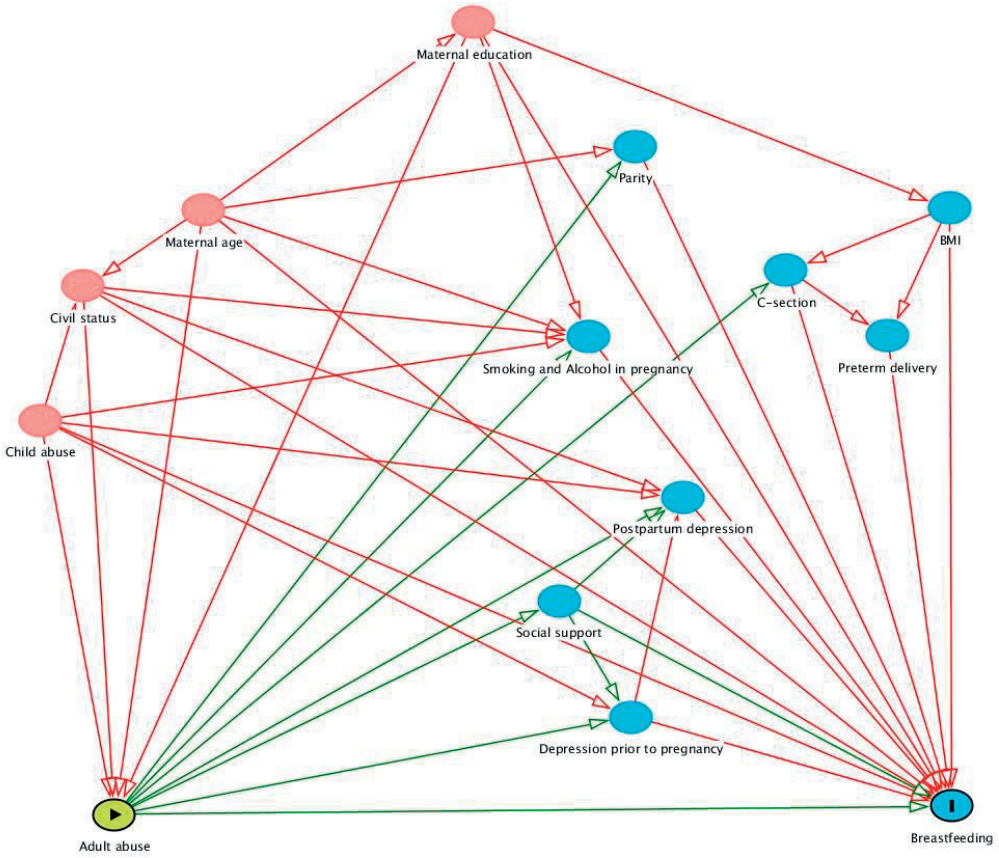

Figure 4 The directed acyclic graph for this study as generated by dagitty.net.

The green node indicates the exposure of interest (Adult abuse), the green lines the exposures effect pathways, and the blue nodes with the "I" indicates the outcome of interest (Breastfeeding behavior). The blue nodes without "I" are intermediate variables in the effect pathway. Red nodes are confounders that are adjusted for in the models. The minimal sufficient adjustment set for estimating the total effect of Adult abuse on Breastfeeding behavior was maternal age, education, child abuse, and civil status.

7.7 Ethics

The MoBa study was approved by The Regional Committee for Medical Research Ethics in South-Eastern Norway. Each participant received written information about the purpose of the study together with the letter of invitation. All participants signed a written informed consent,

accepting linkage to the Medical Birth Registry and publication of the research results. Participation was voluntary and the women could withdraw participation at any time. No additional approval was required to analyse and publish results on the abuse questions. The collected data has been handled and stored in accordance with the directives of the Data Inspectorate to protect participants. All studies were conducted in accordance with the Helsinki Declaration.

8. Overview of results

8.1 Results according to aims, Paper I

In Paper I we described the prevalence of self-reported abuse at different time intervals; lifetime abuse, abuse as an adult, in childhood and abuse the last 12 months. In addition we presented three categories of perpetrators; known, unknown, and both known and unknown. Furthermore, the associations between any adult abuse and socio-demographics and risk factors were calculated by logistic regression analyses.

First aim: *To investigate the prevalence of sexual, physical and emotional abuse reported by a large pregnant population in Norway.*

The results showed that any lifetime abuse was reported by 32% of the women, 20 % had experienced any abuse as adults and 19% in childhood. A total of 5% reported any abuse during the last 12 months; hence were exposed to abuse during the period from about three months prior to conception till about six months in pregnancy. Emotional abuse was the type of abuse reported most frequently, both as adults (16%) and as children (14%). Among women reporting any adult abuse, emotional abuse was reported by 83% (10,739), while physical and sexual abuse were reported by 28% (3735) and 27% (3512), respectively. Among women reporting any child abuse, 74% (9865) reported emotional abuse, while 29% (3610) reported physical abuse and 37% (4545) sexual abuse. Among women reporting adult abuse, 30% has been exposed to two or more types. Similarly, among those exposed to child abuse, 31% reported two or more types of abuse.

Second aim: *To investigate the identity of the perpetrator and to compare women reporting adult abuse with those who did not with regard to socio-demographics and other characteristics.*

The study showed that known perpetrator is the most common type of perpetrator for all types of abuse. Moreover, known perpetrator was reported by 29% of the women, while 5% reported unknown, and 3% reported abuse from both known and unknown perpetrator. Ninety eight percent of the women reporting any abuse respond to whom committed the abuse. The logistic regression analyses showed that factors associated with any adult abuse were

exposure to child abuse, smoking daily or drinking weekly in first trimester, being 35 years or older, being overweight and living alone.

8.2 Results according to aims, Paper II

In this paper we analysed the associations between different categories of adult abuse and postpartum depression. Logistic regression analyses were performed and adjusted for different factors and presented in three models.

First aim: *To investigate the association between different types of adult abuse, emotional, sexual and physical, as singular and combined exposure, and postpartum depression.*

The results showed that all types of adult abuse were strongly associated with postpartum depression and a total of 11% reported postpartum depression. Women reporting any adult abuse had an 80% increased fully adjusted odds of postpartum depression (OR: 1.8, 95% CI: 1.7-1.9) compared to women without adult abuse. There was a tendency towards higher odds of postpartum depression for women reporting combinations of adult abuse, compared to those disclosing sexual, emotional or physical abuse as singular groups only. Women reporting three types of abuse; emotional, sexual and physical abuse, had a 120% increased fully adjusted odds of postpartum depression (OR: 2.2, 95% CI: 1.9-2.6) compared to women with no adult abuse. Women disclosing recent abuse had a 160% increased fully adjusted OR of reporting postpartum depression compared to those without adult abuse (OR: 2.6, 95% CI: 2.4-2.9).

Second aim: *To explore whether associations differed if the perpetrator was a known or an unknown to the women.*

The results showed that exposure from known perpetrator only were more strongly associated with postpartum depression than exposure from an unknown perpetrator only; fully adjusted OR: 1.8 (95% CI: 1.7-1.9) versus fully adjusted OR: 1.5 (95% CI: 1.2-1.9), respectively. However, the odds ratio of being exposed from both known and unknown perpetrator in the full model was 2.0 (95% CI: 1.7-2.4). The associations between all types of adult abuse and postpartum depression were attenuated when adjusted for confounding factors introduced in models 2 and 3, but still remained significant.

8.3 Results according to aims, Paper III

In this paper we examined the associations between exposure to different types of abuse and cessation of breastfeeding. Breastfeeding was examined as any breastfeeding (comprising both full and partial/mixed breastfeeding) and as full breastfeeding. Nearly all women initiate breastfeeding (98.9%), but 12.1% ceased any breastfeeding before four months, and 38.9% ceased full breastfeeding before four months.

First aim: *To examine whether exposure to adult emotional, sexual, or physical abuse, as a singular or combined exposure, was associated with early breastfeeding cessation.*

The results showed that abused women had a significantly higher risk of early breastfeeding cessation than women who were not exposed to adult abuse. For cessation of any breastfeeding before four months, the adjusted OR for any adult abuse is 1.25 (95% CI: 1.17-1.34) relative to no abuse. When any adult abuse was grouped according to sexual, physical and emotional abuse, the results showed the highest risk in women exposed to all three types of abuse, with adjusted OR being 1.47 (95% CI: 1.23-1.76) relative to no abuse. When the abuse was grouped into recent (last year) or not recent, recent abuse resulted in nearly 40% increased risk of cessation of any breastfeeding before 4 months.

Because in Paper II we showed an increased risk of postpartum depression among abused women, we conducted a sensitivity analysis in which we stratified women according postpartum depression to evaluate whether the association between adult abuse and early breastfeeding cessation was mediated primarily through postpartum depression. The analysis showed that cessation of breastfeeding could not be explained by postpartum depression, rather by the abuse. These results are more comprehensively described in paper III.

Second aim: *To assess whether a potential association differed for adult recent and non-recent abuse and for known and unknown perpetrator.*

When abuse was grouped by adult recent and non-recent abuse (Table 3, Paper III), women reporting recent exposure have 40% increased odds (adjusted OR: 1.40, 95% CI: 1.24-1.58) of early cessation compared to non-exposed women; whereas those reporting non-recent adult abuse had 21% increased odds of early breastfeeding cessation (adjusted OR: 1.21, 95% CI: 1.12-1.30).

When abuse was grouped by type of perpetrator (Table 4, Paper III), exposure from "known perpetrator only" is significantly associated with cessation of any breastfeeding before four months (adjusted OR: 1.28, 95% CI: 1.19-1.37). The result for "both known and unknown" perpetrator is significant in the crude model only, while exposure from "unknown perpetrator only" was not associated with cessation of breastfeeding.

Third aim: *To examine the association between child abuse and early breastfeeding cessation*.

In this paper child abuse was examined both as a confounder and as an exposure variable. The results showed that when child abuse was examined as an exposure it was significantly associated with any breastfeeding cessation before four months. The OR for women who had experienced any child abuse was 1.41 (95% CI: 1.32-1.50) relative to those with no experience of child abuse. The association between child "emotional and/or physical, not sexual abuse", and child "sexual alone or in combination with emotional and/or physical" abuse, and cessation of any breastfeeding before four months was OR: 1.27 (95% CI: 1.17-1.37) and OR: 1.66 (95% CI: 1.51-1.82), respectively. There were no available variables that could be considered confounders of child abuse. However, child abuse was significantly associated with breastfeeding cessation in the adjusted models as presented for adult abuse (Tables 2-4 in Paper III), with the OR being 1.12 (95% CI: 1.05-1.20). The association was stronger for child "sexual alone or in combination with emotional and/or physical" abuse than for "emotional and/or physical, not sexual" abuse with OR: 1.22 (95% CI: 1.11-1.65) and OR: 1.06 (95% CI: 0.98-1.15), respectively.

9. Discussion

9.1 Main findings

The thesis demonstrated a high prevalence of abuse among participants, as a total of 32% reported any lifetime abuse and about 30% of those experiencing abuse reported two or three types of abuse. Exposure to abuse was more prevalent in women who were older, parous, living alone, those who had been exposed to child abuse, had caesarean delivery, smoked, were drinking alcohol, were overweight or obese, in women with postpartum depression and in women with early breastfeeding cessation. For all types of abuse a known perpetrator was more commonly reported. We found that all types of adult abuse, both singular and combined categories, were significantly associated with postpartum depression. Although, the associations were attenuated when adjusted for confounding factors, the substantial associations remained in the fully adjusted models. We also found that past and recent abuse was strongly associated with early cessation of breastfeeding. This finding was independent of prior depression, postpartum depression and other potential confounding factors.

9.2 Methodological considerations

9.2.1 Methodological strengths and limitations

Major strengths of our studies include the large sample size, representing women from all regions of Norway, and the prospective design. Further, we have detailed information about three types of abuse, past and recent exposure, about the outcomes of interest as well as information about a wide range of potential confounding factors. The response rate of 40.6% in MoBa is a limitation, as well as the retrospective reporting; which is further discussed in paragraphs below.

Research errors can be classified as random or systematic (110). Random errors affect the precision of the estimates represented by the width of the confidence interval; the narrower the confidence interval, the more precise the estimate. The opposite of random error is precision, consequently an estimate with little random error may be described as precise. With increased size of the study population, the less the random errors are expected to be. The current study comprises one of the largest population-based pregnancy cohorts worldwide.

Systematic errors are commonly referred to as biases and tend to distort the estimates in a specific direction. They may be a bigger threat to validity than random errors in epidemiological studies (110). The opposite of bias is validity, so that an estimate that has little systematic error may be described as valid. Validity can be separated into internal validity, which pertains to the validity of the results within the source population of the study, and external validity, which concerns the generalizability of the results outside the study population. Three biases concerning internal validity will be described in the following sections; selection bias, information bias and confounding.

9.2.2 Selection bias

"Selection bias is a systematic error in a study that stems from the procedures used to select subject and from factors that influence study participation. It comes about when the association between exposure and disease differs for those who participate and those who do not participate in the study" (111).

The MoBa study is a prospective population-based cohort study. Including abuse questions in questionnaires has been a controversial issue, and has previously been considered too sensitive to include in general health surveys. One major concern has been the safety of the woman who report abuse by a partner. In order to minimize the risk for additional abuse when answering the MoBa questionnaire, "partner" was not a response option. Current and past abuse has often occurred in concealment and may generate feelings of guilt, fear and shame among abused women. It is therefore a challenge to ensure that those with an abuse history participate in studies and to avoid selection bias.

The response rate in MoBa is 40.6%. Self-selection in epidemiological studies may introduce selection bias and influence the validity of the results (112, 113). The potential bias due to self-selection in MoBa has been evaluated in two studies (114, 115), which compared differences in prevalence estimates and exposure-outcome associations in MoBa and a representative sample of all women giving birth in Norway. The results showed that MoBa participants were underrepresented in the youngest age group (<25 years), those living alone, mothers with low education and mothers with more than two previous births. In addition, smokers, women with stillbirths and neonatal death, were under-represented; while users of vitamin supplement and folic acid were over-represented. However, in spite of differences in prevalence estimates, the non-representativeness in MoBa did not affect exposure-outcome

associations, e.g. prenatal smoking and birth outcomes (low birthweight, placental abruption, stillbirth) (114), and perinatal and prenatal exposures and specialist-confirmed diagnosis of autism spectrum disorders (115). Consequently, self-selection in MoBa may not be a validity problem in studies of exposure-outcome associations.

We lack information why women did not participate in MoBa. Possible reasons could be that the questionnaires were extensive and time consuming to answer and participation had no immediate benefit for the women. Fairly good Norwegian language was required to participate and may explain why very few immigrants took part in the study. Still it is unlikely that invited women declined participation due to a few questions on abuse, postpartum depression and breastfeeding. In addition, they had no information about what exposure and outcome variables that would be linked together. Because population-based studies are known to yield lower prevalence rates of abuse than do clinical studies (5, 116), and the suggested effect of the socio-demographic gradient on prevalence estimates (101), it is rather likely that the prevalence of abuse in MoBa is an underestimate of the true prevalence. Underestimating the dimensions of abuse may result in relegating intervention programs to a lower priority than they deserve in allocation of resources.

9.2.3 Information bias

"Systematic error in a study can arise because the information collected about or from a study subject is erroneous. Misclassification of subjects for either exposure or disease can be either differential or non-differential. If the misclassification of exposure is different for those with and without disease, it is differential" (111).

Women's information about abuse, lifestyle factors and risk factors was based on self-reported information from questionnaires. All retrospective self-reported information may be influenced by recall bias, but use of self-report is difficult to avoid in large cohort studies like MoBa. Abuse might be under- or over-reported, but this would only bias the results if the majority of participants misreported in the same direction. Previous research indicates that few women report abuse when none exists, whereas underreporting is more likely (116). This could dilute associations between abuse and health outcomes, and produce false negative results. Furthermore, focused studies tend to yield a higher rate of abuse and more information about perpetrators, compared to studies designed for a broader purpose (116). A possible explanation is that focused studies apply methods that enhance disclosure of abuse,

such as asking about numerous and specific abusive acts and provide several opportunities to report abuse (116). The use of a narrow time frame (e.g. only asking about past year abuse or only about adult abuse) can seriously underestimate the magnitude of the problem, hence dilute the associations. Having a large sample size as in MoBa, might counteract the dilution effect by increasing the statistical power to detect a significant association. However, the effect estimates would still be an underestimate of the "true" effect. Further, in prospective analyses women experiencing abuse for the first time in the follow up will be misclassified as non-abused. This would also attenuate potential associations. Likewise, the comparison group in our study may have included false negatives. They would have been misclassified as non-abused, and this may have reduced the strength of associations found.

Definitions of abuse affect both the comparison of results between studies and the detection rate. The question on sexual abuse and response options in our study was based on a modified version of the question of sexual abuse in the Abuse Assessment Screen (ASS) (10). ASS has a broad conceptualization of abuse, but not well established psychometric properties. It has been used in other Scandinavian studies (117, 118). The question of physical abuse has been used in other studies, but is not validated (63). The questions in our study allowed women to define both "forced" and "sexual acts" and "exposed to physical acts". Some cases of sexual and physical abuse will not be identified by these questions. In addition both categories of abuse are measured by a single question. Hence sexual and physical abuse in our study might be underreported. The two questions of emotional abuse are almost identical to those in the validated NorAq (9). Including two questions of emotional abuse in contrast to only one question of sexual and physical abuse, respectively, might lead to higher detection rate for emotional abuse than the two other types. That does not necessarily mean that emotional abuse is over-reported; rather it may reflect a true prevalence. Several studies indicate that emotional abuse is more frequently reported than sexual and physical abuse when included in studies; thereby contributing to higher prevalence of lifetime abuse (119-123). Furthermore, the identification of abuse depends on women's own definitions of abuse, yet women might not interpret violent acts as abuse. Some studies indicate that self-defined abuse may have higher sensitivity for severe than for moderate abuse (116, 124).

With respect to the outcome measurement postpartum depression in Paper II, women responded to the validated Edinburgh Depression Scale (EDS) (107). Because the women reported how often they experienced certain emotions in their daily life at the time of response, it is not likely that the information provided relied on recall. Diagnostic information

about postpartum depression would have been an advantage. However, the prospective design of the study is advantageous because it would be impossible for the study participants to link the exposure and outcome when answering the questions, hence potential misclassification of postpartum depression is not likely to be differential. The reported prevalence of postpartum depression of 11 % is in the range of results in other Norwegian and international studies (69, 125).

Regarding the outcome in Paper III, breastfeeding behaviour, the prevalence seen in our study is in line with previous studies showing high breastfeeding rates in Norway. During the last decades, the evidence for beneficial health effects of breastfeeding for mother and child have been substantially strengthened, followed by strong social pressure to breastfeed. Moreover, it is established that behaviour perceived as beneficial to health and/or socially acceptable is commonly over-reported, as seen in dietary surveys (126). Hence, over-reporting has been an important concern in breastfeeding epidemiology. However, a recent Norwegian study found that the over-reporting of breastfeeding duration was small (127). Another concern would be systematic misreporting of breastfeeding duration among sub-groups in the study population. One Brazilian study found a systematic bias towards reporting longer breastfeeding durations among the wealthier and more educated mothers, while those poorer and less educated did not tend to misclassify more in one direction than in the other (128). MoBa comprises women from all over Norway and includes more women with a higher educational level compared to the general female population of Norway. Hence, we cannot rule out that the women in our study over-reported breastfeeding due to high level of education. Besides, breastfeeding rates are generally high in Norway, adding to the expectations of high breastfeeding rates among women in MoBa. However, a review study suggested that maternal recall is a valid and reliable estimate of breastfeeding duration, especially when the duration of breastfeeding is recalled after a short period (3 years) (129). A Norwegian study found that mother's recall of breastfeeding was valid also after two decades (127). In view of this, we believe that the reported breastfeeding rates in our study are valid and accurate.

9.2.4 Confounding and intermediary factors

Confounding is mixing or confusing of effects of different variables, and has three requirements. Firstly, a confounder must be associated with the disease, secondly it must be associated with the exposure and, thirdly, the confounder must not be affected by the exposure or the outcome (110).

The purpose of using the multivariate models was to better understand possible pathways between abuse and selected outcomes. The rationale for taking confounding factors into account is to remove the effects of the confounders (e.g. age) on the outcome (e.g. breastfeeding) that is not related to abuse. Thus, after adjustment for confounders the effect estimates for abuse should reflect the independent influence of abuse on the health outcome studied. In general, confounders should preferably be assessed on the basis on prior knowledge. Furthermore, a confounder should be associated with both the exposure and the outcome. Identification and modelling of confounding factors is rather challenging, as it is not always clear whether a variable is a confounder or an intermediary variable in the causal pathway. The theoretical causal pathway between abuse and breastfeeding behaviour was complex and it was challenging to disentangle which variables to use as confounders. Therefore, we used a Directed Acyclic Graph (DAG) approach to help identify which covariates to choose for confounder control (109). DAGs entail a set of rules aimed to select a minimally sufficient set of covariates for confounding control when the objective is to obtain an unbiased causal effect estimate of an outcome. DAGs are particularly appropriate to prevent over-control (e.g. adjusting for variables affected by the exposure) and when conventional criteria for confounding are not met.

Using the DAG clarified how a number of potential confounding factors were intermediate variables in the effect pathway and therefore not true confounders in Paper III. For instance; in Paper II we found an association between abuse and postpartum depression. Postpartum depression has also been associated with breastfeeding cessation. In the analysis between abuse and breastfeeding, the abuse could lead to breastfeeding cessation as well as to postpartum depression. Postpartum depression would be a confounder if a woman reported abuse because she was depressed and stopped breastfeeding because she was depressed. However, the abuse was assessed more than six months prior to assessment of breastfeeding. Therefore, postpartum depression is not a confounder but an intermediary factor if a depressed woman ceased breastfeeding as a result of abuse exposure. The dataset made it possible to examine to what degree postpartum depression was an intermediate variable in the analysis between abuse and early cessation of breastfeeding.

There are different ways of handling the bias that confounding can cause; restriction, stratification and controlling for the confounding factor in regression analysis (111). We conducted a sensitivity analysis in which we stratified women by postpartum depression. It showed that the association between abuse and breastfeeding cessation could not be explained

by postpartum depression, rather the abuse; hence postpartum depression was an intermediary factor.

Educational attainment has been shown to be a strong indicator of socio-economic differences in Norway and maternal education was used as a confounder in all papers (130-132). Of the four confounding variables in Paper III, maternal education resulted in the largest change in estimate. Some variables may also have both confounding and mediating roles; e.g. there might be a bidirectional relationship between abuse and socio-economic status. As it is commonly accepted that low socio-economic status increases risk of both abuse exposure and poor health, it may be considered a confounder. Oppositely, abuse may also negatively affect socio-economic health determinants, such as ability to sustain an employment and level of income. Accordingly, socio-economic status could be an intermediate variable. Correction of intermediary factors in multivariable analysis might result in over-adjustment. Contrarily, there is a possibility of residual confounding by inaccurate measurements of the confounders, by failure to include relevant confounders and by incorrect specification in the statistical model. Although causal conclusions could not be firmly established, our analyses have provided new insight into the relationship between abuse and postpartum depression and cessation of breastfeeding, and how it was influenced by socio-economic, health and lifestyle characteristics. Irrespective of causality, knowledge about associations may help target groups for prevention.

9.2.5 Generalizability and external validity

Epidemiological studies aim to obtain estimates of effects that are relevant to the target population. MoBa are based on an unselected population of pregnant women from all over Norway. External validity may be limited if the estimates of associations and outcomes vary between responders and non-responders. The results in this thesis may not be generalizable to the women in the lower age groups and the immigrants born in a non-western country, as they were underrepresented in MoBa. However, as discussed in section 4.2.2, self-selection in MoBa has been evaluated and it was found that in spite of differences in exposures and outcomes between MoBa participants and a nationally representative sample of pregnant women, the associations between exposures and outcomes did not differ (113, 114). Hence, results from MoBa are generalizable to the general population of pregnant women.

9.3 Interpretation of results

The thesis provided extensive prevalence data of abuse from a prospective population-based pregnancy cohort. The comprehensive questionnaires assessed several dimensions of abuse (various types of abuse, different time periods and perpetrators). Results from multivariate analyses showed how abuse was influenced by socio-demographics, lifestyle and health factors. The thesis contributed new knowledge about the association between singular and combined types of abuse, whether past or recent, and postpartum depression. It further added new information about abuse and risk of early cessation of breastfeeding. To our knowledge, this is one of the first studies to document a significant association between emotional abuse, as singular and combined exposures, and early breastfeeding cessation. Both non-recent and recent abuse was significantly associated with early breastfeeding cessation. Regarding perpetrators of abuse, the literature is scarce and inconclusive, except for intimate partner. Our results about the impact of abuse from other perpetrators than partners, therefore added new important information. Further, this thesis provided new specific data about perpetrators and how abuse by known and unknown perpetrator was associated with postpartum depression and cessation of breastfeeding, respectively.

9.3.1 Prevalence of abuse and socio-demographics, health and lifestyle factors, Paper I

The thesis demonstrated a high prevalence of abuse, as a total of 32% reported any lifetime abuse. Our results of lifetime abuse are in agreement with the reported prevalence of 34.8% in a recent study from six European countries, which showed a range from 23% to 45% (12). A study from 19 countries showed a range from 2% to 13.5% (Uganda) of partner abuse during pregnancy; with more than half the surveys showing estimates between 3.5% and 8.8% (22). The latter results are in the range of the findings of pregnancy related abuse of 5% in our study (133).

As previous discussed, prevalence rates of abuse vary between regions of the world; so also for pregnancy related abuse. The range of estimates may be partially explained by the time frame measured; yet some studies ask about abuse exposure past 12 months, whereas others assess abuse history during pregnancy and the postnatal period. Additionally, most studies focus mainly on physical and/or sexual abuse, while information on emotional abuse is lacking. Although variations of reported prevalence during pregnancy, pregnant women are at a higher risk of experiencing partner abuse because they are more likely to be in relationships

compared to non-pregnant women and due to their age group (15-49 years) as that may be a high risk period. At the present time little is known about why pregnancy offers a protective time to some while posing an increased risk for others. One of the strongest predictors of pregnancy abuse is a history of pre-pregnancy abuse (134), although, in the WHO multi-country study around 50% of women in three sites stated that they were beaten for the first time during a pregnancy (21). The latter was supported by a recent study from Denmark where about 40% of those abused during current pregnancy reported that it was their first time experiencing abuse (24).

Emotional abuse was the most commonly reported type of abuse in our study, both as a child and an adult, as shown in Figure 5.

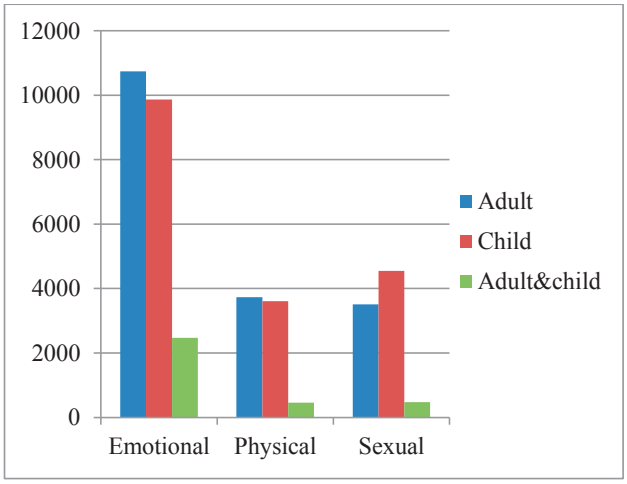

Figure 5 Number of women reporting different types of abuse, by age group, N=65,393

One reason for this could be that the questionnaire contained two questions on emotional abuse compared with one question of sexual and physical abuse, respectively. Among women reporting adult abuse 83% reported emotional abuse; the corresponding prevalence among those exposed to child abuse was 73%. Other studies including three types of abuse, also found higher prevalence of emotional abuse, compared to sexual and physical abuse (119-122). Our results showing a high prevalence of abuse in general, a high co-occurrence of several types of abuse (Figure 6), support that abuse is very common among Norwegian women.

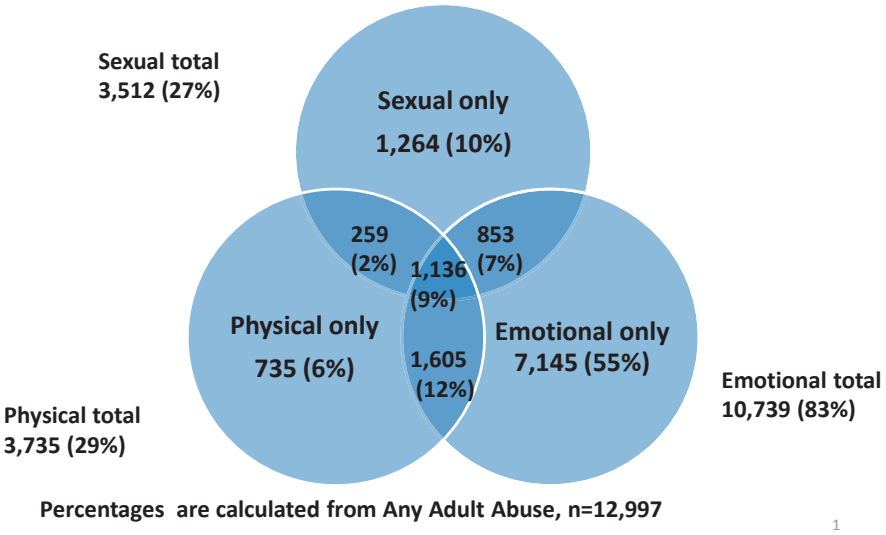

Figure 6 Types of Adult abuse and overlapping categories, N=65,393

Further, the high rates of emotional abuse and its significant adverse health impact, highlights the importance of including several types and time points of abuse in questionnaires, not only physical and/or sexual abuse, as often seen in previous surveys. Regarding types of abuse reported by age groups, physical and emotional abuse was reported more frequently in the category adult abuse only, compared to child abuse only. The opposite result was seen for sexual abuse, as more women reported child sexual abuse (6.2%), compared to adult sexual abuse (4.6%) (Table 1, Paper I). Among women reporting any child abuse, sexual abuse (37%) was more commonly reported compared with physical abuse (29%), whereas among those reporting any adult abuse women were almost equally exposed to sexual (27%) and physical (28%) abuse, respectively. These findings might indicate that since children are less able to protect themselves, they are more vulnerable to sexual abuse, which is most often perpetrated by a person known to the child, possibly the child's caregiver.

Results in Paper I showed that living alone was strongly associated with abuse exposure, which is in accordance with other Swedish studies (13, 119). It is expected that the majority of women in a pregnant population were cohabiting or married and that those living alone comprised a very small group; possibly reflecting that abused women had left their partners.

Women above 35 in our study reported higher prevalence of abuse than women in other age groups. This may be due to accumulative effects. Other studies have found contradictory results, e.g. in the WHO study on recent abuse the younger women were more exposed than the older women, possibly reflecting less opportunity to protect themselves (135). A study of prevalence during pregnancy found lower reporting of abuse among the eldest, possibly due to fading of memory with increasing age (136).

Our results also agree with studies showing an association of exposure to child abuse (135) and of use of alcohol (135, 137). The literature is also inconsistent regarding educational level and abuse exposure. High level of education was protective with respect to abuse exposure in our study, whereas the WHO study on recent abuse suggested that inequality in educational level between a woman and her partner, or if the partner had a higher level, increased the risk of partner abuse (135). A Swedish study found that educational level was positively associated to physical abuse, but not to sexual abuse (119). These results indicate that background factors may have different impact on various types of abuse. Hence, risk factors may vary depending on the setting, the type of abuse studied and the cultural context in which these are studied (6).

WHO's multi-country study showed that women are at more risk of abuse from partner than from any other perpetrator (8). Our study held no information about intimate partner, rather known or unknown person. However, we might assume that the women defined abuse from partner in the "known" category. Results from our study showed that known perpetrator was the most commonly reported perpetrator for all types of abuse, and possibly includes intimate partner. It is a limitation that our study did not collect information about intimate partner; however we consider it a strength to have obtained prevalence data about other perpetrators.

There has been an ongoing discussion both about implementing abuse questions in health surveys and, similarly, whether health care professionals should screen for abuse during general and antenatal care visits. With convincing evidence that both past and recent abuse negatively affect health outcomes for a long time after the abuse has stopped, one can argue

that information about different types, and different timing of the abuse, is relevant to the health care provider. The optimal choice would be to include questions on both partner and other perpetrators when designing surveys in this field; and recent studies show that women are positive about being asked about abuse. For example, a mixed method study found that women showed an overwhelming support for routine or case-based screening for partner abuse in antenatal care in Germany (138). This was supported by a Norwegian study (139). Also the participating women in MoBa showed great willingness to respond to the abuse questions in our study, as less than one percent (493 women) failed to answer any of the abuse questions in questionnaire 3. Furthermore, nearly all women (98%) reported the identity of the perpetrator.

The antenatal period is one in which women are most likely to be routinely consulted by health care providers worldwide, it offers a good opportunity to carefully assess and assist women harmed by abuse. Yet, recommendations to ask for recurrent exposure of past and current abuse have recently been implemented in the revised Norwegian antenatal care guidelines (140).

9.3.2 Abuse and postpartum depression, Paper II

The results presented in Paper II showed that all types of abuse were significantly associated with postpartum depression. Previously, these associations have primarily been examined in cross-sectional studies and with abuse from partner only (141), whereas our study has a prospective population-based design, a large sample size and assess different types of abuse and perpetrators. Further, our results indicated a dose response association, as exposure to more than one type of abuse mainly showed higher odds of postpartum depression than exposure to one type only, which is in agreement with other studies (81, 142). Women exposed to more than one type of abuse in our study had a two to three fold increase in reporting postpartum depression, compared to non-abused women. Our results also endorsed prior documentation showing that recent abuse was more strongly associated with postpartum depression compared to past abuse (81, 143, 144). Women exposed to emotional abuse only had a slightly higher risk of postpartum depression, compared with women exposed to sexual or physical abuse only, respectively. Our results of emotional abuse in the absence of other types of abuse with relation to postpartum depression are supported by both clinical and population based studies (82, 83). The clinical study showed that emotional abuse, but not physical or sexual abuse, was associated with postpartum depression (82). The latter finding

has important implications as research, preventions and interventions strategies mainly focus on physical and/or sexual abuse, without including emotional abuse.

Of the factors adjusted for, social support came out as one of the strongest. The relationship between postpartum depression and social support may be bidirectional. A lack of social support increases the risk of depression and depression appears to impair a person's capacity to establish social connections.

The study provides new information about perpetrators and their impact on postpartum depression. The highest odds were seen among women exposed to abuse by known perpetrator only, or by known and unknown, compared to those abused by unknown only. This may be because abusive acts by a known person have a more detrimental effect than those perpetrated by an unknown person. Further, being exposed to abuse by both known and unknown indicates more than one incident; hence contributing to the strong association. Our results are supported by other studies indicating that recurrent acts of abuse are associated with increased risk of reporting postpartum depression (81, 145), or when the intimate partner was the perpetrator (81). However, oppositely results were found in another study with nearly equal effect of partner and non-partner abuse on postpartum depression (146).

Although causal conclusions can not be firmly established in our study, the results are important and should be replicated in future surveys. The multivariate analyses were performed in three different models; and attenuated the results. However, all results remained significant. Strengths of our study are that we were able to adjust for known risk factors of postpartum depression, such as child abuse, lack of social support and prior depression, which is not always included in previous studies (147). By using EDS together with a clinical interview, it may be possible to promote early identification of postpartum depression; and if followed by appropriate interventions, it can contribute to minimising the long term consequences. However, this should be performed by trained professionals and utilize evidence based knowledge.

9.3.3 Abuse and breastfeeding cessation, Paper III

The results presented in Paper III showed that past and recent adult abuse as well as child abuse was associated with increased risk of early breastfeeding cessation. This study also

demonstrated an association between adult emotional abuse, both as singular and combined types, and breastfeeding cessation.

Whereas Paper II identified strong adjusted associations between all categories of abuse and postpartum depression, the associations were slightly different in relation to breastfeeding in Paper III. In the latter paper we found that singular categories of sexual and physical abuse only, and combined group of sexual and physical abuse, were not significant associated with cessation of breastfeeding. Both Papers II and III applied a prospective design and the inclusion criteria were almost identical in the two samples. The interpretation of the findings is complex, as many factors beyond abuse exposure will contribute to a woman's breastfeeding behaviour. The high expectations to breastfeed in Norway and the long paid parental work leave, might have added to the results of higher breastfeeding rates despite abuse experiences. However, the associations were robust for all categories of emotional abuse and early cessation of breastfeeding. The current finding may indicate that the different types of abuse may have a divergent impact on the outcome studied. Our findings about emotional abuse also underpin the importance of including emotional abuse as singular and combined types, when studying adverse health outcomes of abuse.

Abuse has an impact of both postpartum depression and breastfeeding cessation, as shown in Papers II and III. Further, breastfeeding has been found to prevent postpartum depression in a survey of 6,410 women (148). Women with a history of sexual assault were at increased risk of depression, and suffered overall poorer subjective well-being, relative to their non-assaulted counterparts. However, the sexual assault survivors who were breastfeeding were at lower risk of depression than sexual assault survivors who were mixed or formula feeding (148). Although our results showed higher prevalence of depressed women among those who ceased breastfeeding early, the stratified analyses showed that the association observed between abuse and breastfeeding, was mediated through abuse rather than postpartum depression. Nevertheless, it should be noted that, due to the observational design, causal inference between abuse and the outcomes studied cannot be established.

9.4 Clinical implications

This thesis documented the fact that lifetime abuse is a common experience among pregnant women in Norway, and it found a strong association between abuse and postpartum

depression and early cessation of breastfeeding, respectively. These results have important implications for clinical practice. All factors; abuse, postpartum depression and early breastfeeding cessation, individually or together, might negatively affect the health and well-being of both the child and the mother. Physicians and midwives in charge of antenatal care should be aware of these associations and use their opportunity to assess for abuse when women are attending regular check ups during pregnancy; as suggested in the new Norwegian antenatal care guidelines. However, both past and current abuse may affect health during pregnancy. Consequently, limiting assessment for abuse to women who are currently pregnant will fail to identify the large proportion of women that is in need of special attention before becoming pregnant. Many women do not disclose abuse when it occurs, thus it may become a hidden health burden.

In order to increase the rates of disclosure, effective educational methods of the health care providers are important. Focus should also be drawn to the health sector's lack of knowledge to improve the response to abused women. The educational system for health professions and other relevant fields that relate to women and children play an important role in training students to recognize when women are at risk and how to provide appropriate responses. Although still limited, evidence regarding effective health care interventions to prevent abuse and reduce its adverse impact; physician training with system support interventions, such as enhancing awareness of abuse, seemed to increase referrals to adequate support in a recent review (149). Further, another review found evidence that successful prevention programmes engage multiple stakeholders with multiple approaches (150). Strong programmes also address the underlying risk factors for abuse, such as social norms accepting gender inequality and abuse, and support the development of non-violent behaviour (150).

Intervention strategies are therefore greatly needed to prevent abuse and subsequently postpartum depression and early cessation of breastfeeding, respectively. Systematic screening and increased disclosure of abuse might give women an opportunity to share a hidden burden and receive appropriate support.

9.5 Suggestions for future research

Abuse of women is a major public health issue; hence, this thesis suggests that implementation of abuse questions in future health surveys will provide important knowledge

on the magnitude of the problem and on the public health impact of abuse. The public health sector can contribute significantly to reducing consequences of abuse of women by multi-disciplinary support, adequate health care services and focus on prevention (151). All public health approaches should be firmly grounded in research. Due to the previously discussed limitations in methodology, future health surveys should include a concise abuse instrument assessed for the validity and reliability in the general population. Past research has mainly focused on partner abuse questions and on the adverse health effects of partner abuse. Although there is less research on non-partner abuse than on partner abuse, a WHO report indicated that non-partner abuse has similar adverse mental, physical, and reproductive effects to partner abuse (31). Accordingly, future research should aim to improve and validate instruments on non-partner abuse, in order to increase the knowledge on this type of abuse. Whereas prior research mainly has focused on physical and/or sexual abuse, this thesis shows that emotional abuse alone, and combined with other types of abuse, was both widespread and associated with adverse health outcomes. Consequently, future research should also assess emotional abuse, as singular and combined exposures. Developing better instruments to capture aspects of multiple experiences and multiple perpetrators over different time periods needs attention. Findings also call for longitudinal studies to assess the possible changes in prevalence of abuse and the efficacy of interventions for women experiencing abuse. Further, a combination of longitudinal data on various types of abuse and multiple health outcomes could increase our insight into temporal sequence and causal mechanisms between abuse and poor health. Information from different data sources and methodologies needs to be linked; as this will enhance our understanding of the impact of abuse. In recent years, several health registries have been adapted for individualized linkage which promotes this kind of research. Assessment of abuse in population-based health surveys is cost-effective, but should not replace specific population-based studies that mainly focus on abuse. The latter studies tend to yield more valid and higher prevalence of abuse, more information about different aspects of abuse; including multiple types of abuse and perpetrators, which facilitate research on adverse health outcomes (6).

This thesis shows strong associations between abuse and postpartum depression and early cessation of breastfeeding, respectively. The physicians' awareness and management of abuse when treating women with postpartum depression should be explored. Likewise, future studies should also assess how health service providers deal with abuse when supporting women regarding breastfeeding. In order to develop effective health care interventions to

abused women, future surveys should assess the perceived need, access and experience of health services among those exposed to abuse. Finally, studies are needed to assess the individual experience of abuse. By using in-depth qualitative analysis in samples of large-scale quantitative surveys, both population and individual aspects can be combined.

9.6 Conclusions and public health implications

The findings in this thesis document a high prevalence of abuse among Norwegian women, and underscore the contribution of abuse to the burden on women's reproductive and postpartum health.

Factors associated to abuse were exposure to child abuse, smoking, drinking alcohol, being 35 years or older, being overweight and living alone. Known perpetrator was the most common perpetrator of all types of abuse.

The results showed that all types of adult sexual, physical and emotional abuse, as singular or combined exposures, were significantly associated with postpartum depression. Abuse from all three categories of perpetrators showed increased odds of postpartum depression; with the highest risk among those exposed from both known and unknown perpetrator.

Past and recent adult abuse was significantly associated with early breastfeeding cessation, and women who reported child abuse were more likely to cease breastfeeding early, independent of later adult exposure. This thesis is one of the first to document the association between emotional abuse, as singular or combined exposures, and breastfeeding cessation. Abuse exposure from "known perpetrator only" was significantly associated with early cessation of breastfeeding, whereas abuse from the two other categories of perpetrators was not associated.

Health care providers are in a unique position to address the health and psychosocial needs of women who have experienced abuse. The findings in this thesis underpin the need for the health sector to take abuse against women more seriously, and that it should preferably be part of a multi-sectoral response.

10. Errata

Paper I

In Table 2 Socio- demographics in relation to different types of adult abuse (N=65,393), there are two mistakes regarding Child abuse. All missing categories should be 0, whereas under Emotional and Physical abuse, respectively, the percentages are reported to be 13. Both should be 0.

11. References

1. Vienna Declaration and Programme of Action. Adopted by the World Conference of Human Rights (document A/CONF157/23); 14-25 June; Vienna: 1993.
2. The Fourth World Conference on Women; Beijing, China. United Nations. 1995; (document A/CONF.177/20).
3. World Health Organization. In: Understanding and addressing violence against women. WHO fact sheet. Updated November 2014. Available from: http://who.int./mediacentre/Factsheets/fs239/en/ Accessed October 2015.
4. O'Reilly R, Beale B, Gillies D. Screening and intervention for domestic violence during pregnancy care: a systematic review. Trauma Violence Abuse. 2010;11:190-201.
5. Alhabib S, Nur U, Jones R. Domestic Violence Against Women: Systematic Review of Prevalence Studies. J Fam Violence. 2009; 25:369-82.
6. Ellsberg M, Heise L. Researching Violence Against Women: A Practical Guide for Researchers and Activists. Washington DC, United Nations: WHO; 2005.
7. Thombs BD, Bernstein DP, Ziegelstein RC, Scher CD, Forde DR, Walker EA, et al. An evaluation of screening questions for childhood abuse in 2 community samples: implications for clinical practice. Arch Intern Med. 2006;166:2020-6.
8. Garcia-Moreno C, Jansen HA, Ellsberg M, Heise L, Watts CH. Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. Lancet. 2006;368:1260-9.
9. Swahnberg IM, Wijma B. The NorVold Abuse Questionnaire (NorAQ): validation of new measures of emotional, physical, and sexual abuse, and abuse in the health care system among women. Eur J Public Health. 2003;13:361-6.
10. Rabin RF, Jennings JM, Campbell JC, Bair-Merritt MH. Intimate partner violence screening tools: a systematic review. Am J Prev Med. 2009;36:439-45.
11. World Health Organization. Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva, 2013. ISBN 978 92 4 156462 5.
12. Lukasse M, Schroll AM, Ryding EL, Campbell J, Karro H, Kristjansdottir H, et al. Prevalence of emotional, physical and sexual abuse among pregnant women in six European countries. Acta Obstet Gynecol Scand. 2014;93:669-77.
13. Stenson K, Heimer G, Lundh C, Nordstrom ML, Saarinen H, Wenker A. The prevalence of violence investigated in a pregnant population in Sweden. J Psychosomat Obstet Gynecol. 2001;22:189-97.
14. Bacchus L, Mezey G, Bewley S. Domestic violence: prevalence in pregnant women and associations with physical and psychological health. Eur J Obstet Gynecol Reprod Biol. 2004;113:6-11.
15. Thoresen S, OK H. Vold og voldtekt i Norge. En nasjonal forekomststudie av vold i et livsløp. Oslo: Nasjonalt kunnskapssenter om vold og traumatisk stress (NKVTS), 2014. Report No.1/2014.
16. Lundgren E, Heimer G, Westerstrand J, Kalliokoski AM. Captured queen. Men's violence against women in "equal" Sweden - a prevalence study; Umeå, 2001. ISBN 91 974139 4 1.
17. Helweg-Larsen K, Kruse M. Mænds vold mod kvinder. Omfang, karakter og indsats mod vold. Det Nationale Voldsobservatoruium i Kvinderådet, Statens Institut for Folkesundhet, Minister for Ligestilling; 2004. ISBN 87 91292 36 0.

18. Helweg-Larsen K, Frederiksen ML. Mænds vold mod kvinder: Omfang-karakter og indsats mod vold-2007. Syddansk Universitet, Statens Institut for Folkesundhed, Minister for Ligestilling; 2007. ISBN 13978 87 92142 12 2.
19. Wijma B, Schei B, Swahnberg K, Hilden M, Offerdal K, Pikarinen U, et al. Emotional, physical, and sexual abuse in patients visiting gynaecology clinics: a Nordic cross-sectional study. Lancet. 2003;361:2107-13.
20. Duley L. The global impact of pre-eclampsia and eclampsia. Semin Perinatol 2009;33:130-7.
21. World Health Organization. WHO multi-country study on women's health and domestic violence against women: summary report of initial results on prevalence, health outcomes and women's responses. Geneva, 2005. ISBN 92 4 159351 2.
22. Devries KM, Kishor S, Johnson H, Stöckl H, Bacchus LJ, Garcia-Moreno C, et al. Intimate partner violence during pregnancy: analysis of prevalence data from 19 countries. Reproduct Health Matters. 2010;18:158-70.
23. Roelens K, Verstraelen H, Van Egmond K, Temmerman M. Disclosure and health-seeking behaviour following intimate partner violence before and during pregnancy in Flanders, Belgium: A survey surveillance study. Eur J Obstet Gynecol Reprod Biol. 2008;137:37-42.
24. Finnbogadottir H, Dejin-Karlsson E, Dykes A-K. A multi-centre cohort study shows no association between experienced violence and labour dystocia in nulliparous women at term. BMC Pregnancy Childbirth. 2011;11:14. doi: 10.1186/1471-2393-11-14.
25. Finnbogadóttir H, Dykes A-K, Wann-Hansson C. Prevalence of domestic violence during pregnancy and related risk factors: a cross-sectional study in southern Sweden. BMC Womens Health. 2014;14:63. doi: 10.1186/1472-6874-14-63.
26. Shamu S, Abrahams N, Temmerman M, Musekiwa A, Zarowsky C. A Systematic Review of African Studies on Intimate Partner Violence against Pregnant Women: Prevalence and Risk Factors. PLOS ONE. 2011;6:e17591.
27. Romans S, Forte T, Cohen MM, Du Mont J, Hyman I. Who Is Most at Risk for Intimate Partner Violence?: A Canadian Population-Based Study. J Interpers Violence. 2007;22:1495-514.
28. Haaland T, Clausen SE, Schei B. Vold i parforhold – ulike perspektiver. Resultater fra den første landsdekkende undersøkelsen i Norge. (Couple Violence-different perspectives. Results from the first national survey in Norway). Oslo: NIBR-rapport 2005:3.
29. Nybergh L, Taft C, Enander V, Krantz G. Self-reported exposure to intimate partner violence among women and men in Sweden: results from a population-based survey. BMC Public Health. 2013;13:845. doi:10.1186/1471-2458-13-845.
30. World Health Organization. Global status report on violence prevention 2014. United Nations Development Programme; 2014. ISBN 978 92 4 156479 3.
31. Stöckl H, Devries K, Rotstein A, Abrahams N, Campbell J, Watts C, et al. The global prevalence of intimate partner homicide: a systematic review. Lancet. 382:859-65.
32. Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. Am J Prev Med. 1998;14:245-58.
33. Eberhard-Gran M, Schei B, Eskild A. Somatic symptoms and diseases are more common in women exposed to violence. J Gen Intern Med. 2007;22:1668-73.
34. Kendall-Tackett K. Psychological trauma and physical health: a psychoneuroimmunology approach to etiology of negative health effects and possible interventions. Psychol Trauma. 2009;1:35-48.

35. Trickett PK, Noll JG, Susman EJ, Shenk CE, Putnam FW. Attenuation of cortisol across development for victims of sexual abuse. Dev Psychopathol. 2010;22:165-75.
36. Kendall-Tackett KA. Inflammation, Cardiovascular Disease, and Metabolic Syndrome as Sequelae of Violence Against Women The Role of Depression, Hostility, and Sleep Disturbance. Trauma Violence Abuse. 2007;8:117-26.
37. Altarac M, Strobino D. Abuse during pregnancy and stress because of abuse during pregnancy and birthweight. J Am Med Womens Assoc. 2001;57:208-14.
38. Wadhwa PD, Entringer S, Buss C, Lu MC. The contribution of maternal stress to preterm birth: issues and considerations. Clinics in perinatology. 2011;38:351-84.
39. Miller AH. Neuroendocrine and immune system interactions in stress and depression. Psychiatr Clin. North Am. 1998;21:443-63.
40. Dube SR, Fairweather D, Pearson WS, Felitti VJ, Anda RF, Croft JB. Cumulative childhood stress and autoimmune diseases in adults. Psychosom Med. 2009;71:243-50.
41. Ellsberg M, Jansen H, Heise L, Watts C, Garcia-Moreno C. Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. Lancet. 2008;371:1165-72.
42. Plichta SB. Intimate partner violence and physical health consequences policy and practice implications. J Interpers Violence. 2004;19:1296-323.
43. World Health Organization. WHO report highlights violence against women as a 'global health problem of epidemic proportions'. New clinical and policy guidelines launched to guide health sector response. WHO, the London School of Hygiene & Tropical Medicine and the South African Medical Research Council; 2013. Available from: http://www.who.int/mediacentre/news/releases/2013/violence_against_women_20130620/en/index. Accessed: October 2015.
44. Campbell JC. Health consequences of intimate partner violence. Lancet. 2002;359:1331-6.
45. Wuest J, Merritt-Gray M, Ford-Gilboe M, Lent B, Varcoe C, Campbell JC. Chronic pain in women survivors of intimate partner violence. J Pain. 2008;9:1049-57.
46. Campbell J, Jones AS, Dienemann J, Kub J, Schollenberger J, O'Campo P, et al. Intimate partner violence and physical health consequences. Arch Intern Med. 2002;162:1157-63.
47. Coker AL, Smith PH, McKeown RE, King MJ. Frequency and correlates of intimate partner violence by type: physical, sexual, and psychological battering. Am J Public Health. 2000;90:553-9.
48. Leserman J, Drossman DA. Relationship of abuse history to functional gastrointestinal disorders and symptoms some possible mediating mechanisms. Trauma Violence Abuse. 2007;8:33-43.
49. Leserman J, Zolnoun D, Meltzer-Brody S, Lamvu G, Steege JF. Identification of diagnostic subtypes of chronic pelvic pain and how subtypes differ in health status and trauma history. Am J Obstet Gynecol. 2006;195:554-60.
50. Coker AL, Davis KE, Arias I, Desai S, Sanderson M, Brandt HM, et al. Physical and mental health effects of intimate partner violence for men and women. Am J Prev Med. 2002;23:260-8.
51. Golding J. Intimate Partner Violence as a Risk Factor for Mental Disorders: A Meta-Analysis. J Fam Violence. 1999;14:99-132.
52. Sorbo MF, Grimstad H, Bjorngaard JH, Lukasse M, Schei B. Adult physical, sexual, and emotional abuse and postpartum depression, a population based, prospective study

of 53,065 women in the Norwegian Mother and Child Cohort Study. BMC Pregnancy Childbirth. 2014;14:316. doi: 10.1186/1471-2393-14-316.
53. Widom CS. Posttraumatic stress disorder in abused and neglected children grown up. Am J Psychiatry. 1999;156:1223-9.
54. Kaplow JB, Widom CS. Age of onset of child maltreatment predicts long-term mental health outcomes. J Abnormal Psychol. 2007;116:176.
55. Wu Q, Chen H-L, Xu X-J. Violence as a risk factor for postpartum depression in mothers: a meta-analysis. Arch Womens Ment Health. 2012;15:107-14.
56. Chapman D, Whitfield C, Felitti V, Dube S, Edwards V, Anda R. Adverse childhood experiences and the risk of depressive disorders in adulthood. J Affect Disord. 2004;82:217-25.
57. Widom CS, DuMont K, Czaja SJ. A prospective investigation of major depressive disorder and comorbidity in abused and neglected children grown up. Arch Gen Psychiatry. 2007;64:49-56.
58. Devries K, Watts C, Yoshihama M, Kiss L, Schraiber LB, Deyessa N, et al. Violence against women is strongly associated with suicide attempts: evidence from the WHO multi-country study on women's health and domestic violence against women. Soc Sci Med. 2011;73:79-86.
59. Fanslow J, Silva M, Whitehead A, Robinson E. Pregnancy outcomes and intimate partner violence in New Zealand. Aust N Z J Obstet Gynecol. 2008;48:391-7.
60. Pallitto CC, García-Moreno C, Jansen HAFM, Heise L, Ellsberg M, Watts C. Intimate partner violence, abortion, and unintended pregnancy: Results from the WHO Multi-country Study on Women's Health and Domestic Violence. Int J Gynecol Obstet. 2013;120:3-9.
61. Coker AL, Sanderson M, Dong B. Partner violence during pregnancy and risk of adverse pregnancy outcomes. Paediatr Perinat Epidemiol. 2004;18:260-9.
62. Murphy CC, Schei B, Myhr TL, Du Mont J. Abuse: a risk factor for low birth weight? A systematic review and meta-analysis. CMAJ. 2001;164:1567-72.
63. Lukasse M, Schei B, Vangen S, Oian P. Childhood Abuse and Common Complaints in Pregnancy. Birth.2009;36:190-9.
64. Grimstad H, Schei B. Pregnancy and delivery for women with a history of child sexual abuse. Child Abuse Negl. 1999;23:81-90.
65. Leeners B, Stiller R, Block E, Görres G, Rath W. Pregnancy complications in women with childhood sexual abuse experiences. J Psychosom Res. 2010;69:503-10.
66. Trickett PK, Noll JG. The impact of sexual abuse on female development: Lessons from a multigenerational, longitudinal research study. Dev Psychopathol 2011; 23:453–76.
67. Boynton-Jarrett R, Wright RJ, Putnam FW, Hibert EL, Michels KB, Forman MR, et al. Childhood Abuse and Age at Menarche. J Adolesc Health. 2012;52:241-247.
68. O'Hara MW. Postpartum depression: what we know. J Clin Psychol. 2009;65:1258-69.
69. O'Hara MW, AM S. Rates and risk of postpartum depression-a meta-analysis. Int J Psychiatry. 1996;8:37-54.
70. Meltzer-Brody S. New insights into perinatal depression: pathogenesis and treatment during pregnancy and postpartum. Dialogues Clinical Neurosci. 2011;13:89-100.
71. Almond P. Postnatal depression: a global public health perspective. Perspect Public Health. 2009;129:221-7.
72. Lee DTS, Chung TKH. Postnatal depression: an update. Best Pract Res Clin Obstet Gynecol. 2007;21:183-91.

73. Halligan SL, Murray L, Martins C, Cooper PJ. Maternal depression and psychiatric outcomes in adolescent offspring: A 13-year longitudinal study. J Affect Disord. 2007;97:145-54.
74. Seimyr L, Edhborg M, Lund W, Sjogren B. In the shadow of maternal depressed mood: Experiences of parenthood during the first year after childbirth. J Psychosom Obstet Gynecol. 2004;25:23-34.
75. Cooper PJ, Murray L, Hooper R, West A. The development and validation of a predictive index for postpartum depression. Psychol Med. 1996;26:627-34.
76. Beck CT. Predictors of postpartum depression: an update. Nurs Res. 2001;50:275-85.
77. Milgrom J, Gemmill AW, Bilszta JL, Hayes B, Barnett B, Brooks J, et al. Antenatal risk factors for postnatal depression: a large prospective study. J Affect Disord. 2008;108:147-57.
78. Beydoun H, Al-Sahab B, Beydoun M, Tamim H. Intimate partner violence as a risk factor for postpartum depression among Canadian women in the maternity experience survey. Ann Epidemiol. 2010;20:575-83.
79. Ludermir AB, Lewis G, Valongueiro SA, de Araujo TV, Araya R. Violence against women by their intimate partner during pregnancy and postnatal depression: a prospective cohort study. Lancet. 2010;376:903-10.
80. Garabedian MJ, Lain KY, Hansen WF, Garcia LS, Williams CM, Crofford LJ. Violence against women and postpartum depression. J Womens Health (Larchmt). 2011;20:447-53.
81. Urquia ML, O'Campo PJ, Heaman MI, Janssen PA, Thiessen KR. Experiences of violence before and during pregnancy and adverse pregnancy outcomes: an analysis of the Canadian Maternity Experiences Survey. BMC Pregnancy Childbirth. 2011;11:42. doi: 10.1186/1471-2393-11-42.
82. Cohen M, Schei B, Ansara D, Gallop R, Stuckless N, Stewart D. A history of personal violence and postpartum depression: is there a link? Arch Womens Mental Health. 2002;4:83-92.
83. Tiwari A, Chan KL, Fong D, Leung WC, Brownridge DA, Lam H, et al. The impact of psychological abuse by an intimate partner on the mental health of pregnant women. BJOG. 2008;115:377-84.
84. World Health Organization. Evidence of the Long term effects of Breastfeeding: Systemativ reviews and Meta-analyses. Geneva; 2007. ISBN 978 92 4 159523 0.
85. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, et al. Breastfeeding and maternal and infant health outcomes in developed countries. Evid Rep Technol Assess. 2007;1-186.
86. Hörnell A, Lagström H, Lande B, Thorsdottir I. Breastfeeding, introduction of other foods and effects on health: a systematic literature review for the 5th Nordic Nutrition Recommendations. Food Nutr Res. 2013;57: 10.3402/fnr.v57i0.20823.
87. World Health Organization. The optimal duration of exclusive breastfeeding. Report of an expert consultation. Department of Nutrition for Health and Development, Department of Child and Adolescent Health and Development. Geneva: 2001.
88. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. Cochrane Lib. 2012.
89. World Health Organization. Global strategy for infant and young child feeding. UNICEF; 2003. ISBN 92 4 156221 8.
90. Helsedirektoratet. Spedbarnsernæring - mat og drikke det første året. Norwegian Directorate for Health. Infant feeding recommendations (In Norwegian). Available from: http://helsedirektoratet.no/folkehelse/kosthold-og-ernering/spedbarnsernering-mat-og-drikke-det-forste-aret. Accessed: October 2015.

91. Callen J, Pinelli J. Incidence and duration of breastfeeding for term infants in Canada, United States, Europe, and Australia: a literature review. Birth. 2004;31:285-92.
92. Haggkvist AP, Brantsaeter AL, Grjibovski AM, Helsing E, Meltzer HM, Haugen M. Prevalence of breast-feeding in the Norwegian Mother and Child Cohort Study and health service-related correlates of cessation of full breast-feeding. Public Health Nutr. 2010;13:2076-86.
93. Kristiansen AL, Lande B, Overby NC, Andersen LF. Factors associated with exclusive breast-feeding and breast-feeding in Norway. Public Health Nutr. 2010;13:2087-96.
94. Lande B, Andersen L, Baerug A, Trygg K, Lund-Larsen K, Veierød M, et al. Infant feeding practices and associated factors in the first six months of life: the Norwegian infant nutrition survey. Acta Paediatr. 2003;92:152-61.
95. Garcia-Moreno C, Stockl H. Protection of sexual and reproductive health rights: addressing violence against women. Int J Gynecol Obstet. 2009;106:144-7.
96. Moraes CL, de Oliveira AS, Reichenheim ME, Lobato G. Severe physical violence between intimate partners during pregnancy: a risk factor for early cessation of exclusive breast-feeding. Public Health Nutr. 2011;14:2148-55.
97. Lau Y, Chan KS. Influence of intimate partner violence during pregnancy and early postpartum depressive symptoms on breastfeeding among chinese women in Hong Kong. J Midwifery Womens Health. 2007;52:15-20.
98. Silverman JG, Decker MR, Reed E, Raj A. Intimate partner violence around the time of pregnancy: association with breastfeeding behavior. J Womens Health (Larchmt). 2006;15:934-40.
99. Prentice JC, Lu MC, Lange L, Halfon N. The Association Between Reported Childhood Sexual Abuse and Breastfeeding Initiation. J Hum Lact. 2002;18:219-26.
100. NAV. Parental benefit on birth. Available from: https://www.nav.no/en/Home/Benefits+and+services/Relatert+informasjon/parental-benefit Accessed March 2016.
101. Magnus P, Irgens LM, Haug K, Nystad W, Skjaerven R, Stoltenberg C. Cohort profile: the Norwegian Mother and Child Cohort Study (MoBa). Int J Epidemiol. 2006;35:1146-50.
102. Schreuder P, Alsaker E. The Norwegian Mother and Child Cohort Study (MoBa)–MoBa recruitment and logistics. Nor Epidemiol. 2014;24:23-27.
103. Irgens LM. The Medical Birth Registry of Norway. Epidemiological research and surveillance throughout 30 years. Acta Obstet Gynecol Scand. 2000;79:435-9.
104. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry. 1987;150:782-6.
105. Austin MP, Hadzi-Pavlovic D, Saint K, Parker G. Antenatal screening for the prediction of postnatal depression: validation of a psychosocial Pregnancy Risk Questionnaire. Acta Psych Scand. 2005;112:310-7.
106. Eberhard-Gran M, Eskild A, Samuelsen SO, Tambs K. A short matrix-version of the Edinburgh Depression Scale. Acta Psych Scand. 2007;116:195-200.
107. Eberhard-Gran M, Eskild A, Tambs K, Schei B, Opjordsmoen S. The Edinburgh Postnatal Depression Scale: validation in a Norwegian community sample. Nord J Psychiatry. 2001;55:113-7.
108. World Health Organization. Indicators for assessing infant and young child feeding practices. Part 1, Definitions; 2008. ISBN 978 92 4 159666 4.
109. Greenland S, Pearl J, Robins JM. Causal diagrams for epidemiologic research. Epidemiology. 1999;10:37-48.
110. Rothman KJ, Greenland S, Lash TL. Modern epidemiology. 3rd ed. Philadelphia: Williams and Wilkins; 2008. 758 p.

111. Rothman K. Epidemiology: An introduction. New York: Oxford University Press; 2002. 223 p.
112. Jacobsen TN, Nohr EA, Frydenberg M. Selection by socioeconomic factors into the Danish National Birth Cohort. Eur J Epidemiol. 2010;25:349-55.
113. Nohr EA, Frydenberg M, Henriksen TB, Olsen J. Does low participation in cohort studies induce bias? Epidemiology. 2006;17:413-8.
114. Nilsen RM, Vollset SE, Gjessing HK, Skjaerven R, Melve KK, Schreuder P, et al. Self-selection and bias in a large prospective pregnancy cohort in Norway. Paediatr Perinat Epidemiol. 2009;23:597-608.
115. Nilsen RM, Surén P, Gunnes N, Alsaker ER, Bresnahan M, Hirtz D, et al. Analysis of Self-selection Bias in a Population-based Cohort Study of Autism Spectrum Disorders. Paediatr Perinat Epidemiol. 2013;27:553-63.
116. Ellsberg MH, Heise L, Pena R, Aqurto S, Winkvist A. Researching domestic violence against women: Methodological and ethical considerations. Stud Fam Plann. 2001;32:1-16.
117. Johnson JK, Haider F, Ellis K, Hay DM, Lindow SW. The prevalence of domestic violence in pregnant women. BJOG. 2003;110:272-5.
118. Stenson K, Heimer G, Lundh C, Nordstrom ML, Saarinen H, Wenker A. Lifetime prevalence of sexual abuse in a Swedish pregnant population. Acta Obstet Gynecol Scand. 2003;82:529-36.
119. Swahnberg K, Wijma B, Schei B, Hilden M, Irminger K, Wingren GB. Are sociodemographic and regional and sample factors associated with prevalence of abuse? Acta Obstet Gynecol Scand. 2004;83:276-88.
120. Nguyen DV, Ostergren PO, Krantz G. Intimate partner violence against women in rural Vietnam-different socio-demographic factors are associated with different forms of violence: need for new intervention guidelines? BMC Public Health. 2008;8:55. doi: 10.1186/1471-2458-8-55.
121. Valladares E. Violence against pregnant women: prevalence and characteristics. A population-based study in Nicaragua. BJOG. 2005;112:1243-8.
122. Groves AK, Kagee A, Maman S, Moodley D, Rouse P. Associations between intimate partner violence and emotional distress among pregnant women in Durban, South Africa. J Interpers Violence. 2012;27:1341-56.
123. Babu BV, SK K. Domestic violence against women in eastern India: a population-based study on prevalence and related issues. BMC public health. 2009:9:129. doi: 10.1186/1471-2458-9-129.
124. Hamby SL, Gray-Little B. Labeling partner violence: when do victims differentiate among acts? Violence and victims. 2000;15:173-86.
125. Eberhard-Gran M, Tambs E, Samuelsen K, Opjordsmoen S. Depression in postpartum and non-postpartum women: prevalence and risk factors. Acta Psychiatr Scand. 2002;106:426.
126. Miller TM, Abdel-Maksoud MF, Crane LA, Marcus AC, Byers TE. Effects of social approval bias on self-reported fruit and vegetable consumption: a randomized controlled trial. Nutr J. 2008;7:18.
127. Natland S, Andersen L, Nilsen T, Forsmo S, Jacobsen G. Maternal recall of breastfeeding duration twenty years after delivery. BMC Med Res Methodol. 2012;12:179.
128. Huttly S, Barros F, Victoria C, Beria J, Vaughan J. Do mothers overestimate breast feeding duration? An example of recall bias from a study in southern Brazil. Am J Epidemiol.1990;132:572-5.

129. Li R, Scanlon K, Serdula M. The validity and reliability of maternal recall of breastfeeding practice. Nutr Rev. 2005;63:103-10.
130. Nilsen SM, Krokstad S, Holmen TL, Westin S. Adolescents' health-related dietary patterns by parental socio-economic position, the Nord-Trondelag Health Study (HUNT). Eur J Public Health. 2010;20:299-305.
131. Nilsen SM, Bjorngaard JH, Ernstsen L, Krokstad S, Westin S. Education-based health inequalities in 18,000 Norwegian couples: the Nord-Trondelag Health Study (HUNT). BMC Public Health. 2012;12:998. doi:10.1186/1471-2458-12-998.
132. Petersen CB, Mortensen LH, Morgen CS, Madsen M, Schnor O, Arntzen A, et al. Socio-economic inequality in preterm birth: a comparative study of the Nordic countries from 1981 to 2000. Paediatr Perinat Epidemiol. 2009;23:66-75.
133. Sorbo MF, Grimstad H, Bjorngaard JH, Schei B, Lukasse M. Prevalence of sexual, physical and emotional abuse in the Norwegian mother and child cohort study. BMC Public Health. 2013;13:186. doi: 10.1186/1471-2458-13-186.
134. Taillieu TL, Brownridge DA. Violence against pregnant women: Prevalence, patterns, risk factors, theories, and directions for future research. Aggress Violent Behav. 2010;15:14-35.
135. Abramsky T, Watts CH, Garcia-Moreno C, Devries K, Kiss L, Ellsberg M, et al. What factors are associated with recent intimate partner violence? findings from the WHO multi-country study on women's health and domestic violence. BMC Public Health. 2011;11:109. doi: 10.1186/1471-2458-11-109.
136. Devries KM, Kishor S, Johnson H, Stockl H, Bacchus LJ, Garcia-Moreno C, et al. Intimate partner violence during pregnancy: analysis of prevalence data from 19 countries. Reprod Health Matters.18:158-70.
137. Jewkes R. Intimate partner violence: causes and prevention. Lancet. 2002;359:1423-9.
138. Stockl H, Hertlein L, Himsl I, Ditsch N, Blume C, Hasbargen U, et al. Acceptance of routine or case-based inquiry for intimate partner violence: a mixed method study. BMC Pregnancy Childbirth. 2013;13:77. doi:10.1186/1471-2393-13-77.
139. Hjemdal OK, Engdal K. Å spørre om vold ved svangerskapskontroll. Rapport fra et forskningsprosjekt i fire kommuner. Nasjonalt kunnskapssenter om vold og traumatisk stress (NKVTS), 2009. Rapport 1, 2009. Oslo: 2009. (English: Asking about abuse at antenatal check-up. Report from a pilot project in Norway).
140. Helsedirektoratet. Nasjonal faglig retningslinje for svangerskapsomsorgen - hvordan avdekke vold. 2014; IS No 2181. In Norwegian from: https://helsedirektoratet.no/retningslinjer/nasjonal-faglig-retningslinje-for-svangerskapsomsorgen-hvordan-avdekke-vold. Accessed October 2015.
141. Beydoun HA, Beydoun MA, Kaufman JS, Lo B, Zonderman AB. Intimate partner violence against adult women and its association with major depressive disorder, depressive symptoms and postpartum depression: a systematic review and meta-analysis. Soc Sci Med. 2012;75:959-75.
142. Garabedian M, Lain K, Hansen W, Garcia L, Williams C, Crofford L. Violence Against Women and Postpartum Depression. J Womens Health (Larchmt). 2011;20:447-53.
143. Ross LE, Dennis CL. The prevalence of postpartum depression among women with substance use, an abuse history, or chronic illness: a systematic review. J Womens Health (Larchmt). 2009;18:475-86.
144. Valentine JM, Rodriguez MA, Lapeyrouse LM, Zhang M. Recent intimate partner violence as a prenatal predictor of maternal depression in the first year postpartum among Latinas. Arch Womens Mental Health. 2011;14:135-43.

145. Janssen PA, Heaman MI, Urquia ML, O'Campo PJ, Thiessen KR. Risk factors for postpartum depression among abused and nonabused women. Am J Obstetrics Gynecol. 2012;207:489.e1-8.
146. Beydoun HA, Al-Sahab B, Beydoun MA, Tamim H. Intimate partner violence as a risk factor for postpartum depression among Canadian women in the Maternity Experience Survey. Ann Epidemiol. 2010;20:575-83.
147. Robertson E, Grace S, Wallington T, Stewart D. Antenatal risk factors for postpartum depression: a synthesis of recent literature. Gen Hosp Psychiatry. 2004;26:289-95.
148. Kendall-Tackett K, Cong Z, Hale TW. Depression, sleep quality, and maternal well-being in postpartum women with a history of sexual assault: A comparison of breastfeeding, mixed-feeding, and formula-feeding mothers. Breastfeed Med. 2013;8:16-22.
149. Zaher E, Keogh K, Ratnapalan S. Effect of domestic violence training Systematic review of randomized controlled trials. Can Fam Phys. 2014;60:618-24.
150. Ellsberg M, Arango DJ, Morton M, Gennari F, Kiplesund S, Contreras M, et al. Prevention of violence against women and girls: what does the evidence say? Lancet. 2015;385:1555-66.
151. Krug EG, Dahlberg LL, Mercy JA, Zwi AB, Lozano R. World report on violence and health. World Health Organization. Geneva; 2002.

12. Papers I-III

Paper I

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RESEARCH ARTICLE Open Access

Prevalence of sexual, physical and emotional abuse in the Norwegian mother and child cohort study

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Abstract

Background: Abuse of women occurs in every society of the world. Increased information about the prevalence in industrialized countries, like Norway, is required to make strategies to prevent abuse. Our aim was to investigate the prevalence of self-reported sexual, physical and emotional abuse in a large obstetric population in Norway, and the associations between exposure to adult abuse, socio-demographics and other characteristics.

Methods: Our study is based on the Norwegian Mother and Child (MoBa) Cohort study, conducted by the Norwegian Institute of Public Health. The current study included 65,393 women who responded to two extensive postal questionnaires during pregnancy. Any adult abuse is defined as being exposed to one or more types of adult abuse, any child abuse is defined as being exposed to one or more types of child abuse, and any lifetime abuse is defined as being exposed to abuse either as a child and/or as an adult. Perpetrators were categorized as known or stranger.

Results: Overall, 32% of the women reported any lifetime abuse, 20% reported any adult abuse, 19% reported any child abuse and 6% reported abuse both as adults and as children. Emotional abuse was the most frequently reported type of abuse both as adults (16%) and children (14%). Adult sexual abuse was reported by 5% and child sexual abuse by 7%. Physical abuse was reported by 6% as adults and by 6% as children. Approximately 30% of those reporting adult or child abuse reported exposure to two or three types of abuse. Five percent of the women reported exposure to any abuse during the last 12 months. For all types of abuse, a known perpetrator was more commonly reported. Logistic regression showed that being exposed to child abuse, smoking and drinking alcohol in the first trimester of pregnancy, living alone, and belonging to the eldest age group were significantly associated with being exposed to any adult abuse.

Conclusion: The reported prevalence of any lifetime abuse was substantial in our low-risk pregnant population. Antenatal care is an opportunity for clinicians to ask about experiences of abuse and identify those at risk.

Keywords: Emotional abuse, Sexual abuse, Physical abuse, Prevalence, The Norwegian mother and child cohort study

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Background

Every fifth woman in the world faces some type of abuse during her lifetime, in some cases leading to serious injury or death [1]. Abuse of women and girls is widely recognized as a major public health problem and as a violation of women's rights. The United Nations (UN) defines violence against women as *'any act of gender-based violence that results in, or is likely to result in, physical, sexual or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life'* [2].

There is an increasing awareness of the extent of emotional, physical and sexual abuse against women, particularly during childbearing periods, and of their possible negative consequences. Prevalence studies of abuse and identification of risk factors provide valuable information for the prevention of violence against women. The prevalence of reported abuse varies considerably, depending among other things on definitions used, study design, the population studied, and the response rate achieved [3-8]. Standardization of research has been requested to facilitate comparisons among studies on abuse [4,7]. The World Health Organization (WHO) carried out a multi-country study on domestic violence between 2000 and 2003 where one aim was to collect internationally comparable data by using standardized survey methods [9]. Between 15% and 71% of women from the ages of 15 to 49 years reported lifetime sexual and/or physical partner violence, and 4% to 54% of respondents experienced this violence within one year prior to the study [9]. Findings from the WHO study showed that the prevalence of abuse was much lower in industrialized environments than in any other study settings, possibly suggesting that variations of prevalence can be related to cultural and economic differences in the patterns of abuse. Prevalence of pregnancy-related abuse also varies. In a review article from the United States, prevalence of abuse during pregnancy was reported to range from 0.9% to 20.1% [7]. A lower prevalence is expected when information is collected from self-administered questionnaires compared with personal interviews and a higher prevalence with well qualified interviewers, use of structured screen and with repeated questioning [7,10,11]. Studies from industrialized countries, including Norway, also reveal high levels of abuse, but the prevalences reported in the various studies are difficult to compare due to methodological differences, the studies are usually small, performed in special age groups, or differing in types of abuse are investigated. The first national study in Norway of partner violence on women from the ages of 20 to 55 years showed that 27% had experienced abuse by their partner and 6% in the year before the study [12]. In another Norwegian study among approximately 7000 senior students (about 18 years of age) in secondary school, sexual abuse was reported by 22% of the women [13]. More studies of abuse of Norwegian women are required to devise prevention strategies, and a population-based approach will give more and better information to the field. To our knowledge, the current study is the largest population-based study of emotional, sexual and physical abuse reported by pregnant women in Norway. Our primary aim was to investigate the prevalence of sexual, physical and emotional abuse reported by a large pregnant population in Norway. The secondary aim was to investigate the identity of the perpetrator, and to compare women reporting adult abuse with those who did not with regard to socio-demographics and other characteristics.

Methods

Study population

Our study is based on the Norwegian Mother and Child Cohort Study (MoBa), which is a prospective population-based pregnancy cohort study conducted by the Norwegian Institute of Public Health [14]. The inclusion period was from 1999 to 2008, and 90,700 mothers and 108,000 children participated in the MoBa study. Hospitals with more than 100 births annually were invited to collaborate and 70% of all pregnant women in Norway during this period were invited to participate. The overall response rate was 38.5%. All pregnant women in Norway are offered a routine ultrasound screening at week 18 of gestation at their local hospital [14]. Together with the ultrasound appointment, the women received a postal invitation that included an informed consent form, the first questionnaire and an information brochure. A detailed protocol of the study including the consent can be found elsewhere (http://www.fhi.no/morogbarn). Women who agreed to participate received three extensive self-administrated questionnaires by post during pregnancy. The MoBa sample has been described in more detail elsewhere [14,15]. Data from the questionnaires are linked to the Medical Birth Registry of Norway, which has kept records of all deliveries in Norway since 1967. This register is based on a standardized form completed by midwives shortly after delivery. Pregnancy was the unit of observation in the MoBa survey; while in the current study the unit of observation was the woman. Figure 1 shows a flow-chart of those excluded from the current study. We merged Questionnaires One and Three, and only women who had filled in both questionnaires were included. For women who participated with more than one pregnancy, only information from their first pregnancy was included. Only singleton pregnancies were included, and only women who had answered a minimum of one of the abuse questions (Figure 2) in Questionnaire Three were included, leaving a total of 65,393 women for the

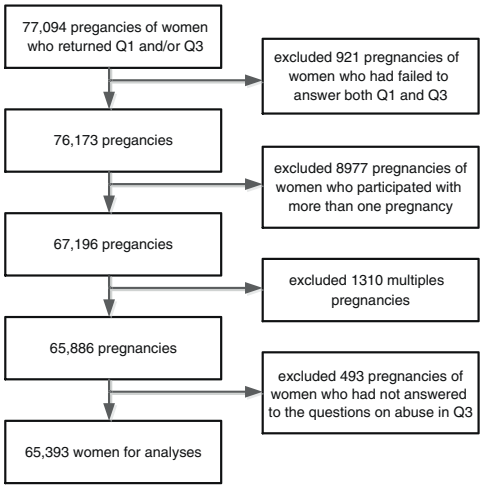

Figure 1 Flow-chart of inclusion in the study population.

analyses. The current study is based on version 4 of the data files released for research in 2008. Written informed consent was obtained from each participant at recruitment. The study was approved by The Regional Committee for Medical Research Ethics in South-Eastern Norway.

Abuse variables

The third MoBa questionnaire was posted around Week 30 of gestation. It included four questions on abuse. Figure 2 shows the questions on abuse, and the response options provided. The two questions on emotional abuse are similar to two of the three questions on emotional abuse in the validated NorVold questionnaire [16], which is used in a review article and in other studies in the Nordic countries [17-20]. We merged the questions of emotional abuse into one variable in the analyses. The question on sexual abuse with response options in our study, is a modified version of the sexual abuse question in the Abuse Assessment Screen (ASS) [21], which is an abuse screening tool, and has been used in other Scandinavian prevalence studies and in an English study of pregnant populations [6,10,11]. The question of physical abuse is not validated. Women could respond "no never" to the various types of abuse, or "yes" as an adult (≥ 18 years) and/or as a child (< 18 years) to the various types of abuse. Women who answered yes to at least one of the adult abuse questions were defined as having suffered from any adult abuse. Likewise, women who responded yes to one or more of the child abuse questions were defined as having suffered from any child abuse. Those who responded yes to any abuse either as an adult or as a child were defined as suffering from any lifetime abuse. Women could also indicate whether they experienced abuse during the last 12 months.

Perpetrators

In Questionnaire Three, women were given the opportunity to reveal who committed the abuse: a stranger, family/relative, or known other (Figure 2). The two latter

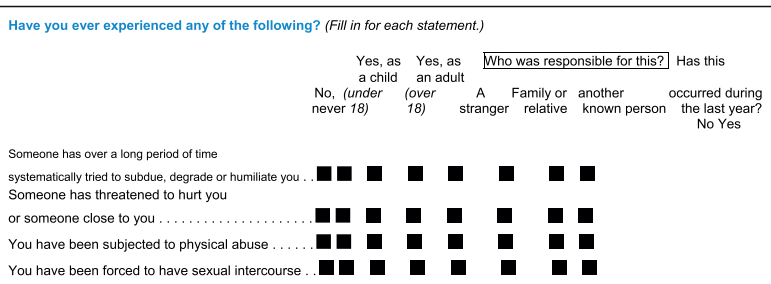

Figure 2 Questions on abuse and perpetrators in questionnaire 3 in the Norwegian mother and child cohort study, 1999–2009.

categories were merged and hence we used the two categories of stranger and known in our analysis. Through the way in which questions about abuse and perpetrators were expressed, women could indicate abuse both as an adult and as a child, and by one, two or no perpetrators. To be able to relate perpetrators to adult or child abuse, respectively, we used a segregated category of *only* adult abuse and *only* child abuse for the different types of abuse. To achieve this, we subtracted those who had responded yes to both child and adult abuse from the adult abuse category and likewise for the child abuse category. In addition, we have one category for women reporting exposure to both adult and child abuse. Table 1 shows the numbers of women reporting abuse only as a child, only as an adult, or both. These are also the categories needed to relate information about exposure to adult or child abuse during the last 12 months.

Other variables

Background information such as age, civil status, education, parity, body mass index (BMI), and use of tobacco and alcohol during the first trimester were collected from Questionnaire One (Table 2). Information about education was categorised into four groups: primary school (9 years), secondary school (12 years), higher education (college or university) up to 4 years, and higher education more than 4 years. Information about parity was based on number of self-reported previous deliveries >21 weeks of gestation, and categorized into women never giving birth (P0), and women giving birth previous to this pregnancy (P+). Civil status was redefined into three groups: married, not married but cohabitee, and living alone. BMI was calculated from self-reported information about height and weight pre-pregnancy. Age was divided into five groups. We wanted to compare with the largest age group – hence we chose the age group 30–34 as reference. Smoking was recoded into three categories: no smoking, sometimes, and daily in the first trimester. Alcohol use first trimester was re-categorized into: never, less than once a week (one alcohol unit), and 2–7 days a week. All background information was reported at Week 18 of gestation.

Data analysis

Descriptive statistics were presented for all women. Logistic regression analyses were performed on any adult abuse as crude (unadjusted) and adjusted odds ratios (ORs). In the adjusted model, the various categories of socio-demographic characteristics (age, education, civil status, and parity) and other characteristics (BMI, smoking and alcohol consumption, child abuse) were included. The results from the logistic models were presented with 95% confidence intervals (95% CI) and analysed for complete cases only. The data programme PASW statistical 18 was used in the analyses.

Results

Prevalence of different types of abuse

Overall, any lifetime abuse (which includes adult and child abuse except those exposed to both adult and child abuse) was reported by 32% of the women, 20% reported any adult abuse, 19% any child abuse, and 6% reported both any adult abuse and any child abuse. Figure 3 shows reported types of abuse according to the different age groups. Among those reporting any adult abuse, sexual and physical abuse were reported by 27% (3512) and 28% (3735), respectively, and emotional abuse by 83% (10,739). Among women reporting any child abuse, 37% (4545) reported sexual abuse, while 29% (3610) reported physical abuse and 74% (9865) reported emotional abuse. Of those reporting any adult abuse, 30% had been exposed to two or more types of abuse (Figure 4). The same occurred among women reporting any child abuse, where 31% reported two or more types of abuse. Among women exposed to emotional abuse as an adult, 23% had also experienced emotional abuse as a child; the absolute numbers are shown in Figure 3. Of the women reporting sexual abuse as an adult, 14% also reported child sexual abuse, whereas 12% who suffered physical abuse as an adult also reported child physical abuse. Of those who experienced any adult abuse, 32% reported any child abuse.

Five percent of the study population indicated having experienced any abuse in the last 12 months. Among those reporting physical abuse only as an adult, 8%

Table 1 Types of abuse and groups of exposure, Norwegian mother and child cohort study, 1999-2009

	Emotional abuse		Physical abuse		Sexual abuse		Any abuse	
	N	(%)	N	(%)	N	(%)	N	(%)
Child only	6601	(10.1)	3151	(4.8)	4072	(6.2)	8143	(12.5)
Adult only	8272	(12.6)	3276	(5.0)	3039	(4.6)	10891	(16.7)
Child and adult	2467	(3.8)	459	(0.7)	473	(0.7)	4121	(6.3)
No abuse	48053	(73.5)	58507	(89.5)	57809	(88.4)	44253	(67.7)

Table 2 Socio-demographics and risk factors in relation to different types of adult abuse (N = 65,393)

		No abuse		Emotional abuse		Physical abuse		Sexual abuse		Any abuse	
		n = 52,396	80%	n = 10,739	16%	n = 3,735	6%	n = 3,512	5%	n = 12,997	20%
		n	%	n	%	n	%	n	%	n	%
Age (yr)	n*										
14-19	947	800	85	124	13	35	4	33	4	147	16
20-24	8049	6551	81	1214	15	425	5	431	5	1498	19
25-29	23614	19434	82	3444	15	1158	5	1096	5	4180	18
30-34	26354	20954	80	4449	16	1593	6	1475	6	5400	21
>35	6428	4657	72	1507	23	523	8	476	7	1771	28
missing	1	0	0	1	0	1	0	1	0	1	0
Civil status											
married	31642	2617	83	4451	14	1359	4	1462	5	5464	17
cohabiting	31320	24653	79	5531	18	2068	7	1785	6	6667	21
not cohabiting	2072	1297	63	673	33	285	14	240	7	775	37
missing	359	268	<1	84	<1	23	<1	25	<1	91	<1
Education											
primary	1638	1176	72	404	25	171	10	134	8	462	28
secondary	19297	14886	77	3749	19	1386	7	1206	6	4411	23
≤ 4 yr uni	37739	31298	83	5150	14	1630	4	1697	5	6441	17
> 4 yr uni	4340	3198	74	996	23	370	9	310	7	1142	26
missing	2379	1838	4	440	4	178	5	165	5	541	4
Parity											
P 0	33913	27494	81	5261	16	1748	5	1687	5	6419	19
P +1	31480	24902	79	5478	17	1987	6	1825	6	6578	21
missing	0										
BMI											
<20	7947	6389	80	1274	16	481	6	490	6	1558	20
20-24,9	35576	28780	81	5622	16	1945	6	1758	5	6816	19
25-29,9	13934	11102	80	2350	17	795	6	753	5	2832	20
>30	6074	4690	77	1156	19	392	7	397	7	1384	23
missing	1862	1455	3	337	3	122	3	114	3	407	3
Smoking 1st trim.											
no	58934	47953	81	8983	15	2974	5	2940	5	10981	19
sometimes	2010	1460	73	471	23	191	10	127	6	550	27
daily	3956	2600	66	1194	30	532	13	411	10	1356	34
missing	493	383	<1	91	<1	38	1	34	1	110	<1
Alcohol 1st trim.											
Never	48498	39151	81	7767	16	2666	6	2503	5	9347	19
<1 /week	8377	6425	77	1529	18	586	7	596	7	1952	23
2-7 /week	52	30	58	18	35	5	10	8	15	22	42
missing	8466	6790	13	1425	13	478	13	405	12	1676	13
Child abuse											
no	53129	44253	83	7366	14	2507	5	2287	4	8876	17
yes	12264	8143	66	3373	28	1228	10	1225	10	8877	17
missing	0	0	0	0	13	0	13	0	0	0	0

* Total number of women in each category.

reported physical abuse in the last 12 months. Furthermore, 3% of those reporting sexual abuse only as an adult also reported sexual abuse in the last 12 months, while among women reporting emotional abuse only as an adult, 22% reported emotional abuse in the last 12 months. The questions on abuse during the last 12 - months had responses missing for between 73% to 88% of the different types of abuse.

Perpetrators

Thirty two percent of the women in the study reported any abuse: of whom nearly all (98%) also reported who committed the abuse. Overall, 29% reported a known perpetrator, 5% reported a stranger, and 3% reported being exposed to abuse from both a known perpetrator and a stranger.

Associations between background information and exposure to adult abuse

Figure 5 shows the reported perpetrators of the different types of abuse according to only adult abuse and only child abuse. Table 3 shows the crude and adjusted logistic regression analysis on any adult abuse according to background information. Some factors were strongly associated with being exposed to adult abuse while other factors showed less or no association. In the adjusted analyses, BMI and parity were not substantially associated with any adult abuse. Smoking daily and drinking alcohol weekly in the first trimester of pregnancy or being exposed to child abuse were associated with being exposed to adult abuse (OR =1.6, [95% CI: 1.5, 1.8]; OR 2.5, [95% CI: 1.4, 4.6]; and OR =2.4, [95% CI: 2.3, 2.5], respectively). Married or cohabiting women were less likely to report adult abuse compared with women living alone. Women at 35 years or older were more likely to have been exposed to adult abuse than the younger women. The unadjusted logistic regression was in the main confirmed by the adjusted results.

Discussion

Thirty two percent of the 65,393 pregnant women in our low-risk population reported any lifetime abuse. Adult and child abuse were reported by 20% and 19%, respectively, of whom around 30% reported exposure to two or three types of abuse. Living alone, exposure to child abuse, smoking and drinking alcohol in the first trimester, and being 35 years or older were associated with any adult abuse.

Strengths and limitations

The large number of participants and the population-based design are major strengths of our study. Furthermore, women were subjected to a broad spectrum of questions and had no information that abuse reports would be linked to other questions. It is a strength of the study that the questions give information about exposure to three types of abuse (emotional, physical and sexual) in addition to information from a long time spectrum (childhood, adulthood and last 12 months exposure), as this gives a broad picture of the exposure to abuse in this population. Three abuse measures give more possible comparisons with other studies, as does the broad time aspect of the questions; as many studies only include one or two types of abuse, seldom three, and usually a shorter time aspect than in our study. A limitation to our study is that none of the four abuse questions in our study were validated when implemented, nor at the time of the start of the survey in 1999. There has been a huge development in the past decade in improving and acknowledging the importance of using validated instruments for research and screening in this field. Nevertheless, not many abuse instruments were validated prior to the start of the MoBa study. The questions on emotional abuse in the current study are similar to those in the NorVold questionnaire which was validated in 2002, but the populations in our study and the NorAQ study are not directly comparable, as the latter study includes patients from three gynecology clinics and one population based sample. The validation study showed that the abuse variables in the NorAQ have good reliability and validity [16]. This was the first validation study of an instrument in the Nordic countries, and the aim was to create an instrument making it possible to compare prevalence rates between the five Nordic countries [16]. Furthermore, there are great similarities between the question on sexual abuse and given response option in the current study, and the question of sexual abuse in the Abuse Assessment Screen (ASS) [21]. It does not have a well-established psychometric property, but it has a broad conceptualization of abuse. According to a review on abuse screening tools, no single tool had well established psychometric properties, including the ASS [21]. The question on physical abuse in our study gives room for subjective interpretation. Nevertheless, we decided to include the question because we wanted to show the broad aspect of reported abuse among our population. Anyhow, for each of the questions, whether the abuse is described well or not, the reported abuse is subjected to the woman's interpretation of both the questions and her own experiences. As the information was available we thought it was better to use it rather than excluding it.

Our population is based on pregnant women from all over Norway. More than 90% of the women who agreed to participate in the Mother and Child Cohort Study (MoBa) responded to Questionnaires One and Three during pregnancy [14], indicating "dedicated" responders. In

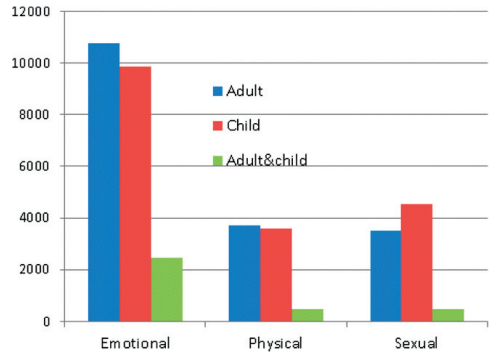

Figure 3 Number of women reporting different types of abuse at various age groups.

addition, only 493 women, (less than one percent) of the participating women, had not responded to any of the abuse questions in the questionnaire. This shows great willingness to respond about abuse exposure. Furthermore, of those who reported one or more types of abuse, almost all (98%) also reported on the identity of the perpetrator. A limitation of the study is the high rate of missing data for the questions on abuse in the preceding 12 months. A reason for this could be the way in which the questions were expressed (Figure 2). Most of the questions in the questionnaire required that the women indicated only if she had a positive answer to the specific question. On these particular questions on abuse during the last 12 months the women were required to change the way of responding by indicating yes or no. In addition these questions were at the very end of the questionnaire that had 94 main questions, with several sub questions.

Substantially more women reported emotionally abuse than other kinds of abuse in our study. It is probably easier to report emotional abuse than sexual and physical abuse. Another reason could be that our study contained two questions on emotional abuse compared

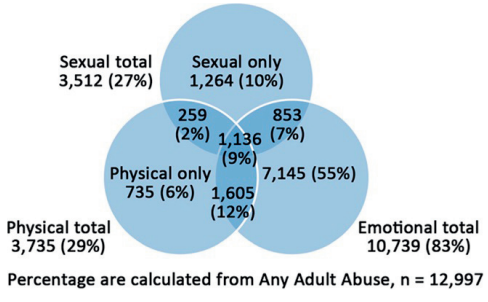

Figure 4 Types of adult abuse (n = 12,997) and overlapping categories.

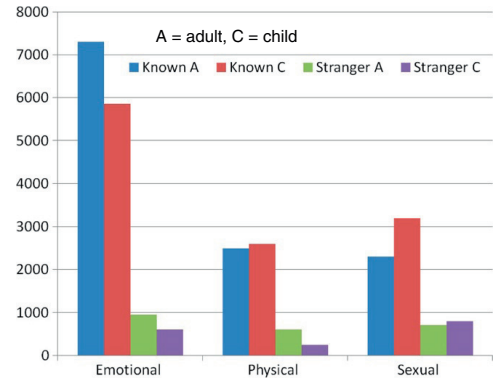

Figure 5 Number of reported perpetrators according to child and adult abuse.

with one question of sexual and physical abuse, respectively. The questions in our study allow women to define both "forced" and "sexual acts", and "exposed to physical acts". Some cases of sexual and physical abuse will not be identified by this question. The low overall response rate of 38.5% in the MoBa is a limitation. Nilsen et al. investigated this possible bias in the MoBa study by comparing women participating in the study with all women giving birth in Norway, and concluded that prevalence estimates of exposures and outcomes, but not estimates of exposure-outcome, were biased [15]. The same study showed that more women in the MoBa were living alone and fewer were under the age of 25 compared with all women giving birth in Norway. We would expect that these factors and the great number of highly educated women in the MoBa study contribute to a lower prevalence of abuse than in the general population. Retrospective reporting is a challenge, but difficult to avoid in these kinds of surveys. The women were on average 30 years old when responding to exposure to abuse. Their reporting on abuse could be subject to recall bias. Being pregnant could influence their response, as negative exposures denied earlier in life, could come to awareness. The way we see it this can both have a potential impact on depression, and oppositely, being in a depressed state may have an impact of memories and hence on the retrospective reporting.

Comparing prevalence results to other studies

Lifetime exposure

In our study, 32% of subjects reported any lifetime abuse (emotional, physical and sexual). This is in the mid-range of the results in Devries et al's study, where about 11% to 64% reported lifetime abuse. That study analyzed prevalence data of intimate partner violence from 19

Table 3 Logistic regression analysis on any adult abuse according to socio-demographics and risk factors

	*n	Crude OR	95% CI	Adjusted OR	95% CI
Age					
14-19	111	0.8	(0.7-1.0)	0.3	(0.2-0.4)
20-24	1120	0.9	(0.8-0.9)	0.6	(0.5-0.6)
25-29	3317	0.8	(0.8-0.9)	0.8	(0.7-0.8)
30-34**	4415	1.0		1.0	
≥ 35	1437	1.5	(1.4-1.6)	1.4	(1.3-1.5)
Civil status					
married	4405	1.0		1.0	
cohabiting	5417	1.3	(1.2-1.3)	1.3	(1.2-1.4)
not cohabiting	578	2.8	(2.6-3.2)	2.5	(2.2-2.8)
Education					
primary	364	1.0		1.0	
secondary	3604	0.7	(0.6-0.8)	0.8	(0.7-0.9)
≥ 4 yr univer.	5494	0.5	(0.4-0.6)	0.6	(0.5-0.7)
> 4 yr univer.	938	0.8	(0.7-1.0)	0.9	(0.8-1.1)
Parity					
P0	5053	1.0		1.0	
P1+	5347	1.1	(1.1-1.2)	1.0	(1.0-1.1)
BMI					
<20	1245	1.0		1.0	
20-24.9	5642	1.0	(0.9-1.1)	1.0	(0.9-1.1)
25-29.9	2351	1.1	(1.0-1.1)	1.0	(0.9-1.1)
≤ 30	1162	1.2	(1.1-1.3)	1.0	(1.0-1.1)
Smoking 1st trim.					
no	8884	1.0		1.0	
sometimes	440	1.6	(1.5-1.8)	1.4	(1.2-1.6)
daily	1076	2.2	(2.0-2.4)	1.6	(1.5-1.8)
Alcohol 1st trim.					
never	8587	1.0		1.0	
<1 /week	1792	1.3	(1.2-1.3)	1.2	(1.1-1.2)
2-7 /week	21	3.2	(1.8-5.6)	2.5	(1.4-4.6)
Child abuse					
no	7183	1.0		1.0	
yes	3217	2.5	(2.4-2.6)	2.4	(2.3-2.5)

Crude and adjusted odds ratios (ORs) with 95% confidence intervals (CI), (N = 52,964).
*Numbers of exposed to adult abuse in each category. **30-34 is reference group in age category. Comparison group is no adult abuse. Analyzed for complete cases only.

countries, and reported higher prevalence in African and Latin American countries relative to European and Asian countries [22]. The only two developed countries in the study, Denmark and Australia, reported 22% and 27%, respectively, which is lower than our results. The data-collection method in the latter two countries was interviewing by telephone, while in the other countries, it was interviewing face-to-face. This may partly explain the differences within that study, as the first method is recognized as having lower response rates than face-to-face interviews, but not why the results differ from ours [22]. One possible reason might be that their study examined partner abuse, while in our study abuse from other perpetrators also is also reported. Reported lifetime abuse in the Gazmararian et al. review article of abuse during pregnancy varied from 10% to 30% [7], which is lower than any lifetime abuse reported in our study, but corresponds with lifetime physical abuse reported in our study at 11%. The study is from United States and other developed countries comparable with Norway, and focused mainly on physical abuse. Our results on lifetime physical abuse were lower than those reported in a Swedish study from three gynecology clinics and in one randomly selected population group, where women reported exposure to lifetime physical abuse in the range of 32% to 38% [23]. This may reflect the fact that clinical populations often report a higher prevalence than population-based studies [17,24]. One reason for this is that self-reported problems, both mental and physical, are associated with exposure to abuse [25]. A second reason is that health care utilization is higher among those exposed to abuse [26,27]. Third, high prevalence rates are seen in specific groups, for example, among women with severe menstrual syndrome [28] or pelvic pain [29]. Emotional abuse is reported more frequently than physical or sexual abuse [23,30-33], thereby contributing to a higher prevalence of any lifetime abuse in studies where questions about sexual, physical and emotional abuse are included. In addition, the current study also contained two questions about emotional abuse. This may have contributed additionally to the higher prevalence detected in our study compared with other studies on any lifetime abuse. The population-based design and extensive questionnaires in our study indicate a lower prevalence compared with studies focusing on abuse only, which are recognized as showing a higher prevalence than surveys designed with a broader perspective [4].

Pregnancy related abuse

Our study gives information about exposure to abuse in the preceding 12 months, asked at about 30 weeks of gestation (Table 1). Hence, our study provides information about exposure to abuse prior to, or during pregnancy, and the results are regarded as pregnancy-related. Our findings on last-year prevalence of any abuse were 5%, corresponding with the first national Norwegian study in a non-obstetric population, where 6% reported any partner abuse in the preceding year [12]. Our results are, however, in the lower range of the findings in WHO's multi-country study, where between 4% (Japan

and Serbia and Montenegro) and 54% (Ethiopia) of the women reported exposure to partner abuse in the last 12 months [9]. Findings in this article showed that the prevalence of abuse is usually lower in industrialized settings than in rural settings [9]. Our results correspond with the lower prevalence rates reported in the latter study, and are also in the lower range of the findings from the Gazmararian et al's review article on the prevalence of abuse of pregnant women in developed countries, which found that exposure to abuse in the preceding 12 months in four studies varied between 6% and 24% [7]. These differences in methodology may explain why our results correspond with the lower reported prevalences, in addition to the possibility that there is a real lower exposure to abuse in Norway as an industrialized country.

Perpetrators

Our results showed that a known perpetrator is more frequent for all types of abuse (Figure 5). This finding corresponds well with other studies reported in pregnant populations [10]. WHO's multi-country study suggests that women are at more risk of abuse from intimate partners than from any other [9]. The questionnaire in MoBa did not elicit information about a partner or former partner being the perpetrator, out of consideration for the women's safety receiving and possibly filling out the questionnaire at home. Other research, however, suggests that this known person most frequently will have been the present or former partner [9].

Background information and relation to abuse

Living alone, exposure to child abuse, drinking alcohol in the first trimester, and being 35 or older were associated with exposure to any adult abuse in our study. Women living alone were a small group in our sample, but interestingly, the study also showed a higher exposure to abuse in the cohabiting group compared with the married group (OR 1.3, 95% CI 1.2-1.4). Our results showing that living alone or being single was associated with a higher exposure to abuse and that being married or cohabiting was a protective factor correspond with another study [11]. Our results also agree with studies showing an association of exposure to child abuse [34] and of use of alcohol [34,35] with increased prevalence of reporting abuse, even though none of these studies can predict a causal connection between exposure to background factors and exposure to abuse. The cross–sectional design of our study provides associations and not causal relations. In the current study, women above 35 reported more exposure to any adult abuse than women in the other age groups. This may be due to accumulative effects, as the older subjects have had more time to be exposed to abuse. A Swedish clinical study showed the contrary, however, as high age was negatively associated with lifetime abuse in that study [23]. The WHO's study on recent abuse reported higher exposure to abuse with lower age [34], and in Devries et al. study, prevalence of abuse during pregnancy was relatively constant to the age 35 and then slightly declined [22]. Younger age may reflect less opportunity to protect oneself and lower reporting from the eldest can be due to fading of memory with age. The literature is inconclusive regarding education and exposure to abuse. Norway has a generally high level of education and more women than men graduate at university level. In our study, we chose to divide higher education into two groups, those who completed four years of education at university level and those with more than four years. Our results showed that the association to any adult abuse was weaker in the group reporting four years of education at university level compared to all the other educational groups (Table 3). A low level of education is reported to be a risk factor for exposure to abuse in the populations-based WHO study on recent abuse [34], while a Swedish study from three clinical populations and one randomly selected population reported that educational level had a positive association with physical abuse but not with sexual abuse in both clinical and population samples [23]. One possible explanation is that women with higher education have higher self-esteem, are more aware of their rights, and tolerate less violation of their integrity [23]. Studies show that background factors have different impacts on different types of abuse. This indicates that the type of abuse (emotional, physical or sexual) and whether it is a single type or overlapping types are results of various patterns. Risk factors therefore vary depending on the type of abuse studied, as suggested by a study from Vietnam [30].

Public health implications

Previous research has shown that abuse of women and children is associated with morbidity for the women and the children, possibly both with short and long term consequences. Studies, including the current, have reported that abuse of women is more frequent than many other pregnancy complications [10]. Five percent of the women in our study reported exposure to abuse in the last 12 - months at Week 30 of gestation. This is comparable with the prevalence of preeclampsia (2-5%) and gestational diabetes (5%) in Norway, conditions for which pregnant women are routinely screened. Several studies have shown more negative reproductive health consequences in abused than in non-abused women, e.g. reporting more pregnancy terminations [11], and more pregnancy complaints and fear of birth [20,36]. Self-reported poor health and psycho-somatic symptoms are also more common in abused than non-abused women

[19]; so also with symptoms of chronic pelvic pain, stomach pain, headache, emotional distress and depression [12,25,37,38].

Conclusions

Our study provides information from pregnant women about self-reported exposure to adult and child abuse within a population with relatively few risk factors for abuse. Whether screening for abuse should be incorporated into routine antenatal care is an important discussion, but is beyond the limits of this article. Antenatal care is free in Norway and almost all women participate in regular check-ups at their general practitioner and/or midwife. Pregnancy may be the only time when healthy women come into frequent regular contact with health care providers, creating a good opportunity to ask about the experience of abuse and to identify those at risk.

Competing interests

There are no potential conflicts of interests. There are no financial competing interests. No one have in the past five years received reimbursements, fees, funding, or salary from an organization that may in any way gain or lose financially from the publication of this manuscript, either now or in the future.

Authors' contributions

MFS prepared the data, performed the statistical analyses, and drafted and corrected the manuscript. HG contributed on the interpretation of the analyses and helped to draft and critically revised the manuscript. JHB advised on the statistical analyses and the interpretation of results and drafted the manuscript. BS conceived the study idea and planned the study and contributed to the interpretation of the analyses and the drafting of the manuscript. ML contributed to the preparation of the data and the interpretation of the results and drafted and critically revised the manuscript. All authors contributed to the study's design and read and approved the final manuscript.

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References

1. WHO Department of Gender: *Addressing violence against women and achieving the Millennium Development Goals.* 2005.
2. WHO: *Violence against women.* 2011. [cited 2012 May]: http://www.who.int/reproductivehealth/publications/violence/en/.
3. Bowling A: *Research Methods In Health Investigating health and health services.* Second editionth edition. Philadelphia: Open University Press Buckingham; 2002.
4. Ellsberg M, Heise L: **Researching domestic violence against women: Methodological and ethical considerations.** *Stud Fam Plann* 2001, **32**:1–52.
5. Jansen HAFM, *et al*: **Interviewer Training in the WHO Multi-Country Study on Women's Health and Domestic Violence.** *Violence Against Women* 2004, **10:**831–849.
6. Stenson K, *et al*: **Lifetime prevalence of sexual abuse in a Swedish pregnant population.** *Acta Obstet Gynecol Scand* 2003, **82:**529–536.
7. Gazmararian JA, *et al*: **Prevalence of violence against pregnant women.** *JAMA* 1996, **275:**1915–1920.
8. Norton L: **Battering in pregnancy: an assessment of two screening methods.** *Obstet Gynecol* 1995, **85:**321–325.
9. Garcia-Moreno C, *et al*: **Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence.** *Lancet* 2006, **368:**1260–1269.
10. Johnson JK, *et al*: **The prevalence of domestic violence in pregnant women.** *BJOG* 2003, **110:**272–275.
11. Stenson K, *et al*: **The prevalence of violence investigated in a pregnant population in Sweden.** *J Psychosom Obstet Gynecol* 2001, **22:**189–197.
12. Neroien AI, Schei B: **Partner violence and health: results from the first national study on violence against women in Norway.** *Scand J Public Health* 2008, **36:**161–168.
13. Mossige S, Stefansen K: *Violence and sexual abuse against children and young people in Norway. A questionnaire study among students in their last year of secondary school*, Norwegian Social Research Report 20/07. Oslo: Norwegian Social Research; 2007.
14. Magnus P, *et al*: **Cohort profile: the Norwegian Mother and Child Cohort Study (MoBa).** *Int J Epidemiol* 2006, **35:**1146–1150.
15. Nilsen RM, *et al*: **Self-selection and bias in a large prospective pregnancy cohort in Norway.** *Paediatr Perinat Epidemiol* 2009, **23:**597–608.
16. Swahnberg IM, Wijma B: **The NorVold Abuse Questionnaire (NorAQ): validation of new measures of emotional, physical, and sexual abuse, and abuse in the health care system among women.** *Eur J Public Health* 2003, **13:**361–366.
17. Alhabib SU, Nur U, Jones R: **Domestic Violence Against Women: Systematic Review of Prevalence Studies.** *FamViolence* 2009, **2009**(25):369–382.
18. Lukasse M, *et al*: **Childhood abuse and fear of childbirth-a population-based study.** *Birth* 2011, **37:**267–274.
19. Hilden M, *et al*: **A history of abuse and health: a Nordic multicentre study.** *BJOG* 2004, **111:**1121–1127.
20. Wijma B, *et al*: **Emotional, physical, and sexual abuse in patients visiting gynaecology clinics: a Nordic cross-sectional study.** *Lancet* 2003, **361:**2107–2113.
21. Rabin R, *et al*: **Intimate Partner Violence Screening Tools.** *Am Prev Med.* 2009, **36:**439–445.
22. Devries KM, *et al*: **Intimate partner violence during pregnancy: analysis of prevalence data from 19 countries.** *Reprod Health Matters* 2010, **18:**158–170.
23. Swahnberg K, *et al*: **Are sociodemographic and regional and sample factors associated with prevalence of abuse?** *Acta Obstet Gynecol Scand* 2004, **83:**276–288.
24. Campbell JC: **Health consequences of intimate partner violence.** *Lancet* 2002, **359:**1331–1336.
25. Ellsberg M, *et al*: **Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study.** *Lancet* 2008, **371:**1165–1172.
26. Plichta S: **The effects of woman abuse on health care utilization and health status: a literature review.** *Womens Health Issues* 1992, **2:**154–163.
27. Talley NJ, *et al*: **Gastrointestinal tract symptoms and self-reported abuse: a population-based study.** *Gastroenterology* 1994, **107:**1040–1049.
28. Golding JM, *et al*: **Prevalence of sexual abuse history in a sample of women seeking treatment for premenstrual syndrome.** *J Psychosom Obstet Gynaecol* 2000, **21:**69–80.
29. Walling MK, *et al*: **Abuse history and chronic pain in women: I. Prevalences of sexual abuse and physical abuse.** *Obstet Gynecol* 1994, **84:**193–199.
30. Nguyen DV, Ostergren PO, Krantz G: **Intimate partner violence against women in rural Vietnam-different socio-demographic factors are**

associated with different forms of violence: need for new intervention guidelines? *BMC Public Health* 2008, **8**:55.
31. Valladares E: **Violence againstpregnant women: prevalence and characteristics, A population-based study in Nicaragua.** *BJOG* 2005, **112:**1243–1248.
32. Groves AK, *et al*: **Associations between intimate partner violence and emotional distress among pregnant women in Durban, South Africa.** *J Interpers Violence* 2012, **27:**1341–1356.
33. Babu BV: **Domestic violence against women in eastern India: a population-based study on prevalence and related issues.** *BMC Public Health* 2009, **9:**129.
34. Abramsky T, *et al*: **What factors are associated with recent intimate partner violence? findings from the WHO multi-country study on women's health and domestic violence.** *BMC Public Health* 2011, **11:**109.
35. Jewkes R: **Intimate partner violence: causes and prevention.** *Lancet* 2002, **359:**1423–1429.
36. Lukasse M: **Common Complaints in Pregnancy.** *Birth* 2009, **36:**190–199.
37. Selic P, *et al*: **The prevalence of exposure to domestic violence and the factors associated with co-occurrence of psychological and physical violence exposure: a sample from primary care patients.** *BMC Public Health* 2011, **11:**621.
38. Urquia M: **Experiences of violence before and during pregnancy and adverse pregnancy outcomes: an analysis of the Canadian Maternity Experiences Surve.** *BMC Pregnancy Childbirth* 2011, **11:**42.

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RESEARCH ARTICLE Open Access

Adult physical, sexual, and emotional abuse and postpartum depression, a population based, prospective study of 53,065 women in the Norwegian Mother and Child Cohort Study

Marie Flem Sørbø[1*], Hilde Grimstad[1], Johan Håkon Bjørngaard[1,2], Mirjam Lukasse[1,3] and Berit Schei[1,4]

Abstract

Background: Postpartum depression (PPD) has detrimental consequences to the women, their infants and families. The aim of the present study was to assess the association between adult abuse and PPD.

Methods: This study was based on data from 53,065 pregnant women in the Norwegian Mother and Child Cohort Study (MoBa), conducted by the Norwegian Institute of Public Health. Women were recruited through a postal invitation in relation to a routine ultra-sound invitation at week 18 of gestation. Exposure to adult emotional, sexual, physical abuse was based on self-report at week 30, also differentiating if the perpetrator was known or a stranger, and whether the abuse was recent or not (<12 month since abuse). PPD was measured with a four items version of the Edinburgh Postnatal Depression Scale (EDS) at six months postpartum. The associations between different types of adult abuse and PPD were performed with logistic regression, adjusting for age, parity, civil status, education, child abuse, social support, and depression prior to pregnancy.

Results: Altogether, 11% had PPD, and 19% had been exposed to adult abuse. Women reporting adult abuse had an 80% increased fully adjusted odds of PPD (OR 1.8 95% CI 1.7-1.9) compared to non-abused women. There was a tendency towards higher odds of PPD for women reporting combinations of adult abuse (emotional, sexual and physical), as compared with those reporting sexual, emotional or physical abuse only. Exposure from known perpetrator was more strongly associated with PPD than exposure from an unknown perpetrator. Compared with women without adult abuse, the fully adjusted odds of PPD was 2.6 (95% CI 2.4-2.9) higher for women with any recent adult abuse and 1.5 (95% CI 1.5-1.7) higher for women with any adult abuse, but not recent.

Conclusions: The results from this large prospective population-based cohort study support initiatives aiming to assess and adequately address abuse when counseling and treating women of PPD.

Keywords: Adult Physical, Emotional, Sexual abuse, and recent abuse, Postpartum Depression (PPD), Edinburgh Postnatal Depression Scale (EDS), The Norwegian Mother and Child Cohort Study (MoBa)

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Background

Postpartum depression (PPD) affects around 13% of women giving birth, and occurs within one year of childbirth [1,2]. PPD is a public health concern, for which the consequences to the woman and her infant have been well established with both short and long term effects [3]. PPD negatively influences the experiences of motherhood and breastfeeding [4], it may cause impaired bonding with the infant [5], and altered relationship with the partner [6,7]. Furthermore, increased risk of future maternal depressions [8] and adverse psychiatric outcomes in adolescent offspring has been demonstrated [9].

Known risk factors for developing PPD include a history of abuse as a child or an adult and overall 35% of the women worldwide have experienced partner or non-partner abuse [10-12]. Several studies show that women reporting lifetime abuse, recent intimate partner abuse, or child abuse are considered more prone to develop PPD than their counterparts [10,13-16]. The combination of abuse and depression is complicated, as both stressors put women at elevated risk for health problems and adverse pregnancy outcomes [7,17]. Abuse of women and PPD can be prevented, thus increased knowledge facilitating prevention is important. The associations between abuse and PPD have mostly been studied in cross sectional designs [18,19]. For example, in a recent review by Beydoun et al only two of seven studies were prospective [20]; similarly two out of six in Wu et al's meta-analysis had a prospective design [21]. These studies included only small samples and did not take into account other well known risk factors for PPD, such as previous depression and child abuse. We wanted to prospectively explore these associations in a large population, also including several possible confounding factors. Our primary objective was to investigate the association between different types of adult abuse, emotional, sexual and physical, as singular or combined exposures, and PPD. Secondly, we wanted to explore whether the associations differed if the perpetrator was known or a stranger to the woman.

Methods

Study population

Our study uses data from the Norwegian Mother and Child Cohort Study (MoBa), a prospective population-based pregnancy cohort study conducted by the Norwegian Institute of Public Health. The inclusion period was from 1999 to 2008. Hospitals with more than 100 births annually were invited to collaborate in the MoBa study and 70% of all pregnant women in Norway during this period were invited to participate. A total of 90,700 mothers and 108,000 children agreed to participate in the MoBa study. The response rate was 40.6%. All pregnant women in Norway are offered a routine ultrasound screening at week 18 of gestation at their local hospital [22]. Together with the ultrasound appointment, the women received a postal invitation that included an informed consent form, the first questionnaire and an information brochure. A detailed protocol of the study including the consent can be found elsewhere (http://www.fhi.no/morogbarn). Women who agreed to participate received extensive self-administrated questionnaires by post, both during pregnancy and after birth. The MoBa sample has been described in more detail elsewhere [22,23]. Data from the questionnaires are linked to the Medical Birth Registry of Norway, which is based on a standardized form completed by midwives shortly after delivery. The inclusion and exclusion of the study population are shown in Figure 1. Our study population consists of women who had filled in three questionnaires, at 18 and 30 of weeks of gestation, and six months postpartum. For women who participated more than once, information from their first pregnancy was included. Only women with singleton pregnancies and women who had answered a minimum of one of the abuse questions were included in the study. Those having missing on the PPD questions were excluded, leaving a total of 53,065 women whose characteristics are described in Table 1.

A total of 3,864 women were excluded due to missing covariate data, leaving 49,201 women for analyses of the association between different types of adult abuse and symptoms of PPD in Table 2. Of those exposed to adult abuse, 99 women did not report if they knew the perpetrator(s) or not, leaving 49,102 women for analyses in Table 3. Of the women exposed to adult abuse, 186 women did not respond to the questions of recent abuse (last 12 months) or not, leaving 49,015 women for analyses in Table 4. The current study is based on version 4 of the data files released for research in 2008 from the MoBa study. Written informed consent was obtained from each participant at recruitment. The study was approved by The Regional Committee for Medical Research Ethics in South-Eastern Norway. The research was performed in accordance with the Strobe guidelines [24]. An outline of the Strobe guidelines is added in Additional file 1.

Variables

Assessment of PPD

The Edinburgh Postnatal Depression Scale (EDS) is a self-rating scale designed to identify postpartum depression, and has two versions EDS-10 and EDS-5 [25]. The short-matrix 5 items version (EDS-5) has evidence of good psychometric properties, was primarily meant for research use, and has been translated into Norwegian and validated [26]. The questions on PPD were listed in questionnaire 4, and are displayed in Figure 2. In this paper we chose to use the four items identical to the

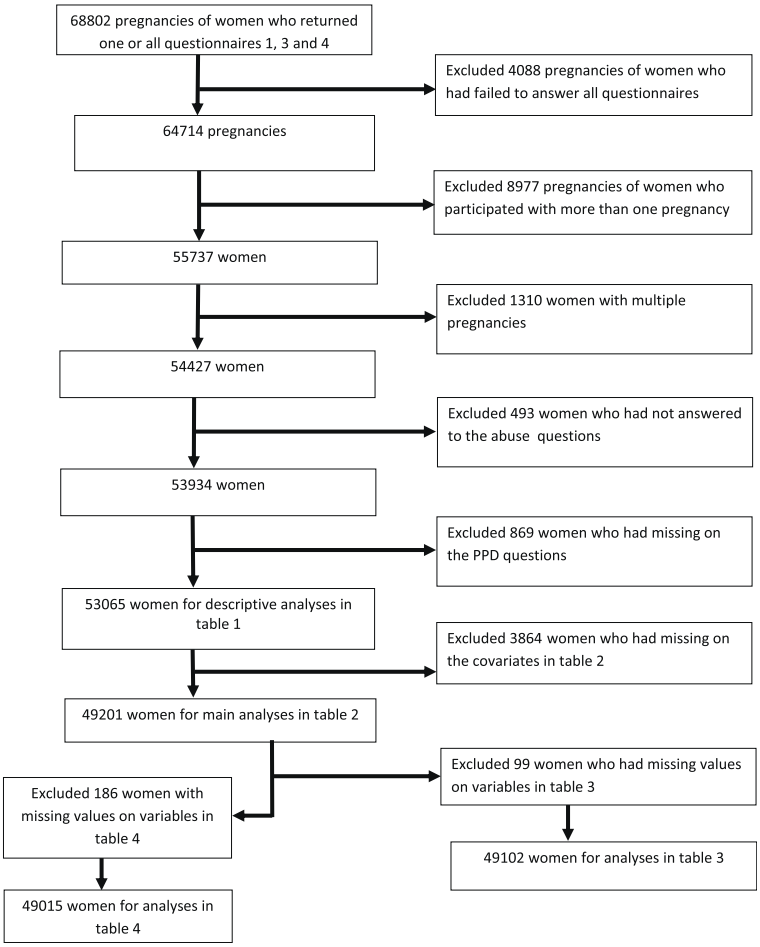


Figure 1 Flow-chart of inclusion.

items in the research version. The score ranges from 0 to 3 on each item, the latter indicating higher depression symptom score. We used a cut off score ≥ 6 which corresponded with a cut off at ≥ 10 in the EDS-10, and indicates a moderate level of PPD [27]. The PPD items 1, 2, 4 and 5 in Figure 2 were used in our analyses.

Assessment of abuse

The abuse questions and response options are shown in Figure 3. These questions were from the third MoBa questionnaire and responded to at approximately week 30 of gestation. The two questions of emotional abuse are almost identical to those in the Norvold Abuse Questionnaire [28], which measures mild and severe emotional abuse. The questions of emotional abuse in our study were merged into one variable. The question on sexual abuse and response options was based on a modified version of the sexual abuse question in the Abuse Assessment Screen (ASS) [29], a screening tool used in other Scandinavian studies [30,31]. The question on physical abuse has been used in other studies, but is not validated [32,33]. Women who answered yes to at least one of the adult abuse questions were defined as having suffered from any adult abuse. Likewise, women responding yes to one or more of the child abuse questions were defined as having suffered from any child abuse (used as a covariate for adjustment). Women could also indicate whether they had been abused the last 12 months or not (in our study categorised as recent abuse or not).

Table 1 Characteristics of the study population in the Norwegian Mother and Child Cohort Study, 1999-2008

	Any adult abuse			
	Yes (10267)		No (42798)	
	No.	%	No.	%
PPD				
No	8370	82	38979	91
Yes	1897	19	3819	9
*n	10267	100	42798	100
Age in years				
14-19	95	1	577	1
20-24	1145	11	5162	12
25-29	3325	32	16012	37
30-34	4323	42	17291	40
≥35	1378	13	3756	9
n	10266	100	42798	100
Education				
Primary (9yrs)	324	3	838	2
Secondary (12yrs)	3493	36	12114	29
Higher ≤ 4 yrs	5141	52	25852	63
Higher > 4yrs	893	9	2584	6
n	9851	100	41389	100
Living with partner				
Yes	9633	95	41656	98
No	564	6	923	2
n	10197	100	42579	100
Parity				
0	5066	49	22158	52
1+	5201	51	20640	48
n	10267	100	42798	100
Any child abuse				
no	7091	69	36264	85
yes	3176	31	6534	15
n	10267	100	42798	100
Prior depression				
no	8928	87	40795	95
yes	1339	13	2003	5
n	10267	100	42798	100
Social support				
no	368	4	1396	3
yes	9564	96	39882	97
n	9932	100	41278	100

*n vary according to numbers of missing values within the different variables. N = 53,065.

Perpetrators

Women were given the opportunity to indicate if the abuse was committed by a stranger, a family member/relative or other known person (Figure 3). The two latter categories were merged into "known perpetrator". Furthermore, we included women reporting adult abuse from known perpetrator only, in the group; "known only". Those reporting abuse from stranger only were included in "stranger only" and, finally, women reporting abuse from both stranger and known perpetrators were included in the "stranger and known perpetrator" group.

Possible confounding variables

Background information such as age, education, depression prior to pregnancy, social support, and civil status was collected from the first questionnaire at inclusion, in order to take into account possible confounding factors of the abuse-PPD association. Age was categorized into five groups (Table 1). Information about education was categorized into four groups: primary school (9 years), secondary school (12 years), two groups at college or university level, (≤4 years) or (>4 years). Women were asked to respond yes or no to whether, earlier in life, they had suffered from depression in a period of two weeks or more. Social support was defined as having anyone other than the partner the woman can ask for advice in a difficult situation, with three answering options; no, yes 1-2 persons, or yes, more than 2 persons, which we categorized into no or yes. Civil status was defined as living with partner or not. Information about parity was categorized into nulliparous, and women giving birth previous to this pregnancy (1+).

Statistical analyses

Descriptive statistics of women exposed to adult abuse are presented in Table 1. Logistic regression analyses were used to estimate the associations between different types of adult abuse and PPD (Table 2), to estimate associations between perpetrators (known or unknown) of adult abuse and PPD (Table 3) and, finally, to estimate associations between time of abuse (recent or not) and symptoms of PPD (Table 4). We used three models adjusting for possible confounding factors. In Model 1, we adjusted for age and parity. In Model 2, we adjusted for age, parity, education, civil status, and any child abuse. Finally, in Model 3 all variables from Model 2 were included along with depression prior to pregnancy and experience of social support. The reference group for all analyses was women reporting no adult abuse. Adjusted odds ratios (OR's) were presented for the different models with 95% confidence intervals (95% CIs) and analysed for complete cases only. The data programme PASW statistical 20 was used to conduct all analyses.

Table 2 Logistic regression analyses of the association between types of adult abuse and postpartum depression

		Model 1		Model 2		Model 3	
		OR	95% CI	OR	95% CI	OR	95% CI
	n_PPD*						
No adult abuse (ref)	3471	1.0		1.0		1.0	
Physical only	75	1.7	(1.4-2.2)	1.5	(1.1-1.9)	1.4	(1.1-1.8)
Sexual only	149	2.0	(1.7-2.4)	1.7	(1.4-2.1)	1.6	(1.4-2.0)
Emotional only	888	2.1	(2.0-2.3)	1.8	(1.7-2.0)	1.7	(1.6-1.9)
Emot.-physical	229	2.8	(2.4-3.2)	2.2	(1.9-2.6)	2.0	(1.7-2.3)
Physical-sexual	33	2.2	(1.5-3.2)	1.8	(1.2-2.6)	1.7	(1.2-2.5)
Emot.-sexual	156	3.6	(3.0-4.4)	2.9	(2.4-3.5)	2.3	(1.9-2.8)
Emot.-physic.-sex.	195	3.4	(2.9-4.0)	2.7	(2.3-3.2)	2.2	(1.9-2.6)
Any adult abuse	1725	2.4	(2.2-2.5)	2.0	(1.8-2.1)	1.8	(1.7-1.9)

Model 1 adjusted for age and parity. Model 2 adjusted for age, parity, civil status, child abuse, education. Model 3 adjusted for age, parity, civil status, child abuse, education, social support, and prior depression. *Numbers of women in each abuse category reporting PPD. Analyzed for complete cases on all variables. N = 49,201.

Results

Altogether, 11% of the women had PPD and 6% reported depression prior to pregnancy. Nineteen percent reported exposure to any adult abuse. Table 1 presents characteristics for the study participants by exposure to any adult abuse or not. Figure 4 shows the number of women reporting different types of adult abuse and combinations of adult abuse. Among the 2,938 women reporting adult physical abuse, 593 reported having suffered from adult physical abuse only. Of the 8,601 women reporting adult emotional abuse, 5,792 did not report having experienced any other abuse. While among those 2,816 reporting adult sexual abuse, 1,033 women reported adult sexual abuse only. Women reporting any adult abuse had an 80% increased fully adjusted odds of PPD symptoms (OR 1.8, 95% CI 1.7-1.9) compared to women without any adult abuse (Table 2). Women reporting combinations of emotional, physical and sexual abuse were more at risk of PPD than women reporting only one type of abuse. Women reporting three types of abuse; emotional, physical and sexual abuse, had a 120% increased fully adjusted odds of PPD (OR 2.2, 95% CI 1.9-2.6) compared to women reporting no adult abuse. Compared with women with no adult abuse, exposure from known perpetrator was more strongly associated with PPD than exposure from an unknown perpetrator (fully adjusted OR known perpetrator only 1.8, 95% CI 1.7-1.9 and unknown and known perpetrators OR 2.0, 95% CI 1.7-2.4 versus OR unknown perpetrator only 1.5, 95% CI 1.2-1.9) (Table 3). The odds ratio of PPD symptoms following any recent abuse in the fully adjusted model was 2.6 (95% CI 2.4-2.9) compared to no adult abuse, while those women reporting no recent abuse had an OR of 1.6 (95% CI 1.5-1.7) (Table 4). The associations between all types of adult abuse and PPD were attenuated when adjusted for confounding factors introduced in Models 2 and 3.

Discussion

All types of adult abuse were strongly associated to PPD. Although the associations were attenuated with adjustment for possible confounding factors such as age,

Table 3 Logistic regression analyses of the association between perpetrator status (known/unknown) and postpartum depression

		Model 1		Model 2		Model 3	
Perpetrator + any adult abuse		OR	95% CI	OR	95% CI	OR	95% CI
	n_PPD*						
No adult abuse (ref)	3471	1.0		1.0		1.0	
Known only	1353	2.3	(2.1-2.5)	2.0	(1.8-2.1)	1.8	(1.7-1.9)
Unknown only	102	1.5	(1.2-1.9)	1.6	(1.3-2.0)	1.5	(1.2-1.9)
Unknown and known	254	3.7	(3.2-4.3)	2.3	(1.9-2.6)	2.0	(1.7-2.4)

Model 1 adjusted for age and parity. Model 2 adjusted for age, parity, civil status, education, and child abuse. Model 3 adjusted for age, parity, civil status, education, child abuse, social support, and prior depression. *Numbers of women reporting PPD within each category of perpetrator/abuse. Analyzed for complete cases only, N = 49,102.

Table 4 Logistic regression analyses of the association between time (recent/not recent) of adult abuse and postpartum depression

		Model 1		Model 2		Model 3	
		OR	95% CI	OR	95% CI	OR	95% CI
	n_PPD*						
No adult abuse (ref)	3471	1.0		1.0		1.0	
Any adult abuse, but not recent	1160	2.0	(1.9-2.2)	1.7	(1.6-1.9)	1.6	(1.5-1.7)
Any adult recent abuse	527	3.6	(3.2-4.0)	2.9	(2.6-3.2)	2.6	(2.4-2.9)

Model 1 adjusted for age and parity. Model 2 adjusted for age, parity, civil status, child abuse, education. Model 3 adjusted for age, parity, civil status, child abuse, education, social support, and prior depression. *Numbers of women in abuse categories reporting PPD. Analyzed for complete cases on all variables, N = 49,015.

parity, child abuse, civil status, education, social support and depression prior to the pregnancy, the substantial associations remained in the fully adjusted models.

Strengths and limitations

The prospective design of the study is a major strength. Also, the study included a large number of non- selected groups of pregnant women. The reporting of abuse and potential confounding factors were assessed during pregnancy hence reported prior to and unrelated to the reporting of PPD. We were also able to adjust for known risk factors of PPD, like child abuse, experience of social support, and previous depression, which is not always included in previous studies. There are also limitations. We were able to use only four out of five items in the validated EDS-5 version (research version) to measure PPD [27]. This may have influenced our estimated prevalence, but is probably less likely to have influenced our estimated associations. Also, diagnostic information of PPD would have been an advantage. However, given the prospective design of our study where potential confounding information was reported early in pregnancy and outcome assessment of PPD was reported after pregnancy, we believe that misclassification of abuse is not likely to be differential. The low response rate in the MoBa survey of 40.6% is a limitation. Nevertheless, a study investigating the possible effect of the low response rate on eight well-known exposure-outcome factors in the MoBa survey, concluded that prevalence estimates of exposures and outcomes were biased, but not estimates of associations between exposure and outcome [22].

Comparing the results to other studies

Prevalence

Our results of PPD at 11% are in the range of the prevalence found in other studies in high income countries; including one Norwegian study using EPD-10 where 9% had PPD [34] and a meta-analysis where the prevalence of PPD was 13% [1].

Dose-response association

Overall, women in our study exposed to more than one type of abuse had about a two to three fold increase in PPD, compared to non-abused women. Furthermore, the results indicate a dose-response association, as exposure to more than one type of abuse showed stronger associations to PPD than exposure to one type only. This is in agreement with other studies, where the strength of association increased with each additional type of violence experienced and with increased frequency of abusive acts [35,36].

Type, and timing of the abuse

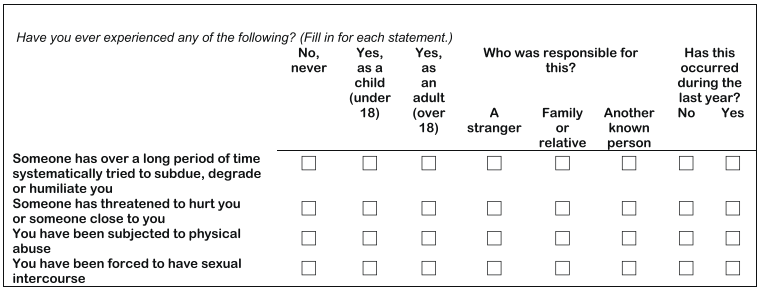
Emotional abuse was the most commonly reported type of abuse in our study. Women exposed to emotional abuse only in our study had a slightly higher risk of PPD, compared with women exposed to either only sexual or only physical abuse. This is in accordance with other studies

Have you ever experienced any of the following feelings last week? (Enter just one cross in a box for each item.)

	Yes, almost all the time	Yes, now and then	Not very often	No, never
1 Really reproached yourself when something went wrong	☐	☐	☐	☐
2 Have been anxious or worried for no reason	☐	☐	☐	☐
3 Have been afraid or panicked for no reason	☐	☐	☐	☐
4 Have been so unhappy that you've had problems sleeping	☐	☐	☐	☐
5 Felt down or unhappy	☐	☐	☐	☐
6 Have been so unhappy that you've cried	☐	☐	☐	☐

We included questions number 1, 2, 4 and 5 in our analyses.

Figure 2 Questions on Postpartum Depression in the Mother and Child Cohort Study.



Have you ever experienced any of the following? (Fill in for each statement.)

	No, never	Yes, as a child (under 18)	Yes, as an adult (over 18)	Who was responsible for this? A stranger	Family or relative	Another known person	Has this occurred during the last year? No	Yes
Someone has over a long period of time systematically tried to subdue, degrade or humiliate you	☐	☐	☐	☐	☐	☐	☐	☐
Someone has threatened to hurt you or someone close to you	☐	☐	☐	☐	☐	☐	☐	☐
You have been subjected to physical abuse	☐	☐	☐	☐	☐	☐	☐	☐
You have been forced to have sexual intercourse	☐	☐	☐	☐	☐	☐	☐	☐

Figure 3 Questions and response options on abuse and perpetrators in the Norwegian Mother and Child Cohort Study.

which indicate a higher risk of PPD among women exposed to emotional abuse compared to other types of abuse. For example, one clinical study of 200 women in Canada showed that emotional abuse but not physical or sexual abuse was found to be associated to PPD [18]. In our study the association between any abuse and PPD was stronger when the abuse was reported as recent compared to past experience. Our findings are consistent with previous studies linking recent abuse to PPD [14,36,37].

Perpetrators

The literature is both scarce and inconclusive on the topic of perpetrators other than intimate partner. In our study women abused by known perpetrator only, or by known *and* stranger, were at higher risk of experiencing PPD than those abused by stranger only. This may be because exposure to abusive acts from a known person may have more detrimental effects to the women compared to abuse from a stranger. Reporting exposure of abuse from different perpetrators (both stranger and known) can imply strong association to PPD through different mechanisms. Being abused by a trusted person is likely to be more detrimental than being abused by an unknown person. Another possible explanation is that exposure to both known and stranger indicating more than one insult; hence contributing to the strong association. Recent studies indicate that recurrent acts of abuse are associated with an increased risk of PPD [36,38], which correspond with our findings according exposure to abuse from different perpetrators. Nevertheless, results from three Canadian studies on PPD comparing abuse by partner and other perpetrators show diverse results [36,39,40]. In a population-based survey there was a strong association between abuse by partner and PPD, but no association was found of abusive acts perpetrated by other persons [36]. In contrast, one study showed no differences between women with and without PPD regarding who perpetrated the abuse (partner, other family member, or stranger) [39]. However, in the third study the odds of PPD were significantly greater among women abused by partner compared with those who did not experience partner abuse [40]. In the same study the perpetrators were equally to be partner or non-partner, and

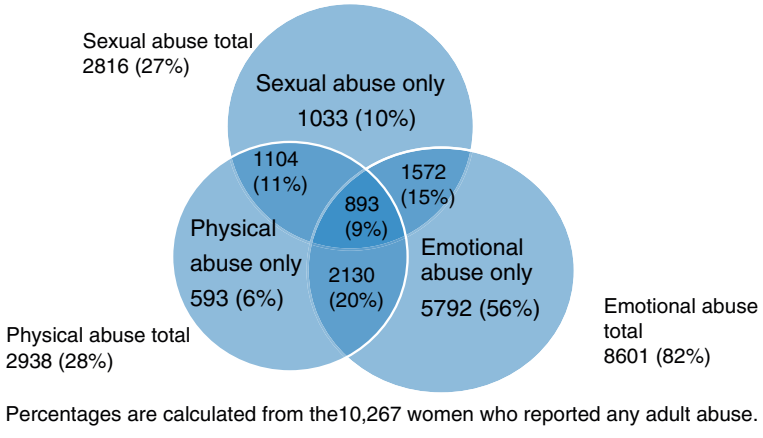


Figure 4 Types of adult abuse and overlapping categories.

although not significant, abuse from other persons (family member, stranger or acquaintance), also showed a positive association to PPD.

Conclusions

The women in our study commonly reported adult emotional, sexual, and physical abuse. All types were highly associated with PPD, either as singular types of abuse only, or in combination with other types. Furthermore, our findings showed that reporting abuse by a known perpetrator only, or by both a known and a stranger, showed stronger association with PPD compared to those abused from strangers only. Our findings highlight the importance of assessing and adequately addressing abuse when counseling and treating women with PPD.

Additional file

Additional file 1: STROBE guidelines.

Abbreviations

(PPD): Postpartum depression; (MoBa): The Norwegian Mother and Child Cohort Study; (PPD): Postpartum depression; (EDS): The Edinburgh Postnatal Depression Scale; (ASS): Abuse assessment screen.

Competing interests

The authors declare that they have no competing intersts.

Authors' contribution

MFS prepared the data, performed the statistical analyses, and drafted and corrected the manuscript. HG contributed to the interpretation of the analyses, drafted and critically revised the manuscript. JHB advised on the statistical analyses and the interpretation of the results and critically revised the manuscript. ML contributed to the interpretation of the analyses, drafted and critically revised the manuscript. BS conceived the study idea and planned the study and contributed to the interpretation of the analyses and critically revised the manuscript. All authors contributed to the study's design and read and approved the final manuscript.

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References

1. O'Hara MW, Swain AM: **Rates and risk of postpartum depression-a meta-analysis.** *Int J Psychiatr* 1996, **8:**37–54.
2. O'Hara MW: **Postpartum depression: what we know.** *J Clin Psychol* 2009, **65**(12):1258–1269.
3. Almond P: **Postnatal depression: a global public health perspective.** *Perspect Public Health* 2009, **129**(5):221–227.
4. Seimyr L, Edburgh M, Lundh W, Sjogren B: **In the shadow of maternal depressed mood: Experiences of parenthood during the first year after childbirth.** *J Psychosom Obstet Gynaecol* 2004, **25**(1):23–34.
5. Milgrom J, Ericksen J, McCarthy R, Gemmill AW: **Stressful impact of depression on early mother–infant relations.** *Stress Health* 2006, **22**(4):229–238.
6. Goodman JH: **Paternal postpartum depression, its relationship to maternal postpartum depression, and implications for family health.** *J Adv Nurs* 2004, **45**(1):26–35.
7. Lee DTS, Chung TKH: **Postnatal depression: an update.** *Best Practice Res Clin Obstet Gynaecol* 2007, **21**(2):183–191.
8. Meltzer-Brody S: **New insights into perinatal depression: pathogenesis and treatment during pregnancy and postpartum.** *Dialogues Clin Neurosci* 2011, **13**(1):89–100.
9. Halligan SL, Murray L, Martins C, Cooper PJ: **Maternal depression and psychiatric outcomes in adolescent offspring: A 13-year longitudinal study.** *J Affect Disord* 2007, **97**(1–3):145–154.
10. WHO, the London School of Hygiene and Tropical Medicine and the Sourth African Medical Research Counci: **WHO report highlights violence against women as a 'global health problem of epidemic proportions' New clinical and policy guidelines launched to guide health sector response**. In *WHO Media Release.* 2013. http://www.who.int/mediacentre/news/releases/2013/violence_against_women_20130620/en/index.html.
11. Neroien AI, Schei B: **Partner violence and health: results from the first national study on violence against women in Norway.** *Scand J Public Health* 2008, **36**(2):161–168.
12. Campbell JC: **Health consequences of intimate partner violence.** *Lancet* 2002, **359**(9314):1331–1336.
13. Records K, Rice MJ: **Lifetime physical and sexual abuse and the risk for depression symptoms in the first 8 months after birth.** *J Psychosom Obstet Gynaecol* 2009, **30**(3):181–190.
14. Valentine JM, Rodriguez MA, Lapeyrouse LM, Zhang M: **Recent intimate partner violence as a prenatal predictor of maternal depression in the first year postpartum among Latinas.** *Arch Womens Ment Health* 2011, **14**(2):135–143.
15. Buist A: **Childhood abuse, parenting and postpartum depression.** *Aust N Z J Psychiatry* 1998, **32**(4):479–487.
16. Malta LA, McDonald SW, Hegadoren KM, Weller CA, Tough SC: **Influence of interpersonal violence on maternal anxiety, depression, stress and parenting morale in the early postpartum: a community based pregnancy cohort study.** *BMC Pregnancy Childbirth* 2012, **12:**153.
17. Ellsberg M, Jansen HA, Heise L, Watts CH, Garcia Moreno C: **Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study.** *Lancet* 2008, **371**(9619):1165–1172.
18. Cohen MM, Schei B: **A history of personal violence and postpartum depression: is there a link?** *Arch Womens Ment Health* 2002, **4:**83–92.
19. Leung WC, Kung F, Lam J, Leung TW, Ho PC: **Domestic violence and postnatal depression in a Chinese community.** *Int J Gynecol Obstet* 2002, **79**(2):159–166.
20. Beydoun HA, Beydoun MA, Kaufman JS, Lo B, Zonderman AB: **Intimate partner violence against adult women and its association with major depressive disorder, depressive symptoms and postpartum depression: a systematic review and meta-analysis.** *Soc Sci Med* 2012, **75**(6):959–975.
21. Wu Q, Chen HL, Xu XJ: **Violence as a risk factor for postpartum depression in mothers: a meta-analysis.** *Arch Womens Ment Health* 2012, **15**(2):107–114.
22. Nilsen RM, Vollset SE, Gjessing HK: **Self-selection and bias in a large prospective pregnancy cohort in Norway.** *Paediatr Perinat Epidemiol* 2009, **23**(6):597–608.
23. Magnus P, Irgens LM, Haug K, Nystad W, Skjaerven R, Stoltenberg C: **Cohort profile: the Norwegian Mother and Child Cohort Study (MoBa).** *Int J Epidemiol* 2006, **35**(5):1146–1150.
24. Elm E, Douglas G, Altman C, Egger M, Pocock SJ, Gøtzsche PC, Vanderbroucke JP: **The strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies.** *J Clin epidemiol* 2008, **61**(4):344–9.
25. Cox JL, Holden JM, Sagovsky R: **Detection of postnatal depression. Development of the 10-item edinburgh postnatal depression scale.** *Br J Psychiatry* 1987, **150:**782–786.

26. Eberhard-Gran M, Eskild A, Tambs K, Schei B, Opjordsmoen S: **The edinburgh postnatal depression scale: validation in a norwegian community sample.** *Nord J Psychiatry* 2001, **55**(2):113–117.
27. Eberhard-Gran M, Eskild A, Samuelsen SO, Tambs K: **A short matrix-version of the edinburgh depression scale.** *Acta Psychiatr Scand* 2007, **116**(3):195–200.
28. Swahnberg IM, Wijma B: **The NorVold Abuse Questionnaire (NorAQ): validation of new measures of emotional, physical, and sexual abuse, and abuse in the health care system among women.** *Eur J Public Health* 2003, **13**(4):361–366.
29. Rabin RF, Jennings JM, Campbell JC, Bair-Merritt MH: **Intimate partner violence screening tools: a systematic review.** *Am J Prev Med* 2009, **36**(5):439–445.
30. Stenson K, Heimer G, Lundh C, Nordstrom ML, Saarinen H, Wenker A: **Lifetime prevalence of sexual abuse in a Swedish pregnant population.** *Acta Obstet Gynecol Scand* 2003, **82**(6):529–536.
31. Johnson JK, Haider F, Ellis K, Hay DM, Lindow SW: **The prevalence of domestic violence in pregnant women.** *Bjog-an Int J Obstet Gynaecol* 2003, **110**(3):272–275.
32. Sorbo MF, Grimstad H, Bjorngaard JH, Schei B, Lukasse M: **Prevalence of sexual, physical and emotional abuse in the Norwegian mother and child cohort study.** *BMC Public Health* 2013, **13**:186.
33. Lukasse M, Schei B, Vangen S, Oian P: **Childhood abuse and common complaints in pregnancy.** *Birth* 2009, **36**(3):190–199.
34. Eberhard-Gran M, Eskild A, Tambs K, Samuelsen KO, Opjordsmoen S: **Depression in postpartum and non-postpartum women: prevalence and risk factors.** *Acta Psychiatr Scand* 2002, **106**(6):426.
35. Garabedian M, Lain KY, Hansen WF, Garcia LS, Williams CM, Crofford LJ: **Violence against women and postpartum depression.** *J Women's Health* 2011, **20**(3):47–453.
36. Urquia ML, O'Campo PJ, Heaman MI, Janssen PA, Thiessen KR: **Experiences of violence before and during pregnancy and adverse pregnancy outcomes: an analysis of the Canadian Maternity Experiences Survey.** *BMC Pregnancy Childbirth* 2011, **11**:42.
37. Ross LE, Dennis CL: **The prevalence of postpartum depression among women with substance use, an abuse history, or chronic illness: a systematic review.** *J Womens Health* 2009, **18**(4):475–486.
38. Janssen PA, Heaman MI, Urquia ML, O'Campo PJ, Thiessen KR: **Risk factors for postpartum depression among abused and nonabused women.** *Am J Obstet Gynecol* 2012, **207**(6):481–489.
39. Dennis C: **Epidemiology of postpartum depressive symptoms among canadian women: regional and national results from a cross-sectional survey.** *Can J Psychiatr* 2012, **57**(9):537–546.
40. Beydoun HA, Al-Sahab B, Beydoun MA, Tamim H: **Intimate partner violence as a risk factor for postpartum depression among Canadian women in the Maternity Experience Survey.** *Ann Epidemiol* 2010, **20**(8):575–583.

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Past and recent abuse is associated with early cessation of breast feeding: results from a large prospective cohort in Norway

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ABSTRACT

Objective: Breast feeding provides a wide range of health benefits for both infants and mothers. Few studies have examined the impact of past and recent abuse of women on breastfeeding behaviour. The aims of our study were to examine whether exposure to past and recent emotional, sexual or physical abuse was associated with early breastfeeding cessation, and to assess whether a potential association differed for known and unknown perpetrators.

Design: Prospective cohort study.

Setting: Norway, years 1999–2006.

Participants: 53 934 mothers participated in the Norwegian Mother and Child Cohort Study. We included mothers with singleton pregnancy who had responded to three questionnaires (weeks 18 and 30 in pregnancy, and 6 months postpartum) and had answered minimum one of the abuse questions in week 30.

Main outcome measure: ORs were estimated by binary logistic regression with cessation of any (all) breast feeding before 4 months as the outcome, and abuse including subcategories of abuse, as the exposure.

Results: Nearly all women initiated breast feeding, but 12.1% ceased any breast feeding before 4 months and 38.9% ceased full breast feeding before 4 months, but continued partial breast feeding. Overall, 19% of the women reported any adult abuse and 18% reported any child abuse. The highest risk of any breast feeding cessation before 4 months was seen in women exposed to three types of adult abuse (emotional, sexual or physical), with adjusted OR being 1.47 (95% CI 1.23 to 1.76) compared with no abuse. Recent abuse and exposure from known perpetrator resulted in nearly 40% and 30% increased risk, respectively. The OR of any breast feeding cessation for women exposed to any child abuse was 1.41 (95% CI 1.32 to 1.50) compared with no abuse in childhood.

Conclusions: Past and recent abuse of women is strongly associated with early cessation of breast feeding. Abused mothers comprise a key group to target for extra support and breastfeeding assistance.

Strengths and limitations of this study

- This is one of the largest studies to report an association between abuse of women and increased risk of early breastfeeding cessation. Our study provides new significant information about singular and combined types of abuse and breast feeding (emotional, sexual and physical abuse) from one of the largest prospective population-based pregnancy cohorts. It is an important contribution to the field because it is one of the first to document the association between emotional abuse, as singular and combined groups, and breastfeeding cessation.
- The increased risk of early breastfeeding cessation among women who have experienced abuse was observed independently of prior depression, postpartum depression, and other potential confounders and intermediate factors.
- Major strengths of this study include the prospective design; the large sample of women from all regions of Norway, including all age and socioeconomic groups; and detailed information about experiences of abuse, including type of abuse, whether past or recent abuse, and potential confounding factors.
- Since this study is observational, no causal implications can be drawn, and although confounding by other variables was carefully considered, residual confounding cannot be excluded.

BACKGROUND

Breast feeding has long been acknowledged as the optimal infant nutrition conferring beneficial short-term and long-term health effects for both infants and mothers.[1–5] The WHO has since 2001 recommended exclusive breast feeding for the first 6 months of life[6–8] and this has been is adopted by the Norwegian Health Authorities.[9]

Abuse of women is common worldwide, as one in three women during lifetime suffer partner or non-partner abuse.[10] There is an increasing body of research showing that recent and past abusive experiences influences women's physical and mental health negatively, and have a negative impact on reproductive and postpartum health.[11] Adverse effects include adolescent and

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unintended pregnancies, miscarriages, sexually transmitted diseases and postpartum depression,[11–14] all of which are barriers to breast feeding.

Given the overwhelming evidence of the positive effects of breast feeding, knowledge about factors influencing breastfeeding behaviour is essential. Norway has one of the highest breastfeeding rates in the world and almost all mothers initiate breast feeding.[4 15 16] Factors that positively influence breast feeding in Norway are higher educational level of the mother, higher maternal age, being married and multiparity; however, smoking and obesity have shown a negative impact.[15 17 18] There is a lack of knowledge about the impact of past and recent abuse of women on breastfeeding behaviour. Only a few studies have been published and these are preliminary and inconclusive. Most studies have examined only one type of abuse, that is, sexual or physical, although these often occur simultaneously and studies that included perpetrators mostly focused on abuse from partner only.[19–23] The impact of emotional abuse on breast feeding has rarely been studied.[20 23] Furthermore, studies are difficult to compare due to different designs and various definitions of both abuse and breast feeding. The samples are often small, based on clinical cohorts and with a cross-sectional design, hence not applicable to the broader population.

We explored the impact of abuse of women on breastfeeding behaviour in a large prospective population in Norway where the expectations to breast feed are high, and breast feeding is facilitated in the work regulations, for example, paid leave for 1 year. The first aim of our study was to examine whether exposure to adult emotional, sexual or physical abuse as a singular or combined exposure was associated with early breastfeeding cessation. Second, we wanted to assess whether a potential association differed for adult recent and non-recent abuse, and for known and unknown perpetrators. Third, we wanted to examine the association between child abuse and early breastfeeding cessation.

METHODS

Population and study design

The Norwegian Mother and Child Cohort Study (MoBa) is a prospective population-based pregnancy cohort conducted by the Norwegian Institute of Public Health.[24] The participants were recruited to the study through a postal invitation in connection with a routine ultrasound examination offered to all pregnant women in Norway. Participants were recruited from all over Norway from 1999 to 2008, and 40.6% of invited women consented to participate. The cohort now includes 114 500 children and 95 200 mothers. The women were asked to answer questionnaires at regular intervals during pregnancy and after birth. In the current study, we used information from three questionnaires: the baseline questionnaire completed around week 18 of pregnancy (sociodemographics and risk factors), the questionnaire answered in gestational week 30 (abuse questions), and the first follow-up questionnaire after delivery (breastfeeding questions), completed at infant aged 6 months (questionnaires available at http://www.fhi.no/moba). MoBa files are linked to pregnancy and birth records from the Norwegian Medical Birth Registry (NMBR). Written informed consent was obtained. The current study is based on version IV of the quality-assured data files, including participants recruited in years 1999–2006. The research was performed in accordance with the Strobe guidelines.[25] An outline of the Strobe guidelines is added in the online supplementary material.

The inclusion of the study population is described in figure 1. The source population study comprised women who had filled in all three questionnaires and were registered in NMBR (n=64 714). For women participating with more than one pregnancy, only information from the first pregnancy was included. Furthermore, we only included women with singleton pregnancies and those who had answered a minimum of one of the abuse questions, leaving a total of 53 934 for descriptive characteristics. For all adjusted analyses, we included only women with complete information on the exposures and covariates.

VARIABLES

Exposure variables—different abuse categories

The abuse questions and response options are shown in online supplemental figure S1. These questions were part of the third MoBa questionnaire, which was responded to at gestational week 30. The two questions about emotional abuse are similar to those in the

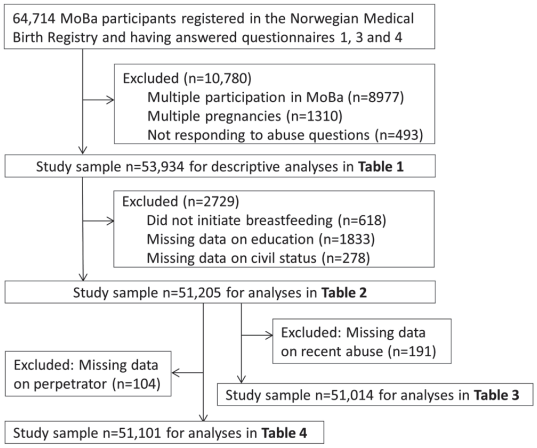

Figure 1 Flow chart of inclusion. Questionnaire 1 was answered in gestational week 18, questionnaire 3 in gestational week 30 and questionnaire 4 was answered 6 months postpartum (MoBa, Norwegian Mother and Child Cohort Study).

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Norvold Abuse Questionnaire,[26] which measures mild and severe emotional abuse. We merged the responses to the two emotional abuse questions into one variable. Women could respond 'no never' to the various types of abuse or 'yes' as an adult (≥18 years) and/or as a child (<18 years) to the various types of abuse. The question about sexual abuse with response options is a modified version of the sexual abuse question in the Abuse Assessment Screen.[27] This screening tool is not validated, but has been used in other studies.[28 29] The question about physical abuse has been used in other studies, but is not validated.[30 31] Women who answered 'yes' to at least one of the adult abuse questions, that is, past or recent adult abuse, were defined as having suffered from any adult abuse. Likewise, women responding 'yes' to one or more of the child abuse questions were defined as having suffered from any child abuse. Information about child abuse was grouped into two non-overlapping categories: 'emotional and/or physical, not sexual' and 'sexual alone or in combination with emotional and/or physical'. Women could also indicate whether or not they had been abused during the past 12 months, and we defined this as recent abuse. All analyses of recent abuse refer to adult recent abuse, not child abuse. Past abuse refers to both child abuse and non-recent adult abuse.

Perpetrators

As part of the abuse questions, women were given the opportunity to reveal who committed the abuse: a stranger, family/relative or other known person (see online supplemental figure S1). The two latter categories were merged into known perpetrator. We categorised the responses about perpetrators into three groups: only known perpetrator, only unknown, and both known and unknown.

Outcome variables: breast feeding

The breastfeeding data are based on three questions about infant nutrition in the questionnaire completed 6 months postpartum. The questions asked about what type of milk (breast feeding or formula feeding) or other liquid the baby had been given in the first week of life and in monthly intervals up until and at the date of filling in the questionnaire (median 27 weeks/190 days). The women also reported the age (in months) of the infant at the time of introduction of semisolid or solid food. Full breast feeding was defined as predominant breast feeding without any formula or solids, but allowing water and vitamins. Any breast feeding included both full and partial breast feeding (ie, breast feeding with concomitant formula or solid foods given). The breastfeeding categories used in the present study are based on WHO definitions.[32] In the present study, four dichotomous breastfeeding variables reflecting breastfeeding behaviour were used as outcome variables: (1) cessation of any breast feeding before 4 months, (2) cessation of full breast feeding before 4 months, (3) cessation of any breast feeding before 6 months and (4) cessation of full breast feeding before 6 months. We present descriptive data for all breastfeeding variables. As the main outcome, we present results only for the cessation of any breast feeding before 4 months, while results for the other breastfeeding variables are reported as text.

Other variables

Characteristics associated with any adult abuse in our study population have been examined previously[30] and the following potential confounding variables were included based on this knowledge: being exposed to child abuse, civil status, maternal age, smoking and alcohol intake. We also included as potential confounding variables the following maternal characteristics and risk factors for early cessation of full or any breast feeding: maternal education, parity, body mass index (BMI), mode of delivery, preterm delivery, social support, prior depression and postpartum depression.

Information about maternal age, education, civil status, pre-pregnant weight and height (for calculating of BMI), parity, prior depression, social support, alcohol intake and smoking in pregnancy, was retrieved from the baseline questionnaire (week 18 in pregnancy). Information about postpartum depression was obtained from questionnaire 4 (6 months postpartum), whereas information about mode of delivery (caesarean section or vaginal delivery) and preterm delivery was retrieved from NMBR. The categorisation of age, education, civil status, parity, smoking and alcohol is shown in table 1. BMI was calculated as weight in kg/(height)^2 (in m) and dichotomised into <25 (underweight and normal weight) and ≥25 (overweight and obese). Depression prior to current pregnancy was dichotomised into no or yes. Mode of delivery was categorised into vaginal birth or caesarean section. We defined preterm delivery as giving birth at <37th week of gestation on the basis of ultrasound measurements. In the few cases, without ultrasound information (<2%), gestational age was calculated from the first day of last menstrual period. Social support was defined as having anyone other than partner to ask for support, and was dichotomised into no or yes. Postpartum depression was identified and dichotomised based on four questions from the Edinburgh Postpartum Depression Scale and a cut-off score >6, which indicates a moderate level of postpartum depression symptoms. This variable has been described and examined previously in relation to adult exposure to abuse in MoBa.[13]

Statistical analyses

Descriptive statistics of the study population by exposure to any adult abuse are presented in table 1. For testing differences between categories we used Pearson's χ^2 test. We used binary logistic regression to examine the associations between adult abuse and early cessation of breast feeding. The reference group for all analyses of

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Table 1 Characteristics of the study population by any adult abuse in the Norwegian Mother and Child Cohort Study (N=53 934)

	Total		Any adult abuse		
	n	Per cent	n	Per cent	p Value*
All	53 934	100	10 442	19.4	
BF initiation					
No	618	1.1	147	23.8	0.005
Yes	53 316	98.9	10 295	19.3	
Full BF for 4 months					
No	20 991	38.9	4510	21.5	<0.001
Yes	32 325	59.9	5785	17.9	
No BF initiation	618				
Full BF for 6 months					
No	45 802	84.9	8896	19.4	0.102
Yes	7514	13.9	1399	18.6	
No BF initiation	618				
Any BF for 4 months					
No	6539	12.1	1588	24.3	<0.001
Yes	46 777	86.7	8707	18.6	
No BF initiation			147		
Any BF for 6 months					
No	10 341	19.2	2445	23.6	<0.001
Yes	42 945	79.7	7850	18.3	
No BF initiation	618		147		
Age (years)					
14–19	693	1.3	101	14.6	<0.001
20–24	6423	11.9	1162	18.1	
25–29	19 628	36.4	3383	17.2	
30–34	21 945	40.7	4390	20.0	
≥35	5245	9.7	1406	26.8	
Education					
Primary (9 years)	1195	2.2	332	27.8	<0.001
Secondary (12 years)	15 902	29.5	3556	22.4	
Higher ≤4 years	31 432	58.3	5218	16.6	
Higher >4 years	3544	6.6	910	25.7	
Missing information	1861	3.5	426	22.9	
Civil status					
Married	26 572	49.3	4504	17.0	<0.001
Cohabiting	25 543	47.4	5289	20.7	
Not married/cohabiting	1523	2.8	578	38.0	
Missing information	296	0.5	71	24.0	
Child abuse					
No	44 064	81.7	7209	16.4	<0.001
Yes	9870	18.3	3233	32.8	
Parity					
0	27 666	51.3	5155	18.6	<0.001
+1	26 268	48.7	5287	20.1	
Mode of delivery					
Vaginal	50 296	93.3	9627	19.1	<0.001
C-section	3638	6.7	815	22.4	
Preterm delivery					
No (≥37 weeks)	51 258	95.0	9874	19.3	0.026
Yes (<37 weeks)	2472	4.6	521	21.1	
Missing information	204	0.4	47	23.0	
Smoking in pregnancy					
No	49 100	91.0	8954	18.2	<0.001
Yes	4834	9.0	1488	30.8	
Alcohol in pregnancy					
Never	38 931	72.2	7494	18.8	<0.001
Sometimes	7221	13.4	1628	22.5	

Continued

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Table 1 Continued

	Total		Any adult abuse		
	n	Per cent	n	Per cent	p Value*
Daily	47	0.1	19	40.4	
Missing information	6705	12.4	1301	19.4	
BMI					
<25	35 389	66.5	6700	18.7	<0.001
≥25	16 552	30.7	3422	20.7	
Missing information	1490	2.8	320	21.5	
Postpartum depression					
No	47 349	87.8	8370	17.7	<0.001
Yes	5716	10.6	1897	33.2	
Missing information	869	1.6	175	20.1	

*p Value calculated using Pearson's χ^2 test (missing category not included).
BF, breast feeding; BMI, body mass index.

adult abuse was no adult abuse and the reference group for child abuse was no child abuse. Crude and adjusted ORs with 95% CIs were presented and analysed for complete cases only. We included potential confounding variables based on previous knowledge of variables associated with either the exposure or the outcome. We identified potential confounders through directed acyclic graph (DAG) analysis. DAGs provide a method to identify potential confounders and decide which to adjust for.[33] Many of the variables associated with both the exposure and the outcome in this study were intermediate variables rather than confounding variables. The minimal sufficient adjustment variables for estimating the total effect between adult abuse and breastfeeding behaviour were: maternal age, education, civil status and child abuse (see online supplemental figure S2), and these variables were included in all adjusted models. In addition, we evaluated the change in estimates when including intermediate variables: smoking, alcohol intake, parity, preterm delivery, social support, mode of delivery, BMI, preterm delivery and depression prior to pregnancy. Finally, we conducted a sensitivity analysis in which we stratified women according to postpartum depression to evaluate whether the association between adult abuse and breastfeeding behaviour was mediated primarily through postpartum depression. The data programme SPSS V.22 (SPSS Inc, IBM Company, Chicago, Illinois, USA) was used to conduct all analyses. A significance level of 0.05 was used.

RESULTS

The majority of the women in the study population initiated breast feeding (98.9%). Nearly 14% of the infants were fully breast fed up to 6 months postpartum, while almost 80% were still breast fed (table 1). However, 12.1% of mothers ceased any breast feeding before 4 months and 38.9% ceased full breast feeding before 4 months. Overall, 19% of the 53 934 women reported exposure to any adult abuse, and the prevalence of abuse was significantly higher in women who did not initiate breast feeding than in those who did. Likewise, any adult abuse was more prevalent in women who did not continue full or any breast feeding for 4 or 6 months. Exposure to abuse was more prevalent in women who were older, not married, had been exposed to child abuse, were parous, had caesarean delivery, smoked, reported drinking alcohol in pregnancy, were overweight or obese, and in women with postpartum depression.

Adult abuse was significantly associated with early cessation of breast feeding (table 2). Women exposed to any adult abuse had 25% increased adjusted ORs of cessation of any breast feeding before 4 months compared to their counterparts (table 2, model 1). When the other breastfeeding variables were used as the outcome, women who reported any adult abuse also had significantly increased odds of full breastfeeding cessation before 4 months and of any breastfeeding cessation before 6 months, respectively. However, no significant association was found between any adult abuse and full breastfeeding cessation before 6 months (data not shown).

In the analyses of singular or combined types of adult abuse, we found that women reporting emotional abuse only (adjusted OR 1.28, 95% CI 1.18 to 1.39), emotional and physical abuse (adjusted OR 1.39, 95% CI 1.18 to 1.62), emotional and sexual abuse (adjusted OR 1.27, 95% CI 1.02 to 1.58) or those reporting all three types of abuse, that is, emotional, sexual and physical (adjusted OR 1.47, 95% CI 1.23 to 1.76) were more likely to stop any breast feeding before 4 months than women without abuse (table 2, model 2).

Women reporting recent abuse (table 3) had 40% increased odds (adjusted OR 1.40, 95% CI 1.24 to 1.58) of early cessation of any breast feeding compared to non-exposed women, while those reporting non-recent adult abuse had 21% increased odds of early breastfeeding cessation (adjusted OR 1.21, 95% CI 1.12 to 1.30).

When abuse was grouped by type of perpetrator (table 4), exposure from 'known perpetrator only' was significantly associated with cessation of any breast

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Table 2 Logistic regression analyses of the association between types of adult abuse and cessation of any breast feeding (BF) before 4 months (cessation of any BF <4 months) (N=51 205)

	Cessation of any BF <4 months				Crude		Adjusted	
Abuse category	n	(%)	n	(%)	OR	95% CI	OR	95% CI
Model 1								
No adult abuse (reference)	41 396	80.8	4728	11.4	1.00		1.00	
Any adult abuse	9809	19.2	1511	15.4	1.41	(1.33 to 1.50)	1.25	(1.17 to 1.34)
Model 2 (abuse categories)								
No adult abuse (reference)	41 396	80.8	4728	11.4	1.00		1.00	
Physical only	567	1.1	65	11.5	1.00	(0.77 to 1.30)	0.96	(0.73 to 1.25)
Sexual only	976	1.9	107	11.0	0.96	(0.78 to 1.17)	0.94	(0.76 to 1.16)
Emotional only	5464	10.7	843	15.4	1.42	(1.31 to 1.53)	1.28	(1.18 to 1.39)
Physical+emotional	1149	2.2	210	18.3	1.73	(1.49 to 2.02)	1.39	(1.18 to 1.62)
Physical+sexual	189	0.4	24	12.7	1.13	(0.73 to 1.75)	0.95	(0.61 to 1.47)
Sexual+emotional	630	1.2	101	16.0	1.18	(1.19 to 1.84)	1.27	(1.02 to 1.58)
Sexual+physical+emotional	827	1.6	161	19.3	1.86	(1.56 to 2.21)	1.47	(1.23 to 1.76)

The adjusted model included the following variables: maternal age, education, civil status and any child abuse. Analysed for complete cases.

feeding before 4 months (adjusted OR 1.28, 95% CI 1.19 to 1.37). The result for 'both known and unknown' perpetrators was significant in the crude model only, while exposure from 'unknown perpetrator only' was not associated with cessation of any breast feeding.

Compared with crude ORs, the adjusted ORs for the association between adult abuse and early breastfeeding cessation were attenuated to some degree, for example, from 1.41 to 1.25 in model 1, table 2. Of the four confounding variables, maternal education resulted in the largest change in the estimate. Additional adjustment for smoking, alcohol intake, parity, preterm delivery, social support, mode of delivery, BMI and depression prior to pregnancy did not substantially change in the OR of interest (<10%), suggesting that the effect of adult abuse on early breastfeeding cessation was not mediated through these.

We have previously shown an association between abuse history and risk of postpartum depression,[13] and we were particularly interested in examining postpartum depression as an intermediate variable in the analysis of adult abuse and early cessation of any breast feeding. The prevalence of breastfeeding cessation before 4 months was 19.3% among women with postpartum depression and 12.4% in those without postpartum depression. However, when stratifying women by postpartum depression, the association between any adult abuse and cessation of any breast feeding was evident and comparable in women with postpartum depression (adjusted OR 1.21, 95% CI 1.12 to 1.30) and in those without (adjusted OR 1.23, 95% CI 1.06 to 1.44). Accordingly, the association between exposure to abuse and early cessation of breast feeding cannot be explained by postpartum depression, rather by the abuse.

Exposure to child abuse was by itself significantly associated with any breastfeeding cessation before 4 months; the OR for any child abuse was 1.41 (95% CI 1.32 to 1.50). When child abuse was categorised into 'emotional and/or physical, not sexual' and 'sexual alone or in combination with emotional and/or physical', the association with breastfeeding cessation was OR 1.27 (95% CI 1.17 to 1.37) for emotional and/or physical, and OR 1.66 (95% CI 1.51 to 1.82) for sexual abuse. We had no available variables that could be considered confounders of child abuse. However, child abuse was still significantly associated with early breastfeeding cessation in the adjusted models, including adult abuse, maternal age, education and civil status with OR for any child abuse: 1.12 (95% CI 1.05 to 1.20). This association was stronger for sexual (sexual only or combined with other abuse) than for emotional and/or physical, not sexual, with OR 1.22 (95% CI 1.11 to 1.65) and OR 1.06 (95% CI 0.98 to 1.15), respectively.

Table 3 Logistic regression analyses of the association between time of adult abuse (recent/not recent) and cessation of any breast feeding (BF) before 4 months (cessation of any BF <4 months) (N=51 014)

	Cessation of any BF <4 months				Crude		Adjusted	
	n	(%)	n	(%)	OR	95% CI	OR	95% CI
No adult abuse (reference)	41 396	81.1	4728	11.4	1.00		1.00	
Any adult, but not recent	7495	14.7	1084	14.5	1.31	(1.22 to 1.41)	1.21	(1.12 to 1.30)
Any adult recent abuse	2123	4.2	394	18.6	1.77	(1.58 to 1.98)	1.40	(1.24 to 1.58)

The adjusted model included the following variables: maternal age, education, civil status and any child abuse. Analysed for complete cases.

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Table 4 Logistic regression analyses of the association between perpetrator of adult abuse and cessation of any breast feeding (BF) before 4 months (cessation of any BF <4 months) (N=51 101)

	Cessation of any BF <4 months				Crude		Adjusted	
Perpetrator	n	(%)	n	(%)	OR	95% CI	OR	95% CI
No adult abuse (reference)	41 396	81.0	4728	11.4	1.00		1.00	
Known only	7850	15.4	1232	15.7	1.44	(1.35 to 1.55)	1.28	(1.19 to 1.37)
Unknown only	861	1.7	99	11.5	1.01	(0.82 to 1.25)	1.09	(0.88 to 1.35)
Known and unknown	994	1.9	165	16.6	1.54	(1.30 to 1.83)	1.18	(0.99 to 1.41)

The adjusted model included the following variables: maternal age, education, civil status and any child abuse. Analysed for complete cases.

DISCUSSION

The main finding in our study was that exposure to past and recent abuse was strongly associated with early cessation of any breast feeding. The strongest effect was seen for women exposed to three types of abuse (sexual, physical and emotional), with nearly 50% increased adjusted ORs of any breastfeeding cessation before 4 months compared to the non-exposed women. Recent abuse and exposure from known perpetrator resulted in nearly 40% and 30% increased risk of any breastfeeding cessation before 4 months, respectively. Women who reported a history of child abuse were more likely to stop breast feeding before 4 months than women who had not experienced child abuse. This was independent of later exposure to adult abuse. The theoretical causal pathway between adult abuse and breastfeeding behaviour is complex and it is challenging to disentangle which variables to use as confounders. We used a DAG approach and landed on including only maternal age, education, civil status and child abuse (see online supplemental figure S2). Of these, adjustment for maternal education resulted in the largest change of the estimate. Educational attainment has been shown to be strong indicator of socioeconomic differences in Norway.[34–37] The DAG clarified how a number of the potential confounding variables were intermediate variables in the theoretical effect pathway and therefore, not true confounders.[33] Furthermore, the sensitivity analyses showed that the estimated effect of abuse exposure on breastfeeding cessation was not primarily mediated through the intermediate variables. Interestingly, the association between adult abuse and breastfeeding cessation was evident both in women with and without postpartum depression.

Strengths and limitations

The major strengths of our study include the large sample size representing women from all regions of Norway, the prospective design and comprehensive information about singular and combined types of abuse, as well as extensive information on breast feeding. In addition, information about a wide range of potential confounding factors was available. The low participation rate in MoBa is a concern (40.4%), with under-representation of women <25 years of age, smokers and those living alone.[38] The potential selection bias in MoBa has been evaluated. Despite differences in prevalence estimates, associations between eight exposures and outcomes did not differ between MoBa participants and a representative sample from the general pregnant population, indicating that selection bias did not affect the associations.[38] Retrospective reporting is a challenge, but difficult to avoid in this kind of study. The women's reporting of breast feeding 6 months postpartum could be subject to recall error. However, studies have found that maternal recall of breast feeding give accurate estimates shortly after delivery[39] and even 20 years after delivery, as described in a recent Norwegian study.[40]

Comparison with other studies

Previous studies have mainly investigated the associations between child sexual abuse, intimate partner violence (IPV) or pregnancy-related abuse and breast feeding.[19–23 41] Our findings of abused women being significantly less likely to initiate breast feeding, and significantly more likely of early cessation of breast feeding, are in agreement with four other studies.[19 20 42 43] A study in 811 randomly selected women in five large primary health clinics in Brazil reported that severe physical IPV increased the risk of early breastfeeding cessation.[19] A cross-sectional study comprising 1200 Chinese women showed that those who did not experience IPV during pregnancy were significantly more likely to initiate breast feeding than abused women.[20] A review of 800 medical records in one family practice in the USA revealed an association between lack of breast feeding and physical and sexual abuse of mothers or their children.[42] A longitudinal study in 296 adolescent females showed that participants who had experienced IPV ceased breast feeding earlier than their counterparts.[43] Contrary to this, three studies found no differences in breast feeding between abused and non-abused women.[21 22 44] An Australian cluster randomised controlled trial involving 2621 women from 80 maternal and child health centres found that women exposed to IPV were less likely to initiate breast feeding than non-abused women, but rates of any breast feeding did not differ significantly between non-exposed women and those exposed to IPV when other factors such as maternal age and education were taken into account.[21] Women in this study were older and had higher educational level than the general pregnant population, which are factors that may promote higher

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breastfeeding rates and underestimate abuse prevalence. Likewise, a large American population-based study (n=118 579), found no significant association between recent IPV and any breastfeeding initiation or cessation during the first month postpartum.[22] The results indicated that smoking and sociodemographic factors were more important predictors of breast feeding duration than abuse.[22] Finally, no association was found between abuse and initiation and duration of breast feeding in a case–control study with 212 low-income women in two cities in the USA.[44] The women were interviewed about past and recent domestic abuse, and classification of either breast feeding or formula feeding was determined by the type of food voucher the women received postpartum. The duration of breast feeding was assessed by the number of months the women received the vouchers. Important limitations of the study include the small sample size and possible sample bias. The authors discussed the possibility that women who had decided to breast feed were more likely to participate in the study than those who planned to bottle feed.

There are different reasons why results from the three studies differed from ours. One important factor is the differences in methodology and time frame of abuse as well as breast feeding. These also differ with regard to sample size and study design, which may influence prevalence rates of both abuse and breast feeding, respectively. Accordingly, one could argue that the low prevalence rates of IPV in two of the studies, that is, 6.3%[21] and 5.8%,[22] may be underestimated and influence the results. In comparison with other studies, our study has a large sample size, a prospective design and clearly defined exposure and outcome variables which corroborate the scientific evidence that past and recent abuse are negatively associated with breast feeding.

Emotional abuse and breast feeding

Few studies have examined emotional abuse and breast feeding,[20 23] and to the best of our knowledge, no previous studies support the current finding of a significant association between emotional abuse as a singular or combined exposure and early cessation of any breast feeding. A cross-sectional study from Hong Kong (n=1200) found that women who experienced emotional or physical abuse during pregnancy were more likely to be found in the artificial feeding group, than in the breast feeding or mixed feeding groups.[20] In the current study, all abuse categories containing emotional abuse were significantly associated with cessation of any breast feeding in the adjusted models: emotional abuse only, emotional and sexual abuse, emotional and physical abuse, and emotional, physical and sexual abuse. This result is important and underpins that emotional abuse should be included when studying adverse health outcomes of past or recent abuse.

Child abuse and breast feeding

Child abuse was associated with both the exposure and the outcome in our study, and was modelled as a confounder. Furthermore, we found that child abuse was significantly associated with increased risk of any breastfeeding cessation before 4 months, independent of adult abuse. This association was stronger for child sexual abuse than for physical and/or emotional abuse only. The few existing previous studies that examined associations between child abuse and breast feeding have focused only on child sexual abuse and these have reported contradictory results.[23 41 45] The US study in 1220 nationally representative women, aforementioned, found that women with a history of self-reported child sexual abuse were twice as likely to initiate breast feeding as their non-abused counterparts, whereas breastfeeding duration did not differ significantly.[23] A Canadian qualitative study found that the women's experiences of child sexual abuse affected their breastfeeding decisions, with the breastfeeding experience possibly resulting in re-traumatisation for some abused women and a healing effect on others.[41] A literature review concluded that women with a history of child sexual abuse was more likely to express desire to and initiate breast feeding than their non-abused counterparts, but that both past and recent abuse could lead to breastfeeding cessation.[45] A study from the USA in 1220 women from a nationally representative sample showed that childhood emotional and physical abuse was not significantly associated with breast feeding, whereas childhood sexual abuse was.[23] The same study aimed to investigate a possible cumulative effect of abuse, but was unable to assess these effects due to few women reporting multiple types of abuse. Our results showed a strong independent effect of child abuse—particularly child sexual abuse—on breastfeeding cessation. This is an important finding and may indicate that sexual abuse early in life results in even worse adverse long-term effects than do other types of abuse.

Public health implications

During the past decades, several interventions to promote breast feeding in Norway have been implemented, and breastfeeding rates are higher in Norway than in most European countries.[4 16] Baby-friendly hospitals, free antenatal care, free follow-up by community nurses and favourable maternity leave in Norway are societal priorities to enhance breastfeeding duration. Early maternal return to work can be a barrier both to initiating and duration of breast feeding.[46 47] Norway has a long parental leave which supports the possibility of breast feeding throughout the first year of life.[48] Mean breastfeeding duration in Norway is about 10 months. Although, the majority of women in Norway breast feed for at least 6 months, a large decline in full breast feeding occurs between 3 and 4 months, and some women also discontinue any breast feeding within the first 6 months.[15 49] An Australian longitudinal cohort

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study showed that women qualified for paid maternity leave had significantly reduced odds of reporting combined physical and emotional IPV the first year postpartum compared to non-working women.[50] The current study showed that despite high breastfeeding rates and a favourable breastfeeding policy in Norway, past and recent abuse of women increased the prevalence of early breastfeeding cessation. These findings indicate that all women need to be screened for abuse during pregnancy because of its impact on maternal and child health. Recommendations urging caregivers to ask women about past and recent abuse have recently been implemented in the revised antenatal care guidelines in Norway. However, more research is needed on how antenatal care providers can recognise or ask about abuse, and which strategies to choose for support and breastfeeding assistance.

CONCLUSION

The current study shows that past and recent abuse of women is strongly associated with early cessation of breast feeding. Our results also underpin the need for emotional abuse to be included in studies of the adverse health effect of abuse. Given the convincing evidence of the beneficial effects of breast feeding both for the mother and the infant, it is crucial to promote high breastfeeding rates. Mothers with a history of past or recent abuse comprise a key group to target for extra support and breastfeeding assistance.

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REFERENCES

1. WHO. *Evidence of the long term effects of breastfeeding: systematic reviews and meta-analyses*. WHO/NHD/01082007. Geneva: World Health Organization, 2007.
2. Ip S, Chung M, Raman G, *et al*. Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries. Evidence Report/Technology Assessment. 2007:1–186.
3. Natland ST, Nilsen TI, Midthjell K, *et al*. Lactation and cardiovascular risk factors in mothers in a population-based study: the HUNT-study. *Int Breastfeed J* 2012;7:8.
4. Hörnell A, Lagström H, Lande B, *et al*. Breastfeeding, introduction of other foods and effects on health: a systematic literature review for the 5th Nordic Nutrition Recommendations. *Food Nutr Res* 2013;57:10.3402/fnr.v57i0.20823. Published Online 12 Apr 2013. doi:10.3402/fnr.v57i0.20823.
5. Dermer A. Breastfeeding and Women's Health. *J Womens Health (Larchmt)* 1998;7:427.
6. WHO. The optimal duration of exclusive breastfeeding. Report of an expert consultation, Geneva, Switzerland, 28–30 March 2001.
7. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. *Cochrane Database Syst Rev* 2012;8:CD003517.
8. WHO. Global strategy for infant and young child feeding. 2003. http://www.who.int/nutrition/publications/infantfeeding/9241562218/en/
9. Norwegian Directorate of Health. Recommendations for infant feeding during the first year of life [in Norwegian]. https://helsedirektoratet.no/folkehelse/kosthold-og-ernering/spedbarnsernering-mat-og-drikke-det-forste-aret http://helsedirektoratet.no/lists/publikasjoner/anbefalinger-for-spedbarnsernering.pdf
10. WHO. WHO report highlights violence against women as a 'global health problem of epidemic proportions'. New clinical and policy guidelines launched to guide health sector response. WHO in partnership with the London School of Hygiene & Tropical Medicine and the South African Medical Research Council. WHO media release. WHO, the London School of Hygiene & Tropical Medicine and the South African Medical Research Council, 2013. http://www.who.int/mediacentre/news/releases/2013/violence_against_women_20130620/en/index.html
11. WHO. Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. Department of Reproductive Health and Research, London School of Hygiene and Tropical Medicine, South African Medical Research Council, 2013.
12. García-Moreno C, Stöckl H. Protection of sexual and reproductive health rights: addressing violence against women. *Int J Gynaecol Obstet* 2009;106:144–7.
13. Sørbø MF, Grimstad H, Bjørngaard JH, *et al*. Adult physical, sexual, and emotional abuse and postpartum depression, a population based, prospective study of 53,065 women in the Norwegian Mother and Child Cohort Study. *BMC Pregnancy Childbirth* 2014;14:316.
14. Pallitto CC, García-Moreno C, Jansen HAFM, *et al*. Intimate partner violence, abortion, and unintended pregnancy: results from the WHO Multi-country Study on Women's Health and Domestic Violence. *Int J Gynecol Obstet* 2013;120:3–9.
15. Kristiansen AL, Lande B, Øverby NC, *et al*. Factors associated with exclusive breast-feeding and breast-feeding in Norway. *Public Health Nutr* 2010;13:2087–96.
16. Callen J, Pinelli J. Incidence and duration of breastfeeding for term infants in Canada, United States, Europe, and Australia: a literature review. *Birth* 2004;31:285–92.
17. Lande B, Andersen LF, Bærug A, *et al*. Infant feeding practices and associated factors in the first six months of life: the Norwegian Infant Nutrition Survey. *Acta Pædiatr* 2003;92:152–61.
18. Winkvist A, Brantsæter AL, Brandhagen M, *et al*. Maternal body mass index and gestational weight gain are associated with initiation and duration of breastfeeding among Norwegian mothers. *J Nutr* 2015;145:1263–70.

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19. Moraes CL, de Oliveira AS, Reichenheim ME, *et al.* Severe physical violence between intimate partners during pregnancy: a risk factor for early cessation of exclusive breast-feeding. *Public Health Nutr* 2011;14:2148–55.
20. Lau Y, Chan KS. Influence of intimate partner violence during pregnancy and early postpartum depressive symptoms on breastfeeding among Chinese women in Hong Kong. *J Midwifery Womens Health* 2007;52:e15–20.
21. James JP, Taft A, Amir LH, *et al.* Does intimate partner violence impact on women's initiation and duration of breastfeeding? *Breastfeed Rev* 2014;22:11–19.
22. Silverman JG, Decker MR, Reed E, *et al.* Intimate partner violence around the time of pregnancy: association with breastfeeding behavior. *J Womens Health (Larchmt)* 2006;15:934–40.
23. Prentice JC, Lu MC, Lange L, *et al.* The association between reported childhood sexual abuse and breastfeeding initiation. *J Hum Lact* 2002;18:219–26.
24. Magnus P, Irgens LM, Haug K, *et al.* Cohort profile: the Norwegian Mother and Child Cohort Study (MoBa). *Int J Epidemiol* 2006;35:1146–50.
25. von Elm E, Altman DG, Egger M, *et al.* The strengthening of the Reporting of Observational Studies in Epidemiology (STROE) statement: guidelines for reporting observational studies. *J Clin Epidemiol* 2008;61:344–9.
26. Swahnberg IM, Wijma B. The NorVold Abuse Questionnaire (NorAQ): validation of new measures of emotional, physical, and sexual abuse, and abuse in the health care system among women. *Eur J Public Health* 2003;13:361–6.
27. Rabin RF, Jennings JM, Campbell JC, *et al.* Intimate partner violence screening tools: a systematic review. *Am J Prev Med* 2009;36:439–45.e4.
28. Stenson K, Heimer G, Lundh C, *et al.* Lifetime prevalence of sexual abuse in a Swedish pregnant population. *Acta Obstet Gynecol Scand* 2003;82:529–36.
29. Johnson JK, Haider F, Ellis K, *et al.* The prevalence of domestic violence in pregnant women. *BJOG* 2003;110:272–5.
30. Sørbø MF, Grimstad H, Bjørngaard JH, *et al.* Prevalence of sexual, physical and emotional abuse in the Norwegian mother and child cohort study. *BMC Public Health* 2013;13:186.
31. Lukasse M, Schei B, Vangen S, *et al.* Childhood abuse and common complaints in pregnancy. *Birth* 2009;36:190–9.
32. WHO. *Indicators for assessing infant and young child feeding practices.* Part 1: definitons. Geneva: WHO, 2008. http://www.whqlibdoc.who.int/publications/2008/9789241596664_eng.pdf
33. Greenland S, Pearl J, Robins JM. Causal diagrams for epidemiologic research. *Epidemiology* 1999;10:37–48.
34. Nilsen SM, Bjørngaard JH, Ernstsen L, *et al.* Education-based health inequalities in 18,000 Norwegian couples: the Nord-Trøndelag Health Study (HUNT). *BMC Public Health* 2012;12:998.
35. Nilsen SM, Krokstad S, Holmen TL, *et al.* Adolescents' health-related dietary patterns by parental socio-economic position, the Nord-Trøndelag Health Study (HUNT). *Eur J Public Health* 2010;20:299–305.
36. Petersen CB, Mortensen LH, Morgen CS, *et al.* Socio-economic inequality in preterm birth: a comparative study of the Nordic countries from 1981 to 2000. *Paediatr Perinat Epidemiol* 2009;23:66–75.
37. Nilsen SM, Bjørngaard JH, Erntsen L, *et al.* Education-based health inequalities in 18,000 Norwegian couples: the Nor-Trøndelag Health Study (HUNT). *BMC Public Health* 2012;12:998.
38. Nilsen RM, Vollset SE, Gjessing HK, *et al.* Self-selection and bias in a large prospective pregnancy cohort in Norway. *Paediatr Perinat Epidemiol* 2009;23:597–608.
39. Cupul-Uicab LA, Gladen BC, Hernández-Ávila M, *et al.* Reliability of reported breastfeeding duration among reproductive-aged women from Mexico. *Matern Child Nutr* 2009;5:125–37.
40. Natland S, Andersen L, Nilsen T, *et al.* Maternal recall of breastfeeding duration twenty years after delivery. *BMC Med Res Methodol* 2012;12:179.
41. Wood K, Van Esterik P. Infant feeding experiences of women who were sexually abused in childhood. *Can Fam Physician* 2010;56:e136–41.
42. Acheson L. Family violence and breast-feeding. *Arch Fam Med* 1995;4:650–2.
43. Sipsma HL, Magriples U, Divney A, *et al.* Breastfeeding behavior among adolescents: initiation, duration, and exclusivity. *J Adolesc Health* 2013;53:394–400.
44. Bullock LF, Libbus MK, Sable MR. Battering and breastfeeding in a WIC population. *Can J Nurs Res* 2001;32:43–56.
45. Kendall-Tackett KA. Violence against women and the perinatal period: the impact of lifetime violence and abuse on pregnancy, postpartum, and breastfeeding. *Trauma Violence Abuse* 2007;8:344–53.
46. Chuang CH, Chang PJ, Chen YC, *et al.* Maternal return to work and breastfeeding: a population-based cohort study. *Int J Nurs Stud* 2010;47:461–74.
47. Mandal B, Roe BE, Fein SB. The differential effects of full-time and part-time work status on breastfeeding. *Health Policy* 2010;97:79–86.
48. NAV (Norwegian Social Welfare System). Parental benefit in Norway. Information in English. https://www.nav.no/en/Home/Benefits+and+services/Relatert+informasjon/Parental+benefit.353588.cms (accessed 08 May 2015).
49. Häggkvist AP, Brantsæter AL, Grjibovski AM, *et al.* Prevalence of breast-feeding in the Norwegian Mother and Child Cohort Study and health service-related correlates of cessation of full breast-feeding. *Public Health Nutr* 2010;13:2076–86.
50. Gartland D, Hemphill SA, Hegarty K, *et al.* Intimate partner violence during pregnancy and the first year postpartum in an Australian pregnancy cohort study. *Matern Child Health J* 2011;15:570–8.

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Appendix

Appendix

The MoBa study

The MoBa protocol 1 (enrolment) and the MoBa protocol (end of enrolment, revised Oct. 2012), include contact information and consent form. They can be found in the following website. Source reference: Norwegian Institute of Public Health, http://www.fhi.no/artikler/?id=86157

The questionnaires are extensive and easily accessible and therefore not included in this thesis. Source reference: Norwegian Institute of Public Health. The questionnaires can be found at the following website: http://www.fhi.no/studier/den-norske-mor-og-barn-undersokelsen/sporreskjemaer