



## Research paper

# Latent trajectory classes of postpartum depressive symptoms: A regional population-based longitudinal study

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## ABSTRACT

**Purpose:** This study aimed to (a) assess trajectories of women's depressive symptoms during the first year postpartum to (b) identify potential unobserved classes of women as defined by their trajectories, (c) identify antepartum and early postpartum risk factors associated with trajectory classes, and (d) examine the association between trajectory classes and counselling during the postpartum period.

**Methods:** Data on depressive symptoms, using the Edinburgh Postnatal Depression Scale (EPDS), were collected from 1374 women across nine Norwegian well-baby clinics at 1.5, 4, 6, and 12 months postpartum. Well-baby clinics offer universal, free services to all families living in the municipality. Thus, there were no specific exclusion criteria for this study. All clinics had implemented the Edinburgh–method which combines screening for PPD, using the EPDS, with supportive counselling.

**Results:** Analyses showed that depressive symptoms decreased initially, followed by a flattening in symptoms at 6 months. Mixture analyses, however, identified two classes of women with distinct trajectories; (1) a low-risk ( $n = 1249$ , 91%) and (2) a high-risk group ( $n = 119$ , 9%). Complications after birth, elevated prenatal depressive symptoms, previous or current mental illness, and gestational week, predicted trajectory class membership. Women in the high-risk group were more likely to receive counselling than low-risk women.

**Limitations:** Women had higher educational level than the general population and one of the municipalities did not have a 12-months routine consultation.

**Conclusion:** Findings suggest heterogeneity among women in their depressive symptoms during the first year postpartum with a distinct set of risk factors associated with high-risk women. This has implications for the prevention and follow-up of women during pregnancy and the first year after childbirth.

## 1. Introduction

Postpartum depression (PPD) affects 10–15% of women (Gavin et al., 2005; O' Hara and Swain, 1996). Symptoms of PPD usually peak at 4 to 6 weeks and, thereafter, gradually decline from 3 months and towards the end of the first year postpartum (Haga et al., 2012; Vliegen et al., 2014). In most studies, it is assumed that participants come from one single, homogenous population that follow the same trajectories in symptomatology over time (see e.g., Horwitz et al., 2009; Seto et al., 2005; Wang et al., 2011; Woolhouse et al., 2015). However, more recent studies suggest that there are sub-groups of mothers who follow unique trajectories of depressive symptoms, which are associated with different antecedents and outcomes (Ashman et al., 2008; Campbell et al., 2009, 2007; Cents et al., 2013; Fredriksen et al., 2016; Giallo et al., 2015, 2014; Gross et al., 2009; Luoma et al., 2015; Matijasevich

et al., 2015; Mora et al., 2009; Najman et al., 2017; Postpartum Depression: Action Towards Causes and Treatment (PACT) Consortium, 2015; Sutter-Dallay et al., 2012; van der Waerden et al., 2015a, 2015b).

Studies have consistently identified 2–6 classes of women with distinct trajectories and classes of women with minimal symptoms of depression and/or with stable, persistent symptomatology. Some of these have investigated trajectories from mid-pregnancy and up to 1–3 years postpartum (Cents et al., 2013; Fredriksen et al., 2016; Luoma et al., 2015; Mora et al., 2009; Sutter-Dallay et al., 2012), but only one study appears to have examined trajectories in a clinical setting (Christensen et al., 2011). Examining maternal depressive symptoms limited to critical timepoints in the postpartum period is; first of all, more in line with knowledge about PPD (see e.g., Vliegen et al., 2014), and, second, enables us to capture any unique trajectories and risk factors associated with maternal depression that may, potentially, be

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more relevant for clinical work.

Demographic risk factors such as young age, low education, and ethnicity, tend to be associated with higher, but also moderate, persistent, and stable trajectories (see e.g., Campbell et al., 2007; Cents et al., 2013; van der Waerden et al., 2015b). Contextual and psychosocial antecedents such as family stress, low parenting self-efficacy, and social support (or lack thereof; e.g., Ashman et al., 2008; Giallo et al., 2014; Mora et al., 2009), have also been identified to predict to higher and stable trajectories, as well as reports of mental health problems, substance use, and other psychiatric risk factors (see e.g., Fredriksen et al., 2016; Matijasevich et al., 2015; van der Waerden et al., 2015b). This wide variety of risk factors may be due to methodological differences between studies (e.g., measurement of depressive symptoms at different timepoints), but may also suggest that there is not sufficient research in this area yet. Furthermore, these studies have consistently found that children whose mothers were assigned to higher trajectories reported more emotional and behavioural problems, than children of mothers assigned to lower trajectories (Ashman et al., 2008; Campbell et al., 2007; Cents et al., 2013; Giallo et al., 2015; Gross et al., 2009; Matijasevich et al., 2015; van der Waerden et al., 2015a). This demonstrates the importance of early prevention and treatment of PPD and examination of maternal trajectories in clinical settings.

Early interventions for PPD show considerable uncertainty regarding their effects, although some appear more beneficial than others (Morrell et al., 2016). One promising psychosocial approach is the ‘Edinburgh–method’ which uses the Edinburgh Postnatal Depression Scale (EPDS) for screening for depressive symptoms, in combination with supportive counselling. The Edinburgh–method is based on the work by Cox et al. (2014), and has been shown to be effective and acceptable (Brealey et al., 2010; Brugha et al., 2011; Morrell et al., 2009a, 2009b). It has been estimated to reduce the prevalence of depression up to 6 months after birth, from 10 to 6% (Larun et al., 2013). However, none of the studies on trajectory classes have examined patterns of depressive symptoms in community-based clinical settings and associations with counselling, while none of the studies on the Edinburgh–method have examined associations of trajectories with maternal, infant, and partner characteristics. This may have important diagnostic, preventive, therapeutic, and prognostic implications for clinical work.

### 1.1. Aim of this study

The purpose of this study was to (a) assess the trajectory of women's depressive symptoms during the first year postpartum to (b) identify potential unobserved classes of women as defined by their trajectories, (c) identify antepartum and early postpartum risk factors associated with classes, and (d) examine the association between classes and supportive counselling. To the best of our knowledge, no studies have examined trajectories of maternal depression in communities where the Edinburgh–method is implemented in well-baby clinics, which approximately 100% of the target population visits frequently during the first year postpartum, and the association between trajectories and supportive counselling.

## 2. Methods

### 2.1. Study design

The present study is a Norwegian population-based prospective cohort study, approved by the Regional Committees for Medical and Health Research Ethics (project no.: 2011/124). Participants were recruited from nine well-baby clinics in five municipalities (i.e., Hamar, Larvik, Løten, Nøtterøy, and Tønsberg) between May 2011 and May 2012. Well-baby clinics offer routine child health care monitoring (i.e., growth and development) but also comprehensive health promoting and preventive services. As such, well-baby clinics are community-

based clinics with interdisciplinary teams (i.e., midwives, public health nurses, medical doctors, physiotherapists, and psychologists), working closely with other public health services (e.g., general physicians, daycare centres, and mental health services).

Every expectant or new mother was invited to participate in the study by a midwife or a public health nurse (PHN) at their first consultation, either during pregnancy or at the first home–visit within two weeks after birth. Exceptions were made for asylum seekers, as it was highly uncertain for how long they would stay in the region, and families with active plans of moving out of the region at the time of recruitment. The study had no specific exclusion criteria since well-baby clinics provide free, universal services to all families with children aged 0 to 5. Thus, all families were provided with oral and written information about the study and all families who consented to participate were included. Due to differences in routine consultations, one of the municipalities, including four of the clinics, did not have a routine consultation at 12 months. This is the main reason for the lower number of participants at this measurement.

### 2.2. Setting and participants

All well-baby clinics had implemented the Edinburgh–method (Cox et al., 2014), and all midwives and PHNs were trained in (1) postpartum depression, (2) identification of mental health problems in new mothers, (3) administering the EPDS, (4) providing supportive counselling, and (5) participated in monthly group supervision, prior to study onset. Upon completing the EPDS, all mothers had an initial session with the midwife or PHN exploring their answers and discussing her current mental health. This initial session, which followed immediately upon filling in the EPDS, is supposed to rule out any false positives or false negatives and validate women's report on depressive symptoms (e.g., a woman turns out to be more depressed than reported or a high level of symptoms may have a plausible explanation such as a baptism or wedding). A combination of the midwife's or PHN's clinical judgement and the mother's need for support, rather than an EPDS-score of 10 or above alone, determined further follow-up or need for referral. Mothers with indication of severe depression (i.e., EPDS > 12 and clinical confirmation) were referred to their general physician (GP) for further evaluation and treatment, while all women indicating thoughts about self-harm (i.e.,  $\geq 1$  on item 10 on the EPDS) were routinely asked for a history of self-harm and ideation about harming their child. The midwives and PHN's also had clear referral plans, if necessary, and plans for whom to consult if in doubt (e.g., community psychologist). Furthermore, all women with moderate symptom level were offered counselling by the trained midwife or PHN. On average, women received 4–6 sessions with counselling. Women with little progress were referred to specialist care.

### 2.3. Measures

Depressive symptoms were assessed at routine consultations at 1.5, 4, 6, and 12 months postpartum by midwives or PHNs, using the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987; Eberhard-Gran et al., 2001). The EPDS is a 10-item questionnaire with scores ranging from 0–30, and has validated cut-offs at  $\geq 10$  and  $\geq 12$  that indicate a ‘minor depression’ and ‘probable major depression’, respectively (Matthey et al., 2006). In this study, cut-offs were used to count the number of women with a minor and probable major depression at each time point, while continuous scores were used to model the development and heterogeneity in depressive symptoms. In the present study, the Cronbach's alphas ranged from 0.80 to 0.82 across measurements.

A variety of risk factors were routinely collected by the midwife or PHN from parents or health records at the clinic, either at the first consultation during pregnancy or first home–visit after birth. More specifically, maternal risk factors included age < 20 or > 36 years,

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