

# Maternal Sick Leave Due to Psychiatric Disorders Following the Birth of a Child With Special Health Care Needs

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## Abstract

**Objective** Child-related stress following the birth of a child with special health care needs (SHCN) can take a toll on parental health. This study examined how the risk of sick leave due to psychiatric disorders (PD) among mothers of children with SHCN compares with that of mothers of children without SHCN during early motherhood. **Methods** Responses from 58,532 mothers participating in the Norwegian Mother and Child Cohort Study were linked to national registries and monitored for physician-certified sick leave from the month of their child's first birthday until the month of their child's fourth birthday. **Results** As compared with mothers of children without SHCN, mothers of children with mild and moderate/severe care needs were at substantial risk of a long-term sick leave due to PD in general and due to depression more specifically. **Conclusions** Extensive childhood care needs are strongly associated with impaired mental health in maternal caregivers during early motherhood.

**Key words:** child care; depression; employment; Norwegian Mother and Child Cohort Study; sick leave; special health care needs; work absence.

## Introduction

Caring for children with special health care needs (SHCN) may take a toll on parental health, divert attention from typical aspects of family functioning, and can also influence possibilities for participation in paid employment (DeRigne, 2012; Hauge et al., 2013; Reichman, Corman, & Noonan, 2008). Children with SHCN often have a substantial need for professional medical care and are typically at risk of having chronic

physical, developmental, behavioral, or emotional conditions that require health-related services of a type or amount beyond that required by typically developing children of similar age (McPherson et al., 1998; Perrin, 2002). Caring for a child with SHCN can be an enormous responsibility and can far exceed the demands of the typical caregiver role (Raina et al., 2004). This caregiver role is typically also not chosen or planned, and preparation for and adjustment to the

role will most often need to occur once it has already been acquired.

The care demands associated with raising a child with SHCN are typically both highly intensive and long-lasting, and tend to fall more heavily on mothers as compared with fathers (Crowe & Michael, 2011; Curran, Sharples, White, & Knapp, 2001; Tadema & Vlaskamp, 2010). High levels of child-related stress, constant or returning worries about the child's condition, and sorrow arising from the "loss" of an expected healthy child may also compromise the caregiver's health. In terms of mental health, mothers of children with SHCN have been found to display elevated levels of depressive symptoms as compared with both fathers and mothers raising children without SHCN, with symptom levels often remaining high over time (Brehaut et al., 2009; Kuhlthau, Kahn, Hill, Gnanasekaran, & Ettner, 2010; Nes et al., 2014; Olsson & Hwang, 2001, 2006; Resch, Elliott, & Benz, 2012). Such mental health impairments often arise from the chronic strains involved in the caregiver role, as well as from emotional reactions evoked and sustained by the child's condition (Raina et al., 2004). As such, mothers caring for children with the most severe conditions are commonly also those most affected (Churchill, Villareale, Monaghan, Sharp, & Kieckhefer, 2010).

The additional care demands associated with raising a child with SHCN may influence parents in other vital areas as well. In terms of work participation following the birth of a child with SHCN, participation levels among mothers are commonly more affected than those of fathers (Parish & Cloud, 2006). Early parenthood and the responsibility of caring for young children in general may require adjustments to parental work participation, and women especially tend to reduce work hours or temporarily stop working when their children are young (Bø, Kitterød, Køber, Nerland, & Skoglund, 2008). Implementation of comprehensive family and equality policies, such as the Norwegian Kindergarten Act, has enabled women especially to continue participation in paid work and to pursue their occupational careers during the early years of motherhood (Norwegian Ministry of Education and Research, 2005). With close to 90% of children attending kindergarten (Statistics Norway, 2011), women with young children have steadily increased their employment levels since the 1990s to a current rate of about 73%, a rate increasing further as their children age (Bø et al., 2008). Moreover, with an employment rate exceeding 80% for women aged  $\geq 25$  years, the overall employment levels among Norwegian women of childbearing age is high and higher than in most The Organisation for Economic Co-operation and Development (OECD) countries (Statistics Norway, 2011). As unemployment is low in

Norway, well below the OECD average (OECD, 2011), most nonemployed women are out of paid work due to other reasons than unemployment or lack of available child care.

Despite work participation being high in Norway, maternal employment opportunities appear rather restricted when caring for children with SHCN (Hauge et al., 2013). Many mothers of children with SHCN report having missed days from work, having cut work hours, or having left employment altogether, due to their children's additional health care needs (DeRigne & Porterfield, 2010; Hedov, Wikblad, & Anneren, 2006; Porterfield, 2002). Apart from its obvious financial aspects, employment provides additional benefits such as social inclusion and appreciation by others, and may also reduce feelings of isolation and peripherality (Shearn & Todd, 2000). However, the inability to properly meet employment demands while providing optimal care for their children may necessitate shorter or longer employment adjustments for many mothers. The additional care demands associated with raising a child with SHCN may thus prevent mothers at risk of mental health problems from using the likely beneficial respite effects of employment (Morris, 2012).

Work impairment due to mental health problems in general is a considerable and increasing public health problem in many Western countries. After musculoskeletal disorders, psychiatric disorders (PD) are now the most common diagnostic group reported by physicians on sick leave certificates (Hensing & Wahlström, 2004). Recovery and return to work after a sick leave due to PD generally takes longer than absence due to other conditions, and many long-term absentees do not recover and end up on permanent disability pensions (Bratberg, Gjesdal, & Mæland, 2009; Henderson, Glozier, & Holland Elliott, 2005). Apart from studies showing elevated levels of depressive symptoms and an increased risk of reducing or leaving employment altogether, little is known about how the additional care demands associated with raising a child with SHCN may impact on shorter or longer work absences due to PD among mothers who remain in the work force. Population-based research on employment-related consequences of caring for children with SHCN is scant, and longitudinal research based on data other than parental report is needed (Reichman et al., 2008). In addition, most studies on mental health problems in caregivers of children with SHCN rely on small samples, are often recruited in clinical settings, and may thus lack generalizability to the wider population (Resch et al., 2012).

To address some of the abovementioned shortcomings, this study aimed to explore associations between caring for a child with SHCN and sick leave due to PD

during the early years of motherhood. Self-report data from a large Norwegian population-based birth cohort was applied and linked with national registry-based data on physician-certified sick leave and relevant background factors associated with both sick leave and maternal employment status more generally. Based on the previous literature, we expected the risk of sick leave due to PD in general and due to depression more specifically to be higher among mothers of children with SHCN as compared with mothers of typically developing children during early motherhood. We further hypothesized that the mothers' risk of sick leave due to PD would increase with the severity of the child's care needs.

## Methods

### Study Sample

The study population included participants in the population-based Norwegian Mother and Child Cohort Study (MoBa), conducted by the Norwegian Institute of Public Health (Magnus et al., 2006). Pregnant women were recruited at their first routine ultrasound examination at weeks 17–18 of gestation between 1999 and 2008 (response rate 40.6%), and the cohort includes approximately 90,000 unique observations of expectant mothers, as participants with about 107,000 pregnancies in total among them (Nilsen et al., 2009). The MoBa cohort is linked to the Medical Birth Registry of Norway (Irgens, 2000), which contains the national identification number for all participants in the study, allowing linkage with the Central Population Register, benefit registries from the Norwegian Labour and Welfare Administration, and the education and income registries of Statistics Norway. This linkage provided longitudinal data with annual updates for both mothers and their children throughout 2010. For the present study, only mothers with children aged  $\geq 4$  years by the end of 2010 were considered for inclusion and a total of 66,211 cases were found eligible. Among eligible cases, we excluded cases where the mother had emigrated or where either the mother or the child had died by the time of follow-up. Norwegian sick leave regulations are complex and dependent on employment status, income level, as well as receipt of other social benefits (Norwegian Labour and Welfare Administration, 2015). Therefore, as sickness benefit is granted to compensate for a temporary loss of income from employment while on sick leave, we also excluded cases for which the mothers were not considered to be at risk of sick leave 1 year after childbirth, that is, participants not active in the work force at the time of childbirth. This latter group included mothers with an income from employment below the limit entitling them to sickness benefit, in addition to mothers granted disability

pension before the start of follow-up, leaving a sample of 58,532 mothers and children for the analyses. The study was approved by the Regional Committee for Medical Research Ethics in south-eastern Norway.

### Outcomes and Study Variables

The study outcome was physician-certified sick leave due to PD. In Norway, sickness benefit is granted to compensate for loss of income for employed members of the National Insurance Scheme who are temporarily occupationally disabled due to an illness or injury. The benefit is connected to employment status, and economic compensation equivalent to the individual's employment income is given from the first day of a sick leave period to all employees with an income exceeding the limit entitling them to sickness benefit (i.e., approximately 4,600 € in 2010). Employers are obliged to compensate for the first 16 days of a sick leave period, and a certificate from a physician evaluating whether there are significant medical reasons for an absence from work is required after 3 days of absence. All periods of sick leave exceeding 16 days for up to 1 year are compensated for and recorded, including the main diagnosis, by the Norwegian Labour and Welfare Administration, with diagnostic information according to the International Classification of Primary Care (ICPC-2). Based on information on sickness benefit obtained from the registry, three measures reflecting sick leave due to PD during follow-up were constructed. First, an indicator for any sick leave exceeding 16 days with the ICPC codes P01–P99 was constructed (i.e., any psychiatric disorder). Second, an indicator for a long-term leave (i.e., continuous absence exceeding 8 weeks) with the ICPC codes P01–P99 was constructed, and third, an indicator reflecting a long-term leave due to depression (i.e., ICPC P03 or P76) was constructed. Any sick leave for conditions other than the ICPC codes P01–P99 was ignored.

The main exposure was early childhood SHCN, assessed as receipt of attendance benefit by the age of 3 years. Attendance benefit is a universally accessible benefit provided by the Norwegian Labour and Welfare Administration to compensate for domestic care-related expenses. The benefit may be granted to children with a medically documented need for special care and supervision due to illness, injury, or congenital disabilities. To be eligible for the benefit, the care has to be provided in a private care setting and is granted for persons who are not able to cope without supervision or who need help in performing activities of daily living. Attendance benefit is granted solely based on the health care needs of the recipient and is not dependent on the financial situation of the recipient or the family. The benefit is granted to children who have care needs well exceeding those common to

otherwise healthy children of comparable age, and about 2–4% of children <18 years of age receive attendance benefit. The most common diagnoses among recipients include endocrine and neurological diseases, asthma, congenital malformations, and mental conditions, most of which are conditions that have an early onset and last over a prolonged period of time (Bjerkedal, Kristensen, Skjeret, & Brevik, 2006; Sletvold & Rendedal, 2004). Based on the degree to which the condition impairs the child's physical or psychological functional ability, and how demanding the care arrangement is for the parents, higher rate benefit may be granted to children whose need for care and supervision is considerably greater than that covered by ordinary attendance benefit. Ordinary benefit at rate 1 reflects mild care needs, while rate 2 reflects moderate care needs, and rates 3 and 4 reflect severe care needs. Moderate care needs entitle the recipient to a benefit twice as large as that for mild care needs, whereas benefit entitlement for severe care needs is four to six times that for mild care needs. Congenital malformations and neurological and respiratory diseases are common among recipients of higher rate attendance benefit. Due to relatively low numbers of children receiving benefits for the most severe care needs, rates 2–4 were merged for the analyses.

Information on factors commonly associated with both sick leave and with maternal employment status more generally were included and adjusted for in the analyses (Allebeck & Mastekaasa, 2004; Hensing & Wahlström, 2004). The Medical Birth Registry of Norway provided data on the mothers' age and marital status at the time of childbirth, while the Central Population Register provided data on the mothers' number of children <6 years of age by the end of the year of childbirth. Data on educational attainment was obtained from the National Education Database of Statistics Norway, and the mothers' highest level of attainment at the time of childbirth was categorized as below high school graduate, high school graduate, lower college or university level, and higher college or university level, including postgraduate levels. At weeks 17–18 of gestation, the expectant mothers were asked to complete a five-item version of the Hopkins Symptom Checklist (SCL-5), reflecting susceptibility to anxiety and depression. The SCL-5 has been shown to perform similarly to the long version and is suitable for detecting psychological problems in a nonpsychiatric setting (Tambs & Moum, 1993). The mothers were asked to indicate on a 4-point scale if, during the past 2 weeks, they had been bothered: (1) *not at all*, (2) *a little*, (3) *quite a bit*, or (4) *very much by problems such as "Feeling blue" and "Worrying too much about things."* Cronbach's  $\alpha$  was .79 in the current sample and an average item score >2.0 was used as a clinical cutoff for psychological distress according to convention (Strand, Dalgard, Tambs, & Rognerud, 2003).

## Statistical Analysis

To take into account variation in the year and month of childbirth among participants in the MoBa cohort and to ensure equal and comparable time at risk for all participants in the study, all periods of sick leave due to PD were rescaled into its corresponding month following childbirth. In Norway, parental leave is connected to employment and a parent is entitled to parental benefit and leave from work during the child's first year of life if he or she has been gainfully employed with a pensionable income for at least 6 of the 10 months before the benefit period (Nordic Council of Ministers, 2011). The start of follow-up was thus set to the month the child turned 1 year of age for all participants, and in cases of no sick leave due to PD, follow-up lasted until the month the child turned 4 years of age. For cases with a sick leave due to PD, censoring occurred (i.e., participants left the risk pool) at the respective month of any first sick leave due to PD, a long-term leave due to PD, or a long-term leave due to depression. In addition, mothers being granted disability pension, and who therefore left the work force during the follow-up period, were no longer considered to be at risk of sick leave and were censored at the respective month of receipt of disability pension (equalling 0.6% of the sample). Analyses were performed using Stata/SE version 12.1 (StataCorp, 2011).

Descriptive analyses were performed to assess demographic differences between mothers of children with and without SHCN on the covariate factors included in all models estimated (i.e., maternal age, educational attainment, marital status, number of preschoolers, and psychological distress). Hazard ratios (HR) with 95% confidence intervals (CI) to reflect participants' risk of a sick leave due to PD were computed using the Cox proportional hazard model, adjusted for the covariate factors listed above. The rate of sick leave among mothers of children without SHCN was used as the reference for which to compare the rates of sick leave among mothers of children with mild and moderate/severe care needs, respectively. The HR is an outcome measure in time-to-event analysis, and an HR of 1 indicates that event rates are equal across respective groups, while for instance an HR of 2 indicates that twice as many in the group in question experience the event as in the reference group. If the range of the corresponding 95% CI does not contain the value 1, there is a significant difference in risk at the  $p < .05$  level between the reference group and the comparison group in question.

## Results

Assessed as receipt of attendance benefit by 3 years of age, a total of 1.7% of the women in this population-based sample were mothers of children with medically

documented SHCN, of whom approximately half were mothers of children with mild care needs, while the other half were mothers of children with moderate and severe care needs. Close to 50% of the children were granted attendance benefit already by 1 year of age, and close to 80% were granted the benefit by 2 years of age. Receipt of attendance benefit at an early age was most common among children with moderate and severe care needs. Descriptive analyses were performed to examine demographic differences between mothers of children with and without SHCN on the covariate adjustment factors, all assessed before the start of follow-up. No significant differences were found for either maternal age or marital status at the time of childbirth, while a significantly larger proportion of mothers of children without SHCN had completed education at a college or university level (68.7%) and were having their first child (60.7%) as compared with mothers of children with SHCN (62.3% [ $\chi^2$  18.8;  $p < .01$ ] and 56.7% [ $\chi^2$  6.4;  $p < .01$ ], respectively). In addition, a somewhat larger proportion of mothers of children with SHCN reported psychological distress during early pregnancy (15.1%) as

did mothers of children without SHCN (10.2% [ $\chi^2$  25.4;  $p < .01$ ]).

A considerable proportion of the mothers in this population-based sample had at least one sick leave due to PD during 1–4 years after childbirth. Moreover, a consistent association between the severity of the child's health care needs and the mother's risk of being absent from work due to PD was evident. Whereas close to 11% of mothers of children without any documented SHCN had a sick leave due to PD during the follow-up period, the corresponding proportions among mothers of children with mild and moderate/severe care needs were about 16% and 21%, respectively (Table I). This trend was even more evident for long-term sick leaves due to PD in general and due to depression more specifically. Mothers of children with mild and moderate/severe care needs had approximately twice the amount of physician-certified sick leave lasting for  $\geq 8$  weeks as compared with mothers of children without SHCN for both long-term measures.

After adjustment for factors commonly associated with sick leave and maternal employment status more

**Table I.** Percentages and Adjusted Hazard Ratios for Maternal Sick Leave Due to Psychiatric Disorders 1–4 Years Following Childbirth

	Number of observations	Short-term sick leave (<8 weeks)			Long-term sick leave ( $\geq 8$ weeks)					
		Any psychiatric disorder (ICPC P01–P99)			Any psychiatric disorder (ICPC P01–P99)			Depression (ICPC P03 or P76)		
		% sick leave	Hazard ratio	95% confidence interval	% sick leave	Hazard ratio	95% confidence interval	% sick leave	Hazard ratio	95% confidence interval
Total	58,532	10.9			6.6			3.2		
Child SHCN										
None	57,354	10.7	1.00	Reference	6.5	1.00	Reference	3.1	1.00	Reference
Mild	495	16.2	1.47	[1.18–1.83]	11.5	1.71	[1.31–2.22]	6.5	1.93	[1.36–2.74]
Moderate/severe	503	21.1	1.99	[1.64–2.41]	13.5	2.05	[1.62–2.61]	6.8	2.05	[1.46–2.88]
Maternal age										
$\leq 24$ years	5,719	11.4	1.00	Reference	6.3	1.00	Reference	3.4	1.00	Reference
25–29 years	19,799	10.9	1.07	[0.97–1.17]	6.4	1.16	[1.03–1.31]	3.1	1.12	[0.95–1.33]
30–34 years	23,047	10.5	1.04	[0.95–1.14]	6.5	1.21	[1.07–1.37]	3.0	1.12	[0.94–1.32]
$\geq 35$ years	9,967	11.3	1.12	[1.01–1.24]	7.3	1.35	[1.19–1.54]	3.5	1.30	[1.08–1.56]
Educational attainment										
<High school graduate	4,252	13.1	1.42	[1.27–1.59]	8.1	1.44	[1.25–1.66]	4.1	1.62	[1.32–1.99]
High school graduate	14,108	11.9	1.33	[1.22–1.45]	7.3	1.39	[1.24–1.55]	3.9	1.64	[1.39–1.93]
Lower college/university	31,391	10.7	1.22	[1.13–1.32]	6.4	1.22	[1.11–1.35]	3.0	1.30	[1.12–1.51]
Higher college/university	8,781	8.8	1.00	Reference	5.4	1.00	Reference	2.3	1.00	Reference
Marital status										
Married/cohabiting	56,762	10.8	1.00	Reference	6.5	1.00	Reference	3.1	1.00	Reference
Single	1,770	13.9	1.13	[0.99–1.29]	9.3	1.24	[1.05–1.45]	5.0	1.30	[1.04–1.61]
Number of preschoolers										
One	35,463	10.6	1.00	Reference	6.4	1.00	Reference	3.1	1.00	Reference
Two	20,940	11.2	1.08	[1.02–1.13]	6.8	1.05	[0.99–1.13]	3.2	1.04	[0.94–1.14]
Three or more	2,129	11.9	1.16	[1.02–1.32]	7.4	1.16	[0.99–1.37]	3.5	1.17	[0.92–1.48]
Psychological distress										
No	52,492	9.8	1.00	Reference	5.9	1.00	Reference	2.7	1.00	Reference
Yes	6,040	19.7	2.08	[1.95–2.22]	12.8	2.23	[2.06–2.41]	7.1	2.55	[2.28–2.84]

Note. All estimates adjusted for other variables in respective models.

ICPC = international classification of primary care; SHCN = special health care needs.

generally, the mothers' risks of being absent from work due to PD were strong and consistent for both short-term and long-term absences. Apart from the effects of educational attainment and self-reported psychological distress, which were both associated with a substantial increased risk of sick leave, the mothers' age, marital status, and number of preschoolers had only limited effects on their risk of being absent from work due to PD. In addition to an increased risk of sick leave due to any PD (HR: 1.47; 95% CI: 1.18–1.83; HR: 1.99; 95% CI: 1.64–2.41, respectively), mothers of children with mild (HR: 1.71; 95% CI: 1.31–2.22) and moderate/severe care needs (HR: 2.05; 95% CI: 1.62–2.61) both had a substantial risk of being long-term absent from work due to any PD in general and due to depression more specifically (HR: 1.93; 95% CI: 1.36–2.74; HR: 2.05; 95% CI: 1.46–2.88, respectively) compared with mothers of children without SHCN. Thus, the risk of sick leave due to PD following the birth of a child with SHCN was substantial and demonstrates that children's SHCN constitute an important prospective factor for mental health problems in maternal caregivers during the early years of motherhood.

## Discussion

The findings of this population-based study show that mental health impairments are common among mothers of children with SHCN. Assessed as being granted sickness benefit due to PD during early motherhood, their mental health was significantly poorer than that of mothers of healthy children of similar age for all outcomes examined. Additional childhood care needs were related to an increased risk of both short-term and long-term sick leave due to PD, evident for mothers of children with mild and moderate/severe care needs alike. The risk of sick leave was strong also after adjustment for important factors such as self-reported susceptibility to anxiety and depression, in this study assessed before any knowledge of children's SHCN. Self-reported susceptibility to psychological distress has previously been shown to be strongly related to long-term sick leave due to PD in both men and women (Foss et al., 2010). The finding that the excess risk of being absent from work due to PD remained strong in the adjusted models indicates that the care demands and child-related stress experienced by many mothers of children with SHCN may have a profound impact on their mental health. Our findings thus concur with findings from previous studies on caregiver health following the birth of a child with SHCN (Brehaut et al., 2009; Olsson & Hwang, 2006; Resch et al., 2012). As children with additional needs often require care and assistance over an extended period of time in which otherwise healthy children become gradually more independent, their mothers may

therefore be at prolonged risk of mental health problems. The often long-lasting care responsibilities associated with raising children with SHCN have been associated with depressive symptoms in caregivers well beyond the early years of motherhood (Rosenthal, Learned, Liu, & Weitzman, 2013). Because recovery from psychiatric conditions generally takes longer than recovery from other conditions (Henderson et al., 2005), many caregivers may thus be prevented from participating in regular employment and from using the possible respite effects of employment for a prolonged period of time (Gordon, Cuskelly, & Rosenman, 2008; Morris, 2012).

To our knowledge, this is the first study to investigate associations between children's SHCN and mothers' risk of sick leave due to PD. Application of a large population-based sample with longitudinal register-based data constitutes a major strength, and ensures complete follow-up of all eligible participants who were considered to be at risk of sick leave 1 year after childbirth (i.e., all gainfully employed with an income entitling them to sickness benefit). Such register-based studies are a powerful alternative to traditional longitudinal approaches, which often suffer from a large loss to follow-up and of systematic attrition (Wadsworth et al., 2003). Moreover, the data obtained from national registers provide valid objective measurements of factors previously assessed mostly through parental self-report, evident for both sick leave and for children's SHCN. As such, the use of data on sick leave with physician-certified diagnostic information in accordance with the established ICD-10 coding system constitutes a considerable strength. Although sick leave with PD and its corresponding ICD-10 diagnoses reflect psychiatric health problems resulting in lowered work capacity only among those employed, work participation among Norwegian women is high during early motherhood (Bø et al., 2008), including that of mothers of young children with SHCN (Hauge et al., 2013). Still, it may be that the extent of sick leave due to PD is underestimated due to the stigma associated with PD in general. However, as diagnoses are confidential and as knowledge of PD has increased while the stigma associated with these conditions has decreased, physician-certified sick leave is likely a more valid measurement than traditional self-reports, which may be prone to both selection and reporting bias (Bratberg et al., 2009; Stansfeld et al., 1995).

Moreover, while parents know best the specific care needs of their children and parental report has been shown to be fairly reliable for severe conditions, parental report of children's SHCN may be subject to both response and recall bias that can invalidate findings (Brehaut et al., 2009). Although several studies have investigated employment-related consequences of specific conditions such as asthma and autism,

variation in severity among individual cases may be great and need not reflect the actual care burden for the parents (van Dyck, Kogan, McPherson, Weissman, & Newacheck, 2004). Applying a medically documented assessment of the extent of the child's health care needs, relative to healthy children of similar age, may therefore better reflect the additional parental care burden associated with raising a child with SHCN. Attendance benefit is universally accessible and no children with documented needs, cared for within a private care setting, are left out of the benefit. Although attendance benefit is granted to compensate for domestic expenses related to the child's additional care needs, not even the maximum amount granted for the most severe conditions will compensate for a loss of regular income. As such, it is not likely that attendance benefit alone is an incentive for mothers to reduce work hours or leave paid work altogether. Rather, it is likely that mothers who cannot remain in regular employment due to children's SHCN will gradually experience a more constrained economic situation.

Some limitations of the present study also need to be acknowledged. Although not uncommon for large epidemiological studies (Hartge, 2006), the response rate in the MoBa cohort is lower than optimal. Self-selection to the study may thus result in deviations from the larger population from which the women were sampled. Comparisons of cohort participants with all women giving birth in Norway during the same period identified several deviations in prevalence estimates, notably the underrepresentation of women <25 years of age (Nilsen et al., 2009). However, as young women are less likely to be stably employed in the labor market (OECD, 2011), they are also less likely to have an income from employment exceeding the limit entitling them to sickness benefit and thus of being eligible for the present study. As we adjusted for age and as deviations between the MoBa cohort and the general population mostly reflect differences in prevalence estimates rather than exposure-outcome associations (Nilsen et al., 2009), selection bias is not likely to have threatened the validity of associations reported herein. In addition, as consent to participate in the study was obtained during early pregnancy before any knowledge of children's SHCN, and as the data obtained from national registries ensures complete follow-up of all participants considered eligible for sickness benefit, bias due to possible systematic attrition is also reduced. Moreover, the study of mental health impairments following the birth of a child with SHCN based on the mother's use of sick leave is restricted to those in employment only. Consequently, we are not able to observe the mental health in mothers not participating in the labor market. Although many mothers withdraw from the

labor market following the birth of a child with SHCN, most do not, and temporary withdrawal from the labor market during early motherhood is common among mothers of children without SHCN alike (Bø et al., 2008; Hauge et al., 2013). Thus, our findings on mental health impairments following childbirth are not likely to be systematically biased based on the mothers' withdrawal from the labor market.

Another potential limitation that deserves some attention is that our exposure measure of children's SHCN yields receipt of attendance benefit by age 3 years only. As such, it is possible that some children are not identified as having SHCN by the end of the follow-up period, while in reality having care needs well exceeding those of otherwise healthy children. However, as receipt of attendance benefit is based on a medically documented need for special care and supervision, the special needs of children that may affect their mothers' risk of sick leave due to PD will likely precede being granted the benefit. As approximately 80% of the children receiving attendance benefit in this study were granted the benefit already by 2 years of age, children's SHCN is likely to influence mothers' mental health, necessitating prolonged work absences already from an early age. Moreover, although the study included a sizeable sample of Norwegian mothers, too few of their children were nonetheless identified as having moderate and severe care needs for them to be analyzed as distinct categories. As the severity of children's SHCN has previously been shown to be associated with maternal employment-related outcomes (Hauge et al., 2013), it is possible that its effect on mothers' use of sick leave is somewhat attenuated for the most severe conditions. However, as mothers of children with mild and moderate/severe care needs had an increased risk of sick leave due to PD alike, their risk was nevertheless different from that of mothers of children without SHCN during the early years of motherhood.

Notwithstanding the limitations outlined above, the present study provided reliable evidence that caring for children with SHCN can indeed take a toll on the mental health of many caregivers. The consistent finding that mothers of children with both mild and more severe health care needs are more often long-term absent from work due to PD in general and due to depression more specifically, indicates that their often heavier-than-average caregiving burdens can severely impact their own health and may possibly impact on the overall welfare of the entire family in the long run (Reichman et al., 2008). Prolonged work absences due to their own or their children's health impairments can lead to feelings of isolation, erosion of qualifications, and lowered self-esteem for this group of mothers, making return to work increasingly more difficult and

increasing the mothers' risk of ending up on permanent disability pensions (Bratberg et al., 2009; Shearn & Todd, 2000). Inclusion of employees faced by such challenges in more adapted and flexible work arrangements might hinder some mothers of children with SHCN from dropping out of employment altogether. Furthermore, mental health impairments need not only affect the mothers themselves. Maternal depression has been shown to be related also to child adjustment problems across a wide age range (Downey & Coyne, 1990; Goodman et al., 2011). Children with SHCN are likely to be particularly vulnerable to adverse effects of their mothers' mental health impairments, with maternal depression constituting an additional source of disadvantage faced by this group of children who are already at risk. The psychological, behavioral, and economic implications outlined underscore the importance of early identification and intervention. Services and support for mothers that address their emotional reactions and challenges are clearly needed. Affected parents and appropriate health care services therefore need information relating to particular challenges and risks faced by families raising children with SHCN. Reducing parenting stress and alleviating their caregiving burdens can therefore serve as important targets for future prevention and intervention (Cousino & Hazen, 2013).

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