

Infant Sleep Disturbance Is Associated with Preconceptional Psychological Distress: Findings from the Southampton Women's Survey

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Study Objective: To determine whether preconceptional psychological distress is associated with infant sleep disturbance.

Design: Prospective cohort study

Setting: Southampton, UK.

Participants: A cohort of women from the Southampton Women's Survey (SWS), who were recruited between 20-34 years of age and followed through their subsequent pregnancies and beyond; a total of 874 mother-infant pairs were involved in the study.

Measurements and Results: Preconceptional psychological distress was measured with the General Health Questionnaire (GHQ-12). When their infants were 6 and 12 months of age, mothers were asked to report the number of times babies woke on average between the hours of midnight and 06:00 each night during a 2-week period. Preconceptional psychological distress was a strong predictor of infant night waking at

both 6 and 12 months of age, independent of the effects of postnatal depression, bedroom sharing, and other confounding factors. At 6 months, preconceptional distress was associated with a 23% increased risk of waking (prevalence ratio [PR] 1.23, 95% CI 1.06-1.44), and at 12 months with a 22% increased risk (PR 1.22, 95% confidence intervals [CI] 1.02-1.46).

Conclusions: Women with preconceptional psychological distress are more likely to have babies with sleep disturbance during infancy, independent of whether they suffered from postnatal depression.

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INFANT SLEEP IN THE FIRST 3 MONTHS OF LIFE IS CHARACTERIZED BY FREQUENT NIGHT WAKING, NECESSARY TO ALLOW FEEDING TO MEET THE NUTRITIONAL demands of rapid growth. The remainder of this first year of life is a critical period for maturation of sleep, characterized by a gradual increase in nocturnal sleep and a reciprocal decrease in diurnal sleep. During this latter period, some infants begin to self-soothe after spontaneous night wakings.¹ Failure to self-soothe and frequent disruptive night waking is clinically relevant for several reasons. Firstly, frequent night waking in later infancy predicts sleep problems at 3 years of age, which, in turn, are associated with behavioral problems.² Suboptimal sleep quality may also impair learning, an important consideration in early childhood development.³ Finally, infant night waking disrupts parental sleep; evidence shows that maternal sleep disturbance predicts maternal mood, stress, and fatigue.⁴ Maternal depression following pregnancy has been linked with an increased risk of infant and childhood sleep problems, although lack of longitudinal data has limited our understanding of direction of effects. However, recent evidence from the Avon Longitudinal Study of Parents and Children (ALSPAC) suggests that maternal anxiety and depression during pregnancy are associated with an increased risk of infant sleep problems at 18 and 30 months of age.⁵ It is not clear whether maternal mental health problems that predispose to infant sleep problems are present prior to pregnancy.

We have examined the relationship between preconceptional psychological distress and sleep problems during infancy in the Southampton Women's Survey (SWS)—a population-based study of women surveyed before pregnancy and followed up after the birth of their baby.

METHODS

SWS is a population-based study of 12,500 non-pregnant women aged 20-34 years resident in the city of Southampton, UK. All women in Southampton aged 20-34 between 1998 and 2002 were targeted; those who became pregnant were followed up. A description of the cohort and study methodology has been published.⁶

From March 2000, all women enrolled in the survey were asked to complete the General Health Questionnaire (GHQ-12) before pregnancy. The GHQ-12 is a short screening instrument with good sensitivity for depression, but it is not specific and also detects anxiety disorders.⁷ For each question on the GHQ-12, there are 4 response options. The 2 items indicating a lower likelihood of depressive symptoms were scored as 0, and the other two items as 1. The scores were summed across the 12 questions, and women with a score ≥ 3 were categorized as positive for significant psychological distress.⁸ Of 7,020 women who completed the GHQ-12, a total of 874 delivered singleton infants before the end of 2003; they were followed up when the babies were 6 and 12 months of age. Median time between GHQ-12 completion and conception was 279 days (interquartile range [IQR] 105 to 479). At the 6- and 12-month follow-up interviews mothers were asked how often their babies had woken on average between the hours of midnight and 06:00 each night during the previous 2 weeks. This period was chosen because

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Table 1—Prevalence Ratio of Waking Once or More Each Night at 6 and 12 Months of Age: Findings of Mutually Adjusted Poisson Regression Analyses

	Prevalence ratio (95% CI) for waking once or more each night at 6 months of age	Prevalence ratio (95% CI) for waking once or more each night at 12 months of age
Shared bedroom	1.32 (1.14 to 1.53)	1.73 (1.46 to 2.05)
Breastfed within 4 weeks of interview	1.45 (1.24 to 1.70)	1.54 (1.27 to 1.85)
Maternal preconceptional depression	1.22 (1.05 to 1.43)	1.21 (1.01 to 1.45)
Maternal educational attainment	1.07 (1.01 to 1.14)	b
Maternal smoking during pregnancy	a	0.78 (0.60 to 1.020)

None of the remaining confounding factors considered (infant gender, maternal age, alcohol consumption during pregnancy, receipt of benefits and postnatal depression) added significantly to the model. ^aMaternal smoking during pregnancy was not a significant predictor of waking at 6 months of age and so was not included in the final regression model. ^bMaternal educational attainment was not a significant predictor of waking at 12 months of age and so was not included in the final regression model

infant waking during these hours is likely to interrupt parental sleep and thus be clinically relevant.

We used Poisson regression analysis with robust variance to estimate prevalence ratios (PRs) and 95% confidence intervals for waking once or more a night at 6 and 12 months in relation to the factors of interest. The influences of potential confounding factors were assessed in adjusted models. The variables considered were maternal age, possible postnatal depression (measured at 6 months with Edinburgh Postnatal Depression Scale [EPDS⁹]), educational attainment, receipt of benefits, smoking and alcohol consumption during pregnancy, infant's sex, birthweight-for-gestational age z-score, whether infants were breastfed within 4 weeks of the interview, and whether the infant shared a bedroom.

The SWS was approved by the Southampton and South West Hampshire Local Research Ethics Committee.

RESULTS

Analyses relate to 874 women who completed the GHQ-12 and their singleton babies. Of these, 776 women and babies had complete 6-month data and contributed to analyses at 6 months; 758 had complete 12-month data and contributed to analyses at 12 months.

Approximately a quarter (n = 255, 29%) of women were positive on the GHQ-12 for psychological distress before pregnancy. Compared with the 619 women who did not have preconceptional psychological distress, women with psychological distress tended to be younger at the birth of their baby—mean (SD) 28.8 (4.0) years, compared with 30.63 (3.7) years in the women without psychological distress (P = 0.008). Women with preconceptional psychological distress were more likely to be in receipt of benefits than other women—42 (16.5%) of the women in the group with psychological distress were receiving benefits compared with 69 (11.2%) in the other group (P = 0.03). There were no statistically significant differences between the 2 groups in relation to any of the other confounding variables considered at baseline. These included infant birthweight and gender, proportion of infants who shared bedrooms at 6 and 12 months of age, proportions of women who smoked or drank alcohol during pregnancy, and proportion of women educated to degree level or above.

The proportions of infants waking once or more each night were 46% and 39% at 6 and 12 months respectively. These proportions were greater for infants born to women with preconceptional psychological distress than for those born to other women at 6 months (52% vs 43%, P = 0.03) and 12 months (46% vs 36%, P = 0.015) of age. The median number of night wakings at 6 months in infants born to mothers with preconceptional psychological distress was 1 (IQR 0 to 2) compared with 0.25 (IQR 0 to 1) in the infants born to other mothers. At 12 months, the corresponding median (IQR) in infants born to mothers with preconceptional psychological distress was 0.5 (0 to 1) compared with 0.15 (0 to 1) in infants born to other mothers. In regression analyses (Table 1), the strongest independent influence on night waking was bedroom sharing (PRs of 1.38, 95% CI 1.19-1.60; and 1.76, 95% CI 1.49-2.09 at 6 and 12 months, respectively). Further analysis (not presented) revealed that this effect is predominantly due to infants sharing bedrooms with their parents rather than other members of the family. Preconceptional psychological distress was a strong predictor of infant night waking at both 6 and 12 months of age, independent of the effects of bedroom sharing, maternal educational attainment, smoking during pregnancy, and whether infants were breastfed within 4 weeks of the interview. EPDS measurements revealed that overall 42% of women had possible postnatal depression. However, maternal postnatal depression was not associated with infant night waking. None of the other confounding variables, including postnatal depression, contributed significantly to the multivariate model (see Table 1). At 6 months, preconceptional psychological distress was associated with a 23% increased risk of waking (PR 1.23, 95% CI 1.06-1.44), and at 12 months with a 22% increased risk (PR 1.22, 95% CI 1.02-1.46).

DISCUSSION

In this population-based study, we found that women with preconceptional psychological distress were more likely to report night waking in their infants than women without preconceptional psychological distress. The associations were observed when infants were 6 and 12 months of age and were independent of the effects of postnatal depression, whether infants shared a bedroom with other family members, and other confounding factors.

A strength of our study was the use of the GHQ-12 and the EPDS Scale, validated measures of psychological distress, and postnatal depression, respectively. Recent research suggests that GHQ-12 and EDPS are highly correlated when used in the postnatal period.¹⁰ The SWS is representative of the population of England and Wales in relation to socioeconomic factors, although ethnic minorities are somewhat under-represented.⁶ We assessed sleep disturbance as frequency of night waking between midnight and 06:00 over a 2-week period, based on maternal report. While objective measures, such as actigraphy, provide a more precise assessment of sleep quality, parental report of night waking has been shown to be a more relevant discriminator of clinical sleep problems.¹¹ Data were not available for night waking prior to midnight nor after 06:00. However, night waking occurring between midnight and 06:00 is more likely to interrupt parental sleep and hence be more clinically relevant than night waking during the total sleep period. Furthermore, the prospective nature of the study, resulting in the complete separation of measurement of preconceptional psychological distress (which took place during interviews when women were first enrolled in SWS), from follow-up interviews at 6 and 12 months, will have eliminated any risk of recall bias.

Previous research has suggested that babies born to women suffering from depression are more at risk of sleep problems. A longitudinal study of 308 women living in two middle-class outer London boroughs demonstrated the link between maternal feelings of depression when infants were 8 months old and the persistence of infant sleep problems from 8 months to 3 years of age.² Burnham proposes a transactional model whereby key infant, parental and environmental factors interact to determine a child's ability to self-soothe during normal night wakings.¹ Maternal depression is identified as one of a number of relevant factors along with parental attachment style, stress and competence. Recent findings from ALSPAC, however, have suggested that maternal anxiety and depression during pregnancy are predictive of infant sleep problems, defined by parental report of total sleep time and frequency of night wakings at 8 weeks and 8 months of age.⁵ The authors hypothesize that prenatal exposure to increased maternal glucocorticoids may program the diurnal pattern of the fetal hypothalamic-pituitary axis.⁵ Our findings are consistent with the suggestion that maternal anxiety and depression may predispose to the development of sleep problems in infancy, but importantly extend previous findings and suggest that preconceptional maternal mental health problems are independently associated with infant night waking.

There are a number of possible explanations for our findings. It is possible that preconceptional maternal mental health is simply a marker for mental health in pregnancy. Alternatively

genetic factors that predispose to maternal mental health difficulties may in turn determine child temperament, itself a factor influencing sleep behavior in infancy.¹ Infant sleep problems, if untreated, can become chronic with implications for both child and maternal mental health and well-being.^{2,4} The difficulties of mothers who are already vulnerable to anxiety and depression are exacerbated if they are also deprived of sleep. Our findings have implications for the prevention of infant sleep problems; they suggest that recognition and treatment of women with psychological distress before, as well as during and after pregnancy may promote improved infant sleep.

DISCLOSURE STATEMENT

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REFERENCES

1. Burnham MM, Goodwin-Jones BL, Gaylor EE, Anders TF. Night-time sleep-wake patterns and self-soothing from birth to one year of age: a longitudinal intervention study. *J Child Psychol Psychiatry* 2002;43:713-25.
2. Zuckerman B, Stevenson J, Bailey V. Sleep problems in early childhood: continuities, predictive factors and behavioural correlates. *Pediatrics* 1987;80:664-71.
3. Hill CM, Hogan AM, Karmiloff-Smith A. To sleep, perchance to enrich learning? *Arch Dis Child* 2007;92:637-43.
4. Meltzer LJ, Mindell JA. Relationship between child sleep disturbances and maternal sleep, mood, and parenting stress: a pilot study. *J Fam Psychol* 2007;21:67-73.
5. O'Connor TG, Caprariello P, Blackmore ER, Gregory AM, Glover V, Fleming P. Prenatal mood disturbance predicts sleep problems in infancy and toddlerhood. *Early Hum Dev* 2007;83:451-8.
6. Inskip H, Godfrey KM, Robinson SM, et al. Cohort profile: the Southampton Women's Survey. *Int J Epidemiol* 2006;35:42-8.
7. Goldberg D, Williams P. A user's guide to the General Health Questionnaire. Windsor: NFER-Nelson; 1988.
8. Inskip HM, Dunn N, Godfrey KM, Cooper C, Kendrick T. Is birth weight associated with risk of depressive illness in young women? Evidence from the Southampton Women's Survey. *Am J Epidemiol* 2008;167:164-8.
9. 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.
10. Navarro P, Ascaso C, Garcia-Esteve L, Agudao J, Torres A, Martin-Santos R. Postnatal psychiatric morbidity: a validation study of the GHQ-12 and the EPDS as screening tools. *Gen Hosp Psychiatry* 2007;29:1-7.
11. Sadeh A. A brief screening questionnaire for infant sleep problems: validation and findings for an Internet sample. *Pediatrics* 2004;113:e570-7.