

Sleep deprivation, even when moderate, hurts employment

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Lack of sleep is responsible for human fatigue, and can undermine economic performance. Paradoxically, the extent to which sleep time is a productive activity, or not, has received very limited attention in economics research so far. Sleep is often overlooked in economic models despite its obvious restorative effects on human health alongside its influence on brain plasticity and feelings of well-being. Sleep exerts an influence on emotional well-being and restful perceptions, and sleep deprivation more generally, even when moderate, is found to be detrimental to employment behaviours. *The number of hours the average person sleeps has declined over the past century, and we still ignore its effects on economic activity and economic performance.*

Children sleep as an experiment

Although sleep deprivation can have several triggers such as round-the-clock access to technology, time and work schedules alongside changes in light and noise, there is evidence of household-derived sleep deprivation. *Specifically, sleep deprivation resulting from children's sleep routines together with increasing parental involvement and parental sharing in child-bearing duties makes child-related sleep deprivation a potential source of variation in adult sleep.* This is especially the case when we control for other variables including parental coordination efficiency.

What does the economics literature found so far?

Seminal work by [Biddle and Hamermesh \(1990\)](#) developed an optimal model of time allocation including sleep. They use a cross section of time-use survey data and estimate that a one-hour increase in paid work reduces sleep by 10 minutes, and more generally they reveal the effect of the opportunity cost of sleep on wages. [Hamermesh et al \(2008\)](#) examine how cues such as TV programs and sunlight affect sleep and coordination.

Other economic influences on sleep include the effect of income and education: one would expect that they influence the opportunity costs of sleep, but especially sleep efficiency. Indeed, more affluent individuals appear to take longer to get to sleep, but are more efficient in their sleep ([Grandner et al., 2010](#)). However, income differences in sleep problems no longer appear significant when health and other characteristics are adjusted.

Other studies focus on the labour market effects of sleep. [Kamstra et al. \(2000\)](#) find an influence of sleep on financial market performance, and [Szalatonai \(2006\)](#) and [Brochu et al. \(2012\)](#) estimate the impact of changes on income and wages respectively, and [Bonke \(2012\)](#) examines effects on productivity. [Antillon et al \(2014\)](#) examine the effect of unemployment on sleep, and find evidence of sleep to be countercyclical but [Ásgeirsdóttir and Ólafsson \(2015\)](#) find a relationship between sleep duration and employment. Nevertheless, this literature does not develop the link between child sleep quality and parental sleep quality.

Only one paper deals with the endogeneity of sleep quality by using an instrumental variables approach as we do here. [Gibson and Shrader \(2015\)](#) instrument account for sleep quality by using the short and long-term sunset time. [Gibson and Shrader \(2015\)](#) estimate the short-term effect of a reduction of one-hour sleep on wages to be 1.5 per cent and the long-term effect to be 5 per cent. The problem with this study is that they rely on location-level variations. Their estimates, therefore, should not be interpreted as individual effects. They potentially include spillovers across people who live in the same location. The advantage of our approach is that we exploit *individual variations* in sleep quality, due to changes in child sleep duration and the number of times a child wakes up at night.

Our data,... the Avon Longitudinal Study of Parents and Children (ALSPAC)

We rely on a unique dataset for the United Kingdom (UK), a cohort study which follows a sample of 14,000 families from a child's birth to age 25. More specifically, it contains records of mothers since pregnancy and, crucially for our paper, has the advantage of including a rich and validated set of measures of both parental and child sleep alongside a set of other variables to be employed as controls and employment outcomes.

For instance, it contains very precise information on the child's quality of sleep, including whether the child wakes up at night, sleep time and day sleep, as well as child sleeping routines and environmental triggers of sleep quality. We can then relate these measures to objective and subjective measures of parental sleep quality, including average sleep duration, and whether the mother/father feels she had enough sleep. Another advantage is that the data provides us with information on both maternal and paternal employment characteristics, including employment status, the number of hours worked, job satisfaction and income for parents on a longitudinal basis.

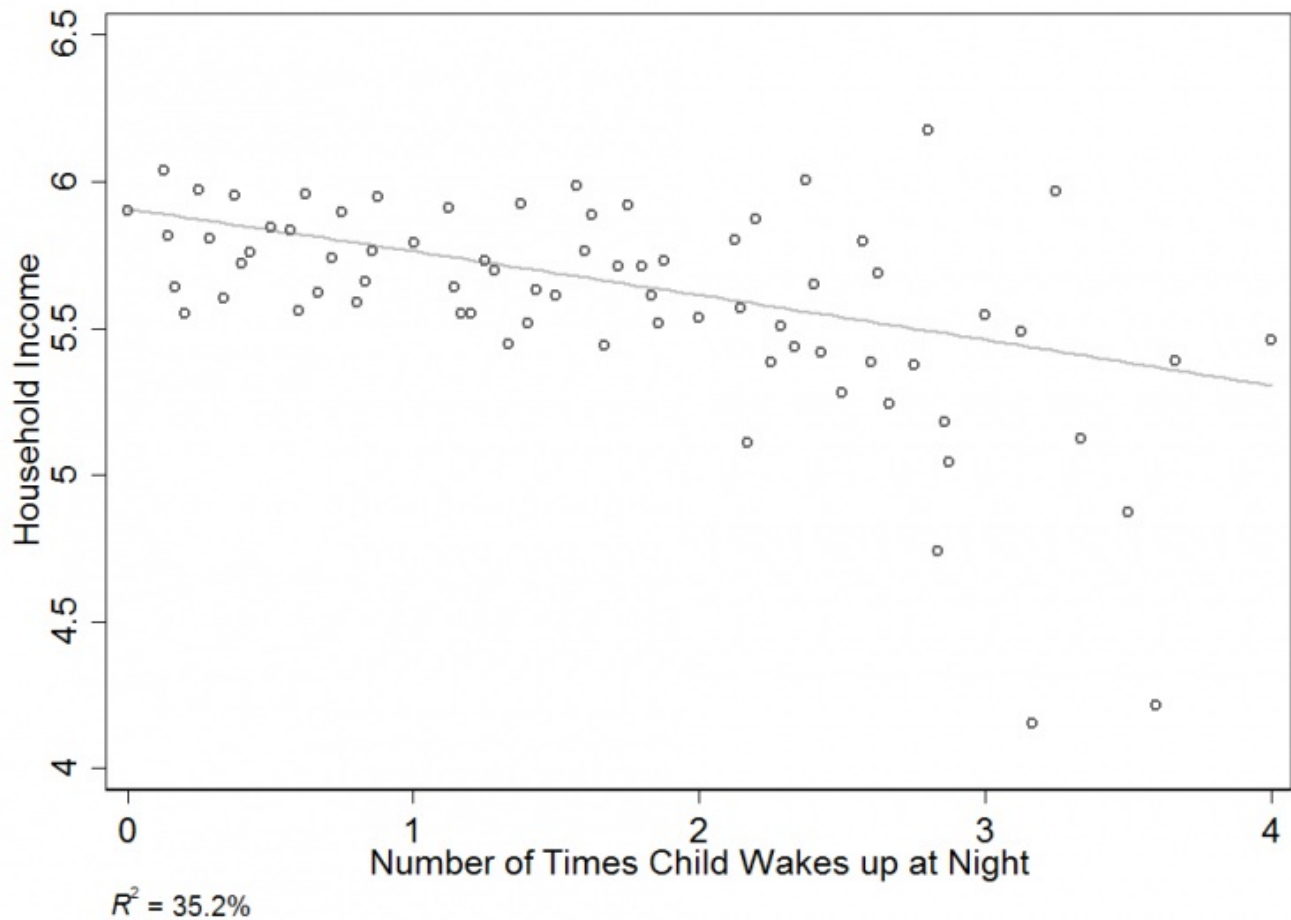
Findings

Figures 1 and 2 display the association between two employment outcomes (both the probability of mother's employment and her household income) on the number of times the child wakes up at night for a sample of 10,000 children (see below for data details). In both cases, the Figures show a strong negative relationship.

Consistently, our main finding confirms that the relationship between sleep and employment outcomes works through the channels we consider: (i) child sleep quality is a major driver of parental sleep quality; and (ii) parental sleep quality is strongly correlated with parental employment and working-time decisions.

Our two-stage least squares estimates of the effect of parental sleep on economic performance are substantial. We find that improving the mother's average nightly sleep duration by one hour increases employment by 4 percentage points, the number of hours worked by 7 percent, household income by 10-11 percent and job satisfaction by 0.01 points.

Figure 1. Reduced-form relationship between mother's probability to work and the number of times child wakes up at night



So what?

Sleep is a major determinant of employment outcomes that needs attention in designing employment policies. The estimated effect of sleep in our study can be attributed to changes in child sleep quality. To our knowledge, this is the first paper that finds a link between child sleep quality and parental economic performance. The average effects mask substantial heterogeneity: fathers are somewhat less affected by child sleep problems; similarly, the probability of high-skilled mothers working is not affected when children wake up at night. Low-skilled mothers instead experience a large decrease in employment and the number of hours worked when facing sleep deprivation.

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Notes:

- This blog post is based on the authors' paper [Parental sleep and employment: evidence from a British cohort study](#), CEP Discussion Paper 1467, LSE's Centre for Economic Performance (CEP), February 2017. The paper will be presented in the 2017 [Annual Conference](#) of the Royal Economic Society, 10-12 April.
- The post gives the views of its author, not the position of LSE Business Review or the London School of Economics.
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