

# Sleep Prescription for Prenatal Moms Can Improve Maternal and Child Outcomes

## Abstract

In recent studies, poor sleep quality during pregnancy has been linked to adverse outcomes, including gestational weight gain, preterm delivery, longer labor and unplanned cesarean deliveries. Relaxation techniques, exercise and improvements in nutrition can all minimize the effects of insomnia, but they don't address the physical discomfort caused by a rapidly changing body.<sup>1</sup> By improving the expectant mother's sleep comfort through the use of supportive pillows, sleep quality and quantity throughout pregnancy can be increased. This will set the foundation for the best possible labor and delivery.

## Identifying Sleep Challenges

Many factors come into play when discussing prenatal sleep quality. More than 79% of women reported that their sleep was different during pregnancy than at any other time of their lives.<sup>2</sup> This is not surprising, considering the rapid hormonal and physical changes that occur during the 40 weeks of pregnancy. In the first trimester, it's common for the progesterone surge to leave women feeling exhausted. Nausea and vomiting from morning sickness can also add to the feeling of depletion. But for many women, the hormonal and emotional changes of pregnancy can reduce the quality of sleep and even cause insomnia at a time when high quality sleep is most needed.<sup>3</sup>

Current research suggests that physicians and caregivers should strongly recommend – or even prescribe – 8 hours of bed time each night during pregnancy to improve perinatal outcomes.<sup>12</sup>

While the hormonal surges of the first trimester ease a bit in the second, sleep can once again be disrupted in the third trimester by fetal movement, back pain, shortness of breath, heartburn and the frequent need to urinate.<sup>4</sup> Add in stress, anxiety and the need to care for other children in the night, and it's no wonder why getting adequate sleep proves challenging for many pregnant women.

## Sleep Quality: A Barometer of Good Health?

Most studies correlating sleep with maternal and baby health are, by nature, limited to women who are seeking consistent prenatal care and are willing and qualified to participate in a clinical study. Many more factors can influence maternal sleep that are not covered in these studies, including safety, nutrition, the number of children she needs to care for at home, and work schedules.

### Sleep and psychosocial measures across pregnancy<sup>11</sup>

|             | Time 1: 14-16 weeks |      |      |      | Time 2: 24-26 weeks |      |      |      | Time 3: 30-32 weeks |      |      |      |
|-------------|---------------------|------|------|------|---------------------|------|------|------|---------------------|------|------|------|
|             | Preterm             |      | Term |      | Preterm             |      | Term |      | Preterm             |      | Term |      |
|             | M                   | SD   | M    | SD   | M                   | SD   | M    | SD   | M                   | SD   | M    | SD   |
| PSQI Total* | 7.79                | 4.88 | 4.97 | 2.68 | 6.20                | 3.95 | 5.03 | 2.61 | 7.79                | 4.13 | 5.26 | 2.73 |
| PSS**       | 28.7                | 9.1  | 26.5 | 7.2  | 27.1                | 8.8  | 24.9 | 7.2  | 31.6                | 12.2 | 25.1 | 7.5  |
| CES-D***    | 15.9                | 3.2  | 17.1 | 3.3  | 16.6                | 2.7  | 16.5 | 2.7  | 17.8                | 3.7  | 16.6 | 2.9  |
| STAI****    | 41.1                | 16.0 | 36.1 | 10.7 | 42.0                | 15.0 | 35.5 | 11.2 | 47.5                | 17.9 | 34.5 | 10.9 |

PSQI, Pittsburgh Sleep Quality Index; PSS, Perceived Stress Scale; CES-D, Center for Epidemiologic Studies-Depression Scale with the sleep item removed; STAI, State-Trait Anxiety Inventory.

\*PSQI scores were significantly different between Preterm and Term deliveries at Time 1 Mann-Whitney U test, P-value = 0.05 and Time 3 P-value = 0.03.

\*\*PSS scores were significantly different between Preterm and Term deliveries at Time 3 Mann-Whitney U test, P-value = 0.04.

\*\*\*CES-D scores were significantly different between Preterm and Term deliveries at Time 3 Mann-Whitney U test, P-value = 0.02.

\*\*\*\*STAI scores were significantly different between Preterm and Term deliveries at Time 3 Mann-Whitney U test, P-value = 0.002.

|                  | Time 1: 14-16 Weeks |      | Time 2: 24-26 Weeks |      | Time 3: 30-32 Weeks <sup>11</sup> |      |
|------------------|---------------------|------|---------------------|------|-----------------------------------|------|
|                  | M                   | SD   | M                   | SD   | M                                 | SD   |
| Preterm Delivery | 7.79                | 4.88 | 6.20                | 3.95 | 7.79                              | 4.13 |
| Term Delivery    | 4.97                | 2.68 | 5.03                | 2.61 | 5.26                              | 2.73 |

Figure 1 Pittsburgh Sleep Quality Index (PSQI) scores were significantly different between Preterm and Term deliveries at Time 1 (P-value = 0.05) and Time 3 (P-value = 0.03)

Studies have linked poor sleep quality with adverse health outcomes in the general population,<sup>5,6</sup> resulting in inflammation, metabolic syndrome, insulin resistance and type 2 diabetes. These health challenges carry over into pregnancy, as poor sleep is correlated with poor blood glucose control in gestational diabetes resulting in larger-than-average babies (macrosomia);<sup>7</sup> postpartum depression;<sup>8</sup> and preeclampsia.<sup>9</sup> But an increasing number of researchers are now focusing on the impact of sleep disturbance in pregnant women, and the correlation to adverse perinatal outcomes such as gestational weight gain,<sup>10</sup> preterm birth,<sup>11</sup> longer labor<sup>12</sup> and the need for unplanned cesarean deliveries.<sup>12</sup>

## Poor Sleep Can Result in Longer Labor, Preterm Birth and Gestational Weight Gain

In 2004, Lee and Gay obtained both subjective and objective measures of sleep in a group of 131 women as part of a larger randomized clinical trial conducted at the University of California, San Francisco (UCSF). The study found that women with severe sleep disruption were more likely to labor longer or have a cesarean delivery than women with little or no sleep disruption.<sup>12</sup>

Participants in the UCSF study wore a wrist-based actigraph to objectively measure their sleep patterns on two consecutive weekday nights, and subjectively recorded their sleep time and sleep quality using the General Sleep Disturbance Scale (GSDS) and the Visual Analog Scale for Fatigue.

Because the UCSF study only investigated women in the final month of pregnancy when all infants were already past 36 weeks gestational age, it did not assess the impact of sleep disturbances on preterm delivery.

| Hours of sleep | Labor duration (hours) | Cesarean rate <sup>12</sup> |
|----------------|------------------------|-----------------------------|
| < 6 hours      | 29.0 +/- 12.5          | 36.8%                       |
| 6 - 6.9 hours  | 20.5 +/- 11.3          | 32.4%                       |
| 7+ hours       | 17.7 +/- 15.6          | 10.8%                       |

The impact of sleep quality on preterm birth was analyzed by Okun, et al., in a study conducted at University of California, Irvine (UCI). Women self-reported their sleep quality using an 18-item questionnaire known as the Pittsburgh Sleep Quality Index (PSQI).

The UCI researchers found that women who delivered preterm reported more disrupted sleep in the first measurement period (14-16 weeks) and third measurement period (30-32 weeks). With every one-point increase on the PSQI scale in early pregnancy, the odds of preterm birth increased by 25%. Each one-point increase in the PSQI score in late pregnancy increased preterm birth odds by 18%.<sup>11</sup>

The UCI authors theorize that sleep disturbance in early pregnancy causes an exaggerated inflammatory response — higher levels of inflammatory cytokines (interferon, interleukin, etc.). This disrupts the remodeling of the maternal vascular bed and placenta, an abnormality present in preeclampsia and preterm birth. Third trimester sleep disruption, on the other hand, may prematurely activate one or more normal processes associated with the onset of labor.

For every one-point increase on the PSQI scale during the first measurement period (14 - 16 weeks), the odds of a preterm birth increased by 25%.<sup>11</sup>

Poor sleep quality can also affect gestational weight gain. The 2016 multi-center prospective nuMoM2b study objectively and subjectively examined the correlation between poor sleep in pregnancy and the mother's weight gain.<sup>10</sup> Gestational weight gain has important short- and long-term health implications for both mother and child,<sup>9</sup> as excessive maternal weight gain can result in greater-than-average birth weight, and serve as a predictor for future maternal obesity and future childhood obesity.<sup>9</sup>

## Prescribing Improved Sleep Quality

Of all behaviors that can be modified during pregnancy — exercise, dietary change, etc. — sleep is a relatively easy fix. There are a number of ways to help women minimize discomfort and improve sleep quality during pregnancy. It is recommended that pregnant women:

- **Use pillows.** A pregnancy pillow can be used between the knees, under the abdomen or behind the back to relieve pressure and discomfort.<sup>4</sup>
- **Avoid sleeping on the back.** The weight of the uterus can restrict blood flow to the fetus. Most women naturally find this position to be uncomfortable.<sup>2</sup>
- **Lie on the left.** Research suggests that the left side is the best side for comfort, reducing heartburn symptoms, improving blood flow, and reducing nasal congestion that can lead to snoring.<sup>13</sup>
- **Maintain a sleep routine.** Regularly go to bed and wake at the same time.<sup>4</sup>
- **Stay active.** Regular physical activity can prevent excess weight gain and promote better quality sleep.<sup>4</sup>

## Comforting and Supporting the Mother

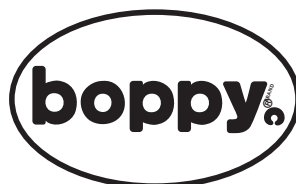
Many mothers-to-be find a pregnancy pillow to be one of the greatest assets to their comfort and sleep quality. A variety of pillows are available to suit each woman's preference, from contoured full-body pillows to smaller pillows that support only the abdomen, hips and legs. Even a small wedge pillow can offer support to the back or abdomen to relieve pressure and strain during the third trimester.

Increasing a mother's comfort can improve sleep quality, resulting in better outcomes for both mom and baby.

## Conclusion

Discussing, educating and prescribing prenatal mothers small modifications that improve quality and quantity of sleep can result in better outcomes for mom and baby. The use of supportive pillows is an easy way to relieve back pain, reduce joint discomfort and alleviate heartburn symptoms to improve comfort and promote sleep quality. The result: a well-rested mother-to-be and better perinatal outcomes for all.

- 1 <http://www.webmd.com/sleep-disorders/guide/pregnancy-insomnia>
- 2 National Sleep Foundation. Summary of Findings of the 2007 Sleep in America Poll. 2007.
- 3 <https://sleepfoundation.org/sleep-news/sleeping-the-trimesters-1st-trimester>
- 4 <http://www.mayoclinic.org/healthy-lifestyle/pregnancy-week-by-week/in-depth/sleep-during-pregnancy/art-20043827>
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- 10 Facco F, et al. Short and long sleep durations in pregnancy are associated with extremes of gestational weight gain. *Am J Obstet Gynecol*. 2016;214(1):S24.
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- 12 Lee KA, Gay CL. Sleep in late pregnancy predicts length of labor and type of delivery. *Am J Obstet Gynecol*. 2004 Dec;191(6):2041-2046.
- 13 <https://www.babyq.com/lens/lifestyle/what-is-the-best-sleep-position-in-pregnancy/>



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