

## Utilizing Sleep Education to Reduce Postpartum Mood Disorder in New Mothers

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### ABSTRACT

**Background:** Infant sleep biology and maternal intuition challenge the idea of behavioral sleep training being authoritative knowledge in Western society. Behavioral sleep training may increase stress levels in postpartum mothers who feel conflicted and wish to use alternative methods. The aim of this study was to determine whether having access to infant sleep education improves maternal mental health.

**Subjects and Method:** A quasi-experimental pretest-posttest design using web-based surveys was used to assess the impact of a three-week virtual infant sleep education program on the dependent variables of depression outcomes and consolidated infant sleep. The target population were postpartum women between the age of 18 and 50. Sample size was 18 subjects were recruited through convenience and criterion sampling. Pre-tests and post-tests included nominal questions, Likert scale items, and the Edinburg Postnatal Depression Scale (EPDS). Analysis included difference analyses, Shapiro-Wilk normality checks, Spearman's rho and Bayes factor bounds.

**Results:** The average improvement on the EPDS was a decrease of 1.89 points, 95% CI=  $-\infty$  to 0.11;  $p= 0.116$ ), VS-MPR = 1.47, with the highest magnitude of improvements in domains regarding feelings of failure if their baby does not sleep through the night ( $r= 0.78$ ; 95% CI= 0.40 to  $\infty$ ;  $p= 0.012$ , desire to sleep train ( $r= 0.50$ ; 95% CI = -0.10 to  $\infty$ ;  $p= 0.091$ ) and decreased feelings of self-blame ( $r= 0.34$ ; 95% CI= -0.13 to  $\infty$ ;  $p = 0.080$ ).

**Conclusion:** Sleep education can be beneficial in reducing stress related to infant sleep and feelings of failure as a parent in postpartum women.

**Keywords:** behavioral training, maternal mental health, sleep education, postpartum depression.

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### BACKGROUND

For centuries, families have been sleeping with their newborns by whatever means necessary to ensure everyone gets a little bit of sleep. This included co-sleeping, bedsharing,

and following mom and baby's cues. However, the rise of dual-income families and a shift in societal expectations have put pressure on parents to get their children to sleep through the night. Sleeping through the night

is defined as uninterrupted sleep of 6-8 hours at night time (Pennestric et al., 2018). Sleep behavioral training, such as the Cry-It-Out (CIO) method, gained popularity in the 19th century and shifted families from sleeping with their newborns to leaving them alone in their cribs in an effort to promote sleep consolidation. This pressure can impact maternal mental health and contribute to postpartum depression (PPD), which is a postnatal mood disorder that presents as depressive symptoms. PPD is influenced by physiological and environmental factors and can occur within a few months to a year after childbirth (Anokye, 2018).

One of the activities of daily living (ADL) in the Occupational Therapy Practice Framework is sleep and rest. Sleep and rest are occupations that are part of a person's routine. Getting inadequate and poor-quality sleep impacts a person's well-being. From bedtime rituals to personal preferences, sleep can be significantly personal. Thus, assessing and delivering interventions around sleep should be on a per case basis rather than a "one size fits all" approach. For example, sleep training would not be ideal for a family that comes from a bed-sharing culture or for a mother who is exclusively breastfeeding. Being told to sleep separately from their newborn could result in additional stress and anxiety (Pennestric et al., 2018). Other occupational therapy strategies for improving sleep function include education on sleep misconceptions and expectations, identifying secondary conditions that may affect quality sleep, establishing sleep hygiene routines, habits, and patterns, modifying the environment, and developing coping skills (American Occupational Therapy Association, 2014). Ideally, providing postpartum mothers with evidence-based research on infant sleep, including the history of sleep training, would help them make informed decisions regarding sleep.

It is important to address infant sleep to improve maternal mental health, as PPD affects one-fifth of postpartum women and postnatal mood disorders have been linked to disrupted sleep (Henshaw, 2003; Podvey, 2018). Although there have been multiple studies on the impact of sleep quality on development and maternal well-being, there are limited interventions and research on how sleep education can be used to reduce PPD risk and help with mental health management. Sleep education and environmental assessment could potentially reduce stress and increase sleep for the whole family without implementing behavioral sleep training strategies. Family Centered Theory (FCT) emphasizes the importance of taking the whole family in consideration when assessing and implementing care for a child (Bamm & Rosenbaum, 2008). By using FCT, the family is recognized as the experts in their care and what they need, rather than as a non-contributing participant. This facilitates a true collaborative relationship between provider and client. Additionally, with FCT as a guide, providers can gain insight into how to support families and manage exhaustion without compromising individual family values and needs. The purpose of this study is to determine if sleep education improves maternal mental health and if sleep education can be used as an alternative to sleep behavioral training.

## SUBJECTS AND METHOD

### 1. Study Design

The methodology of this study is a quantitative quasi-experimental design single group with a pre-test and post-test. After completing the pre-test survey, participants were given one learning module on infant sleep education per week for a total of three weeks. Following completion of the three-week educational program, the participants were given the post-test survey. The location for

the surveys and educational program was virtual and the time was asynchronous.

## **2. Population and Sample**

The target population was postpartum women between the ages of 18 and 50 with an infant under one year of age. The accessible population were clients or interested clients of the Postpartum Wellness Foundation, an organization in the District of Columbia, Virginia, Maryland, Florida, and Texas area, dedicated to serving the postpartum population with maternal mental health services. The sampling methods used to recruit participants were a combination of convenience and criterion sampling. The project sample size was 18 participants.

## **3. Study Variables**

The independent variable in this study is consolidated infant sleep and the dependent variables are risk of depression in postpartum women.

## **4. Operational Definition of Variables**

Consolidated sleep refers to uninterrupted sleep lasting at least six hours. Factors relating to risks of depression in this study include blaming oneself unnecessarily when things go wrong, feelings of failure, and stress from pressure related to infant sleep.

## **5. Study Instruments**

The tools used for this study were pre-test and post-test surveys. The surveys were a combination of dichotomous nominal questions and Likert scale items. The items were developed based on the mother's infant sleep knowledge, mood disturbances, self-assessed competency, and opinions on sleep training. The Edinburg Postnatal Depression Scale (EPDS), a standardized assessment for screening postnatal depression, was included in the surveys to assess maternal mental health. Demographics information was also collected, however, names, date of birth, and other identifiers were not collected to maintain anonymity of participants.

## **6. Data Analysis**

The difference statistics tests used for within groups differences on pre-test versus post-test scores was either a Paired Samples T-test or Wilcoxon Signed Rank Test, depending on the outcomes of Shapiro-Wilk Test of Normality checks and QQ plot inspections. For all Wilcoxon Signed Rank Tests the following statistics were provided: W statistic, the sum of the ranks of a given observation, and coefficient correlation ( $r$ ), an effect size analogue that indicates the percentage of agreement between ordinal outcomes. Vovk-Sellke Maximum p Ratio (VS-MPR) analysis, a Bayesian analysis that indicates the largest odds of in favor of an effect occurring relative to no effect occurring within the observed data (Benjamin and Berger, 2019), was conducted for all pertinent difference analyses to determine Bayes Factor bounds. For all associational analyses, Spearman's rho was utilized, and correlations between the inclusion variables were examined, as well as the impact of sleep education on maternal mental health issues such as anxiety and stress.

## **7. Research Ethics**

Research ethical issues including informed consent, anonymity, and confidentiality, were addressed carefully during the study process. The research ethical clearance approval letter was obtained from the Shenandoah University Institutional Review Board, (ID #1150).

# **RESULTS**

## **1. Sample Characteristics**

As presented on Table 1, a total of 18 individuals participated in the study. The women ranged in age from 24 years old to 39 years old. All of the participants had an infant under one year of age, with a minimum of 1 child and a maximum of 4. Their geographical location was in the District of Columbia, Virginia, and Maryland area. The inclusion criteria included availability of one to two

hours per week to complete the learning modules, must be between 18 and 50 years old, and have an infant 12 months or younger. The exclusion criteria included individuals under the care of a physician, individuals

with complicated medical history, and mothers of multiples (i.e., twins, triplets, and so forth...). The participants may not partake in behavioral sleep training during the course of the study or have consulted a sleep training expert prior to or during the program.

**Table 1. Sample characteristics (descriptive data)**

Variables	n	SD	Min	Max
Your current age in years	18	4.09	24.00	39.00
Number of children	18	0.85	1.00	4.00

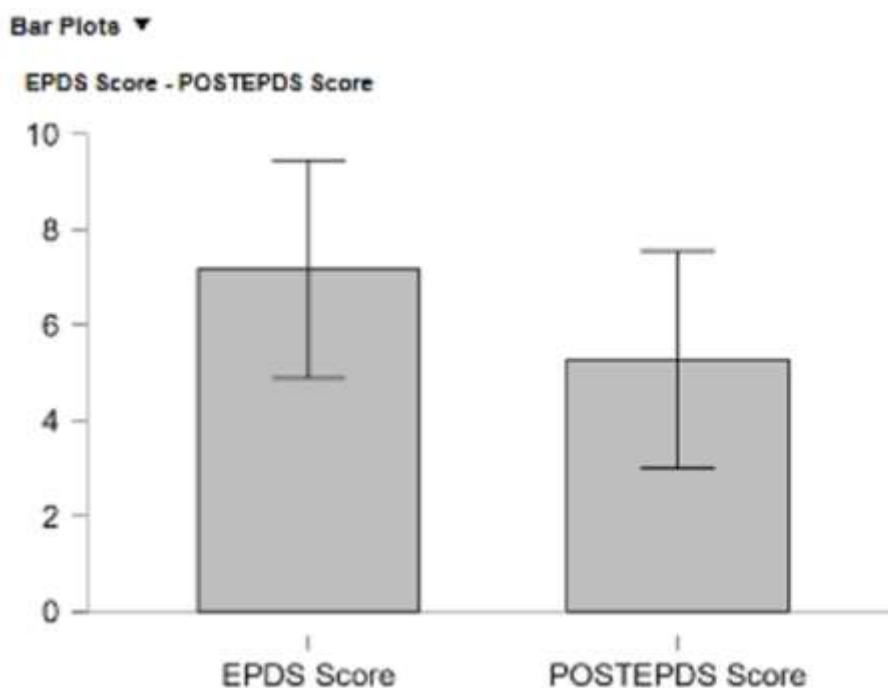
**2. Bivariate Analysis**

A paired sample T-test was conducted to compare pre-test and post-test outcomes on the EPDS. Overall, scores between the pre-test EPDS (M = 7.17, SD = 4.79) and EPDS post-test (M = 5.28, SD = 4.34) improved among participants (see Table 2).

A per question analysis was conducted to further investigate which specific concepts may have contributed to improvements in EPDS post-test scores, with a combination of four questions most likely contributing to overall EPDS improvements (see Table 4).

**Table 2. EPDS Pre-Test to Post Test**

Variables	Mean	p	95% CI	VS-MPR
EPDS Pre-Test to Post-Test	-1.89	0.116	-∞, 0.11	1.47



**Figure 1. Bar graph of scores on the EPDS pre-test and post-test surveys**

**Table 3. Sleep training desire (dichotomous data)**

	Category	Frequency (n)	Percentage (%)
Do you want to sleep train? (pre-test)	Yes	8	44.44
	No	10	55.56
Do you want to sleep train? (post-test)	Yes	4	22.22
	No	14	77.78

**Table 4. EPDS Pre-Test to Post Test**

Question	Mean Increase	W	p	r	CI 95%	VS-MPR
Do you feel like you have failed or will fail if your baby does not sleep through the night?	0.39	5.00	0.012	0.78	0.40 to ∞	7.10
On a scale of 1 to 5, how pressured do you feel to sleep train?	0.61	26.50	0.052	0.50	0.04 to ∞	2.39
Do you want to sleep train?	1.01	9.00	0.091	0.50	-0.10 to ∞	1.69
I have blamed myself unnecessarily when things went wrong.	0.44	1.46*	0.08	0.34 <sup>†</sup>	-0.13 to ∞	1.75

Note. \*reported as t-score, <sup>†</sup>reported as Cohen's d

Regression analysis revealed several associations between demographic variables and sleep-related variables. A moderate negative association existed between age in years and anxiety regarding the thought of sleep training,  $r = -0.55$ ,  $p = 0.018$ , where younger mothers were less likely to express anxiety toward sleep training. There was also a moderate negative association between age in years and feelings of failure if their baby does not sleep through the night,  $r = -0.54$ ,  $p = 0.021$ , as younger mothers were less likely to think they have failed if their baby does not sleep through the night. A moderate negative association was shown between anxiety regarding the thought of sleep training and feeling anxious or worried for no good reason,  $r = -0.50$ ,  $p = 0.033$ . Participants who noted moderate to high anxiety about sleep training also felt more anxious or worried for no good reason compared to participants who noted low or no anxiety about sleep training. Similarly, there was

also a moderate negative association between anxiety regarding the thought of sleep training and blaming oneself unnecessarily when things go wrong,  $r = -0.47$ ,  $p = 0.047$ . The more anxiety that was felt about sleep training, the more likely one was to blame oneself for things going wrong.

A moderate negative association was exhibited on the test results between feelings of failure if their baby does not sleep through the night and blaming oneself unnecessarily when things go wrong,  $r = -0.57$ ,  $p = 0.014$ . A moderate negative association between feelings of failure if their baby does not sleep through the night and feeling anxious or worried for no good reason,  $r = 0.59$ ,  $p = 0.010$ . These two associations demonstrate that postpartum mothers who reported feelings of failure if their baby does not sleep through the night also blamed themselves when things go wrong and expressed feeling anxious or worried for no good reason.

## DISCUSSION

Infant sleep and cry problems are common causes of concerns that prompt parents to seek guidance from healthcare professionals within the first few months, despite shorter sleep duration and longer sleep latency being normal (Hiscock et al., 2014). The result of disproven myths surrounding infant sleep and its association with infant development and maternal mental health is false expectations and extra pressure on parents to have infants sleep through the night. To potentially counter this, Paavonen et al. (2020) and Pennestric et al. (2018) found in their research that parents could potentially benefit from some sort of sleep education program. Hiscock and Fisher (2015) also suggested that parents would benefit from normal sleep pattern education and clinicians should be asking about infant sleep and maternal and paternal well-being to offer strategies that are appropriate for the family. Families are more likely to practice sensitive and responsive caregiving when they have good knowledge about infant development and have the opportunities to learn infant care skills (Hiscock and Fisher, 2015).

Depression occurs in approximately 15-20% of new mothers in Western countries in the first six months after birth, with 20-50% of these individuals continuing to experience PPD after those six months (Anokye et al., 2018; Vismara, 2017). Sleep education programs could potentially decrease maternal stress, reduce pressure to sleep train, and develop alternative methods to improve sleep quality for both mothers and infants (Paavonen et al., 2020; Pennestric et al., 2018). When parental confidence and competency were addressed and a connection between parent and practitioner established, improvement in parental depression and anxiety and decreased concerns over infant sleep occurred (Hauck et

al., 2012). In a randomized controlled trial, parents of 781 infants born at 32 weeks or after were educated on normal infant sleep and cry patterns, various settling techniques, the underlying causes of crying, and self-care suggestions for parents via booklets and DVDs at 4 weeks postpartum, telephone consultation at 8 weeks postpartum, and parent group session at 13 weeks postpartum (Hiscock et al., 2014). The educational program intervention was found to significantly reduce postnatal depression symptoms in caregivers and decreased sleep and cry problems in frequent feeding infants when compared to the controlled group.

The analyses from this study provide insight to the research questions of whether sleep education for new parents help alleviate symptoms of postpartum mood disorders and whether access to non-behavioral sleep methods help parents with their transition into parenthood. For the research question, “does providing sleep education to new parents help alleviate symptoms of or onset of postpartum mood disorders for new mothers?”, several points from the study results are worthy of discussion. New mothers face numerous challenges after childbirth, especially for first-time mothers. Loss of identity, role transition, and physical changes all contribute to negative impacts on the well-being of a postpartum mother. In this study, there was an improvement on the EDPS post-test survey from the pre-test survey that is generally supported by its associated Bayes Factor bound, however further reproduction of this study will be necessary to establish the consistency and magnitude of these results. The improvement may be attributed to the fact that parents were taught infant sleep patterns are rooted in biological needs and developmental milestones, suggesting that whether or not a baby sleeps through the night is not indicative of parenting skills.

Duration of infant sleep is significantly predictive of depression symptoms, suggesting that poor sleep quality influences maternal mental health (Škodová et al., 2022). However, there is a lack of significant association between sleeping through the night before 1 year of age and maternal mental health, which is often cited as a reason to implement CIO or other sleep training methods (Pennestric et al., 2018). Improving sleep quality is also not exclusively dependent on sleep training, as sleep training can exacerbate feelings of anxiety and depression when parents feel pressured into this choice, rather than believing it is the best choice for them. FCT would address these and other factors that uniquely influence each family.

The pretest scores on the domain item “do you feel like you have failed or will fail if your baby does not sleep through the night?” revealed that many potentially believe it is related to their abilities as a parent, despite research revealing that sleep consolidation does not begin until children are two years old (Paavonen et al., 2020). In other words, if their baby does not sleep through the night, then they may feel like they have failed as a parent, which could have contributed to a lower EPDS score in the pre-test. While the exact age that sleep consolidation begins varies, it is agreed that it is not the biological norm for infants zero to 12 months to sleep six to eight hours per night uninterrupted. Still, parents often connect the idea of reducing exhaustion with implementing strategies to promote sleep consolidation rather than looking for ways to support family and mothers to increase rest and promote self-care. Sleep for infants is influenced by genetic, prenatal, and environmental factors such as breastfeeding status, gender (girls are more likely to sleep longer than boys during infancy), the presence of

other children in the home, maternal education, maternal depression or insomnia, screen time, introduction of solids, and daycare attendance (Paavonen et al., 2020; Pennestric et al., 2018).

The sleep education program offered evidence-based research on the biology of infant sleep, to include a brief explanation of the circadian rhythm, benefits of short sleep duration during the first several months of infancy, and realistic sleep expectations of a normally developing infant, and supported family-centered care and maternal intuition. The courses were structured to provide a wealth of information to new mothers to promote gentle parenting, holistic approaches, and self-competency as a way to combat stress and anxiety related to sleep. Following the completion of this educational program, many participants responded that they no longer felt like they have failed if their infant does not sleep through the night. Parents were also less likely to blame themselves unnecessarily when things go wrong and felt less pressure to sleep train according to the analyses of related survey items on the pre- and post-test surveys.

The study did not yield conclusive results for the research question “can more holistic approaches than behavioral sleep training help parents transition into parenthood and reduce exhaustion?” However, the improvement between the pre-test and the post-test scores on the question “do you want to sleep train” indicates that there may be a potential relationship between the sleep education program and pressure to sleep train, which may alleviate some of the stress surrounding transition to parenthood. Fewer participants indicated they wish to sleep train on the post-test survey. This may be attributed to the fact that during the educational course, they received information and research-based alternative strategies to behavioral-based sleep interventions. The

acquired knowledge may have also improved confidence in ability to make decisions that go against authoritative culture of sleep training. Additionally, learning about the history of sleep training while simultaneously learning about the benefits of co-sleeping may have reinforced mothers to follow their intuition.

One of the biggest justifications for sleep training comes from the idea that disrupted nighttime sleep-in children negatively impacts their mental and psychomotor development. While adequate sleep-in childhood has been shown as beneficial, there is little evidence that it is directly associated with development before one year of age (Pennestric et al., 2018). A second idea is that behavioral sleep training significantly improves maternal mental health, despite research showing that there is no significant association between the two (Pennestric et al., 2018). Other reasons for implementing behavioral sleep training include outdated and unproven notions that bedsharing recirculates “bad air” for infants to breathe in, that crying expands the lungs, and possibility of spoiling a baby (Rosier and Cassels, 2021). CIO, coined by Dr. Emmett Holt, became the authoritative knowledge in Western cultures during the 19<sup>th</sup> and 20<sup>th</sup> century as anxiety related to public health increased and society shifted from a communal culture to individualistic values and beliefs (Rosier and Cassels, 2021). Ideas such as “night air” - like stagnant water - created stale air that infants would breathe in from their parents and contract an illness, or that the body heat from their caregivers would be detrimental to their health. Along the way, notions such as crying helps expand the baby’s lungs and spoiling babies from holding them too much gained traction; these became the common justifications for implementing sleep training (Rosier and Cassels, 2021). Soon, sleep training became

a way for working mothers to get more adequate sleep and to satisfy expectations from others as to how the baby is sleeping.

Many of the literature and research discussed here are level I and level II in quality of evidence. Rosier and Cassels (2021) and Hiscock et al (2014) provided an investigative analysis and a randomized trial (respectively). Threats to external validity include limited geographical location and accessibility to different cultures and populations. A strength of the evidence includes the large sample sizes and randomized controlled groups.

A larger sample size would have possibly indicated, through improved statistical power, improved probability values and Bayes Factor bounds significance. Future research on the study should include, and measure for, people from various locations, cultures, and socioeconomic backgrounds. Although sleep behavioral training may be the answer for some families, the decision should come from the parents and not because of authoritative culture. Therefore, sleep education should be the initial response to sleep-related stress from providers and may be provided by allied healthcare professionals such as social workers, psychotherapists, licensed clinicians, and occupational therapists to new mothers who are looking for reinforcement in respectful and gentle parenting. Equipping new mothers with evidence-based research on infant sleep and education on normal development, safe alternative methods to sleep behavioral training, and coping strategies may reduce risk of developing postpartum mood disorders and boosts confidence in parental skills. It is hopeful that others will continue to expand the research on non-sleep behavioral training and advocate for sleep education courses being offered to postpartum women as standard practice.



### AUTHOR CONTRIBUTION

Virginia Osorio raised the initial research question, developed the research concept and design, recruited participants and implemented study program, managed data collection, interpreted results, drew tables, and wrote up manuscript. Daniel Martin ran statistical analysis, drew tables, interpreted results, and edited manuscript.

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### CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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