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Guided Imagery

An Innovative Approach to Improving Maternal Sleep Quality

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ABSTRACT

Mothers of preterm infants are at risk for poor sleep quality, which may adversely affect their health, maternal-infant attachment, and infant caretaking activities. This study examined the relationship of an 8-week relaxation guided imagery intervention on sleep quality and the association between sleep quality and maternal distress (perceived stress, depressive symptoms, and state anxiety) in 20 mothers of hospitalized preterm infants. Mothers received a CD (compact disc) with three 20-minutes recordings and were asked to listen to at least 1 recording daily for 8 weeks. This analysis used self-report data gathered at baseline and 8 weeks. Pearson correlations were used to examine the relationships between mean cumulative relaxation guided imagery use and measures of maternal distress and sleep quality scores at 8 weeks. Complete data on 19 mothers were available for analysis. At 8 weeks, higher mean relaxation guided imagery use was inversely correlated with sleep quality scores ($r = -0.30$); sleep quality scores were positively correlated with stress ($r = 0.42$), depressive symptoms ($r = 0.34$), and anxiety ($r = 0.39$) scores. In mothers of preterm infants, sleep quality was negatively affected by mental distress and may be improved by a guided imagery intervention.

Key Words: depressive symptoms, relaxation guided imagery, sleep quality, state anxiety, stress

Sleep quality is linked with important health outcomes, such as immunity, memory, longevity, and the quality of life.[1] Poor sleep is a common problem in the postpartum population and has been associated with the onset of depression in postpartum women,[2] which negatively impacts a mother's ability to attend to infant cues,[3] interferes with maternal infant attachment,[4] contributes to deficits in maternal caretaking activities related to infant safety,[5] healthcare follow-up, and breast-feeding.[3] Mothers of preterm infants are at an increased risk for maternal distress (stress, depressive symptoms, and anxiety),[6,7] and poor sleep quality,[8] as premature birth is often experienced as a crisis for the mother.[9] This population of mothers experiences uncertainty and fear over the health of their infants, concerns over infant survival, decreased physical contact with their newborns, stressful events related to their infant's medical conditions, invasive medical interventions, newborn medical complications, and their own recovery.[6] These highly stressful events, coupled with spending long hours in the neonatal intensive care unit (NICU) with their infants, having less daytime light exposure, and decreased activity levels, contribute to poor sleep hygiene[8] and poor sleep quality.[10]

LITERATURE REVIEW

Sleep and postpartum women

From birth to 6 months, there are alterations in the sleep patterns for most postpartum women who give birth at term; these alternations are commonly associated with feeding a newborn during the night.[11] Hormonal

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changes (decline in progesterone) during the postpartum period have also been thought to contribute to altered sleep patterns, resulting in disrupted and insufficient sleep. Postpartum mothers experiencing poorer sleep quality are at risk for postpartum depression, as the neurotransmitter systems in the brain responsible for the regulation of sleep are also responsible for multiple functions including those related to mood disorders,[12] particularly depression.[2,13] Poor sleep quality can be both a cause and a symptom of postpartum depression. In fact, poor sleep has been associated with depression independent of other risk factors including depression during pregnancy, poor partner relationship, previous depression, and stressful life events in the past year.[14]

To maintain health, 7 to 8 hours of sleep is recommended.[15] However, postpartum mothers generally sleep less than 7 hours per night, which may predispose them to poor health outcomes.[14] In the general population, individuals who have insufficient sleep are at risk for dysfunction of the cardiovascular, gastrointestinal, metabolic, endocrine, and immunologic systems of the body.[16] Insufficient sleep is associated with damage to bone and tissue; growth of fat cells over muscle cells; acceleration of the aging process; and interference with memory and is linked to increased insulin resistance, anxiety, depression, and accidents.[1]

Maternal distress and sleep

Stress plays a significant role in disrupting the sleep patterns of postpartum mothers.[17] Having an infant in the NICU presents mothers with overwhelming stressors. The NICU environment (sounds, medical equipment, and procedures), infant appearance and behaviors, alterations in the maternal role, conflicting roles and responsibilities, and knowledge deficits regarding preterm infant care have been identified as significant maternal stressors.[9,18] Stress contributes to the development of postpartum depression, anxiety,[19] posttraumatic stress disorder,[20] difficulties with breast-feeding,[3] and poor sleep quality.[10] Mothers often experience a decrease in activity levels, which has been linked with alterations in circadian activity rhythms, sleep disturbances, fatigue, depressive symptoms, and poor health-related quality of life.[21,22] Maternal distress may extend beyond the infant's hospitalization and interfere with the mother's ability to optimally care for the infant, increasing the risk for poorer long-term outcomes related to child health and development. It is important to find interventions to facilitate maternal coping with the myriad of stressors experienced when an infant is hospitalized in an NICU and especially to identify approaches that can promote sleep in this population.[23]

Interventions to promote sleep quality in the postpartum population

While numerous researchers have identified the need to develop interventions to promote sleep in postpartum mothers,[8,10,14,17,22–25] few interventions have been tested. Intervention studies for mothers of term infants have focused on educational interventions aimed at promoting sleep hygiene[24,25] and have examined infant feeding practices in relationship to parental sleep.[11] Stremler et al[24] identified that mothers in a behavioral education sleep intervention program averaged 57 minutes more nighttime sleep and rated sleep as less of a problem than mothers in a control group. Lee and Gay[25] found that a modified behavioral education sleep hygiene intervention including noise masking, dim light, and infant proximity was more beneficial to mothers from a higher socioeconomic level than those who were less advantaged. Doan et al[11] examined sleep patterns in parents whose infants were breast-fed as compared with parents whose infants were bottle-fed at night. Mothers and fathers whose infants were breast-fed slept an average of 40 to 45 minutes more than parents whose infants were given formula. The parents who bottle-fed their infants reported more sleep disturbance than those whose infants were breast-fed.

Social support has been identified as a factor that promotes coping. Cheng and Pickler[26] found that social support moderates the effects of stress on depression in postpartum mothers. However, although there is a strong correlation between depression and poor sleep quality,[14] and the mediating effects of social support on depression, a study could not be located that examined the effects of social support on sleep quality in this population.

Intervention studies to improve the sleep quality of mothers of hospitalized preterm infants are limited. Only one study could be found that tested an intervention with mothers whose infants were hospitalized in the NICU. In a pilot study, Lee et al[27] tested a 3-week bright light therapy and educational intervention with mothers of low-birth-weight infants in the NICU and found that circadian rhythm activity, morning fatigue, depressive symptoms, and health-related quality of life all improved in the intervention group when compared with a control group. Since 2 interventions were used with the intervention group, it could not be determined whether the outcomes resulted from the light therapy or the educational intervention.

Given the importance of sleep quality on health,[1] it is essential to test interventions directed at improving sleep quality among postpartum mothers. One potential intervention is relaxation guided imagery (RGI). Guided imagery is a mind-body technique that focuses on the creation of specific mental images designed to bring

about positive physical or emotional effects.[28,29] This technique captures the power of the mind by including mental imaging of the senses to form connection between the mind and the body to promote healing or maintain health. Relaxation appears to be an important component in achieving vivid imagery, as it seems to quiet the mind and enhances imagery production.[30] Relaxation guided imagery has been found to be effective in reducing symptoms related to stress, depression, and anxiety.[31–33] Furthermore, there is empirical evidence supporting the effectiveness of RGI in improving sleep quality both in patients with chronic pain[34] and in surgical patients.[35,36] In addition, pregnant women reported that an RGI intervention was feasible and improved their ability to fall and stay asleep.[37] While potentially promising as an intervention, no studies have examined the effect of RGI on sleep quality in mothers of hospitalized preterm infants. Therefore, the aims of this study were to (1) describe maternal and infant factors that influence self-reported sleep quality; (2) examine the association between self-reported measures of sleep quality and maternal mental distress (perceived stress, depressive symptoms, and state anxiety); and (3) evaluate the relationship of an 8-week RGI intervention with sleep quality in mothers of hospitalized preterm infants.

METHODS

This study was a secondary analysis of data from a prospective, repeated-measures, feasibility study testing the use of an RGI intervention delivered over 8 weeks in a sample of 20 mothers of hospitalized preterm infants. Because data for this inquiry were derived from a feasibility study, the sample size did not provide sufficient power for formal hypothesis testing. The study design was guided by the theoretical framework of stress, coping, and adaptation developed by Lazarus and Folkman,[38] where the processes of cognitive appraisal and coping are considered mediators between stressful person-environmental transactions and health outcomes. This investigation explored the potential for an RGI intervention to enhance a mother's ability to cope with the stressors related to having a fragile, hospitalized infant. The institutional review boards at the University of San Diego and the sponsoring hospital approved this inquiry.

Participants were recruited from the NICU of a large metropolitan hospital for women and newborns located in southern California between April 2010 and September 2010. Mothers were eligible for study inclusion if they had 1 or more infants currently hospitalized in the NICU and were 23 to 32 weeks' gestation at the time of birth; were 18 years or older; and were willing to complete 3 study visits over an 8-week period. Mothers were excluded if they were unable to read, write, and understand spoken English; being treated for chronic immune or psychiatric disorders; taking systemic steroids; or currently using RGI techniques. Twenty participants met the study criteria and provided written informed consent for themselves and for access to their infants' medical record.

Measures

Sleep quality

Sleep quality was measured by the Pittsburgh Sleep Quality Index (PSQI),[39] a 19-item (4-level response) self-report measure of subjective sleep quality over the past month. The PSQI is used in clinical and community populations to differentiate overall between "good" and "poor" sleepers by measuring components of sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications, and daytime functions. The component scores were weighted equally on a 0- to 3-point scale and were summed together to provide a global PSQI score ranging from 0 to 21 (higher score reflecting worse sleep quality). A global PSQI score of 5 or more indicates poor sleep quality. Reliability and validity of the PSQI were established by Buysse and colleagues.[39]

Depression

Depressive symptoms were measured by the Center for Epidemiological Studies Depression Scale (CES-D),[40] a 20-item (4-level response) self-report measure that assessed depressed mood, guilt, worthlessness, helplessness, hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. The scale for the range of answers was from 0 to 3, with a total score range of 0 to 60, and a higher score indicating more depressive symptoms. Scores of 16 or more are correlated with clinically important levels of depressive symptoms. Used widely in both clinical and community populations, the CES-D has excellent reliability and validity.[40]

Anxiety

State anxiety was measured by the State-Trait Anxiety Inventory (STAI),[41] a self-report measure of state anxiety (a reaction to a specific situation) and trait anxiety (a quality an individual possesses to be predisposed to perceive situations as threats). For this study, the State Anxiety Inventory was used. It consisted of 20-items (4-level response), with higher scores indicating higher levels of anxiety. Reliability and validity of the STAI were reported by Spielberger et al.[41]

Stress

Stress was evaluated by the 10-item (5-level response) Perceived Stress Scale (PSS),[42] a frequently used measure of the degree to which situations in one's life were appraised as stressful during the last month. The experience of stress was assessed in a global manner, with higher scores indicating greater perceived stress. The PSS demonstrates valid and reliable psychometric properties.[43]

Social support

Social support was assessed by the Duke University of North Carolina Functional Social Support Questionnaire,[44] a self-report measure containing 8-items (5-level response), with a score range of 8 to 40; higher scores indicate more social support. All self-report measures are widely used in clinical research and have demonstrated good validity and reliability in a variety of clinical populations.[39–45] The internal consistency reliability of these measures in this study ranged from 0.73 to 0.96 and were as follows: PSQI, 0.73; CES-D, 0.93; STAI, 0.95; PSS, 0.87; and Functional Social Support Questionnaire, 0.96.

Maternal demographic and infant factors

Within the context of the Lazarus and Folkman[38] model, person and environmental factors are thought to influence the appraisal of stress. For this reason, information related to maternal age, education level, number of children, annual household income, employment, marital status, breast-feeding, race, and ethnicity was obtained using a Demographic and Health History Questionnaire. The severity of infant illness while hospitalized was measured by the Neonatal Medical Index,[46] a rating scale of overall medical acuity (eg, birth weight, use of assisted ventilation, and history of intraventricular bleeding) of a preterm infant that correlates with long-term developmental and medical morbidity. Scores ranged from 1 (least ill) to 5 (most ill). This measure has concurrent validity. To determine the Neonatal Medical Index score, data were collected from the infant's medical record at the time of the infant's discharge from the NICU or on the date of the mother's final study visit. The gestational age and length of stay of the infant were also obtained from the infant's medical record.

Semistructured interview

A brief semistructured interview was conducted at the end of the final visit by the principal investigator to gain further information on the acceptability of the RGI intervention. One a scale of 1 to 5, participants were asked to rate how useful each of the recordings were (1 = not at all useful to 5 = extremely useful) in (1) creating feelings of relaxation, (2) working with difficult feelings, and (3) feeling good about oneself. Study members were then invited to explain their rating in their own words, which was recorded by the principal investigator. Participants were further asked to offer any suggestions on how the recordings could be improved.

Intervention

The intervention made use of a professionally produced CD (compact disc) with three 20-minute tracks that were developed and sequenced to enhance imaging ability and the desired study outcomes. The RGI scripts were developed and recorded by Dr Nancy Jallo, a coinvestigator in the parent study. Dr Jallo is certified in guided imagery and collaborated with the principal investigator of the parent study in developing each script based on the intended outcomes. Each track provided images to promote increased relaxation, capacity to work with difficult feelings, and self-empathy. Participants were asked to listen to the CD at least once daily in the following way: first track (weeks 1 and 2), second track (weeks 3 and 4), third track (weeks 5 and 6), and then any track they preferred to use for the final 2 weeks of the study. Study members were asked to listen to a track at least once a day but could listen more than once. They were advised to use the CD at any time of the day they preferred.

Procedures

After enrollment, participants completed the demographic questionnaire and self-report measures for sleep quality, psychological distress, and social support. At this initial baseline visit, the participants received a detailed packet of instructions, a CD that contained the intervention, a CD player, extra batteries, and instructions regarding all study procedures by a member of the research team. Intervention fidelity was monitored by a brief (<5 minutes) scripted weekly phone call from a research assistant who (1) asked the mother to report the amount of weekly RGI practice, (2) advised when to advance to a different track of the CD, (3) inquired whether there were any problems or comments about using the intervention CD, and (4) scheduled any upcoming visits. A standardized form was used for purposes of recording the obtained data. Self-report measures were repeated at week 8. At the final study visit, the principal investigator conducted each of the semistructured interviews to evaluate the acceptability of the RGI intervention. There were 126 weekly telephone calls and 19 face-to-face final interviews during which participants offered comments. The data that were collected from phone calls and the final

Table 1. **Summary of maternal and infant characteristics of study sample (*N* = 20)**

Characteristic	*n* (%)	Mean (SD)/ Range
Race		
American Indian	1 (5)	
Asian	1 (5)	
Black, non-Hispanic	1 (5)	
Native Hawaiian, Pacific Islander	1 (5)	
White	12 (60)	
Other	4 (20)	
Ethnicity		
Hispanic	10 (50)	
Non-Hispanic	10 (50)	
Education level		
Completed high school only	3 (15)	
Some college or technical training	10 (50)	
College graduate or higher	7 (35)	
Marital status		
Married	10 (50)	
Single, never married	10 (50)	
Employment status		
Employed	6 (30)	
Not employed	14 (70)	
Annual household income		
≥$30 000	10 (50)	
<$30 000	10 (50)	
Parity		
Primipara	13 (65)	
Multipara	7 (35)	
Maternal age, y		27.3 (6.4)/18-37
Gestational age at birth, wk		28 (2.3)/24-32
Neonatal Morbidity Index score		4 (1.1)/2-5
Weekly RGI listening frequency		4.46 (1.1)/2-7

Abbreviation: RGI, relaxation guided imagery.

interview were reviewed for similarities and differences by the study investigators. A pattern emerged as several participants made statements regarding how the RGI recordings affected their sleep. When similar comments appeared, they were grouped together and summarized by study personnel.

Statistical analysis

Descriptive statistics were used both to detail characteristics of the study sample and to detect any data anomalies (eg, outliers, problematic values, missing data). The data were cleaned prior to analysis. Pearson correlations were used to explore the relationships among continuous variables. Independent-samples *t* tests were used to test for differences in mean PSQI scores by categorical variables. Pearson correlations assessed the relationship between the mean number of times a mother used the RGI CD during the study and PSQI score at week 8.

RESULTS

The study sample is summarized in Table 1. Participants had a mean age of 27.3 (SD = 6.38) years. Sixty percent identified themselves as white, and 50% self-described as Hispanic. Fifty percent of participants were married. Half of the sample reported an annual household income below $30 000. Most participants had completed high school, and 30% were employed. Sixty-five percent had other children at home. All participants reported breast-feeding (using a breast pump) at the time they were enrolled in the study. Mean gestational age of the infants was 28 (SD = 2.32) weeks.

Table 2 describes the mean scores of self-reported levels of stress, anxiety, depressive symptoms, and sleep quality both at baseline and at week 8. In this study, the participants reported high baseline levels of mental distress. For instance, at baseline, 55% of the mothers had CES-D scores of more than 16 and a mean STAI score of 42 (SD = 2.99) compared with a mean score of 37.6 (SD = 9.1) among community-dwelling

Table 2. **Self-reported mean scores for measures of maternal mental distress, social support, and sleep quality at baseline and at week 8**

Variable	Mean (SD)/Range	
	Baseline score (*n* = 20)	Week 8 score (*n* = 19)
Sleep quality	9.79 (3.94)/4-17	8.04 (3.57)/1-14
Perceived stress	19.55 (5.75)/10-28	17.79 (5.80)/9-28
State anxiety	42.05 (13.40)/21-67	39.42 (12.79)/20-62
Depressive symptoms	18.45 (11.90)/1-45	14.61 (11.79)[a]/0-38
Social support	34.05 (5.39)/25-40	33.74 (8.69) 10-40

[a] *n* = 18.

women.[46] Participants had a mean PSS score of 19.6 (SD = 5.75) compared with 13.0 (SD = 6.4) in a general female population.[47] Most mothers reported poor sleep quality (PSQI score ≥5) both at baseline and at week 8.

The only demographic factors associated with sleep quality were maternal age and household income. Better sleep quality (lower PSQI scores) at baseline was associated with mothers who were older ($r = -0.488$, $P = .029$) and those with household incomes above $30 000 compared with those mothers with household incomes below $30 000 ($t_{18} = 2.43$, $P = .026$). All infant characteristics demonstrated very low correlations with PSQI scores at baseline and week 8. Table 3 reveals that greater maternal distress (stress, anxiety, and depression) was moderately correlated with worse sleep quality scores both at baseline and at week 8. At baseline, there was a large relationship between higher social support scores and better sleep quality scores. However, this relationship decreased by week 8.

The usage of RGI CD by participants varied from 1.7 to 7.4 times per week during the study period. There was a negative medium relationship between mean weekly RGI CD use and sleep quality score at week 8 ($r = -0.255$). The relationship between the average amount of time spent listening per week and the PSQI score at week 8 is shown in the Figure 1. As the average number of times spent listening to the RGI CD increased, PSQI scores decreased, indicating improving sleep quality.

Although not solicited, some participants spontaneously offered comments about positive effects of the RGI intervention on their sleep quality. The mothers reported that the intervention seemed to help them fall asleep. Table 4 reflects a summary of these comments.

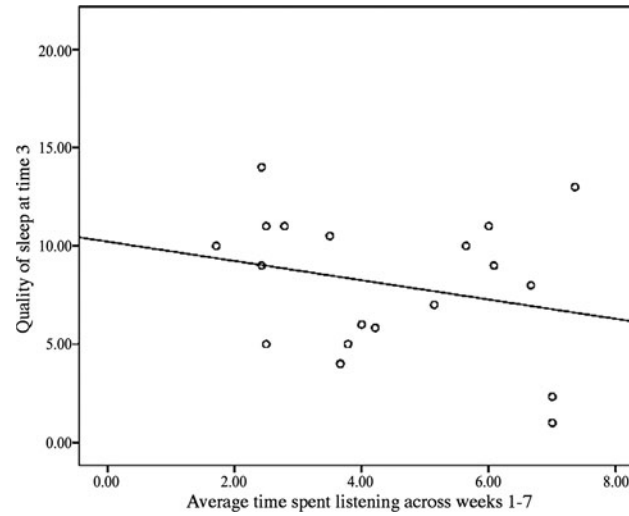

Figure 1. Relationship between relaxation guided imagery use frequency and sleep quality at week 8.

DISCUSSION

At study entry, the majority of participants reported high levels of depressive symptoms and the higher scores were associated with poorer sleep quality. These findings are consistent with the research of Dorheim et al,[14] who found that for postpartum participants, poor sleep was associated with depression independent of other risk factors (depression during pregnancy, poor partner relationship, previous depression, and stressful life events in the past year). These results are important, as depression in the postpartum population is associated with impairments in maternal-infant attachment and poor outcomes for both the mother and the infant.[19,23]

Participants reported higher state anxiety scores, which were associated with poorer quality of sleep. These findings support the previous research of

Table 3. **Pearson correlations of self-reported measures of maternal distress and social support with sleep quality at baseline and at week 8**

	r (*P*)	
Variable	**Mean PSQI score at baseline (*n* = 20)**	**Mean PSQI score at week 8 (*n* = 19)**
Depressive symptoms	0.496 (0.026)[a]	0.343 (0.164)[b]
State anxiety	0.324 (0.164)	0.391 (0.098)
Perceived stress	0.321 (0.167)	0.419 (0.074)
Social support	−0.462 (0.040)[a]	−0.126 (0.608)

Abbreviation: PSQI, Pittsburgh Sleep Quality Index.
[a] $P < .05$.
[b] $n = 18$.

Table 4. **Participant comments related to effects of relaxation guided imagery on sleep quality**

- "I fall asleep when listening."
- "Put me in a relaxed state; I fall asleep at the end."
- "Track 1 puts me to sleep; track 2 puts me to sleep faster."
- "It hypnotizes me; the voice is so calming it puts me to sleep."
- "I've used the CD a couple of times a week at bedtime to help me sleep."
- "Still helps me fall asleep."
- "When I was stressed out, they helped me to sleep."
- "Fell asleep became so relaxed."
- "I've never been able to listen to the whole track, because it always puts one to sleep."
- "I put on track 2 and then fell asleep."

Kachikis and Breitkopf,[48] who found that poor sleep quality was associated with anxiety in the general population of women. The relationship between sleep quality and anxiety is significant, as in the general population, untreated anxiety has been linked to subsequent depression; individuals with comorbid anxiety and depression are more difficult to treat, have poor health outcomes, and are at a greater risk for suicide.[49] In this inquiry, higher perceived stress scores were moderately correlated with worse sleep quality, which is consistent with previous research in the general population.[48] The relationship between sleep quality and stress is a critical consideration, as untreated stress has also been linked to depression in later life.[49]

At baseline, there was a large relationship between higher social support scores and better sleep quality scores. This is consistent with previous research, as Costa et al[50] identified that social support improved aspects of sleep quality, including the ability to fall asleep, in the elderly population. These findings are important, as those with limited social support are at a greater risk for depressive symptoms[26] and poor sleep quality.[14]

The results from this study suggest that RGI use is associated with better sleep quality, a finding that is supported by the previous work of Chen and Francis,[34] who reported an improvement in sleep quality following a 6-week RGI intervention in patients with chronic pain. Renzi et al[35] demonstrated similar findings with a 30-minute guided imagery intervention in patients following anorectal surgery. The participants' positive comments as to the influence of the intervention on their sleep support the findings of other studies suggesting the sleep-promoting aspect of RGI. In a 12-week RGI intervention study with second trimester pregnant women, a consistent theme identified by participants was the perceived ability to fall and stay asleep.[37] Lin[36] found that surgical patients reported one of the most helpful effects of an RGI intervention was the promotion of sleep.

The findings of this study indicate that more frequent use of the RGI intervention was related to more improvement in sleep quality, suggesting a "dosage effect" of the intervention. It has been demonstrated that the effects of guided imagery rise as the dose or duration of the intervention increases.[32] Furthermore, the capacity for imagery can be consciously enhanced and strengthened through practice.[51]

Limitations of the study

The limitations of this study were the small heterogeneous sample size that made it difficult to control for confounding factors and to statistically test for relationships among the study variables. The participants might have experienced recall bias when completing measures that asked for information over the previous month period (PSQI and PSS). The study was limited by missing data, as 1 participant dropped out after week 7 and did not complete final self-report measures and another study member did not provide complete data on the CES-D at week 8. Resources were not available to make the intervention available in Spanish. Therefore, the feasibility and acceptability of this intervention among Spanish-only mothers remains to be studied. However, despite these limitations, this investigation revealed a high prevalence of maternal mental distress and poor sleep quality in a sample of mothers of preterm infants. Furthermore, the study provides evidence for the potential benefit of an RGI intervention in improving sleep quality in this vulnerable population.

Clinical implications

There are more than a half million infants born prematurely each year in the United States.[52] For very preterm infants, this can mean weeks and perhaps months of hospitalization in an intensive care environment. Parents experience a range of distressing emotions (fear, anger, guilt, powerlessness) and can be overwhelmed by the hectic NICU environment.[6,9] It is no surprise that mothers of preterm infants can be significantly more stressed, anxious, and depressed than parents of term infants and that these distressing mental states can affect the mother's ability to sleep well. An intervention that has the ability to improve sleep quality for mothers of these small infants can have many positive effects on the family,[14] including the premature infant. Improving maternal sleep quality may increase a mother's attention, focus, and memory, which are necessary to effectively learn about their infant's development and subtle cues, as well as provide for safe care.[3] Being more rested may help mothers be able to better communicate their needs and understanding about their infant's condition and promoting more open and effective communication with the NICU staff. Sufficient rest may reduce the mother's risk for the downward spiral of stress, anxiety, and depression, thereby increasing the potential for better long-term health for both the mother and the infant. Mothers who are younger, are economically disadvantaged, and/or have limited social support are at greater risk for poorer sleep quality. Early identification of these higher risk mothers offers opportunity for more timely intervention and better outcomes for the mother and the infant.

Implications for future research

Many participants in this study sample had sleep difficulty and experienced high levels of stress, anxiety, and depression. In this inquiry, as mothers identified more frequent use of the RGI intervention, they also reported better sleep quality; however, it is not clear what factors influenced the use of the intervention over time. Further exploration of RGI as an intervention to improve sleep quality could be strengthened by using a mixed-methods, longitudinal, randomized control trial design. An adequately powered sample would more clearly test the effectiveness of this novel approach and allow for higher levels of statistical testing. Development of the intervention in Spanish may allow for evaluation of the generalizability of this strategy in an important and growing demographic of mothers in the United States. The use of more precise measurement methods including actigraphy and sleep diaries may provide a fuller understanding of the effects of the RGI intervention on sleep quality in this vulnerable population.

CONCLUSIONS

Guided by the theoretical framework of Lazarus and Folkman,[38] this investigation examined maternal and infant factors that influenced sleep quality among a sample of mothers with 1 or more hospitalized preterm infants. This study examined the effects of an RGI intervention on improving maternal sleep quality. It is clear that sleep quality was negatively affected by mental distress, consistent with previous research in this field; however, the RGI intervention was found to be highly feasible and acceptable in this sample of mothers and may be an effective strategy to improve stress and coping in this population. Improving sleep quality in mothers of NICU infants may enhance their ability to read infant cues and respond more effectively to their infants, promote a better understanding of information and directions provided by NICU physicians and nurses, and ease the transition in care of the infant from the hospital to the home environment.

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