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Abstract

Background: Poor sleep is common during pregnancy and is associated with increased risk of negative health outcomes. Research indicates that physical discomfort and having an active mind are primary factors for prenatal sleep disturbances. Mindfulness-based interventions have the potential for addressing these factors, but have yet to be optimized for this purpose in this population.

Objective: The objective of this study was to gather input from pregnant and postpartum individuals about the value of a mindfulness-based program for improving prenatal sleep and their preferred content and delivery format.

Methods: We conducted 2 focus groups with 12 pregnant people experiencing poor sleep quality and 3 individual interviews with postpartum people. Interviews were thematically analyzed.

Results: The majority of participants expressed strong interest in a mindfulness program for improving prenatal sleep. Participants reported that pregnancy-specific physical discomfort and worry (both general and pregnancy-specific) affected their sleep. Participants wanted sleep education, and strategies for calming the mind, reducing physical discomfort, reducing impact of bedtime partners on sleep, and tips for improving sleep schedule and quality. Participants recognized the convenience of an online intervention and the social benefits of an in-person intervention and favored a hybrid delivery model.

Conclusion: Addressing prenatal sleep problems is an unmet need. Given the challenges and discomfort women face during pregnancy, and the importance of adequate sleep for promoting mental and physical health during pregnancy, sleep difficulties are critical to address. A mindfulness-based intervention for improving prenatal sleep was deemed of high interest to this perinatal population.

Keywords

prenatal sleep, sleep quality, mindfulness, focus group, qualitative

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Introduction

Poor sleep quality is common during pregnancy¹ and associated with negative maternal outcomes such as depression,^{2,3} suicidal ideation after accounting for depression,⁴ and gestational diabetes mellitus.⁵ Further, those with an insomnia diagnosis during pregnancy are at increased risk of preterm birth relative to matched controls. Despite this, research on interventions to improve prenatal sleep is limited.

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There is limited research on the efficacy and safety of sleep-promoting medications among pregnant populations, and mixed evidence for their impact on birth outcomes, such as preterm birth and small-for-gestational-age.⁶ Moreover, pregnant women prefer non-pharmacological interventions for sleep.⁷ The majority of research investigating non-pharmacological interventions has focused on cognitive behavioral therapy for insomnia. This approach targets the dysfunctional sleep beliefs and behaviors that perpetuate insomnia, and 3 randomized controlled trials document its efficacy during pregnancy.⁸⁻¹⁰ However, many patients in these trials did not experience symptom remission (i.e., remission rates at post-intervention ranged from 35% to 64%). It is possible that an intervention that targets the unique factors contributing to poor sleep quality during pregnancy may increase efficacy.

Pregnant people report that physical symptoms, including discomfort and pain, disturb their sleep.¹ Additionally, over one-third of pregnant people report that worries about their baby, pregnancy, or labor and delivery disturb their sleep.¹ Theory and empirical evidence suggests that mindfulness-based interventions may be effective for helping individuals cope with discomfort and calm an active mind.¹¹⁻¹⁵ For example, in mindfulness-based stress reduction (MBSR), participants learn skills to notice and accept difficult sensations, emotions, and thoughts. Randomized clinical trials of MBSR among non-pregnant populations demonstrate significant effects on the psychological mechanisms (pain acceptance^{13,14} and rumination¹⁵) that may contribute to poor sleep quality during pregnancy, as well as on objective and subjective measures of sleep,¹² even in the context of chronic pain.¹⁶

Although mindfulness-based interventions are well-suited to targeting the cognitive factors that contribute to poor sleep during pregnancy, they have yet to be optimized for this purpose. In the current study, we conducted focus groups and individual interviews with pregnant and postpartum participants to aid in development of a mindfulness-based intervention for prenatal sleep to ensure that it would be relevant, credible, and acceptable to our target population. We sought feedback on 2 broad domains: intervention content and delivery format.

Methods

Participants

Pregnant participants were recruited at a large, urban academic medical center via messages sent through the electronic health record, direct patient mail, and digital flyers displayed in prenatal clinics. Pregnant participants were also recruited through Facebook advertisements. Additionally, we recruited postpartum participants who could provide feedback on what support they needed for their sleep while reflecting on their entire pregnancy and the early postpartum

period. Postpartum participants were recruited from a previous observational study examining sleep during pregnancy.

Eligibility criteria were designed to match the criteria to be used in a future intervention trial. Inclusion criteria, assessed via an online eligibility survey, consisted of the following: (a) currently pregnant 12–28 weeks gestation or had a baby in the last 12 months; (b) 18 years or older; (c) ability to speak English and provide informed consent. Additionally, pregnant participants were required to have poor sleep quality (i.e., Pittsburgh Sleep Quality Index score >5). Participants were excluded and referred to other services if they had (a) self-reported diagnosis of sleep apnea, narcolepsy, parasomnia, or circadian rhythm disorder, (b) circadian rhythm disorder based on the Morning-Eveningness Questionnaire (≥ 70 or ≤ 30),¹⁷ (c) Epworth Sleepiness Scale score >10,¹⁸ (d) evidence for sleep apnea based on the Facco pregnancy-specific screening tool,¹⁹ (e) night shift-work in the past month or upcoming month, and (f) psychological, medical, or other issues that necessitate priority treatment or that would preclude participation in a trial investigating a mindfulness-based intervention for improving prenatal sleep (e.g., active suicidality defined as a score >0 on EPDS item 10, probable depression defined as total score ≥ 15 on the EPDS, and schizophrenia, bipolar disorder, on bed rest, or multiple gestation defined by self-report). Finally, pregnant participants were excluded if they had nighttime caregiving responsibilities 3 or more times per week.

Data Collection

All procedures were approved by the institutional review board of the University of California, San Francisco (UCSF), and all participants provided electronic informed consent prior to completing the eligibility survey.

Two focus groups (six pregnant participants each) and 3 individual interviews were conducted by the first author, who has extensive experience leading and facilitating groups. The focus groups and individual interviews began with a mindfulness of breath practice, a definition of mindfulness, and a brief overview of how mindfulness has been used to help patients cope with pain, prevent depression, improve sleep, and prepare for childbirth and parenting. Next, the first author reviewed the following group guidelines:

There are no right or wrong answers to the questions I am about to ask. We expect that you will have differing points of view. Please feel free to share your point of view even if it differs from what others have said. Don't feel like you have to respond to me all the time. Feel free to have a conversation with each other about these questions. I am here to ask questions, listen, and make sure everyone has a chance to share. We're interested in hearing from each of you. So if you're talking a lot, I may ask you to give others a chance. And if you aren't saying much, I may call on you. We just want to make sure we hear from all of you.

Table 1. Open-ended focus group and individual interview questions.^a

| Intervention Content |
|--|
| <ol style="list-style-type: none"> 1. What strategies have helped you sleep during pregnancy? <ol style="list-style-type: none"> a. Was there anything that you tried that did not help? 2. How interested would you be in a mindfulness program designed to improve your sleep during pregnancy? <ol style="list-style-type: none"> a. What questions would you have about this kind of program? 3. What issues with your sleep would you want this program to address? <ol style="list-style-type: none"> a. What about coping with the physical discomforts of pregnancy? b. Do you think learning ways to calm your mind when trying to sleep would be helpful? c. How about learning about how pregnancy impacts sleep? d. Would you be interested in learning how to change your sleep schedule to help you sleep better? 4. Would you rather have a briefer program focused mainly on improving sleep? <ol style="list-style-type: none"> a. Or would you be interested in a longer program that also focuses on using mindfulness skills to prepare for labor-related pain and fear, getting you ready for childbirth? b. And/or would you be interested in also focusing on mindful couple relationships and mindful parenting? |
| Intervention delivery format |
| <ol style="list-style-type: none"> 1. How would you like to receive this program? Some people prefer to meet others going through the same thing they are to build a support community. Others prefer getting information in efficient ways <ol style="list-style-type: none"> a. Which do you prefer: In-person with a group of other pregnant women? b. On an app that has videos and hand outs and audio downloads? c. On a video call, like Zoom? d. Or a hybrid of these, like an app + Zoom calls? e. If in-person, where should we offer them? f. Do we need to offer childcare? 2. We want to make sure we design a program that feels feasible to complete and yet we know that having sufficient time to practice the skills can be important <ol style="list-style-type: none"> a. We are considering doing this in 4, 6, or 8 weekly sessions. How much of a difference would it make to you if we offered it in 4 vs 6 sessions or 6 vs 8? b. We are also considering a 1.5 hour per week or 3 hour per week program. Which would you prefer? Would you prefer more frequent, briefer sessions or less frequent, longer sessions? 3. What else should we consider in order to make this program feasible? <ol style="list-style-type: none"> a. Interesting? b. Useful? |

^aModified as needed for individual interviews with postpartum participants.

Next, the first author used a topic guide consisting of open-ended questions that were modified as needed to respond flexibly to participant comments and questions. The guide was organized around 2 domains: (1) participants' preferred content of the mindfulness-based intervention for prenatal sleep, and (2) participants' preferred intervention delivery format (see [Table 1](#)). The 2 focus groups were conducted in-person. Due to the COVID-19 pandemic, the 3 interviews were conducted over Zoom, a cloud-based video conferencing platform. In order to be flexible and accommodating of the time and energy demands of the postpartum period, interviews were conducted individually at a time most convenient for each postpartum participant. Data collection ceased when saturation was clearly evident.

Data Analysis and Reporting

All participants contributed to the discussion. Focus groups and interviews were audio recorded and transcribed. Three

authors were actively engaged in qualitative data analysis, and our team used a modified grounded theory approach to analyze focus group data.²⁰ The first author created a preliminary codebook through an iterative process of identifying themes that emerged in the data; this codebook was reviewed and edited by the 3 authors for salience. Over the course of several meetings, the first 3 authors finalized a list of inductive and deductive codes. The final codes used to analyze the data captured recurring experiences and recommendations for developing an intervention program. The first author initially coded all transcripts, and the second and third authors reviewed all coded transcripts in full using Dedoose analysis software. We feature quotes that were particularly impactful or representative.

Results

Of the 124 individuals who completed the screening questionnaire, 37 met eligibility criteria, and 15 were

Table 2. Participant Demographics.

| Characteristic | N (%) |
|--|------------------|
| Race | |
| Caucasian, White, or European American | 9 (60.0%) |
| Asian or Pacific Islander | 2 (13.3%) |
| Latin, Latin American, or Hispanic | 2 (13.3%) |
| African American or Black | 1 (6.7%) |
| Bi- or multi-racial/ethnic | 1 (6.7%) |
| Education | |
| High school graduate, GED, or equivalent | 1 (6.7%) |
| Some college, junior college, or vocational school | 1 (6.7%) |
| College graduate (BA, BS) | 5 (33.3%) |
| Professional or graduate degree (MA, MS, MBA, PhD, MD, JD, etc.) | 8 (53.3%) |
| Relationship status | |
| Married or living with partner | 15 (100%) |
| Income | |
| \$25,000–49,000 | 2 (13.3%) |
| \$50,000–99,000 | 2 (13.3%) |
| \$100,000–199,000 | 2 (13.3%) |
| \$200,000 or higher | 8 (53.3%) |
| Do not know | 1 (6.7%) |
| Employment status | |
| Full time job | 8 (53.3%) |
| Part time job | 1 (6.7%) |
| Unemployed | 1 (6.7%) |
| Student | 2 (13.3%) |
| Homemaker | 1 (6.7%) |
| Unable to work, on disability, or leave of absence | 2 (13.3%) |
| | Mean (SD) |
| Age | 32.8 (5.13) |
| Gestational age ^a | 18.8 (4.11) |

^aNot including 3 postpartum participants.

Table 3. Domains and Themes.

| Domain | Theme |
|--|--|
| Preferences for intervention content | Recognizing the impact of poor sleep |
| | Physical discomfort and sleep |
| | Calming the mind |
| | Bed partners |
| | Changing sleep schedule |
| | Daytime strategies to improve sleep |
| | Nighttime strategies to improve sleep |
| | Narrow focus on sleep |
| | Comprehensive focus including childbirth and parenting preparation |
| | Information about sleep and pregnancy |
| Preferences for intervention delivery format | Pros and cons of receiving the intervention in-person |
| | Pros and cons of receiving the intervention remotely |
| | Seeking a hybrid approach |
| | Needing social support |
| | Intervention schedule |
| | Needing accountability |

available to attend a focus group (n = 12 pregnant participants) or interview session (n = 3 postpartum participants). See Table 2 for demographic information of our full sample.

Preferences for Intervention Content

Recognizing the impact of poor sleep. Overall, participants appreciated the importance of adequate, high quality sleep during pregnancy (Table 3). Participants recommended that the intervention discusses the wide-ranging consequences of poor sleep for their mood and relationships. One participant reflected on a recent poor night of sleep:

The next day I was just grumpy. And then you're kind of moody towards everybody else and you don't want that. I know it was because I didn't get enough sleep. **(Participant B, postpartum)**

Physical Discomfort

Participants reported that common pregnancy symptoms, such as heartburn or hip pain, disrupted sleep. Multiple participants brought up the experience of being unable to feel comfortable in bed, in addition to waking in the middle of the night to urinate:

I would just keep tossing and turning and just trying to find a comfortable position, but I just couldn't get comfortable... Because in reality I really just wanted to lay on my stomach, but I couldn't. **(Participant J, postpartum)**

However, they reflected that it was difficult to find information about how to ease physical symptoms and improve sleep; they reported that most available information focuses on preparing for labor and birth:

You're pregnant for a long time, right? And so, whether it's like nausea at first or heartburn or eventually your hips start hurting and your ligaments start hurting[...] help along the way would be great, where a lot of the pregnant-oriented stuff is like helping you deal with the intense pain of labor, but what about just the everyday stuff of like, not [being able to fall] asleep because your hips are killing you? **(Participant A, pregnant)**

Calming the Mind

Many participants reported that having an active or anxious mind made it difficult to fall asleep, and that they wanted tools to help calm the mind. Participants suggested that the intervention include techniques to be used prior to bedtime to ease the process of falling asleep:

Sometimes, yes, your mind is wondering, thinking about the pregnancy, or towards the end you're wondering if it's going to be a healthy delivery[...] everything starts rushing into your mind. **(Participant B, postpartum)**

Reducing Disturbance From Bed Partners

A pervasive complaint was that partners caused significant sleep disruption. Several participants reported feeling hot or stifled by their partners who had excessive body heat, wanted to cuddle, or took up too much space in the bed. Some participants managed by sleeping in a different room, putting a pillow boundary in the middle of the bed, using relaxation techniques, or communicating their needs to their partner. Participants wanted intervention content to share with their partner that would provide an overview of the importance of sleep, offer suggestions for how partners could promote sleep (e.g., massage and increase space), and minimize sleep disturbances.

Daytime Strategies to Improve Sleep

Participants described the strategies—whether effective or ineffective—that they used to improve their sleep. One participant noted that self-monitoring with daily sleep diaries helped her connect what happened during her day to how she slept at night. Sleep diaries yielded helpful insights about controllable or modifiable sleep disruptors, such as high water intake or arguing with a partner before bed. Many participants also reported exercising and limiting naps during the day to facilitate falling asleep faster at night. Additionally, participants noted that mindfulness strategies could help mitigate the daytime effects of poor sleep, as highlighted in the following quote:

There's also that component of putting yourself in the right mindset if you didn't sleep well the night before, that could be really helpful, that you could put on something in your car or [referring to an audio meditation...] To make it through the day. **(Participant C, pregnant)**

Nighttime Strategies to Improve Sleep

Participants reported using a number of strategies to improve sleep at night, including those to improve comfort (e.g., pregnancy pillows, ice packs, and stretching), make the bedroom environment conducive to sleep (e.g., noise machine, ear plugs, eye mask, and fans), reduce disruptions and distractions (e.g., sleeping separately from partner and putting phone away), relax (e.g., music, breathing exercises, decaffeinated tea, lavender scented products, and warm bath), and change their sleep schedules. For example, participants reported allowing themselves more time in bed with the goal of getting more sleep. Anticipating inevitable sleep disruptions throughout the night, participants described going to bed early to maximize sleep opportunity. As one participant said:

That sort of gives me a head-start on like, if I have to be awake for two hours [in the middle of the night] at least I have this extra time [to sleep] at the beginning. **(Participant D, pregnant)**

Participants were uncertain about how to respond to middle-of-the-night awakenings and expressed needing in-the-moment tools:

Do I get out of bed? Do I go on my phone? Do I just focus on my breathing? **(Participant C, pregnant)**

As one participant explained, anxieties that surfaced during these moments of disrupted sleep, compounded by the allure of screens and information overload, made it particularly difficult to respond to awakenings constructively:

I always have my phone next to me, and when you get up in the middle of the night sometimes you're like, 'Hmm. What was that thing... I had this weird symptom, what's that about?' And you just go into this black-hole of searching online. And you're up and you're like, 'What am I doing?'[...] The phone is very distracting, especially when you get up in the middle of the night and you're trying to go back to sleep, and you're like, 'I'll just jump on my phone for a few minutes', and it's like an hour later. **(Participant E, pregnant)**

Wanting Information About Sleep and Pregnancy

Participants expressed strong interest in prenatal sleep information. Underlying several of these comments was frustration about the lack of comprehensive and reliable information about sleep and pregnancy, as well as their healthcare providers' over-simplification of sleep recommendations. One pregnant participant described their experience with a healthcare provider:

I just think something like this can give real comfort to people who are pregnant. I was with my OB ... before I switched... And I usually beg them for any kind of sheet on like, "What do I do?? What do I not do??" And they gave me some really, really janky sheet that has been Xerox twelve thousand times. So it was crooked and like all messed up and I was like, "Okay, you're not delivering my baby." **(Participant I, pregnant)**

Additionally, participants expressed that even when they do receive recommendations from their providers, these recommendations are often reductive and rarely accompanied by scientific rationale:

I think so much of the information we get as pregnant people is like, 'you should do this because you should do this'. Like, it's not really clear why. Like, why should you sleep on your side? **(Participant D, pregnant)**

In another participant's words:

I think that I'm the kind of person who wants to know more in terms of the science behind something rather than just like, 'Your baby wants you to sleep right now'. I'm like, it doesn't have

desires, you know... I have some background in this, I want to be able to have literature that kind of respects that, rather than just telling me that everything is because my baby wants it. **(Participant F, pregnant)**

Breadth Versus Depth of Intervention's Focus

We invited participants to tell us about their interest in receiving a comprehensive program that included childbirth and parenting preparation with strategies for improving sleep. Several participants commented that they already had several resources for preparing for childbirth and parenting, but none for improving sleep. Some participants were more interested in addressing a current challenge (sleep and mental health) versus addressing a future challenge (parenting), with one participant stating:

I'd be more likely to sign up for an acute issue that I want to resolve, rather than to sign up for something that's going to have a bunch of redundant information that I'm going to get elsewhere. **(Participant D, pregnant)**

Preferences for Intervention Delivery Format

Pros and cons of receiving the intervention in-person. Perceived benefits of an in-person delivery format included the lack of distractions or technological frustrations, and the ability to be "more present" **(Participant L, pregnant)**. Additionally, participants noted that in-person groups tend to foster stronger relationships and sense of community. Despite the benefits of an in-person delivery format, participants discussed logistical considerations, particularly those related to transportation and scheduling.

Pros and Cons of Receiving the Intervention Remotely

Most participants noted that a remote online intervention would not meet their interpersonal needs as effectively as an in-person intervention. Participants brought up how internet communication procedures often feel unnatural and could possibly decrease motivation for attendance. However, the barriers to access for an in-person intervention outweighed the benefits for most participants, with the ability to attend sessions and "share experiences with each other [...] from the comfort of [one's] own home" **(Participant B, postpartum)** bypassing most accessibility concerns. In particular, the time, cost, and energy associated with travel were of concern, and one participant highlighted the desirability of an online option:

When I would go to the [prenatal breastfeeding] classes, normally I would take an Uber from work. So, for me it would have been more convenient at home just because I don't have to spend money to get to the location or take a bus while being pregnant and all that. **(Participant B, postpartum)**

A hybrid approach to the intervention delivery format—such as holding the first session in person with subsequent sessions remotely—was one potential solution participants suggested to address their mixed needs:

A combo would be really great. I'm starting Reiki sessions next week and we're meeting monthly and then she's just giving me tools after that for like the rest of the month. And then we meet again[...] And so I think like an in-person, like these are the tools, this is this. Now here's the app to help guide you through the rest of the month[...] would be awesome. **(Participant K, pregnant)**

Needing Social Support

Many participants reported struggling with isolation during their pregnancies and searching for support from other pregnant people, particularly if they lacked a strong family network or had never been pregnant before. Participants wanted to commiserate, to solicit suggestions and resources, and perhaps most importantly to reassure each other that they are not alone in their “worries, fears, and anxieties” **(Participant G, pregnant)**. As one participant describes her experience:

I also felt like first trimester was super isolating[...] I've been looking for mindfulness classes to start taking for birth and sleep and all that stuff and having that early on for sleep and pregnancy and transitioning throughout your trimesters and being able to meet with a group of moms, say like, “Wherever you are, come here.” That'd be so helpful[...] So having a network and a support group and learning mindfulness and, yes, personalizing it, tailoring it. **(Participant G, pregnant)**

For these reasons, a group—as opposed to a one-on-one—intervention had broad appeal among participants.

Intervention Schedule

Participants brought up multiple considerations regarding the schedule of the intervention. Flexibility was a recurring theme: to accommodate participants' varied preferences and schedules, it was recommended that the intervention be offered at different times (mornings, evenings, and afternoons) and on both weekdays and weekends. Some participants considered the potential time burden of a longer class duration:

I think that commitment scares me off to be honest. I would prefer the CliffsNotes version of it. I couldn't do three hours a week for nine weeks straight. **(Participant H, pregnant)**

However, other participants noted that a longer intervention would allow for “enough time to learn and implement [and] create a new habit.” **(Participant G, pregnant)**

Participants also considered at what point in pregnancy to offer the intervention:

I think we don't do a great job of supporting women throughout their entire pregnancy. We leave them alone for a while and then we tell them that it's a nightmare, it's amazing, it's difficult and then they're never sleeping again. So getting support across the whole time would be helpful. **(Participant C, pregnant)**

Additional suggestions included monthly sessions, an all-day intensive followed by weekly check-ins, or weekly/biweekly sessions.

Needing Accountability

Another theme that emerged when discussing intervention format was needing accountability for completing intervention home practices:

If it was like an accountability measure or reporting measure as part of a group then I could see doing it[...] If it was like when I'm having my tea in the morning I could check up, like, ‘oh, my sleep was great, fair, poor. Did I try the exercises, yes, no’... I am personally motivated by being able to see data a little bit, especially about myself. **(Participant F, pregnant)**

Participants suggested a variety of accountability measures, including involving partners, monetary incentives for attendance, guided practices, regular check-ins, and a self-tracking component.

Discussion

A main finding from this research was that improving prenatal sleep quality was perceived as an unmet need. Participants experienced sleep as foundational for their physical and emotional health during pregnancy. Accordingly, they expressed frustration that their problems sleeping were not taken seriously, and that it was challenging to find reliable information about and tools for improving prenatal sleep. Participants' understanding of their sleep problems matched our conceptual framework. They mainly attributed sleep problems to discomfort and having an active mind. Few participants spontaneously identified mindfulness practice as a potential strategy for targeting these problems.

Consistent with previous research, participants highlighted the importance of flexible options for accessing intervention content.²¹ In-person sessions were appealing because they offered social support and accountability, and online sessions were valued for their convenience. A combination of in-person and online sessions could strike a balance between convenience and community. Of note, these data were gathered prior to the COVID-19 pandemic, when utilization of technologies to receive health care and facilitate

connection became commonplace. Thus, it is unknown whether preferences for delivery format have changed.

These interviews yielded a few unexpected findings. Our expectation was that participants would not be interested in a longitudinal program that focused solely on prenatal sleep. We thought that a mindfulness-based childbirth class, supplemented with content to improve sleep, would be more acceptable. However, many participants expressed interest in a program with a more extensive focus on sleep versus one with a comprehensive focus on childbirth, parenting, and sleep. Participants stated they already had access to classes about childbirth and parenting but lacked reliable information about sleep. They highlighted that a class that included information about childbirth and parenting may be less relevant for participants with previous birth experience. A second unexpected finding was that many participants reported that their bed partner caused significant sleep disturbance, suggesting that a prenatal sleep intervention should consider including strategies to mitigate such disturbances. A third unexpected finding was the extent to which participants had tried numerous, eclectic strategies to improve their sleep—participants spontaneously recommended resources (books, podcasts, websites, etc.) and techniques to each other, further highlighting the appeal of a group program dedicated to prenatal sleep.

Limitations

A major limitation of this study is the specificity of our sample. The majority of participants were non-Hispanic white race, of high socioeconomic status, and living in the San Francisco Bay Area, potentially limiting the generalizability of the findings. More research is needed to understand the treatment preferences of racially and ethnically diverse communities, particularly as they may be at higher risk of reporting inadequate sleep duration.²² Another potential limitation is that most of our pregnant participants were in their second trimester—sleep patterns evolve throughout pregnancy, making it important to assess perspectives at various time points.

Summary and Next Steps

Overall, participants demonstrated strong interest in a group mindfulness intervention for improving sleep during pregnancy. Results also suggested that pregnant people may benefit from clinical care that addresses sleep disruption in pregnancy. Participants consistently reported struggling with pregnancy-specific physical discomfort, as well as anxiety and stress at night, and wanted tools to address these challenges and general education about sleep during pregnancy. The convenience of an online intervention tended to outweigh the social benefits of an in-person intervention for participants, but hybrid models were also considered.

Based in part on these findings, we developed and are pilot testing an 8-week Zoom-based program that includes

standard mindfulness-based stress reduction offered in a heterogeneous group of participants plus weekly 30-minute group sessions focused on skills to improve perinatal sleep specifically. The 30-minute sessions balance mindfulness- and acceptance-based skills for coping with sleep disturbances that cannot be eliminated (e.g., pregnancy-related physical discomfort and newborn wakings), and cognitive behavior therapy for insomnia skills for changing behaviors and thoughts that may perpetuate poor sleep.

This qualitative study of a community sample underscores that difficulty getting high quality sleep is a significant concern for pregnant individuals. While our goal was to use this information to aid in the development of a mindfulness-based intervention for prenatal sleep, it also underscores the need for providers to assess sleep problems and to be prepared to provide referrals as needed for more severe presentations.

Declaration of Conflicting Interests

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Availability of Data and Material

All data are available from the PI upon reasonable request for data access.

Ethics Approval

This study received approval from the institutional review board of the University of California, San Francisco.

Consent to Participate

Written informed consent was received by all study participants in the trial.

Consent for Publication

All authors have reviewed the manuscript prior to its submission for publication.

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