

# Qualitative Assessment of Pregnant Women's Perceptions of Infant Sleep Boxes

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## Abstract

Although several states have implemented programs providing boxes for infant sleep, safe sleep experts express concern regarding the paucity of safety and efficacy research on boxes. The purpose of this study was to assess pregnant women's perceptions regarding use of baby sleep boxes. A convenience sample was recruited from a community prenatal education program. Twenty-eight women were administered a brief semistructured interview about their knowledge of baby sleep boxes, opinions about the boxes, and questions they would have. For most ( $n = 15$ , 54%), this was their first pregnancy. Participants self-identified as white (43%), black (36%), Hispanic (18%), and "other" (4%). Ten subthemes emerged related to previous knowledge of boxes (useful for families in need, historic precedent in other countries), positive attributes (portable, compact, affordable, decorative), and negative attributes (low to ground, structural integrity/design, stability, stigma). Research on safety and efficacy could reduce concerns, but issues of stigma may persist.

## Keywords

injury prevention, maternal infant health, safe sleep, qualitative research, health education

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United States' media has been reporting on the use of cardboard "baby boxes" for infant sleep. The prevalence of these devices has started to grow within the United States. However, little is known about the safety or efficacy of baby boxes for infant sleep (ie, baby sleep boxes). The original idea comes from a Finnish tradition where, as early as the 1930s, expectant mothers received a box of infant care items from the Finnish government as an incentive for early prenatal care.<sup>1</sup> The box itself comes equipped with a mattress and it can be used for infant sleep. With Finland reporting one of the lowest infant mortality rates of industrialized countries (2.3 deaths per 1000 live births), and less than half the US rate (6.1 per 1000 live births),<sup>2</sup> many are wondering if a baby sleep box could be the answer to reducing sleep-related death in the United States.

Only one current study was identified on the use of baby sleep boxes. Temple University compared self-reported bed-sharing rates within 72 hours of hospital

discharge between control groups and a combined group that received enhanced safe sleep education with and without a baby sleep box. Results suggest that the enhanced education group had 27% less bed sharing overall and nearly 50% less bed sharing for exclusively breastfed infants. However, because of the methodology, the impact of the box could not be isolated.<sup>3</sup> Half the mothers who received the box reported having used it as a sleep space for their infant within 72 hours of discharge, and 12% used it as the primary sleep space.<sup>4</sup>

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Several states are starting to utilize baby sleep boxes for their patient populations. The state of New Jersey has partnered with a California-based company to provide every newborn in the state with a Baby Box at hospital discharge.<sup>5</sup> Ohio and Alabama have followed suit.<sup>6</sup> However, experts on infant mortality and risk reduction strategies are expressing concern. Boxes do not meet the federal definition of a crib, bassinet, play yard, or handheld carrier, and no consumer product regulations exist for baby sleep boxes.<sup>7-9</sup> There is a lack of evidence that the boxes are safe or that they can affect sleep-related death rates.<sup>10</sup>

Clearly, a conflict exists in the beliefs about these boxes. However, within these debates, the opinions of caregivers have often been overlooked. The purpose of this study was to assess the perceptions of pregnant women regarding the use of baby sleep boxes.

## Methods

This project was reviewed and approved by the Human Subjects Committee at the University of Kansas School of Medicine-Wichita.

Because of the limited knowledge on the use of baby sleep boxes and the paucity of research available on this topic, we used qualitative methodology to guide and explore our overall research question regarding the use and perceptions of baby sleep boxes by new mothers.

A convenience sample of women was recruited and verbally consented at consecutive sessions of a community prenatal education program. The prenatal education program's priority population is women at high risk for infant mortality, including low-income and minority populations. For women agreeing to participate, a brief information sheet was provided, featuring a picture of a baby sleep box from a box manufacturer. The information sheet had a listing of some of the manufacturer recommendations and noted that the product had been used in other countries.

Women were administered a brief semistructured interview by 1 of 3 investigators (CRA, MB, ME). Interviewers asked about the women's past knowledge about baby sleep boxes, opinions about the boxes (likes and concerns), and specific questions they have (see the appendix). In addition the interviewers explored how the women might use the box in their unique situations, including whether they would use the box, where they would place the box, and what barriers they anticipated in using the box. Finally, women were asked about their pregnancy history and demographic information and to provide any additional comments they would like to share. Interviews took between 5 and 15 minutes to complete.

Following the interview, women were given a hand-out explaining the current paucity of research surrounding baby sleep boxes, supplemented with the American Academy of Pediatrics (AAP) safe sleep recommendations. Women were compensated with an infant wearable blanket.

Interviews continued until saturation of themes was reached. Interviewers summarized their responses from participants, and the summaries were reviewed independently by 3 investigators using thematic analysis. Themes were discussed and compared until consensus was reached. Quantitative data were summarized using frequencies.

## Results

### Demographics

Over 4 weeks, 30 women were approached to participate in brief semistructured interviews; 28 consented to participate (93%). For most ( $n = 15$ , 54%) this was their first pregnancy. The median length of pregnancy was 29 weeks. Forty-three percent self-identified as white, with 36% reporting black, 18% Hispanic, and 4% "other" race. Most participants ( $n = 19$ , 68%) were publicly insured with 7 (25%) having private insurance, and 2 (7%) were uninsured.

### Themes

Twenty-eight semistructured interviews were conducted on the participant's perceptions of the use of baby sleep boxes. Ten subthemes emerged from the data related to previous knowledge of boxes (2 themes), positive attributes (4 themes), and negative attributes (4 themes; Table 1).

Prior to the interviewer's introduction, 18 participants (64%) had not heard of baby sleep boxes, while 8 (29%) had heard of them from online sources, with 3 (11%) specifying that they heard about them on social media. One participant (4%) had heard about baby sleep boxes from the television or radio, and one (4%) had heard from family or friends.

Of those participants who had heard of baby sleep boxes, their current awareness was summarized by the theme of knowledge, which had 2 underlying subthemes: (1) useful for families in need and (2) historic precedent in other countries. First, baby sleep boxes were interpreted as a safer alternative for families in need. One participant encapsulated this feeling by saying baby sleep boxes were "good for those who can't afford a crib, so they are not putting the child in danger by sleeping in the bed with them." Second, many had

**Table 1.** Themes and Example Quotes From Interviews.

Domain	Themes	Example Quotes
Knowledge	Useful for families in need	“Good for those who can’t afford a crib so they are not putting in danger in your bed with you.” “Packed full of stuff for families that can’t afford it.”
	Historical precedent in other countries	“Heard about a nonprofit sending boxes overseas to poor countries packed with baby essentials.” “Moms in Finland think they are really great.” “If Norway is using the boxes, it must be good for baby.”
Positive attributes	Portable	“They can be useful. I think it was a [sic] awesome idea to come up with easier [sic] because you can have your baby close to you at naptime.” “Super portable.”
	Compact	“You can just keep on the bed and not have to get up and go into the baby’s room.” “Of course the small footprint means that you can put it about anywhere.”
	Affordable	“In place of a crib, the box would be a good idea if it was less expensive.” “Seems like you could save a lot of money on a crib.” “If you’re broke and didn’t have an income it would be great.”
	Decorative	“It looks decorative.” “Very decorative.” “Pretty.”
Negative attributes	Low to the ground	“Low to the floor.” “I’m worried about kicking or stepping on it.” “I have a dog, and if the dog could reach in there it would probably be bothering the baby.”
	Structural integrity/design	“Cardboard wears out so would it actually last the 5-6 months?” “Would it come apart?” “How durable is it?” “Someone is going to put the lid on the box.” “Are there any risks of chemicals in the material? Is it safe? Sturdy?” “What is the mattress made of?” “What happens if it gets wet?”
	Stability	“Does it come with something to set it on?” “If they get too big, they might tip it over and get hurt.” “It doesn’t look very stable, so if you put it anywhere else [besides the ground] it might tip over.”
	Stigma	“It’s just a box.” “Why is your baby in a box?” “It feels like the baby is about to be shipped.” “I think it would be beneficial for someone in a different situation.”

heard of the boxes in relation to Scandinavian countries and were inclined to equate baby sleep boxes with safety. One participant who had visited Sweden said, “Baby sleep boxes helped reduce SIDS [sudden infant death syndrome] in Sweden, and it helps with bonding because you keep the baby close to you in the box and makes [sic] the baby feel safe.” Another participant stated that she heard that “moms in Finland think they are really great. They get a box from the government, and it has a lot of educational items in it.” She said that the Internet stated that the boxes decreased SIDS but she thought it was the educational component, not necessarily the box itself that was responsible for the reduction.

Following a brief description, participants’ general thoughts about using baby sleep boxes could be categorized into 2 additional emergent themes, positive attributes and negative attributes, with additional subthemes. Within the theme of positive attributes, 4 subthemes emerged regarding the boxes. These themes were that boxes were perceived as (1) portable, (2) compact, (3) affordable, and (4) decorative.

Regarding the theme of portability, participants appreciated that it appeared easy to move the box both within the home and for travel. One woman stated, “It would be good when you are traveling and at someone’s house, and they don’t have a crib for the baby to sleep in.”

The second positive theme related to the box being compact. Participants appreciated that it had a small footprint, saying, “You can just keep it on the bed and not have to get up and go into the baby’s room.” They also postulated that its small size might make it more conducive to safe sleep as “there is only room for the baby, so it would be easier to keep it clutter-free, unlike a crib.”

Although no information about cost was provided to participants, the third theme related to the affordability of the box. Most assumed that the box was less costly than other infant sleep options and noted that it would be a good alternative in that “if you can’t afford a crib; it is less expensive.”

The final positive theme was that the box was decorative. Several reactions elicited concerned the attractiveness of the box, commenting on the provided image that “it looks very decorative.”

Within the theme of negative attributes, 4 subthemes were also identified: (1) low to the ground, (2) structural integrity/design, (3) stability, and (4) stigma. Many participants noted how low the infant sleep box was to the ground. Concerns revolved around hazards getting into the box, specifically citing pets or other children. One participant described that they “have a dog, and if the dog could reach in there it would probably be bothering the baby.” Another participant contrasted the height of the infant sleep box with a portable crib that was nearby saying “that [portable crib] would be very difficult for [my other children] to get into.” Numerous participants were worried about people inadvertently stepping in, tripping over, kicking, or dropping things into the box because of its proximity to the ground, especially during the middle of the night. One asked “does it come with something to set it on?” while a few said they would only use it with a stand.

The second negative theme was based on respondents’ expressed concerns regarding the structural integrity and design of the box. One of the key concerns related to the presence of the lid. “Why does it have a lid?” “It feels like the baby is about to be shipped.” Other apprehensions involved the materials used for the box. The most ardent concerns were about the perceived durability of the infant sleep box, with participants wanting to know, “how many tests have they done?” or “would it come apart?” and noting “cardboard wears out, so would it actually last the 5-6 months?” Furthermore, it is important to note that while most applauded the small footprint of the boxes, a few expressed consternation about the boxes being too “small” and “uncomfortable,” saying that there did not appear to be enough room for baby.

Some participants acknowledged the lack of ventilation. “A challenge with this box is that it is not ventilated. In a crib, you are supposed to get rid of the bumpers

because it restricts air flow.” Furthermore, the breathing in of chemicals or toxins that may be attached to the box or mattress was considered to be potentially problematic to a few participants. Finally, participants feared that older infants would be able to easily crawl out of the box.

The next negative theme related to the participants’ concern about the stability of the box, with several expressing consternation about the possibility of the box tipping over. One person stated that because of stability concerns she would rather put it on the floor than a couch, when using it in a living room.

Finally, the possibility of a negative stigma of putting your baby in a box was a theme. Participants were concerned about others asking, “Why is your baby in a box?” One expressed that “boxes are for things like puppies.” And another thought it would be more appropriate as a “litter box.” Other mothers stated that while they would not use the box, “For someone in need, it might be a good situation.”

In addition to the positive and negative themes that emerged during interviews, several participants stated that they would only consider the use of an infant sleep box if their doctor said it was safe to do so. Participants commented that they were unaware of whether the boxes had been thoroughly researched, with some making the assumption that since we were asking about baby sleep boxes, it meant that there was research to back them up.

### *Baby Sleep Box Use*

Half (n = 14, 50%) were willing to consider the box for infant sleep with 9 (32%) specifying naptime only, 3 (11%) nighttime only, and 2 (7%) both naptime and nighttime. This echoed the sentiment that many saw a use for the sleep box in central spaces in their home and as an adjunct to a crib or other sleep location. An additional 2 (7%) reported they would consider using it only when traveling.

In total, 8 participants (30%) responded that they would not place their baby in a baby sleep box. Only one of these participants expressed that they were planning on having the baby co-sleep with them; the 7 others discussed having another safe sleep environment they would prefer to use.

Finally, several participants (n = 4, 14%) were not interested in using the box but would consider using the box in the future. Two (7%) required additional information before they would use the box, with one requiring a physician recommendation and the other wanting more safety research supporting box use. The other 2 participants (7%) would use it if their situation changed and they had “no other choice.”

Locations of where to put the baby sleep box varied in specificity. Most mothers stated they would put the box in the bedroom on the floor, on a stand or table, or in the adult bed. Others stated they would move it from room to room (eg, bedroom, living room) depending on what they were doing.

## Discussion

Expectant mothers had varying levels of knowledge of and interest in baby sleep boxes. Primary sources of information were the Internet and social media, which may be why much of the knowledge centered on use in other countries, either historically (eg, Finland) or because of current economic needs (eg, Africa). However, after a brief introduction to the boxes, participants were able to identify a variety of positive attributes that were viewed as benefits (portable, compact, affordable, decorative) and negative attributes that gave them concerns (low to the ground, structural integrity/design, stability, stigma). Many of these concerns echoed those expressed by experts.<sup>7-10</sup> Furthermore, mothers often considered the box in the context of the AAP safe sleep guidelines,<sup>11</sup> in terms of it not being a safety-approved sleep environment, ease of keeping it clutter-free and being safer than bed sharing.

In spite of their concerns, more than half of the expectant mothers interviewed were willing to use the boxes for infant sleep. Of those who expressed they would not use the box, most indicated they already had a safe environment for their infant to sleep in; although one did indicate intentions to bed-share. Several expectant mothers would consider using the boxes if additional information on safety was available or if their situation changed and they had no other option for their infant. While mothers expressed varied levels of interest in using infant sleep boxes, even supporters could identify questions related to their safety or design. As with any infant sleep environment, a comprehensive education program including evidence-based risk reduction strategies (eg, clutter-free, supine position)<sup>11</sup> should accompany the sleep boxes. Given the size and portability of boxes, clear instructions for box placement and discontinuation should also be addressed.

## Appendix

### *Baby Box: Interview Questions*

1. Where have you heard about baby sleep boxes for infant sleep?
2. What have you heard about baby sleep boxes for infant sleep?
3. What do you like about the idea of baby sleep boxes for infant sleep?
4. What concerns do you have about using a baby sleep box for infant sleep?

Several expressed fear of stigma if they used a box for their infant, and many mentioned that boxes might be good for “other families” who could not afford another sleep environment. Similar concerns about promoting sleep boxes to low-income families were expressed in a letter to the editor from the deputy commissioner of the Division of Family and Child Health and program initiatives director in the Bureau of Maternal, Infant and Reproductive Health at the New York City Department of Health and Mental Hygiene.<sup>11</sup> The letter expressed concerns about the boxes from a health equity perspective as other options are available that meet consumer product safety standards and will accommodate infants longer.

The results of this study should be considered within the limitations of the study design. Participants were enrolled in a county-wide prenatal education program and may have been educated on the AAP safe sleep guidelines, which may have influenced their perceptions of the boxes. However, as this community has a strong safe sleep promotion infrastructure, we feel this exposure would not be limited to those in this program. Social desirability response bias may have influenced responses as some participants perceived the fact that boxes were being measured as an endorsement of their safety. Finally, the generalizability to other communities may be limited.

## Conclusion

Expectant mothers have mixed feelings about the use of baby sleep boxes. Research on safety and efficacy could reduce many concerns, but issues of stigma may persist. Future studies should specifically examine the safety of use in relation to AAP safe sleep recommendations. In addition, as women in the current study stated positive and negative aspects of the box, future interventions or observational studies should consider which individuals or environments are best suited, if any, for use of the baby sleep box in the home. In closing, more work needs to be done to reach more definitive conclusions on the usefulness and safety features of using a box as an infant sleep alternative.

5. Would there be any challenges to you using a baby sleep box in your home environment?
6. What specific questions do you have about the baby sleep box?
7. Would you place your baby in a baby sleep box to sleep? Please explain.
8. If you used a baby sleep box for your baby to sleep in, where would you put it?
9. Is this your first pregnancy?  yes  no
10. How many weeks pregnant are you? \_\_\_\_\_ weeks
11. Which of the following best describes you?
 

<input type="checkbox"/> Black/African American	<input type="checkbox"/> Multi-race
<input type="checkbox"/> Hispanic	<input type="checkbox"/> Other _____
<input type="checkbox"/> White	
12. Which type of health insurance do you have?
 

<input type="checkbox"/> Private	<input type="checkbox"/> Other _____
<input type="checkbox"/> Medicaid/Medicare	<input type="checkbox"/> No Insurance
<input type="checkbox"/> Military	
13. Please check the one item you most want as a gift for attending all six Baby Talk sessions. Please note: this will not change the item you receive when you graduate.
 

<input type="checkbox"/> Infant car seat	<input type="checkbox"/> Breastfeeding pillow and kit
<input type="checkbox"/> Portable crib	<input type="checkbox"/> Baby sleep box
14. Please share any other comments about Baby Boxes:  
 Thank you for your time and for sharing your opinions with us.

### Author Contributions

CRA: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

CS: Contributed to conception; contributed to interpretation; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

MLR: Contributed to conception and design; contributed to acquisition and analysis; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

SS: Contributed to conception and design; contributed to acquisition and analysis; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

MB: Contributed to conception; contributed to analysis and interpretation; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

SNK: Contributed to conception; contributed to interpretation; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

ME: Contributed to design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

MB: Contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

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