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Crafting effective messages to enhance safe infant sleep

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ABSTRACT

Background: Health care professionals are continually challenged by the need to provide health information in a way that successfully changes health practices. Research has documented this as a concern in relation to safe infant sleep health campaigns. Often, caregivers' knowledge of recommended practices is not associated with a change in infant sleep choices.

Purpose: Health campaigns, including most safe infant sleep efforts, often share specific risk factors and steps for avoiding risk, that is, in a verbatim format. Research has shown that caregivers' behavior may be more likely to change when presented with messages based on their general understanding of risk, that is, gist-based format. This research examines caregivers' responses as related to verbatim- and gist-based safe sleep information.

Methods: Five hundred forty-one caregivers of infants were shown 12 images depicting infants in safe or unsafe sleep spaces. Images varied across three commercially available spaces, infant race, and presence/absence of one policy-based risk factor.

Results: Differences in caregivers' discernment of safe and unsafe sleep images paralleled reported differences in knowledge of safe sleep recommendations. Discernment of safe/unsafe images was greater for White than Black caregivers, as well as for females in comparison with male caregivers. Gist-based considerations, such as familiarity with the sleeper depicted or infant race, were also associated with caregivers' discernment of safe/unsafe images.

Implications for practice: Attending to both gist- and verbatim-based knowledge regarding safe infant sleep campaign information may help to effectively facilitate caregivers' ability to always create safe sleep spaces for their infants.

Keywords: Gist; health messaging; infant sleep; safe sleep campaigns; SIDS; verbatim.

The relatively modest successes of current infant safe sleep campaigns may reflect a mismatch between how information is shared with caregivers and how caregivers make decisions (Blalock & Reyna, 2016; Carrier, 2009; Moon et al., 2017; Reyna, 2012; Reyna & Farley, 2006; Setton, Wilhelms, Weldon, Chick, & Reyna, 2014).

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Predominantly, infant safe sleep campaigns present specific sleep practices that can lead to infant risk or protection (Gelfer & Tatum, 2014; United States Department of Health and Human Services, 2018). This approach to providing information about safe sleep practices (Moon et al., 2017) falls under the rubric of verbatim messaging. Verbatim messages are constructed to share specific safe sleep knowledge, that is, placing infants to sleep on their backs reduces the risk of infant sleep-related death. Having this knowledge is intended to influence caregivers' sleep practices by preparing caregivers to weigh what generates risk and what leads to protection for infants during sleep (Reyna, 2008). Successful change in practices, then, rests on caregivers' capacity to engage in a cost–benefit analysis of how much risk and how much protection is associated with each sleep location, practice, etc. (Blalock & Reyna, 2016). The Back to Sleep and Safe to Sleep campaigns (Gelfer & Tatum, 2014; United States Department of Health and Human Services, 2018) are excellent examples of verbatim-based health campaigns.

Some factors may compromise verbatim messages as a way to change caregivers' sleep practices. For one, caregivers' cost–benefit analyses or understanding of risk may be impeded by the complexity of safe sleep research literature and plethora of different messages about infant sleep and risk (Middlemiss, Cowan, Kildare, & Seddio, 2017). This may be evidenced in research findings that caregivers' ability to articulate safe sleep recommendations does not lead, necessarily, to parents engaging in recommended practices (Austin, Nashban, Doering, & Davies, 2017; Carlin et al., 2018; Middlemiss et al., 2017; Moon, Oden, Joyner, & Ajao, 2010; Varghese, Gasalberti, Ahern, & Chang, 2015). For example, although caregivers are aware of the recommendation that bed-sharing is unsafe, bed-sharing remains a common practice (Colson et al., 2013; Fu, Colson, Corwin, & Moon, 2008).

Supporting caregivers' ability to accurately discern and act on threats to infants during sleep is an urgent yet achievable goal (Moon & AAP Task Force on Sudden Infant Death Syndrome, 2016) and one central to nurse practitioners working with parents. Toward that end, an important question for health providers is whether verbatim messaging impedes change in caregiver's behavior and thereby inadvertently contributes to the continued high rates of infant sleep-related deaths in the United States. For example, the Kaiser Family Foundation analyses estimates that in 2014 infant sleep-related death rate is 2–3 times higher in the United States compared with other industrialized countries like Japan, the United Kingdom, and France (Gonzales & Sawyer, 2017). Further, the disparity between rates of infant sleep-related deaths between non-Hispanic White and Hispanic infants and non-Hispanic Black and Native American Indian infants has remained (Mathews & Driscoll, 2017). This suggests need to explore different ways of encouraging changes in sleep practice to further protect infants.

Exploring new ways to present safe sleep information may be one step to reducing rates of infant sleep-related deaths, as well as supporting nurse practitioners' work in this area. A first step in providing this support is determining why caregivers' verbatim knowledge of safe sleep recommendations fails to increase safe sleep practices. A next step is to explore what other approaches are available that may be more effective.

One potentially helpful approach is adopting a health education approach successful in other areas of practice. This successful approach moves away from focusing on verbatim information to sharing information that builds on caregivers' general sense, or gist understanding, of the situation (DiMatteo, 2004). The difference between verbatim-based and gist-based reasoning is that gist builds on caregivers' already existing, general sense of what they know about, in this instance, safe infant sleep, and what experiences they have had in keeping their infants safe. Thus, caregivers integrate the new health

information with their previous personal experiences and knowledge (Smith et al., 2015) represent gist. The focus then is not tied solely to the verbatim knowledge of risk or recommendations. Rather, gist representations move caregivers' decision making beyond the verbatim information to create a sense of how to keep infants safe (Kaplan, 2018; Middlemiss, Cowan, Kildare, & Seddio, 2017). Decisions based on gist generally lead to less risky decision making (Reyna, Wilhelms, McCormick, & Weldon, 2015).Thus, their gist knowledge enables caregivers to create representations that include both the information provided in a verbatim fashion and the gist-based knowledge that incorporates their current understandings. In relation to decision making, although verbatim and gist information are stored in memory in a similar fashion, verbatim information fades more quickly than gist information, and decision makers are more likely to rely on gist-based knowledge in making decisions (Blalock & Reyna, 2016; Witteman & Tollenaar, 2012).

Based on memory and decision-making research, gist representations are more immediate and have been found more likely to impact behavior (Kaplan, 2018; Middlemiss, Cowan, Kildare, & Seddio, 2017). The success is evident across different areas of health. Research with medical practitioners' decision making has shown that greater familiarity with an illness, for example, leads to gist decision making. Gist-focused health campaigns have been successful in changing caregivers' behavior related to childhood vaccinations (Freed, Clark, Butchart, Singer, & Davis, 2010), obesity (Brust-Renck et al., 2017), and drowning (Denehy, Leavy, Jancey, Nimmo, & Crawford, 2017).

The potential for gist-based safe infant sleep campaigns to change caregiver practices related to safe infant sleep was evidenced in New Zealand, where campaigns moved from verbatim to a gist framework. This shift was represented in a shift to focusing on the prevention of an already understood aspect of risk, that is, what places infants at risk of suffocation (Middlemiss et al., 2017). With this shift, parents' gist of what increases suffocation risk became central to their assessment of sleep contexts as safe. Using these global signals, caregivers were better able to identify potentially unsafe sleep locations or positions and change practices to protect infants (Reyna, 2012). In New Zealand, reframing safe sleep health information from verbatim knowledge to gist-based understandings was associated with a dramatic reduction in sudden infant death syndrome (SIDS) rates from 2.8 deaths per 1,000 live births in 2009 to 2.0 deaths per 1,000 live births in 2015 (Mitchell, Cowan, & Tipene-Leach, 2016). Further, the reduction of infant sleep-related deaths closed a disparity of rates of SIDS across cultural groups (Middlemiss et al., 2017).

It is possible that caregivers' sense of what is safe or unsafe or what risk is really risk may change depending on family and cultural background. However, the gist-based

information allows for using the health message within culturally based general understandings of safety. A better understanding of the verbatim nature of the traditional safe sleep campaigns may help explain differences in the impact of campaigns across family differences. The discrepancy of infant sleep-related deaths across ethnicity (Moon et al., 2017) suggests that the health message may be heard differently across caregivers. It may not be the absence of verbatim knowledge about safety and risk but rather the general sense of what that means that contributes to the disparities in infant sleep-related deaths in the United States. For example, rates of infant death in the United States are more prevalent for Black and Native American/Alaskan Native infants in comparison with White, Hispanic, or Asian American infants (Mathews & Driscoll, 2017).

Current study

This research project took some initial steps toward understanding the role of verbatim knowledge and gist understanding as related to safe infant sleep messages and changes in caregivers' sleep practice choices. The first aim of this work was to document caregivers' identification of safe from unsafe infant sleep images based on the presence of verbatim-related risk factors. The second aim was to delineate variation in the discernment of safe infant sleep images by caregiver gender, race, and proxies of socioeconomic status (i.e., educational attainment, receipt of public assistance). We reasoned that those correct responses would be lower for groups of caregivers generally reported to have less change in practices or less knowledge related to safe sleep policy (Austin et al., 2017). For example, male caregivers, who generally report less knowledge of verbatim safe sleep policy information, were anticipated to correctly identify fewer images as safe in comparison with female caregivers (Hirsch, Mullins, Miller, & Aitken, 2018). The final aim of the study was to determine whether discernment varied as a function of two salient features of the images, features that were not related to verbatim-based policy recommendation but have differences in their relationship to rate of reported infant deaths during sleep. The variables were examined here are infant race (Black/White) and type of sleep space in the image. Examining differences in the discernment of safe images based on infant race explores whether the higher rate of risk for African American infants is related to gist-based discernment of safe images. The choice of placing infants in three different portable bassinets reflects the distribution of the cardboard box as a safe sleep space. Although currently forwarded by the AAP as a type of space that needs more research to discern its safety, parents are currently using such spaces, and hence, understanding their capacity for the discernment of safety in these sleep spaces is important. By introducing three similar spaces, caregivers' ratings may help indicate whether familiarity of the sleep space influences correct discernment of safe or unsafe sleep spaces. Three discrete sleepers were presented in the images, a commercially available, bassinet-like in-bed sleeper; a New Zealand-based in-bed sleeper with research-based evidence of safety for infant sleep (Tipene-Leach et al., 2018); and a cardboard baby box similar to those being distributed widely by public health departments in the United States.

Methods

Participants

Participants were recruited through Amazon Mechanical Turk (M-Turk), a crowdsourced data collection platform maintained by Amazon, Inc. (Buhrmester, Kwang, & Gosling, 2011). One benefit of using MTurk is that it allows the application of inclusion criterion, which in this study were having had a baby enter your life in the last five months OR expecting a baby to enter your life in the next five months, AND having assumed or expecting to assume a caregiver role. Participants are remunerated for their effort through researchers' prepayment of monies to Amazon. For this research, the participation of 550 caregivers (125 male) was requested through MTurk. After the completion of an informed consent form approved by the researchers' Institutional Review Board, participants completed the constructed survey and were compensated $0.75 for participation.

The final sample contained responses from 541 eligible respondents. Responses were received from 1,615 potential participants. Of these responses, 750 were eligible to complete the survey; of these responses, 549 contained usable data. Participants' responses were considered usable if a respondent had a valid US IP address, spent a nonzero amount of time on the survey, and answered at least one question within the first question set about perceived safety. Of eligible caregivers, eight pairs of responses (totaling 16 respondents) had the same IP address. In these cases, either the sole complete response was used or one of the responses was selected at random.

Measures

Demographic information. Caregivers reported their age, gender, and race. The race was categorized into categories of White, Black, or Other. Additional demographic variables requested included educational attainment and any receipt of public assistance in the past 12 months (i.e., enrolled in supplemental nutrition program Women, Infants, and Children only, Some public assistance, No public assistance). Educational attainment was provided as a response to a multiple-choice question asking what the highest level of school completed was or degree received. Responses were categorized into four levels. Demographic information is presented in **Table 1**.

Table 1. Caregiver demographic characteristics

	Caregivers, N = 541	N	N Missing
Race of caregiver		512	29
Black	61 (11.9%)		
Other	40 (7.81%)		
White	411 (80.3%)		
Education level of caregiver		524	17
Advanced	66 (12.6%)		
Bachelors	206 (39.3%)		
Intermediate	204 (38.9%)		
Minimum	48 (9.16%)		
Public assistance		524	17
No assistance	321 (61.3%)		
Some assistance	166 (31.7%)		
Nutritional assistance (WIC)	37 (7.06%)		
Gender		540	1
Male	121 (22.4%)		
Female	419 (77.6%)		

Overall descriptive statistics.

Safe/unsafe sleep setting. Images (**Figure 1A–C**) were representative of safe or unsafe sleep settings based on the presence or absence of elements identified as protective or risk factors in the current American Academy of Pediatrics Task Force on SIDS policy (Moon & AAP Task Force on Sudden Infant Death Syndrome, 2016). Safe images depicted infants being positioned on their backs on a surface clear of bedding or soft objects of any sort. Unsafe images depicted infants lying in a prone position or on their backs with blankets or soft objects in the sleep space. Sleep spaces were three bassinet-like sleepers currently available for use in the United States: a New Zealand-based in-bed sleeper (**Figure 1A**); a bassinet-like in-bed sleeper with mesh sides (**Figure 1B**); and a cardboard baby box (**Figure 1C**). Images were equally distributed across sleeper type, infant race (White infant or Black infant), and whether the image depicted a safe or unsafe sleep setting (**Figure 1**). In addition to these questions, caregivers rated the hedonic and utilitarian value of each sleeper.

Data analysis
Caregivers' total number of correct responses out of the 12 images presented was used as a measure of total discernment of safe infant sleep spaces. Caregivers' response to each image was coded as a binary variable (correct/incorrect). Statistical models for both total correct responses and individual question correctness were examined, and covariates were identified. Two different statistical models were used to predict the correctness of the caregivers' responses to the safe/unsafe image questions. The total correct score was used as the outcome in a linear model. Individual response scores were used as the binary outcomes for a repeated-measures model computed using generalized estimating equations with the independence working correlation matrix. Potential covariates for inclusion in both models included race, gender, education, and public assistance status of the caregiver. In addition, the repeated-measures model allowed for additional covariates that varied by the question: a race of the infant displayed and sleeper displayed.

Figure 1. Example images of infants sleeping in each of the three sleep spaces: (A) New Zealand-based in-bed sleeper; (B) bassinet-like, in-bed sleeper; and (C) cardboard baby box. For each of the sleep spaces, caregivers were presented with four images, two images with Black infants, one safe and one unsafe; and two images with White infants, one safe and one unsafe.

Results

Table 2 provides the percentage of correct responses for each of the 12 images. The top half of the table includes the six questions depicting images of safe sleep spaces, and the bottom half includes the six questions depicting unsafe sleep spaces. The average number of correct responses answered for safe and unsafe images were comparable. On average, participants answered approximately 4.4 questions correctly out of the six safe images (74%) and 4.4 out of six unsafe images (73%).

The total number of correct answers (out of 12) varied by caregiver's gender and race; model parameters for the total score can be found in **Table 3**. The average number of correct answers for White male caregivers, denoted by the intercept of the model, was 8.1 (SE 0.21) out of 12. As anticipated based on reported levels of knowledge, female caregivers' discernment scores were about 1.2 points higher on average ($p < .0001$) than those of male caregivers (**Table 3**). Scores of Black caregivers and caregivers in the Other category were nearly one point lower ($p = .0013$ for Black and $p = .0270$ for other races) than those of White caregivers. Caregivers' education

Table 2. Correct and incorrect responses based on type of image

Image	Correct %	No. Caregivers
Safe sleep setting		
Supine, White infant, BLS	91	492
Supine, Black infant, BLS	89	482
Supine, White infant, NZ-B	73	393
Supine, Black infant, NZ-B	71	383
Supine, White infant, CBB	62	334
Supine, Black infant, CBB	59	319
Unsafe sleep setting		
Prone, White infant, BLS	76	411
Supine, White infant with blanket, NZ-B	69	371
Supine, Black infant with blanket, NZ-B	60	322
Supine, Black infant with blanket, CBB	77	418
Supine, White Infant with soft objects, CBB	84	452
Supine, Black infant with soft objects, BLS	73	396

Note: BLS = bassinet-like; in-bed sleeper; CBB = cardboard baby box; NZ-B = New Zealand-based in-bed sleeper.

Table 3. Effects of race and gender on caregiver discernment total score

Parameter	Estimate	SE	*p*-Value
Intercept	8.10	0.21	<.0001
Female	1.19	0.23	<.0001
Black	−0.96	0.30	<.0001
Other	−0.80	0.36	.0270

Note: Statistical model of caregiver scores (total number correct out of the 12 questions), based on caregiver demographics. Intercept represents the average score for a White male caregiver, as the reference group. Other rows denote the change in average from the reference group based on changing one characteristic while holding others constant. SE stands for standard error of the estimate. The two-sided p-value tests the null hypothesis that the corresponding parameter is equal to zero. On average, female caregivers score over a full point higher than male caregivers, and White caregivers score nearly a point higher than Black caregivers and those from other races.

level and participation in public assistance were unrelated to total scores after controlling for caregivers' race and gender.

To study features specific to each image, we also fit a model for the probability of correctly answering each individual question (**Table 4**). The probability of correctly discerning an image differed by caregiver race and gender, as well as by infant race and across the type of sleep space, characteristics not related to verbatim safe sleep messages. Females had about 65% higher odds ($p < .0001$) of answering a question correctly than males. Black caregivers had 34% lower odds than White caregivers of correctly identifying the safety of an infant sleep space ($p < .0001$). Holding constant caregivers' gender, caregivers' race, and type of sleeper displayed, caregivers had higher odds of answering correctly when the image depicted a White infant than when the image depicted a Black infant (**Table 4**). Caregivers had 21% lower odds of correctly identifying the safety of a sleep space when the infant displayed was African American than when the image displayed a White infant ($p = .0001$).

In addition, caregivers differed in their ability to discern correct safe sleep spaces based on the sleeper displayed in the image, with the highest odds of caregivers' correct discernment of images associated with the bassinet-like in-bed sleeper (**Table 4**). Odds for sleep spaces less similar to the familiar bassinet space were significantly lower for the New Zealand-based in-bed sleeper and cardboard baby box, respectively. Specifically, the odds of answering questions correctly for the New Zealand-based in-bed sleeper and cardboard baby box were, respectively, about 54% and 49% lower than the odds of answering correctly for the bassinet-like in-bed sleeper. The average number of correct responses answered about the bassinet-like in-bed sleeper was 3.3 out

Table 4. Effects of selected characteristics of images on individual question correctness probability

Parameter	Estimate	Lower CL	Upper CL	*p*-Value
Intercept	1.36	1.20	1.53	<.0001
Black infant	−0.23	−0.34	−0.11	.0001
New Zealand in-bed sleeper	−0.77	−0.91	−0.62	<.0001
Cardboard baby box	−0.68	−0.83	−0.53	<.0001
Female caregiver	0.50	0.37	0.63	<.0001
Black caregiver	−0.41	−0.58	−0.24	<.0001
Other caregiver	−0.34	−0.55	−0.13	.0013

Note: Statistical model of the probability of answering a question correctly based on caregiver demographics and question characteristics and accounting for repeated questions among the same caregivers. Intercept represents the log-odds of answering a question correctly for a White male caregiver viewing a White infant in a bassinet-like, in-bed sleeper, all of which serve as referent categories. The other rows denote the change in log-odds of answering the question correctly based on changing one characteristic while holding others constant. Lower CL and Upper CL form 95% confidence intervals for the parameter estimates. Females had higher odds of answering correctly than males, and Black caregivers and those of other races had lower odds of answering correctly than White caregivers. Caregivers had lower odds of answering questions correctly featuring Black infants compared with White infants. Similarly, caregivers had lower odds of answering questions correctly if they featured the New Zealand-based in-bed sleeper and cardboard baby box than if they featured the bassinet-like, in-bed sleeper. CL = confidence level.

of 4 (82%). The average number of correct responses answered about the New Zealand-based in-bed sleeper and cardboard baby box, respectively, was 2.7 out of 4 (68%) and 2.8 out of 4 (70%).

Discussion

Traditionally, safe infant sleep campaigns, as well as an assessment of caregivers' knowledge of safe infant practices, are based on the verbatim representation of safe infant sleep recommendations, that is, listings of practices that introduce risk. These safe infant sleep campaigns have met with only modest success (Bettegowda et al., 2004; Moon & AAP Task Force on Sudden Infant Deaths, 2016). A growing research literature related to health practice decision making suggests value in moving away from increasing caregivers' verbatim knowledge about safe sleep practices toward a focus on the general gist that caregivers take away from safe sleep campaign recommendations (Mitchell et al., 2016). A starting point for building on caregivers' general gist understanding is to focus on suffocation and suffocation prevention. The caregivers' existing knowledge helps to build a general sense of why and how verbatim knowledge is helpful. Gist-based understanding of risk has been found to increase accuracy in the use of health recommendations (Jenson et al., 2017; Morrongiello, Bell, Butac, & Kane, 2014). Further, based on research regarding the effectiveness of gist information, it indicates the overall meaning of the recommendations, that is, the general gist (Blalock, DeVellis, Chewning, Sleath, & Reyna, 2016). Supporting the potential of focusing on general gist related to suffocation is evident in a shift toward this health message across several public health messages (Smith et al., 2015). When the safe infant sleep health

message in New Zealand shifted to focusing on the general gist caregivers have related to suffocation, there was a reduction in infant sleep-related deaths, as well as a reduction in the disparity in sleep-related deaths across ethnicity (Middlemiss et al., 2017).

The findings in this research provide information regarding the discernment of safe and unsafe images of infants sleeping as related to verbatim recommendations without a focus on suffocation. Further, the research explores differences in discernment across infant and caregiver race, caregiver gender, and type of sleep location. Examining caregivers' level of correct discernment of safe from unsafe infant sleep images based on the presence of risk factors does not necessitate the absence of influence from gist understanding. However, knowledge of these verbatim recommendations would contribute to caregivers' assessment of safety. Helpful in determining the contribution of verbatim knowledge versus gist understanding would be the potential benefit from asking parents to identify what factors made the image of sleep space safe or unsafe. In relation to the role of gist, decision making is influenced by the nature of the task as well as familiarity of the situation or object, previous knowledge, intuition based on knowledge, or other variables such as context (Corbin, Reyna, Weldon, & Brainerd, 2015). Given the traditional focus of infant sleep messages on verbatim recommendations, it is plausible that caregivers' were focusing on safe sleep recommendations in making discernments about safe infant sleep. Without information about suffocation, this study most likely looks at how the decision may be made based not on a general understanding of suffocation but on level of knowledge of verbatim information and the general gist of safe infant sleep spaces based on that

knowledge. Further, with this expectation regarding the role of verbatim information, the expectation would be that those with less knowledge would be less accurate in discernment and those whose general gist about infant sleep may differ from verbatim recommendations based on cultural expectancies about what infants need for sleep would not discern commonly accepted practices as unsafe.

These expectancies were supported in the current research. The majority of caregivers' responses correctly identified images as safe or unsafe. However, discernment differed across caregivers in ways that may reflect findings of safe sleep practices in the research literature. For example, male caregivers, generally fathers in this study, were less successful than female caregivers in correctly discerning safe from unsafe images of infants. This may reflect the reported lower level of knowledge of safe sleep recommendations among fathers (Hirsch et al., 2018). These findings support generally applied recommendations to continue the focus on safe sleep health messaging for fathers (Hirsch et al., 2018). However, the disparity reported between fathers' knowledge and practice of safe sleep recommendations (Hirsch et al., 2018) continues to indicate the importance of moving the message beyond the sharing of verbatim information.

Findings in relation to identifying spaces as safe based on presence or absence of policy-based, safe sleep practices supported the expectation that Black caregivers' scores would be lower than that of White caregivers. Black caregivers and those identified as Other races less frequently identified safe and unsafe images correctly in comparison with caregivers identified as White. Of note, Black male caregivers had the lowest rate of correct, safe, and unsafe responses. This is the first study to show the disparity in accurate discernment of infant safety between White and Black caregivers.

In relation to considerations of verbatim and gist knowledge, these findings provide some support for the disparity between knowledge of recommendations and practices. Clearly reported in the literature is that knowledge alone does not change behavior in relation to safe infant sleep practices. A review of the reasons cited in this research relating to this disparity between knowledge and practice reflects caregivers' gist-based understanding of what is important for infants during sleep and what are important health-related issues to track. For example, some of the most commonly cited reasons for not placing infants on their backs to sleep include gist-based sense of infants' comfort, sense that infants may choke when supine, and other general perceptions of infant well-being (Austin et al., 2017; Bettegowda et al., 2004; Moon et al., 2017). Without addressing both verbatim information and this general sense of what is important, the likelihood of changing parents' choices related to infant sleep practices may remain only modestly successful (Corbin et al., 2015).

Of note, in relation to the potential importance of incorporating caregivers' general gist representations of interpreting safe sleep recommendations, verbatim decision making has been associated with more risk taking than gist-based decision making based on intuition (Blaylock & Reyna, 2016). The next question in relation to safe infant sleep health messaging is to begin to investigate how variables such as familiarity, intuition, and lack of intuitive acceptance of verbatim-information are related to sleep decisions. Correctly discerning an image as safe or unsafe may reflect caregivers' knowledge of policy recommendations, that is, verbatim knowledge (Hirsch et al., 2018). However, if looked at from a gist perspective, correctly discerning an image as safe or unsafe may be related to caregivers' beliefs about what is best for infants when they sleep (Aitken et al., 2016; Carlin et al., 2018). This gist reasoning would incorporate caregivers' verbatim knowledge, but only as interpreted as a part of the caregivers' sense of what infants need during sleep. In the case of gist reasoning, then, building messages aligned with caregivers' knowledge of suffocation may positively affect caregivers' likelihood of engaging in safe sleep practices (Carlin et al., 2018).

Verbatim-based information shared may not align with caregivers' preferred practices or with their responses to changing infant sleep patterns during nighttime care. In this manner, the verbatim recommendations align with neither caregiver practices nor caregiver gist of safe sleep or protection. With gist being stronger in determining behavior, the verbatim message and recommendations may not strongly contribute to determining practice. Rather, caregivers may form a gist of what is safe based on other contextual information, such as commonly seen practices or infants' needs and possible care responses. Exploring what is influencing these decisions is an important next step to informing the best approaches to safe sleep health education.

Differences in currently identifying safe sleep spaces across sleeper type and infant race may indicate the influence of gist-based intuition or knowledge. In relation to the type of sleeper, for example, the familiarity with the appearance of the bassinet-like in-bed sleeper may have contributed to caregivers' general sense of being safer. If the role of familiarity with types of sleep spaces and their relation to discerning safe and unsafe contexts contributes to caregivers' reasoning, then it is important to reframe the sharing of information to allow caregivers to extrapolate across different situations. Generalizing across multiple settings is essential in infant safety, given the likelihood that infant sleep spaces change during a given sleep period (Volpe, Ball, & McKenna, 2013). Researchers examining what contributes to reduced rates of SIDS deaths in New Zealand following a focus on gist-based messaging suggest that improving parents' general gist regarding risk based on suffocation provides

parents the capacity to identify safe sleep alternatives successfully (Mitchell et al., 2016). Further research exploring the lower discernment scores when images depicted Black infants will further help direct health education efforts. It may be that caregivers' general understanding of the higher risk of SIDS for Black infants contributes to caregiver decisions identifying Black infants as in safe or unsafe locations.

Implications

The findings here, as well as the current body of literature related to decision making (Blalock & Reyna, 2016; Blalock & Reyna, 2016; Donohue, Wendelken, Crone, & Bunge, 2005), suggests that focusing on general understandings and the prevention of suffocation may be an effective way to share safe sleep information. Achieving change in caregivers' safe sleep practices by providing verbatim recommendations rests on caregivers' ability to differentiate levels of risk associated with presented practices (Jensen et al., 2017). Thus, the potential drawback is not only recall of the specific recommendations but the necessity that caregivers weigh each of the specific risk factors associated with infant sleep to reduce risk. Even in relation to verbatim-based recommendations and risk, the verbatim-based listing of specific practices oversimplifies the complexity of the science related to safe infant sleep and cultural differences in sleep practices.

The complexity of caregivers' discernment of increased infant risk is compounded by different levels of risk introduced by different sleep practices (Jensen et al., 2017). For example, two of the most significant sources of risk are placing infants on their stomachs or sides to sleep or exposing infants to smoke (Gordon, Rowe, & Garcia, 2015). Without an indication of the level of risk, the cost–benefit analyses are not accurate in the depiction of risk or safety, and caregivers are faced with a long list of practices in which to avoid or engage. Of interest is the increase in the perceived trustworthiness of a health message when the complexity or uncertainty of the health issue is presented (Speigelhalter, Pearson, & Short, 2011).

Informative for sharing information about safe infant sleep practices with parents is the difference in the discernment of safety between mothers and fathers in this research. With this, nurse practitioners may find it helpful to incorporate ideas regarding the risk of infant suffocation in messages about safe infant sleep. When providing this information, in addition to the verbatim recommendations, there is greater opportunity for fathers to take away a general gist of how to keep infants safe that is based in part on their knowledge of suffocation risks.

Regarding safe infant sleep practices, the difference in caregivers' use of verbatim information and gist of risk built on general understanding to drive care decisions may be one contributor to the overall disparity between Black and White infant deaths due to sudden unexpected infant death and SIDS. Global perspectives of safe sleep practices or healthy sleep practices differ across ethnicity. These differences may account for the continued higher levels of bed-sharing in cultures where unsafe behaviors have accepted the practice. Encouraging caregivers to base decisions about safe sleep on factors that place infants at risk of suffocation may increase the use of safe sleep practices. Information on suffocation risk may help caregivers balance safe practices and preferred sleep practices in a manner that best fits with their understanding of both culture and safety contexts.

Limitations

Exploring how to incorporate the consideration of gist knowledge into safe sleep campaigns and health discussions is an exciting area to explore. This research represented one step toward that goal. However, there are limitations to consider. First, the research was conducted via an online survey, where participants chose whether to complete the survey and were provided with a small financial incentive. The sample participant, therefore, may not be representative of the population of American newborn caregivers. Second, participants were shown a small number of images. Future research could investigate a larger number of images to explore potential associations with additional infant and environmental factors.

Moving forward, there are several considerations to help clarify and strengthen our understanding in this area. Eligibility was based on having a child enter the participant's life within a 6-month period of the survey completion. Caregivers represented different roles with the child—grandmother, father, mother, etc. To improve generalizability, future research would benefit from work that incorporates specific groups of care providers and a broad representation of racial and ethnic groups. Cultural factors have been shown to be associated with safe sleep practice decision making. Another next step for the research is to examine decision making more directly as a means of determining what general information may influence practice choices. For this study, safe and unsafe sleep contexts were based on a limited number of sleep practices, that is, infant positioning and use of soft toys or blankets in the sleep space. Expanding these indicators to include other considerations, such as exposure to smoke, premature birth, housing characteristics, etc., would be helpful in understanding how general understanding influences practice choice.

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