

Evaluation of an Early Language and Literacy Program for Parents of Infants in the NICU

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ABSTRACT

Purpose: To evaluate the effect of a NICU parent education program on parents' early language and literacy practices, and on their confidence interpreting and responding to infant signals.

Design: Single group, pre- and post-test, mixed-methods evaluation design.

Sample: One hundred and four parents and other caregivers completed questionnaires before and after the one-hour program. Ten parents participated in follow-up interviews.

Main Outcome Variables: Before and after sessions, participants reported on frequency of their current and intended early language and literacy practices, and their confidence interpreting and responding to infant signals. Participants also reported program satisfaction. Interview participants reported their behavior change one to two weeks later.

Results: The program significantly increased intention to engage in more early language and literacy practices, and increased parent-reported knowledge of how and when to interact with their infants. The majority of interviewed parents reported engaging in these practices one to two weeks later.

Keywords: NICU parent education; neonatal intensive care; early language and literacy; parent–infant interaction

EACH YEAR, APPROXIMATELY 15 MILLION infants worldwide are born preterm, defined as <37 weeks' gestational age.¹ Advances in the medical field, particularly in the NICU, have contributed greatly to increased survival rates for medically complex infants.^{2,3} While the NICU offers critical medical intervention, it can be challenging to achieve the appropriate level of sensory stimulation for infant neurodevelopment. Traditional multibed NICUs are often overstimulating, and private single-family rooms (SFRs), while more intimate, can be understimulating.^{4,5} Furthermore, infants in the

NICU do not always receive optimal levels of caregiver interaction because of physical barriers and holding restrictions, lack of parental preparedness to care for a medically complex infant, and parental stress.⁶ Environmental stressors combined with medical vulnerability place these infants at significant subsequent risk for developmental delays and behavioral challenges.^{7,8} Of particular interest to the present study is delayed and/or atypical development of language, which is common among children born preterm and low birth weight (LBW).⁹ Outcomes are variable based on

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medical and social risk, but many studies suggest that these language delays can persist through middle childhood and adolescence.^{10,11}

The Mother Goose on the Loose–Goslings program (Goslings) was developed to address the need for early language and literacy intervention for medically complex infants and the need for additional parental support in the NICU. Goslings is an adaptation of the Mother Goose on the Loose (MGOL) program, originally designed for parents/caregivers and their infants and toddlers. The MGOL program aims to promote early literacy through nursery rhymes, songs, puppets, and instruments, many of the same tools and strategies used in the Goslings program, as will be later described in further detail.¹² Inspired by the unique needs of a developmentally vulnerable population and the research evidence in favor of language and literacy practices in the earliest weeks of life, the founder of MGOL partnered with a local children's museum, a level IV NICU, and a university to develop and deliver the Goslings curriculum. A more complete history of the evolution of the Goslings program can be found in the *Children and Libraries* article.¹²

The present study evaluates Goslings' effectiveness in promoting parents' early language and literacy practices and confidence interpreting and responding to their infants' signals in a Level IV SFR NICU.

LITERATURE REVIEW

The development of Goslings comes during a widespread transition from traditional multibed rooms to private SFR NICUs. While this change is associated with neurodevelopmental and behavioral benefits for infants through increased frequency and quality of parental involvement,¹³ SFRs may also produce an unintended negative consequence for infants' language development.^{14,15} One study found that infants in SFRs with low parent visitation (and presumably lower levels of sensory stimulation) had lower language scores at two years than infants who were in traditional multibed rooms.¹⁶ This finding is supported by extensive literature on the importance of early language exposure for later language and literacy development.^{17–19} One recent study showed a significant positive correlation between conversational turn taking between parents and their 18–24 months of age toddlers and IQ, verbal comprehension, and vocabulary a decade later.²⁰ Motivated by this research and by the possibilities that this new private NICU setting could offer in terms of parent–infant engagement, Goslings set out to accomplish two primary goals.

Goal one was to provide parents with the knowledge, skills, and tools to promote early language and literacy development through talking, reading, singing, and reciting nursery rhymes to their infants. Despite well-documented evidence on the value of language-rich activities like shared book reading early in life, some studies have found that factors like higher stress and lower socioeconomic status may decrease parental engagement in these activities.^{21,22} One study suggests that

parents of very low birth weight (VLBW) children may be less likely than parents of full-term children to engage in home literacy experiences, which could be attributable to the stress and competing priorities that come with having a child with special medical and/or developmental needs.²³ Nevertheless, there are clear benefits of early literacy activities, particularly for the NICU population. For example, Caskey and colleagues found that exposure to more adult speech in the NICU room predicted higher cognitive and language scores on the Bayley-III at 7 and 18 months.²⁴ Braid and Bernstein found that parental engagement in shared book reading with toddlers born preterm was associated with higher cognitive scores on the Bayley-III at age two.²⁵ Singing to infants is another method of incorporating language into the daily routine and has been found to regulate infants' physiologic function (e.g., heart rate, sleep patterns, caloric intake, sucking) as well as act as a coping mechanism for parents.^{26,27} To our knowledge, only a few interventions exist to promote early language development in the NICU, and they focus mainly on shared book reading, specifically providing books to parents and informing them of the benefits of reading to their infants. These interventions have been found to increase parent-rated value of early literacy practices; frequency of early literacy activities both in the NICU and postdischarge; and parental feelings of intimacy, control, and normalcy.^{28–30}

Goal two of Goslings was to emphasize the bidirectionality of parent–infant communication by informing parents how to interpret and sensitively respond to infant signals, or behaviors that indicate to a caregiver the infant's internal states, needs, and readiness for interaction (e.g., crying, facial grimacing, gesturing). Infants in the NICU experience frequent fluctuations in their behavioral states concurrent with their medical status throughout the day; they may become more easily aroused and distressed when overstimulated by visual, auditory, or tactile stimuli.³¹ Furthermore, preterm infants are often less alert and responsive, and may exhibit less clear behavioral signals than full-term infants.³² A caregiver's sensitive response to signals not only helps regulate the infant's physiologic and behavioral states but also provides the foundation for secure attachment, self-regulation, and subsequent long-term academic and social success.^{33,34} To promote parental knowledge of and responsiveness to infant signals, several NICU interventions exist, including Creating Opportunities for Parent Empowerment (COPE),³⁵ Neonatal Individualized Developmental Care and Assessment Program (NIDCAP),³⁶ and the Mother-Infant Transaction Program (MITP).³⁷ These programs have been shown to reduce parental stress and depression as well as improve maternal confidence in caring for their infants.^{38,39}

The Goslings program is unique in that it introduces several different early literacy activities (i.e., talking, reading, singing, and reciting nursery rhymes) and teaches parents how to adjust those activities based on their infants' signals of readiness for interaction. This goes a step beyond existing early literacy interventions, which typically focus on just

one activity. It also educates parents on how to appropriately use common early childhood toys (e.g., rattles, finger puppets) to introduce other forms of auditory, visual, and tactile stimulation. The present study addressed five questions: (a) Are parents satisfied with the Goslings program? (b) Do parents think Goslings provided them with skills to promote early language and literacy? (c) Do parents think Goslings increased their confidence to interpret their infants' signals of readiness for interaction? (d) Do parents intend to implement what they learned from Goslings? And (e) Do parents utilize the information and strategies presented in Goslings one to two weeks after the session?

METHOD

Design

This study, part of a larger program evaluation,¹² used a single group, pre- and post-test, mixed-methods design with parents and other family members as the primary participants. This study was approved by the institutional review boards of the hospital and the university. Informed consent was obtained from the interview participants.

Procedures

The Goslings program was implemented over the course of two years in a Level IV SFR NICU located in a large, urban city in the mid-Atlantic region of the United States. All parents and relatives of infants cared for in this NICU were eligible to attend a Goslings session. Families were informed of the program via a personal verbal invitation from a nurse, the NICU developmental specialist, or posted flyers.

At each session, families were informed of the evaluation component and were invited to complete anonymous pre- and post-program questionnaires, provided that they met inclusion criteria. Adolescent parents, non-English speaking participants, and participants who arrived to the session late or left early were excluded from participating in the evaluation but were still welcome to participate in the session. Participants were told that the evaluation was voluntary and would not impact their participation in the program or the care they received in the NICU. Only a small number of parents did not agree to complete the questionnaires; the exact number of parents is unknown as refusal rates were not formally recorded.

In the second year of the evaluation, parents who completed the questionnaires were also invited to participate in an interview one to two weeks after the session to share their experiences with implementing Goslings strategies. Interviews were coded concurrently with recruitment. Recruitment for interviews continued until saturation of themes was attained, or when no new themes emerged.⁴⁰

Intervention

The Goslings program was facilitated in the NICU family lounge by a Port Discovery Children's Museum staff

member who had expertise in delivering early childhood programs and specialized training to deliver the Goslings program. The facilitator used visual aids as s/he led the group in songs, nursery rhymes, and chants. The instructional content presented by facilitators (e.g., positive literacy practices and signals for interactions) is described in more depth below. Participants used clear bins as makeshift "isolettes," a Goslings kit (including a songbook, picture books, rattles, finger puppets), and a doll to practice the strategies presented during the session. A member of the NICU staff, either the developmental specialist or a NICU nurse, was also present at each session to answer medical or developmental questions from parents and caregivers. At the end of the session, each family received a new Goslings kit to take back to their SFR, and then home, to use with their infants.

Instructional Content

Language and Literacy. In each Goslings session, the facilitator expressed the importance of early language and literacy activities, specifically talking, reading, singing, and reciting nursery rhymes. The facilitator also explained and demonstrated how these activities could be paired with other forms of stimulation such as visual stimulation (e.g., holding up a colored scarf or finger puppet), auditory stimulation (e.g., gentle shaking of a rattle), and gentle touching (e.g., gently cupping the infant's head and feet for a "NICU hug"). The facilitator modeled these activities, and participants practiced with dolls. For example, the facilitator demonstrated the use of a wordless picture book and led the group in practicing this same activity with their doll. Each activity was practiced more than once during the session and the facilitator provided developmental tips (e.g., information about infants' visual acuity) and advice for implementation (e.g., using books for bedtime routines) throughout the session.

Signals of Readiness for Interaction. The facilitator described, showed images of, and demonstrated infant behavioral signals that indicate they are ready for interaction (e.g., facial expressions like smiling) or not ready for interaction (e.g., gestures like covering their face). Images of these signals were provided in booklet form for parents to take home following the session.⁴¹ Throughout the session, the facilitator advised how to adapt the language and literacy activities described above based on the infant's readiness signals. The facilitator also used a "traffic light" as a visual reminder of when to proceed with visual, auditory, and tactile stimulation as modeled in the session ("green light day") and when to limit stimulation ("yellow" or "red light day") based on the infant's medical status. For example, the facilitator demonstrated singing while gently touching the infant and making soft sounds with a rattle as an example of an activity to be used when the infant is displaying positive readiness signals and is medically stable (e.g., having a green-light day). On a yellow-light day (e.g., the infant is recovering from a procedure), an appropriate activity would be singing quietly but not

touching or using a rattle. Participants were advised to observe their infants' signals while they are interacting with them and adapt their behaviors accordingly to prevent overstimulation.

Participants

A total of 104 family members (e.g., parents, aunts, uncles, or grandparents) of 91 infants completed the evaluation questionnaires (see Table 1 for demographics). Ten parents (nine mothers, one father) participated in semi-structured follow-up interviews (see Table 2 for demographics).

Measures

The research team developed measures in alignment with the goals of the Goslings program. The NICU Advisory Council, a multidisciplinary committee inclusive of former NICU parents and NICU medical professionals, reviewed

TABLE 1 ■ Participant Demographics

N (%)		
Caregivers (N = 104)		
Relation to Infant	Mother	65 (63%)
	Father	21 (20%)
	Other	17 (17%)
Highest Education	Less than HS	7 (7%)
	HS Diploma	28 (27%)
	Some college/trade school	19 (26%)
	AA/BA/BS	26 (25%)
	Postgraduate degree	16 (15%)
Race/Ethnicity	Black	49 (47%)
	White	44 (42%)
	Other	11 (11%)
Marital Status	Married	45 (44%)
	Single	44 (43%)
	Other	14 (14%)
Infants (N = 91)		
Gender	Female	40 (44%)
	Male	51 (56%)
Chronological Age	≤7 days	25 (28%)
	1–4 weeks	36 (40%)
	1–2 months	16 (18%)
	≥2 months	13 (14%)
First-Born	Yes	69 (66%)
	No	34 (35%)
Birth Weight	≤1,000 g	15 (17%)
	1,001–1,500 g	28 (31%)
	1,501–2,000 g	19 (21%)
	2,001–2,500 g	10 (11%)
	≥2,500 g	19 (21%)

Note. Sums may be less than overall N because of missing data and percentages may exceed 100% because of rounding.

TABLE 2 ■ Interview Participant Demographics (N = 10)

		N (%)
Relation to Infant	Mother	9 (90%)
	Father	1 (10%)
Highest Education	Less than HS	1 (10%)
	HS Diploma	3 (30%)
	Some college/trade school	2 (20%)
	AA/BA/BS	4 (40%)
Race/Ethnicity	Black	5 (50%)
	White	3 (30%)
	Other/no response	2 (20%)
Marital Status	Married	4 (40%)
	Single	6 (60%)

the questionnaires and supported their face validity. The measures were then piloted with participants over the first five sessions of the program and further revised as necessary. Official data collection began during the sixth Goslings session.

Pre-Program Questionnaire. Immediately before the program, participants completed a Pre-Program questionnaire, in which they reported demographic information about themselves and their infant(s). They also rated the frequency with which they engaged in several early language and literacy activities with their infant in the past week. Additionally, they rated their confidence on four items relating to caring for and understanding their infants' needs. Cronbach's alpha for this scale was acceptable ($\alpha = .719$). See Table 3 for a complete list of questionnaire items.

Post-Program Questionnaire. Immediately following the program, participants completed a post-program questionnaire in which they rated their satisfaction with the program and how well it met its intended learning objectives. They also reported the frequency with which they intended to engage in several early language and literacy activities. Finally, participants responded to two open-ended questions regarding what they liked most about the program and what they would change. Cronbach's alpha for this scale was excellent ($\alpha = .915$). See Table 3 for a complete list of questionnaire items.

Semi-Structured Interview. One to two weeks after participating in Goslings, parents who consented to be interviewed reported on the frequency with which they had engaged in early language and literacy activities since attending the program. In addition, they were asked how Goslings impacted their knowledge and engagement in early language and literacy activities. Participants also described these interactions, including if and how they used infants' signals to adapt their interactions and what, if any, barriers existed. Finally, participants shared whether Goslings helped increase their comfort and confidence engaging in literacy activities

TABLE 3 ■ Pre- and Post-Program Questionnaire Items

Pre-Program Items
In the past week, how often did you [talk, read, sing, and recite nursery rhymes] to the baby in the NICU? (<i>1 = Not at all, 3 = 4–6 times a week, 5 = Several times a day</i>)
Please rate the following items on a scale of 1 (<i>strongly disagree</i>) to 5 (<i>strongly agree</i>).
I feel comfortable caring for the baby's needs.
I understand the baby's cues of overstimulation.
I feel confident predicting how the baby will react when overstimulated.
I know what the baby looks and acts like when s/he is ready for interaction.
Post-Program Items
Quantitative Questions
During the coming week, how often do you intend to [talk, read, sing, and recite nursery rhymes] to the baby in the NICU? (<i>1 = Not at all, 3 = 4–6 times a week, 5 = Several times a day</i>)
Please rate the following items on a scale of 1 (<i>strongly disagree</i>) to 5 (<i>strongly agree</i>).
I am satisfied with the Mother Goose program.
The Mother Goose program provided me with skills and materials to help the baby's early literacy and development.
The program informed me of the importance of [talking, reading] to the baby.
The program taught me about the baby's signals of readiness for interaction.
The program made me feel more confident that I can read the baby's cues.
How likely would you be to recommend this program to other parents/families of babies in the NICU? (<i>1 = Extremely unlikely, 3 = Neutral, 5 = Extremely likely</i>)
Would you recommend that the NICU offer this program again? Yes/No
Open-Ended Questions
What did you like most about the program?
If you could, what would you change about the program?

and understanding and responding to their infants' signals. See Table 4 for interview questions and sample probes.

Statistical Analysis

Questionnaires. Quantitative data from pre- and post-program questionnaires were entered by a trained research assistant in SPSS-24. The data were re-entered in a separate file by a second research assistant and the two data files were compared for accuracy. Discrepancies between the two files were reviewed and resolved by checking the original data. Pre- and post-program comparisons were analyzed through paired samples *t*-tests. Responses to open-ended questions were transcribed. A member of the research team read and categorized responses according to theme.

Interviews. Parent interviews were transcribed by trained research assistants. Each interview was checked twice for accuracy, first by the initial transcriber and then by a second transcriber. Discrepancies were resolved via consultation with

TABLE 4 ■ Interview Questions and Sample Probes

1. In the last week [or since attending Goslings], how frequently have you come to the hospital and spent time with your baby?
2. When spending time with your baby, how often do you [talk, read, sing, and recite nursery rhymes] to/with your baby?
3. Were there times you wanted to [talk, read, sing, or recite nursery rhymes] to/with your baby but were unable to do so? If yes, can you tell me about this?
4. Please tell me what you do when you [talk, read, sing, recite nursery rhymes] to your baby. What specific toys/instruments/techniques from the program?
5. Do you think attending Goslings changed how much you [talk, read, sing, and recite nursery rhymes] to/with your baby? Why or why not?
6. Do you [talk, read, sing, and recite nursery rhymes] more or less often now than before the Goslings program? Why?
7. Did Goslings change <i>how</i> you [talk, read, sing, and recite nursery rhymes] to your baby? If yes, in what ways? If no, why do you think things stayed the same?
8. Did Goslings help you to feel more comfortable [talking, reading, singing, and reciting nursery rhymes] to your baby? If yes, what helped you feel comfortable? If no, is there anything the program could have done differently to make you feel more comfortable?
9. Do you think the program changed your knowledge of your baby's signals or cues for interaction? If yes, please give a specific example of when you were able to use this knowledge.
10. Have you had any difficulty using the information or skills you learned from Goslings with your baby?

the supervising researcher, who reviewed the original audio tape. Three members of the research team independently coded transcripts for themes using inductive thematic analysis, a bottom-up approach in which themes are derived from interview responses rather than a predetermined coding scheme.⁴² Discrepancies were resolved through repeated discussions, and emerging categories were used to refine interview questions and delineate themes. Enrollment continued until saturation of themes was attained (i.e., no new themes emerged).⁴⁰ The final thematic coding scheme was developed via feedback from all three raters. See Table 5 for the qualitative coding scheme and illustrative quotes.

RESULTS

Overall, quantitative and qualitative data revealed that Goslings was highly successful in meeting its goals. Results for each research question are presented below.

Are Parents Satisfied with the Goslings Program?

Ninety-seven percent of participants reported they were satisfied or strongly satisfied with the program. Additionally, all would recommend the program to other parents of infants in the NICU, and all supported continuation of the program.

In two open-ended questions in the post-program survey, parents were asked what they liked most about the program. The top three themes were learning songs and rhymes (36 percent, *n* = 37), learning about signals of overstimulation (24 percent, *n* = 25), and the interactive nature of the session (17 percent, *n* = 18). Parents were also asked to share what

TABLE 5. ■ Qualitative Coding Scheme for Parent Interviews

Theme	Category	Illustrative Quote
Behavioral Changes	Increased target behaviors (e.g., talking, reading, singing, nursery rhymes)	"At first I used to just look at him . . . I just sit right here and stare like this. Now I just hold full conversations with him . . . At first I wasn't reading to him at all. I just was showing him pictures. But now it's like more active with each other."
	Future intentions	"Going forward, I think we'll use it . . . like once he's a little bit more awake and stuff like that."
	Increased comfort with interaction	"I was nervous when she was first born . . . I don't really know what to do . . . you know, learning different stuff, it helped me adapt . . . feel more comfortable and adapt to my daughter."
	Responsivity to signals	"That [signals] has been invaluable. I think it'd be great even if we weren't in the NICU, but here especially because he is overstimulated and he's not supposed to be touched . . . he's not supposed to do any of this stuff . . . it's nice to not cause him any more pain or discomfort."
	Responsivity to medical status	"When [the baby] is awake and stuff like that I'll sing to him and do the songs and stuff that we learn[ed] but the toys are a little too much . . . like I tried the monkeys and he just squinted his eyes and turned away the whole time."
Barriers to Interaction	Infant alertness	". . . it's like anything you really do like when you talk to him or sing to him, it puts him to sleep."
	Medical equipment (e.g., isolettes, wires, tubing)	"When he's . . . in the isolette, it's too hard to get him to focus on things cause there's so much going on . . . it's too hard to try to hold him and hold a book or things like that, so it's more of just me talking . . . Cause he still has so many cords . . . so it's just hard to handle everything."
Building from Strengths	Affirmation	"[Goslings] reinforced what other people in the family were already saying 'you should read to him!' And I got more books . . . we were doing the right thing."
	New information	". . . cause even before the Goslings . . . I sung to all my babies . . . but, [Goslings] gave me more songs. I didn't know a lot of nursery songs . . ."

Note. For ease of readability filler words (e.g., like, um) were removed.

they would change about the program. The great majority of parents (93 percent, $n = 97$) did not suggest any changes to the program. The most common suggestion ($n = 3$) was displaying on the board the words to the songs and nursery rhymes as they were being practiced during the session. Other suggestions, endorsed by one person each, included having a greater variety of books, considering cultural and religious diversity, giving more time for the session, offering one-on-one time with the facilitator, asking parents to share with the group songs and nursery rhymes they already know, and having less repetition in practicing songs during the session.

Do Parents Think the Goslings Program Provided Them with Skills to Promote Early Language and Literacy?

The majority of participants believed that Goslings informed them of the importance of talking to their infant (94 percent, $n = 98$) and reading to their infant (95 percent, $n = 99$). Participants reported that they had acquired a new appreciation of the importance of early literacy activities, and they believed that the program provided them with the skills and materials to help promote their infants' early literacy and development (97 percent, $n = 101$). In open-ended comments on the post-program questionnaires, parents mentioned that they appreciated being given books and toys to use with their infants. One parent wrote, "I have new ideas on ways to help my child grow and learn other than just holding them."

Do Parents Think the Goslings Program Increased Their Confidence Interpreting Their Infants' Signals of Readiness for Interaction?

The majority of participants believed that Goslings taught them about infant signals of readiness for interaction (96 percent, $n = 100$) and that the program increased their confidence in reading their infants' signals (95 percent, $n = 99$). After attending Goslings, parents reported that they were significantly more knowledgeable about their infants' signals of overstimulation [$t(99) = 6.90, p < .001$] and reported significantly greater confidence interpreting these signals [$t(99) = 7.03, p < .001$] (see Table 6 for complete results). As noted earlier, learning about signals was one of participants' favorite aspects of the program. One parent wrote that the program not only taught her new ways of interacting with her baby but also "different ways to use these toys/songs depending on the kind of day the baby is having."

Do Parents Intend to Implement What They Learned From Goslings?

The frequency with which participants intended to engage in early literacy activities with their infants after the program increased significantly from the reported frequency of those behaviors prior to the program. Participants reported increased intention to sing ($t[96] = 9.77, p < .001$), talk ($t[96] = 2.26, p < .05$), read ($t[96] = 12.39, p < .001$), and recite nursery rhymes ($t[96] = 14.00, p < .001$) to their infants after participating in the program. See Table 6 for complete results.

TABLE 6. ■ Behaviors, Knowledge, and Confidence Before and After Program

Current (Pre) and Intended (Post) Behaviors ^a	Pre-Program <i>M(SD)</i>	Post-Program <i>M(SD)</i>
Talking	4.54 (0.78)	4.68* (0.67)
Reading	2.13 (1.48)	4.02** (1.10)
Reciting Nursery Rhymes	2.19 (1.47)	4.21** (0.96)
Singing	2.84 (1.58)	4.26** (0.98)
Knowledge/Confidence^b		
Confidence Understanding Cues	3.97 (0.88)	4.73** (0.69)
Knowledge of Signals	3.92 (1.02)	4.76** (0.67)

^aScale [1: not at all; 2: 1–3 times per week; 3: 4–6 times per week; 4: every day; 5: several times a day].

^bScale [1: strongly disagree; 2: disagree; 3: neutral; 4: agree; 5: strongly agree].

* $p < .05$. ** $p < .001$.

Do Parents Utilize the Information and Strategies Presented in Goslings One to Two Weeks After the Session?

As interview data were coded, three themes emerged: behavioral changes, barriers to interaction, and building from strengths. Within each large theme were categories of responses, as described below. Themes, categories, and illustrative quotes are provided in Table 5.

Behavioral Changes. Five categories emerged within the theme of behavioral changes: Increased frequency of early language and literacy practices, future intention to engage in these practices, increased comfort with interaction, responsiveness to infant signals, and responsiveness to infant medical status. Eight of the ten parents interviewed discussed that they engaged in more early language and literacy behaviors now than before the program, and seven parents specifically mentioned that the program taught them the importance of engaging in these behaviors while their infants are young. Compared to behavior before the program, parents reported more singing ($n = 8$), talking ($n = 5$), reading ($n = 5$), and reciting nursery rhymes ($n = 3$). Parents who were not engaging in language and literacy practices at the time of the interview expressed interest and motivation to do so when their infants were more alert and medically ready for interaction. Seven of ten parents reported that the program helped them feel more comfortable interacting with their infants. A few first-time parents shared that fear and lack of knowledge prevented them from interacting with their infants beyond basic caretaking activities such as feeding and dressing, but the program gave them concrete strategies for how to engage in appropriate stimulation and enhance language development.

All interviewed parents reported that the program taught them how to read their infants' signals and how to adapt their behaviors accordingly. For example, some parents reported a new understanding of their infants' stress signals and how they could be a response to environmental stressors such as lights that are too bright, sounds that are too loud, or other forms of overstimulation. The majority of parents also reported adapting their behaviors in accordance with their infants' medical status, including limiting interaction when the infant is recovering from a procedure or refraining from interaction when the infant is sleeping.

Barriers to Interaction. Over half of the parents interviewed experienced barriers to being interactive with their infants. The reported barriers fell into two primary categories: infant alertness and NICU medical equipment. Six of ten parents reported that their infants were sleeping most of the day, which limited opportunities to try Goslings strategies in the NICU room. Instead of waking their infants for interaction, parents appropriately allowed their infants to sleep. A few parents even used the terminology from the program in their responses, saying that they try to limit interaction on "red light days" when infants are displaying signals inconsistent with readiness for interaction. Seven of ten parents also commented that interacting with their infants is challenging when isolettes and other medical equipment create physical barriers. Three of those parents noted that it can be challenging to hold their infants and simultaneously hold a book or toy, all while keeping tubes and wires intact. All parents who reported barriers to interaction expressed excitement to try the activities when their infants were more alert and less inhibited by medical equipment.

Building from Strengths. Two categories emerged within the theme of building from strengths: affirmation and new information. Nine parents shared that Goslings reaffirmed the activities they were already doing with their infants. For instance, most parents were already doing at least one of the early language and literacy activities with their infants, but many noted that these interactions were limited in frequency and variety prior to participating in the program. Seven parents specifically shared that Goslings gave them new songs, books, and nursery rhymes to incorporate into their existing routines. With a new repertoire of activities to choose from and knowledge of when it is appropriate to interact, parents reported newfound confidence.

DISCUSSION

This study demonstrated the success of Goslings in meeting the unique needs of infants and their families in a Level IV SFR NICU. In general, participants spoke highly of the program. Three major themes emerged from the quantitative and qualitative data. First, the program provided parents with the guidance and materials to promote early language and literacy. Second, the program increased parents'

confidence interpreting their infants' signals of readiness for interaction. Third, parents' intentions to implement what they learned from Goslings increased significantly from their reported behaviors prior to the program. Among those parents interviewed one to two weeks following the program, there was a reported increase in engagement in early language and literacy activities, especially talking and singing to their infants in ways that were responsive to their infants' signals and medical status. Some parents of more medically fragile infants chose not to engage in certain Goslings activities, particularly those that involved more stimulation than talking, until the infants were more medically ready. This choice communicated an understanding of the important message that all parent–infant interaction should be responsive to the infants' signals and Goslings strategies should be adapted for the medical status and needs of each individual infant.

Goslings is unique among known interventions in that it not only addresses NICU parents' desire to learn how to understand and interact with their medically fragile infants, but it also addresses a relatively recent resurgence of interest in language and auditory stimulation in the NICU, particularly in SFRs. Although some studies suggest that only a small percentage of total NICU noise consists of identifiable adult language because of competing noise from medical equipment,^{15,43} language exposure increases greatly for infants whose caregivers are present and engaged in holding.^{13,43} The developmental trajectories for infants in SFRs are still being studied, but existing research supports the need for targeted interventions, like Goslings, that aim to increase the quantity and quality of language-rich interactions during a critical period of infant brain development. Engaging in literacy practices in the earliest months of life may set the foundation for continued parent engagement in these practices later as well as foster subsequent benefits in children's language acquisition.^{18,19} Knowing when it is appropriate to engage in these early literacy practices is particularly important for infants in the NICU, who experience frequent fluctuations in their readiness for interaction. Promoting responsive and sensitive interactions in infancy and early childhood promotes healthy attachment, which has been found to predict positive academic and social outcomes in later childhood.^{34,44}

The Goslings program also added a level of normalcy to a stressful and unpredictable time for families. Beginning life in a Level IV SFR NICU, which cares for the most critically ill infants, can disrupt the typical parental role as many caretaker responsibilities are often performed by medical staff, leading to feelings of guilt, shame, stress, and anxiety among parents.^{6,45,46} Providing parents with tools and strategies to be active participants in their infants' care may allow them to reclaim their identity as parents and increase feelings of mastery, self-efficacy, and purpose.^{30,38} Although we did not formally assess changes in stress or self-efficacy, parents did report increased confidence in caring for their infants after Goslings and expressed optimism about the journey and excitement to use Goslings strategies with their infants.

The success of Goslings also may be attributed to several process conditions, which have been linked to successful capacity-building interventions in the education setting.⁴⁷ First, the Goslings sessions were designed to target a developmental need of parents in the NICU, and the learning objectives were clearly communicated at the beginning of each session. Second, parents had the opportunity to learn from the facilitators in a safe space, where they were encouraged to share their experiences and form relationships with other caregivers experiencing similar circumstances. Research suggests that psychosocial support can help meet the emotional needs of families in the NICU.^{48,49} Finally, the Goslings sessions were interactive and collaborative; the opportunity to practice strategies with baby dolls and manipulatives during the session likely increased parental feelings of confidence and empowerment to interact with their infants after the session was over. Consistent with adult learning principles, practice enhances the transfer of skills from the session in the NICU family lounge to the SFR to home.⁵⁰ Parents also receive a kit of materials to use with their infants, which maximizes the likelihood that the activities and strategies from the session will be transferred into practice.

The creation, implementation, and evaluation of the Goslings program resulted from a collaborative partnership among practitioners and researchers from three institutions, each of whom had expertise in various relevant areas, including pediatrics, child development, and early childhood programming. We believe that three strategies in particular contributed to the successful implementation of Goslings. First, we consulted with the NICU Advisory Council throughout program development, implementation, and evaluation to obtain feedback on materials and procedures. Second, a developmental specialist or nurse walked the unit to personally invite parents to attend Goslings and then attended Goslings to support the facilitator and address questions posed by families. Third, the Goslings team engaged in multiple efforts to inform all NICU staff of the Goslings program. We did so by providing in-service trainings, placing reading materials on Goslings in the staff lounge, posting announcements in staff areas, sending e-mails, and discussing Goslings attendance at weekly multidisciplinary rounds. By doing so, Goslings became familiar to all staff, which aided in recruitment, created a common language between staff and families, and allowed staff to reinforce Goslings strategies throughout the family's time in the NICU. Other NICUs seeking to implement a parent education program like Goslings may benefit from incorporating some of the strategies that our team found to be effective, while still acknowledging the unit's available resources and unique needs.

NICUs that do not have the capacity to offer programming like Goslings could consider offering individual or group consultation to families to promote their understanding of infant signals and support early literacy practices, ideally in a way that encourages hands-on practice. If resources allow, NICUs could provide families with children's books and/or distribute educational materials that guide parents on

how to engage in language-rich activities with their infants throughout the day while being sensitive and responsive to signals of overstimulation. While the NICU can be a source of stress for families, the support of nurses and other staff can also make the NICU a safe space to learn and practice appropriate methods of interaction prior to discharge.

Limitations and Future Directions

These results, while positive, must be interpreted in light of limitations. First, an inherent limitation of this evaluation is the exclusion of a comparison group of families who did not attend the Goslings program. This decision was made for ethical and logistical reasons, as we did not wish to exclude any families from attending. While our sample was demographically representative of the population served by this NICU, it is possible that the Goslings sessions attracted parents who were already committed to enhancing interactions with their infants, which may have biased the sample and influenced outcomes. Future inclusion of a comparison group would help determine the added benefit of the Goslings program compared to standard practice. A similar limitation related to generalizability is that this program was implemented in a SFR NICU, where parents had more privacy to use these tools and strategies with their infants. An important direction for future research is to determine how this program might function in an open-bay NICU, where auditory stimulation might be greater but high-quality interaction might be more limited. Future research should also aim to recruit a larger sample to enhance generalizability.

Another limitation is that most parents reported on *intended* behavior change; we were only able to follow up with a small sample of parents who reported their *actual* behavior change a few weeks later. Further, we relied exclusively on parent self-report, which poses the threat of social desirability bias. Future research should obtain direct observational measures of the quantity and quality of parent–infant interaction before and after Goslings. For instance, collecting data on nurse observations of parental behavior before and after attending Goslings would add an objective measure of behavior change to supplement parent self-report. We also did not conduct any long-term follow-up with families to learn whether they implemented strategies when their infants became medically ready or whether the program had any long-term effects on child development. With the growing shift toward SFRs in NICUs and the associated concerns regarding long-term language development, it remains an important objective of future research to determine the effect of NICU parent education programs like Goslings on the later development of preterm infants.

CONCLUSION

In general, the success of Goslings provides support for its continuation in this NICU and shows promise for possible extension to other NICUs. This program served the unique needs of families in the NICU by providing guidance

and materials to promote early language and literacy in ways that are responsive to infants' signals and medical status. Empowering parents with knowledge and skills can be a powerful tool for promoting sensitive and responsive parent–infant interaction in the NICU and in the months and years following discharge.

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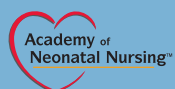
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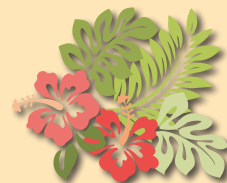
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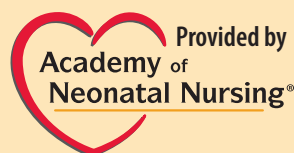
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