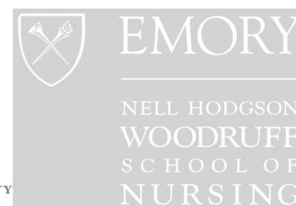




SANDRA DUNAGAN DEAL  
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**Final Report for the Sandra Deal Center for Early Language and Literacy: Research  
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***Impacting Early Language Development through Talk With Me Baby training for Nurses and Allied Health Professionals: Exploring Curriculum Delivery Modalities for Universal Access***

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**Abstract**

Infants born prematurely and very low birth weight (VLBW) requiring admission to the Neonatal Intensive Care Unit (NICU) are at increased risk for developmental delays, impacting their language and brain development. Early language interactions and the language environments that surround NICU infants are strongly associated with enhanced language and cognitive development later in life (Swanson et al., 2019). Parents often require guidance and support on how, why, and when to engage linguistically with their critically ill infants. Talk With Me Baby (TWMB) is an initiative to train professionals on ways to engage babies socially and linguistically and how to transfer that capacity to families (TWMB, n.d.). The need to train parents on ways to effectively engage with their babies linguistically, socially, and emotionally was heightened during the COVID-19 pandemic as parents of NICU infants experienced reduced parenting confidence and increased parental stress and uncertainty (Vance et al, 2021). While TWMB has been implemented across various settings (e.g., educational, community) (Brasher et al., 2021), there is a great need to customize TWMB to adapt to the specific needs of highly

sensitized NICU infants. Therefore, the purpose of this study was to engage trusted professionals in the NICU, Registered Nurses (RNs) and Allied Health Professionals (AHPs), and leverage Implementation Science to evaluate best practices of TWMB implementation in a NICU setting.

## **Literature Review**

Studies demonstrate that rich language interactions within the first three years of life are strongly associated with enhanced language and cognitive development (Burchinal et al., 2008; Hart & Risley, 1995; Golinkoff, 2019; Weislader et al., 2013; Karoly et al., 2005). Infants in the Neonatal Intensive Care Unit (NICU), including those born prematurely (i.e., before 37-weeks gestation) or very low birth weight (VLBW), have an increased neurodevelopmental risk and thus require supportive environments (Chung, Chou, & Brown et al., 2019). Considering language is shaped by the environment surrounding the infant, it is critically important to enhance the environment of the most vulnerable infants with rich language and social emotional interactions. Parents often require guidance and support on how, why, and when to engage linguistically with their critically ill infants. Thus, careful consideration must be made on ways to achieve this enriched environment without contributing towards overstimulation.

Facilitating a supportive parent-child relationship and building a sense of parental self-efficacy and perceived control provides the foundation for healthy childhood development and fosters resilience to overcome adversities (Harvard University Center on the Developing Child, n.d.). The COVID-19 pandemic has increased the need for trainings aimed at increasing early language exposure through rich social emotional reciprocal interactions. Two critical elements emerged during the pandemic that highlight this need: Parents of NICU infants experienced reduced parenting confidence and increased parental stress and uncertainty (Vance et al., 2021) and; limited NICU family visitation to prevent infectious disease spread further reduced the language environments of NICU infants. Further compounding this situation was the inability to provide in-person training to staff in the NICU. Combined, these elements profoundly impacted the infant's language environment, and thus later literacy outcomes. Now, more than ever, is an important time to enrich the social and language interactions between caregivers and infants. Trainings that can be delivered effectively remotely to bolster the language environments of NICU infants have the ability to mitigate negative developmental outcomes.

As a result of the COVID-19 pandemic, many academic and health institutions have begun to explore virtual training as a means of reaching professionals. Although not new, the use of technology to deliver content virtually has seen a 20-fold increase during the pandemic referred to as “Zoom Boom” referencing the popular online platform Zoom (Flaherty, 2020). Approaches that have been utilized include synchronous and asynchronous virtual training. An increasingly effective approach to engage distance learners is through a blended format referred to as a flipped classroom, where learners review materials on their own prior to engaging in a virtual face-to-face training (Hew & Lo, 2018). The power of a flipped classroom has been found to result in stimulated active engagement, greater integration of learning materials, and enhanced ownership of learning (Berret, 2012; Mazur, 2009). Established adult learning principles indicate learning that is rich in engagement, based on experience, relevant, and problem-focused is best (Kearsly, 2010; Knowles, 1984). Given the current pandemic, virtual training is a viable option to reach adult learners and promote interactive learning.

Talk With Me Baby (TWMB) is an initiative to train professionals on ways to empower families to engage babies socially, emotionally, and linguistically. Originally delivered as a one-hour in-person training, the TWMB training has since shifted to a virtual flipped classroom model. Based on the findings of our previously funded Sandra Dunagan Deal Center grant, TWMB training can easily be adapted to a virtual learning environment while both safely enhancing access and promoting effective learning. Additionally, this format of virtual training creates the opportunity to unite professionals from various disciplines to share the same space virtually and model skills. Such enhanced interdisciplinary collaboration has the potential to improve quality of care to NICU infants by building a collaborative and nurturing environment. Research has found interdisciplinary environments to have decreased length of hospital stay and medical expenses while improving quality of care and health outcomes (Malec, Mork, Hoffman and Carlson, 2018). Although existing TWMB trainings are steeped in family-centered care approaches to early language exposure, there is a great need to further customize TWMB to meet the specific needs of highly sensitized NICU infants. Therefore, the purpose of this study was to engage trusted professionals in the NICU, Registered Nurses (RNs) and Allied Health Professionals (AHPs), and leverage Implementation Science to evaluate best practices of TWMB implementation in a NICU setting.

Implementation Science leverages implementation research methods to promote the systematic uptake of research findings and evidence-based practices into routine practice to improve the quality and effectiveness of health services and care (Eccles & Mittman, 2006). Several implementation models, theories, and frameworks exist to explain how and why implementation succeeds or fails (Nielsen, 2015). Included in these approaches are determinant frameworks, such as the Practical, Robust Implementation and Sustainability (PRISM) model, which aims to describe and/or guide the process of translating research into practice through a better understanding of the contextual factors that influence implementation (Nielsen, 2015; Feldstein & Glasgow, 2008). The PRISM model includes program (intervention), external environment, implementation and sustainability infrastructure, and recipients. A key concept of this model is to examine how these variables interact to impact the adoption, implementation and maintenance of a program (intervention) (Feldstein & Glasgow, 2008).

## **Methodology**

### **Setting and Participants**

This study engaged professionals working in a NICU of a pediatric inpatient hospital in Atlanta, Georgia. Participants (n=31) included Speech Language Pathologists (SLPs), Occupational Therapists (OTs), Physical Therapists (PTs), Registered Nurses (RNs), and Certified Child Life Specialists (CCLSs). A convenience sample of RNs and Allied Health Professionals (AHPs) (e.g., PT, SLP, OT, CCLS) working in one of two local pediatric inpatient hospital NICUs were included. RNs and AHPs were recruited from day and night shift to capture a variety of perspectives. Local NICU hospital acuity level varied from Level 3 to Level 4.

### **Program**

Initial meetings with key personnel were conducted to gauge individual and organizational readiness. Key personnel (n=14) included NICU admission and discharge nurses, RNs, PTs, SLPs, OTs, CCLS, and leadership of the developmental council. The original TWMB program was then modified by a team of interdisciplinary experts (e.g., Nursing, Occupational Therapy, Clinical Psychology) of the research team. Modifications included updating visuals (e.g., pictures) to be more inclusive of racial and ethnic diversity, acuity levels, gestational ages,

and developmental care approaches. Additionally, the TWMB training was modified in accordance with local NICU policies and procedures to incorporate behavioral and stress cues, as well as engagement techniques (e.g., modify language exposure to reduce dBHZ) and recognizing states to engage (e.g., ready, in-between, not ready). The TWMB training was delivered through a flipped classroom format, which provided participants access to an online learning platform (<https://twmb.ce.emorynursingexperience.com/>), where learners enrolled in a free TWMB course comprised of 6 learning modules totaling 22 minutes. Upon completion, participants were invited to join a 60 minute synchronous flipped classroom training via Zoom or in-person followed by a focus group.

### **Study Design**

This study incorporated a qualitative descriptive design including iterative phases of qualitative data collection and analysis. Session feedback was incorporated into subsequent trainings to enhance TWMB implementation. Four focus groups of AHPs and RNs (n=31) were conducted immediately following the trainings.

### **Procedures**

Planning of this study was guided by the Practical, Robust Implementation and Sustainability (PRISM) implementation science model. The four components of PRISM include 1) intervention, 2) external environment, 3) implementation and sustainability infrastructure, and 4) recipients. These components and their contextual factors guided the construction of a semi-structured focus group guide to identify the adoption, implementation, maintenance, and overall reach and effectiveness of TWMB in the NICU. University IRB approval was sought and the study was granted exempted status due to program evaluation. Informed consent and rights to participate in the study were explained to all participants. Verbal consent to participate in the study was obtained from all participants. Each focus group session lasted 45-60 minutes and was conducted immediately following the synchronous TWMB training. Participants received a \$50 gift card for their participation. The training and focus group sessions were led by TWMB certified trainers and qualitative experts.

## **Data Collection and Analysis**

Focus group sessions were audio recorded, transcribed, and analyzed by two independent trained qualitative experts. The software Max QDA was used to organize qualitative codes and themes during the analysis. Evaluation of findings was guided by PRISM's companion implementation science model Reach Effectiveness Adoption Implementation and Maintenance (RE-AIM). Deductive coding using the RE-AIM concepts was used as an initial top down approach to identify codes and themes central to the RE-AIM model and influential to the reach, effectiveness, adoption, implementation, and maintenance of TWMB in the NICU. Validity of the findings, representing the credibility of the study and truthfulness of findings, was obtained through peer debriefing sessions among qualitative researchers, independent coding, and investigator triangulation with additional trained independent coders to mitigate methodological error and bias (Tobin & Begley, 2004). Reliability was achieved through audit trails. These combined methods increased the rigor of the study and the trustworthiness of the findings (Tobin & Begley, 2004; Guba & Lincoln, 1981).

## **Results**

This study identified important contextual factors to enhance the implementation of TWMB to increase reach, effectiveness, adoption, implementation, and maintenance. Participants made poignant suggestions to enhance the TWMB training in the NICU.

### **Reach**

Participants identified various ways in which TWMB could extend its reach and benefit additional vulnerable populations with high acuity. Examples included implementing TWMB in the Technology Intensive Care Unit (TICU), Cardiac Intensive Care Unit (CICU), Cardiac Acute Care Unit (CACU), and other NICUs. Additionally, participants identified ways in which TWMB could reach more populations that could benefit from being trained, including parents, music therapists, new graduates, and new employees.

## **Effectiveness**

All participants expressed perceived effectiveness of TWMB and found the training to be affirming and expand on their foundational knowledge. Participants agreed the training was acceptable for their level of experience and knowledge, as well as the acuity level of their patient population. They expressed great satisfaction with approaches used in the training, including a great appreciation for the customization of the training and ease of use.

## **Adoption**

The TWMB training was deemed acceptable by all RNs and AHPs. Consensus was achieved by all RNs and AHPs the modified TWMB NICU training can be adopted into their current practice. Participants identified areas that would be ideal to adopt the TWMB training, such as embedding it into developmental council, admission and discharge processes, developmental rounds, and through interdisciplinary approaches.

## **Implementation**

Participants had a robust discussion throughout the training and during the focus groups on ways to implement TWMB in the NICU setting. Examples included tips for talking with parents, clustering care (e.g., pairing talking with care), modeling techniques, and tailoring implementation (e.g., inclusive of cues and states).

## **Maintenance**

Participants identified ways that TWMB can be maintained in the NICU, including in support of existing infrastructure (e.g., Developmental Council, Developmental Fairs, Baby Buddies), incorporating the training into on-boarding programs for new employees, ongoing professional development, embedding into routine, and creating a TWMB environment (e.g., signs at bedside).

## **Discussion**

Infants born prematurely or VLBW and requiring admission to the NICU are at increased risk for poorer developmental outcomes. This has a significant impact on their language and

brain development, which has lifelong implications for educational and health outcomes. Early language exposure has been shown to improve developmental outcomes, thus enhancing educational and health outcomes. RNs and AHPs play a vital role in providing early language exposure to infants in the NICU. Such enhanced interdisciplinary collaboration has the potential to improve neurodevelopmental outcomes of infants in the NICU by building a collaborative and nurturing early language environment. By utilizing the concepts of TWMB, RNs and AHPs can educate and empower families to provide rich language opportunities for their infant.

Customization of the TWMB training tailored to the unique needs of infants in the NICU is a critical step to ensuring infants have a rich early language environment while recognizing when, how, and why to engage with these vulnerable infants to avoid over stimulation. Parents of infants in the NICU often lack confidence on ways to safely engage with their infants socially, emotionally, and linguistically. Therefore, training to educate and support parents on the importance of early language exposure is paramount. During the COVID-19 pandemic, parenting stress and uncertainty increased significantly. At the same time, many NICU professional trainings were reduced to avoid infectious disease exposure. Providing a TWMB training through a flipped classroom virtual format allowed participants to receive timely training on ways to safely bolster the language environments of infants in the NICU.

Interventions aimed at training RNs and AHPs in the NICU on the importance of early language exposure have the potential to enhance developmental outcomes and reduce language and literacy disparities. While TWMB has been implemented across various settings (e.g., educational, community), this study was the first to partner with RNs and AHPs in the NICU, incorporating developmental care approaches in accordance with NICU policies and procedures, to customize and deliver a virtual flipped classroom TWMB training adapted to the specific needs of infants in the NICU. Results of this study highlight ways to safely and effectively optimize TWMB to surround infants in the NICU with a rich early language environment supported by the RNs and AHPs that care for these infants and have the capacity to transfer these skills to parents. Leveraging Implementation Science in the planning, implementation, and evaluation of this study allowed for a better understanding of the contextual factors that influence TWMB implementation in the NICU and the overall reach, effectiveness, adoption, implementation, and maintenance. Findings will inform future implementation of TWMB in the



NICU and can be generalizable to additional settings (e.g., CICU, CACU, TICU) and scalable to additional NICU hospital settings.

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