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A Scoping Review of Multimodal, Dyadic Early Relational Health Interventions in NICUs in the United States

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Data extraction.

Conflicts of interest - Umber Darilek has received remuneration from the Nurture Science Program at Columbia University for work as a research assistant on the multisite replication trial of Family Nurture Intervention and subsequent salary support for work with the NSP prior to June of 2022. To control for potential bias, articles are blindly agreed upon by at least 2 authors of this study for inclusion. The other authors report no conflict of interest in this project.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 January 2024 and was last updated on 09 January 2024.

INTRODUCTION

Review question / Objective We sought to examine the current state of the science related to multimodal, dyadic ERH interventions implemented in the NICU setting in the United States and identify gaps in the current literature.

Rationale Approximately 12% of children born today in the United States are admitted to the Neonatal Intensive Care Unit (NICU) (Centers for Disease Control and Prevention, 2020). Infants can be admitted to the NICU due to prematurity, illness, congenital anomalies, or difficulties transitioning to extrauterine life; and inpatient stays can be a matter of days to or several months. The period infants spend in the NICU is a time of rapid brain development, and greater susceptibility to neurodevelopmental outcomes based on both positive and negative experiences that contribute to the developing architecture of the brain (DeMaster et al., 2019). Infants in the NICU are subjected to between 14-70 stressful or painful procedures per day (Kelly et al., 2023; Weber & Harrison, 2019). Parents of NICU infants frequently experience anxiety, depression, and often post-traumatic stress disorder resulting from the birth of a premature or sick infant, being separated from their infants, and the overall NICU experience (Weber & Harrison, 2019; Treyvaud et al., 2019), which can interfere with their ability to bond with their child (Dau et al., 2019). The diminished or lost opportunity to be comforted and cared for by their parents can create added stress for infants (Bergman, 2019). Prolonged stress exposure in the

absence of consistent, positive, nurturing interactions, such as positive touch, kangaroo care, and vocal soothing, with parents can amount to biological and behavioral changes that can include maladaptive brain architecture, aptly named “toxic stress” (Garner et al., 2021).

The American Academy of Pediatrics has called for pediatric care environments, including NICUs, to focus on mitigating toxic stress through fostering safe, stable nurturing relationships (SSNRs) with the infant’s primary caregiver, most often the parent (Garner et al., 2021). Early relational health (ERH) is a framework for understanding the vital role the relationship between the parent and infant plays in development and well-being (Willis, et al., 2022). Dyadic ERH interventions have been touted as a necessary approach for the best-case neurodevelopmental outcomes of infants in the NICU (Garner et al., 2021; Givrad et al., 2021). Several stand-alone dyadic ERH interventions such as music therapy (Janner et al., 2021) and kangaroo care (Brignoni-Pérez et al., 2022) have been well documented as dyadic interventions, which are interventions in which involve the parent and infant interacting with each other simultaneously, as opposed to the parent being taught how to interact with the infant (Richter et al., 2022). Findings from a recent review of ERH interventions revealed variable outcomes (Kim & Kim, 2022). Furthermore, gaps remain regarding our understanding of the combination of various dyadic ERH interventions that layer multi-sensory (i.e., auditory, tactile, etc.) interventions to create multimodal, dyadic ERH interventions and whether these interventions have more optimal results, due to providing more avenues for connection.

We seek to examine the current state of the science related to multimodal, dyadic ERH interventions implemented in the NICU setting in the United States and identify gaps in the current literature.

Condition being studied We are studying the research on multi-modal early relational health (ERH) interventions in the NICU. Early relational health refers to the strength of the foundational relationship between an infant and their primary caregiver. The NICU is a very difficult place for parents and infants to build a strong relationship. Therefore we want to know what is known about the studies of ERH interventions in the United States of America.

METHODS

Search strategy The search strategy will aim to locate both published and gray literature. An initial limited search of PubMed was undertaken by a health-sciences librarian to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy. The literature search will include the databases PubMed, Scopus, CINAHL, and PsycInfo, using the EBSCO platform. Key words to describe relational health as a concept (Search 1) were identified as: “relational health” [TW] OR (relational[TW] AND health[TW]) OR “Parent-Child Relations”[MeSH] OR “Family Health”[MeSH] OR “Social Support”[MeSH] OR “Interpersonal Relations”[MeSH] OR “Family Relations”[MeSH] OR dyad*[TW] OR "Life Course Perspective"[Mesh] OR "life course perspective"[TW] OR "life course theory"[TW] OR "Kangaroo-Mother Care Method"[Mesh] OR “kangaroo care”[TW] OR “kangaroo mother care” [TW].

Key words to describe NICU as a concept (Search 2) were: "intensive care units, neonatal"[MeSH Terms] OR (intensive[TW] AND care[TW] AND (neonat*[TW] OR "infant, newborn"[MeSH Terms] OR Infant[MeSH] OR infant[TW] OR newborn[TW])) OR "neonatal intensive care units"[TIAB] OR nicu[TW] OR “neonatal intensive care unit"[TIAB]

Key words to describe outcomes/ indictors as a concept (Search 3) were: neuroprotect*[TW] OR "neuroprotection"[MeSH Terms] OR neuroprotection[TW] OR "neuroprotective agents"[Pharmacological Action] OR "neuroprotective agents"[MeSH Terms] OR "brain development"[TW] OR neurodevelopment*[TW] OR "growth and development"[MeSH Subheading] OR "growth and development"[TW] OR "growth and development"[MeSH Terms] OR "allostasis"[MeSH Terms] OR allostasis[TW] OR "allostatic load"[TW] OR allostatic[TW] OR "child behaviour disorders"[TW] OR "child behavior disorders"[MeSH Terms] OR (("child behavior"[TW] OR “child behaviour”[TW]) AND disorder*[TW]) OR "child behavior disorders"[TW] OR "infant behaviour"[TW] OR "infant behavior"[MeSH Terms] OR "infant behavior"[TW] OR “infant behaviors” [TW] OR “infant behaviours”[TW] OR "Psychology, Developmental"[Mesh] OR "adaptation, psychological"[MeSH Terms] OR "psychological adaptation"[TW] OR "psychological development"[TW] OR "emotional adjustment"[MeSH Terms] OR "emotional adjustment"[TW] OR "affective symptoms"[MeSH Terms] OR "affective symptoms"[TW] OR "emotional intelligence"[MeSH Terms] OR "emotional intelligence"[TW] OR "emotional abuse"[MeSH Terms] OR "emotional abuse"[TW] OR "emotional regulation"[MeSH Terms] OR

"emotional regulation"[TW] OR "psychological distress"[MeSH Terms] OR "psychological distress"[TW] OR "depression"[MeSH Terms] OR "depression"[TW] OR "depressive disorder"[MeSH Terms] OR "depressive disorder"[TW] OR "depressive disorders"[TW] OR "depression, postpartum"[MeSH Terms] OR "postpartum depression"[TW] OR "anxiety"[MeSH Terms] OR anxiety[TW] OR ((stress[TIAB] OR trauma[TIAB] OR adjustment[TIAB] OR maladaptive[TIAB] OR reactive[TIAB]) AND (disorder*[TIAB])) OR "Trauma and Stressor Related Disorders"[Mesh] OR "mental health"[MeSH Terms] OR "mental health"[TW] OR "Adjustment Disorders"[Mesh] OR "maladaptive behavior"[TW]

The fourth and final search was defined as "#1 AND #2 AND #3" Searches were limited to English and a date of 1970

A search for gray literature will also be conducted. Gray literature search syntax was developed based on the original structured search string and contained iterations of keywords such as “NICU,” “neonatal,” “intensive care,” and “relational health.” BMC Proceedings and the Biological Science Collection will be searched for conference proceedings. PubMed and Scopus contain citations for conference proceedings that were returned in the original search results. The search strategy, including all identified keywords and index terms, will be adapted for each included database and/or information source. The reference list of all included sources of evidence will be screened for additional studies.

Participant or population Infants admitted to the NICU and one or more parents must receive the intervention together in order for the intervention to be included in this review.

Intervention Any multi-modal, dyadic, early relational health intervention that took place in a US NICU and not after discharge.

Comparator Not applicable.

Study designs to be included This scoping review will consider both experimental and quasi-experimental study designs including randomized controlled trials, non-randomized controlled trials, before and after studies and interrupted time-series studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies will be considered for inclusion. This review will also consider descriptive observational study designs including case series, individual case reports and descriptive cross-sectional studies for inclusion.

Eligibility criteria Concept: For inclusion, the authors of the studies must describe a multimodal, dyadic intervention that took place primarily in the NICU that either strengthened the relationship between the parent (not limited to gestational parent) and child or leveraged the strengthening of the relationship to improve outcomes for the child, parent, or both. Dyadic interventions are those which directly involve both the parent and the infant. Domains of improvement could be physiological, psychological, or behavioral, or could relate to the implementation of the intervention in the NICU environment. Context: We will extend geographical limitations to exclude studies that took place outside of the United States as we believe that the context of US healthcare presents unique challenges to the uptake of non-billable interventions when compared to high-income countries with socialized medicine such as Canada, where ERH intervention is the norm in an entire province (Kevill et al., 2018). Additionally, we will exclude studies conducted primarily outside of the NICU, or those in which the intervention extends to post-discharge from the NICU. Inclusion criteria includes studies from the 1970s to the present, this time frame representing 10 years prior to what is considered the “modern NICU” (Thomas, 2008).

Information sources The literature search will include the databases PubMed, Scopus, CINAHL, and PsycInfo, using the EBSCO platform. A search for gray literature will also be conducted. Clinicaltrials.gov (www.clinicaltrials.gov) and the World Health Organization’s International Clinical Trials Registry Platform (https://trialsearch.who.int/) were searched for registered trials. F1000 Posters (https://f1000research.com/), Google Scholar, The Substance Abuse and Mental Health Services Administration’s Early Childhood Mental Health Programs website (https://www.samhsa.gov/iecmhc) will be searched. The websites for the nonprofit organizations First 3 Years (https://first3yearstx.org/) and Zero to Three (https://www.zerotothree.org) will be searched.

Main outcome(s) The main outcome of this scoping review will be to map the landscape of the literature on multi-modal, dyadic, ERH interventions in NICUs in the United States, identify the dyadic components of the interventions, and identify the gaps in the literature in regard to these interventions.

Data management Following the search, all identified citations will be collated and uploaded into EndNote 20 (Clarivate Analytics, PA, USA, 2022) and duplicates removed. Following a pilot test, titles and abstracts will then be screened by two or more independent reviewers for assessment against the inclusion criteria for the review. Potentially relevant sources will be retrieved in full and their citation details imported into Rayyan (Ouzzani et al., 2016) The full text of selected citations will be assessed in detail against the inclusion criteria by two independent reviewers. Reasons for exclusion of sources of evidence at full text that do not meet the inclusion criteria will be recorded and reported in the scoping review. Any disagreements that arise between the reviewers at each stage of the selection process will be resolved with an additional reviewer, and discussion, if necessary. The results of the search and the study inclusion process will be reported in full in the final scoping review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram (Page et al., 2021 PRISMA-ScR statement).

Quality assessment / Risk of bias analysis The full text of selected citations will be assessed in detail against the inclusion criteria by two independent reviewers. Reasons for exclusion of sources of evidence at full text that do not meet the inclusion criteria will be recorded and reported in the scoping review. Any disagreements that arise between the reviewers at each stage of the selection process will be resolved with an additional reviewer, and discussion, if necessary. As this is a scoping review, there will be no quality assessment.

Strategy of data synthesis Data will not be synthesized as this is a scoping review. The data will be mapped according to what is known about the studies of these interventions.

Subgroup analysis There will be no subgroup analysis in this scoping review.

Sensitivity analysis There will be no sensitivity analysis in this scoping review.

Language restriction English.

Country(ies) involved United States.

Keywords Intervention, maternal mental health, Neonatal Intensive Care Unit, relational health, toxic stress.

Dissemination plans We expect to publish the results of this scoping review in a medline-indexed, peer reviewed nursing journal.

Contributions of each author

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