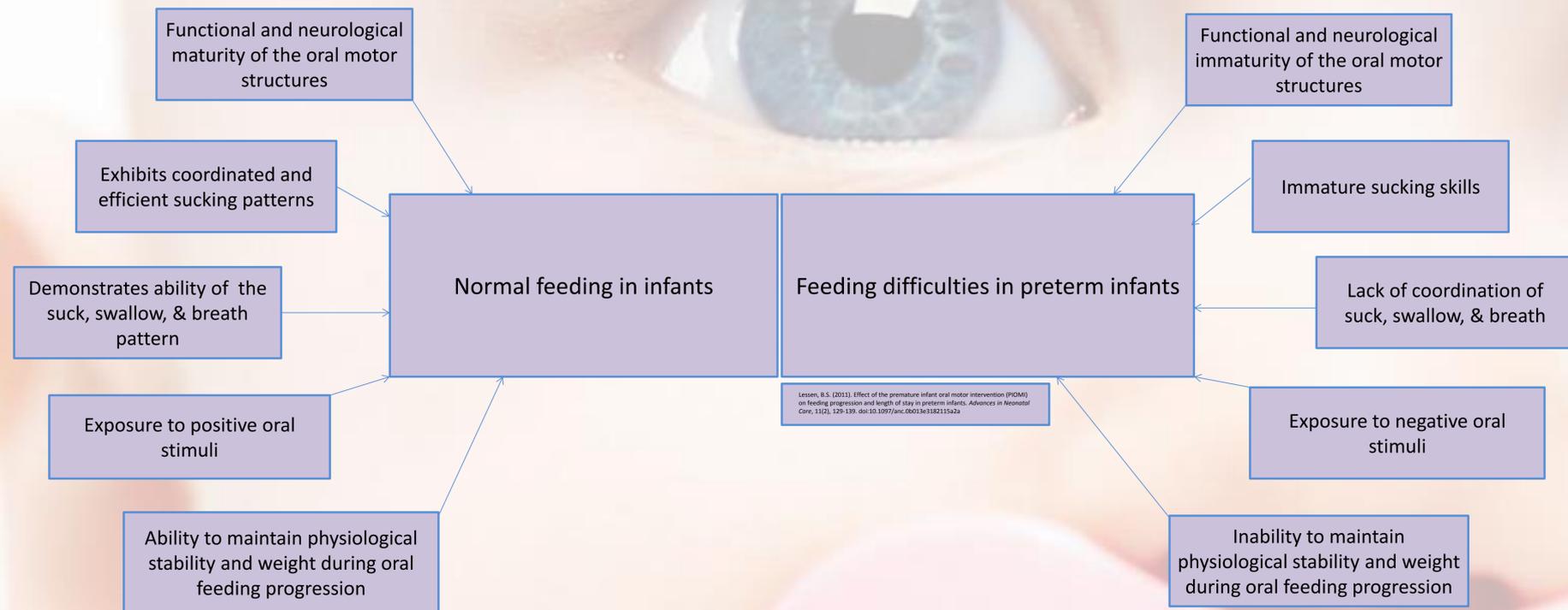


**Background: Feeding Difficulties in Preterm Infants**

Premature infants are infants born before 37 weeks gestational age. Oral feeding is a complex skill that requires an infant to demonstrate precise coordination and efficient suck-swallow-breathe patterns. In preterm infants, oral feeding difficulties occur frequently with lack of coordination of the suck-swallow-breathe mechanism, due to their underdeveloped central nervous system and oral musculature (Lyu et al., 2014). Swallowing and breathing both employ the same space within the pharynx, therefore lack of coordination of the suck-swallow-breathe pattern may cause feeding difficulties to develop. Safe oral feeding requires the proper coordination of suck-swallow-breathe in order to avoid apnea, bradycardia, oxygen desaturations and aspiration (Bache, Pizon, Jacobs, Vaillant, Lecomte, 2013). In 2011, Fucile, Gisel, McFarland, & Lau stated that these difficulties “often impede the transition to independent oral feeding and thus delay hospital discharge, negatively affect mother-infant interactions, and potentially lead to childhood feeding disorders.”

**Background: Sensorimotor Interventions**

Oral feeding is a complex multisystem process that involves both oral and non-oral systems of the human body. Sensorimotor input targeting non-oral systems, such as the trunk and limbs, may have effects that go beyond the target system and improve oral feeding performance. “Sensorimotor intervention is the provision of developmentally appropriate sensory inputs including oral, tactile, kinesthetic, vestibular and auditory inputs which are used to facilitate the development of existing rudimentary skills and to prevent/minimize the deleterious environmental effects” (Fucile et al., 2011). Studies have shown that sensorimotor intervention helps strengthen the systems involved in oral feeding and provides beneficial effects for the feeding management in the preterm population. Oral feeding is essential to ensure preterm infants are gaining the adequate amount of weight needed to continue healthy development. The ultimate goal of a sensorimotor intervention program for preterm infants is to help facilitate transition from gavage feeding to independent oral feeding. Oral motor intervention, tactile/kinesthetic intervention and multisensory interventions are all forms of sensorimotor intervention that provide positive outcomes for preterm infants who experience feeding difficulties.



**Oral Motor Intervention**

Oral Motor Intervention (OMI) requires sensory stimulation to the jaw, lips, tongue, cheeks, velum, pharynx, larynx, and respiratory muscles (Lyu et al., 2014). In 2011, Lessen developed the Premature Infant Oral Motor Intervention (PIOMI) scale and discovered that this tool allowed preterm infants to transition from gavage feeding to independent oral feeding sooner than preterm infants who did not receive this specific intervention. A visual depiction of the PIOMI can be seen in Figure 1. Fucile et al. (2011), conducted an experiment to observe the effects of OMI in preterm infants. The oral intervention program that is performed in this specific study consisted of a twice-daily stroking of the cheeks, gums, lips, and tongue for 12 minutes and non-nutritive sucking for 3 minutes. The researchers discovered that oral intervention in conjunction with non-nutritive sucking in preterm infants improved proficiency, provided an increase in the amount of daily feedings and increased the volume of milk consumed compared to preterm infants who did not receive intervention. The results from this study also noted a decrease in the time it took preterm infants receiving intervention to attain independent oral feeding. A similar study that used this identical oral stimulation program found that the OMI program shortened the transition time from introduction of oral feeding to independent oral feeding and improved the oral feeding performance (Lyu et al., 2014). The researchers also noted that OMI may advance the central and/or peripheral neural structures, leading to improved sucking skills and coordination of the suck-swallow-breathe pattern.

Lessen, B. S., Moretto, C. A., & Williams, L. J. (2011). Establishing interobserver reliability of an oral motor intervention for preterm infants. Neonatal Network, 30(2), 72-82. doi:10.1891/0730-8625.30.2.72

**Tactile/Kinesthetic Intervention**

Tactile/Kinesthetic (T/K) intervention requires sensory stimulation to the non-oral systems of the human body. Fucile et. al (2011) and Fucile et al. (2012) conducted an experiment in order to find further information on the effects that T/K intervention has on oral feeding in preterm infants. The T/K intervention performed consisted of a twice-daily stroking of the head, neck, back, arms, and legs for 10 minutes and passive range of motion to the limbs for 5 minutes. The results of both studies demonstrated an increase in the amount of milk ingested, rate of transfer of milk and an improved proficiency of oral feeding in preterm infants who received T/K intervention compared to preterm infants who did not receive intervention. Appropriate postural alignment and trunk control provide a stable base for the suck-swallow-breathe pattern and may facilitate this function and coordination in preterm infants (Fucile et al., 2011).

Image retrieved from: [http://raisingchildren.net.au/articles/baby\\_massage.html](http://raisingchildren.net.au/articles/baby_massage.html)

**Multisensory Interventions**

Fucile et al. (2011) found that preterm infants who received combined sensorimotor intervention attained independent oral feeding at a significantly younger postmenstrual age than the control group. Multiple stimulation sites may potentially impact common underlying systems or may, in fact, provide multiplicative effects on these coordinative functions (Fucile et al., 2012). One study found that Auditory Tactile Visual Vestibular (ATVV) intervention increased orally directed behaviors and proportion of time spent in an alert behavioral state immediately after intervention (White-Traut, Rankin, Pham, Li, & Liu, 2014). The ATVV intervention in this study consisted of infant directed mother’s voice for the auditory component, moderate touch stroking for the tactile component, eye contact for the visual component and horizontal rocking of the infant by the infant’s mother for the vestibular component. While ATVV intervention requires further evidence on the impact of oral feeding, recent studies demonstrate positive results. Medoff-Cooper et al. (2015) conducted an experiment in order to evaluate sucking organization in premature infants following ATVV intervention. The researchers concluded that the preterm infants who received ATVV intervention exhibited improved sucking organization during hospitalization. Multisensory interventions may be more beneficial in preterm infants because these interventions target both the oral and non-oral systems involved in feeding.

**Conclusion**

Preterm infants are a vulnerable population. Oral feeding difficulty in the preterm population is prevalent due to the underdevelopment of the central nervous system and oral musculature of the human body. The immature development of these systems may lead to a lack of coordination of the suck-swallow-breathe mechanism, which may eventually lead to feeding difficulties. Sensorimotor interventions in the preterm population can help facilitate growth and development of the structures involved in feeding. Recent studies have shown that oral motor interventions, tactile/kinesthetic interventions and multisensory interventions have provided positive effects for preterm infants who experience feeding difficulties.

References provided on separate sheet