

WHY THEY SUCK.

WHAT DOES THE RESEARCH SAY ABOUT PACIFIERS?

Research report compiled & written by
Myo Munchee Australia

MYO MUNCHEE
SMALL DEVICE BIG IMPACT

BACKGROUND AND CONTEXT

The following report has been written to share with clinicians who are working with very young children and concerned about the deleterious nature of pacifier or “dummy” use. A commonly held opinion is that these non-nutritive suck habits (NNSH) are disruptive to normal growth and development. Before making this statement however, a thorough review of the current body of published literature is a necessary step. Importantly, it is necessary to declare that Munchee has a commercial interest in compiling this report.

However more critically, within this evidence based context the Bebe and chew products have an opportunity to be a widely available and viable replacement for the pacifier. Further, these products may be useful aids to help treat or prevent some of the commonly reported deleterious effects of pacifier use.

PACIFIERS

Pacifiers (also known as a “dummy” or “binky”) have been recorded in history as far back as the 16th Century (1). These appliances are cheap and widely available although there has been a growing body of both clinical and published evidence demonstrating the adverse effects of their use.

Soothing children with pacifiers has been controversial for decades (2) despite this parents continue to use pacifiers for a number of reasons, namely for infant soothing, comfort and sleep (3) with the prevalence of pacifier use estimated between 60-80% (4) with many using pacifiers for longer periods during the day rather than simply to soothe or comfort at specific times such as bed time or car travel.

Evidence shows advice on initiating pacifier use is primarily from the mother themselves, the child’s grandmother or midwives (3) suggesting that those professionals who may deal with the long term effects of pacifier use in later years do not have a significant bearing on a mother’s decision making process. Qualified education for parents of infants and very young children is therefore identified as an important consideration within the framework of current evidence, particularly if a widespread health promotion initiative to reduce or prevent pacifier use is initiated.

METHODS

In performing the literature review, search filters were applied excluding papers published before 2000. For the purposes of this report searches were also segregated and performed under the broad headings of the bio-mechanical (structural), bio-chemical and psychophysical effects of pacifier use. The purpose of this segregation was to broadly categorise the effects of the pacifier utilising a published holistic framework that has typically been used to examine and describe dysfunctional breathing (5).

FINDINGS

The searches and topics of research papers were segregated into the categories within the framework identified above. Biomechanical included the structural effects of pacifier use and syndromes as a result of long term pacifier sucking. Those chosen as Biochemical papers demonstrated some form of metabolic consequence (e.g. obesity) while the Psychophysical papers were categorised by examining either the choices and reasons behind pacifier use and long term psychosocial outcomes for the child. The following table breaks down how the papers and outcomes examined were classified into each segment.

Biomechanics	• Contribution of NNSH to malocclusion • Influence and impact of pacifier use on breastfeeding outcomes • Soft tissue dysfunction including lip and tongue rest posture • Swallow dysfunction and pacifier use
Biochemistry	• Early childhood weight and obesity outcomes • Pacifier use and breast versus bottle feeding • NNSH and risk of SDB • Pacifier use and recurrent Otitis Media
Psychophysical	• Soothing nature of pacifier use • Pacifier use and adult's responses to infant emotions • Relationship between pacifier use, emotional competence and conceptual relationships • Parent's choices to use pacifiers • PND and pacifier use • Object attachment and imprinting in young children • Assumed beliefs and knowledge on pacifiers among parents • Efficacy of cessation interventions for NNSH

A summary of the findings of each section is expanded upon below. Please note that for each section there are a separate numerical reference lists which can be found in the references section at the end of this document.

1. BIOMECHANICS

The most prominent outcome in the reviewed literature is centered on the effects of pacifier use on the developing dentition. We examined 18 papers and their citations reporting correlations between pacifier use and malocclusion. In addition, some papers presented results demonstrating a negative effect on breast-feeding outcomes correlated to the duration of pacifier use. Research also drew conclusions on pacifier use and dysfunctional oral rest postures, soft tissue health, arch development and critical motor patterns such as suck and swallow. The following details the findings of each sub-category.

Occlusion:

- There is a marked consensus that NNSH, in particular pacifier use, extended beyond the age of two increases the chance of malocclusion approximately 4 fold (1, 4, 6)
- The longer the duration of pacifier use the higher the chance of malocclusion, up to 22 fold (1, 6, 10)
- Cessation of NNS habits does not necessarily mean reversal of malocclusion. Longer periods of pacifier use can correlate to malocclusion in mixed dentition (40,
- The most common presentations of malocclusion associated with pacifier use and NNSH were: anterior open bite, posterior cross-bite and increased overjet (6, 8, 68, 76, 91)
- Posterior cross-bite was the most commonly reported malocclusion and was correlated to length of time a child continued using a pacifier (6, 26, 40, 54, 76, 84, 93)
- Early treatment of posterior cross-bite is recommended in an attempt to prevent these malocclusions persisting to permanent and/or mixed dentition leading to mandibular and temporomandibular disorders and/or craniofacial asymmetry (53)
- Associated habits of finger sucking, bottle feeding and mouth breathing also contributed to malocclusion and to time taken to correct occlusion (5, 8, 10, 56)

- Bottle feeding is also associated with malocclusion and furthermore, those feeding by bottle in the first 6 months of life were also more likely to use a pacifier (68)
- Breastfeeding and breastfeeding duration reduced the risk of malocclusion up to 5 fold (78)
- As a preventative strategy pacifier use must be phased out by 7 months and replaced by mastication (94)
- The duration of sucking and/or having a pacifier in the mouth is correlated to development of malocclusion it is therefore critical to encourage parents to limit duration. For example, if used as a settling aid it should be used at sleep time and not overnight (26, 40, 54, 78, 93)

Breastfeeding Outcomes:

- Pacificer use for premature and critically ill babies in ICU does not appear to negatively affect breastfeeding relationships (11)
- Pacifier use during a regular post-birth hospital stay is however associated with decreased likelihood of breastfeeding beyond 10 weeks (11)
- Observational studies suggested early pacifier use may interfere with breastmilk production and lead to early discontinuation of breastfeeding although evidence is not conclusive (12)
- It is theorised that use of pacifiers can alter or change the sucking technique of an infant to be more superficial with shorter sucks and no formation of vacuum (11)
- A suggestion is pacifiers increase the number of times a child suckles per day and consequently there is less stimulus for milk production and early weaning (11)
- Breastfeeding for 12 months or greater was shown to significantly reduce the risk of malocclusion (78)

Soft Tissue Dysfunction:

- Oral myofunctional characteristics that were significantly associated with pacifier use were resting lip position, resting tongue posture, shape of hard palette and swallow pattern (52, 75, 84)
- Altered swallow pattern is the most likely myofunctional outcome of pacifier use (56, 75) • Duration and frequency of pacifier habit were again associated with myofunctional dysfunction (84)
- Children using a pacifier had a higher incidence of mouth breathing (56) • With increased frequency and duration of use there may be tendency for hyper function of the buccinator muscles (84)

- Other results identified inadequate lip and cheek tone, poor tongue rest posture and tongue thrust during speech as significant myofunctional outcomes (52, 56, 75)
- Clinicians identifying these traits should refer and/or treat in a multi-disciplinary team (52, 56)

2. BIOCHEMISTRY

Within this section of our analysis we examined ten papers related to metabolic and/or disease/infection processes under the loose heading of biochemical responses. Pacifier use has a measurable effect on weight gain, breastfeeding outcomes and an increased association with bottle feeding.

We reviewed a number of studies demonstrating a causal relationship between pacifier use and acute Otitis Media (ear infection) and recurrent otitis media a common and costly condition that is statistically linked to pacifier use. Finally, sleep breathing in infants is fortified by breastfeeding with no benefits shown using a pacifier. Pacifiers have however been shown to be effective in the prevention of SIDS.

Body Composition:

- Pacificer use was associated with more rapid weight gain in 0-6 months and a higher incidence of being over-weight at ages 1-2 years (1)
- Pacifier use can potentially lead to over-feeding to soothe stress (8)
- A reduction in breastfeeding or transition to bottle feeding can lead to an increased intake of cow's milk which can cause immune reactivity and increases in weight gain (49)

Otitis Media:

- Otitis Media is an extremely common condition with a high financial burden, over-use of antibiotics and surgical intervention (18, 20, 32)
- There are multiple references and studies demonstrating a relationship between pacifier use and increased recurrent acute ear infection (18, 20, 32, 37, 41)

- Parents with children suffering one or more bouts of otitis media should be educated on the increased risks of pacifier use on reoccurrence (32)
- Possible biochemical associations for increased rates of acute ear infection include increasing oral candida and associated colonisation of the mouth by cariogenic microbes. The reasoning is that pacifier sucking causes reflux of these pathogens through the nasopharyngeal secretions to the middle ear (41)
- These biochemical changes are also associated with the structural consequences of malocclusion and soft tissue dysfunction presented above, it is theorised these changes disturb the pattern of drainage of the middle ear via small alterations to the orientation of the eustachian tubes and alterations in the function of salpingopharyngeus (unpublished)

Sleep Disordered Breathing:

- NNS potentially has no effect on the severity of OSA and SDB however breastfeeding has been shown to significantly reduce the risk (13)
- Both breastfeeding and pacifier use have been shown in multiple studies to reduce risk of SIDS (13)

3. PSYCHOPHYSICAL

The psychophysical web related to pacifier use is extremely complex with no hard edge conclusions, solutions or obvious cause and effect. Much of the evidence is still emerging and based on theories which are beginning to be studied. We identified three sub-sections pertaining to the psychosocial outcomes of pacifier use having examined 16 papers and their citations.

Understanding this topic begins with the relationship between a mother's motivation to choose to use a pacifier, the immediate and long term social and emotional outcomes and what options and opinions and guidelines exist for both uptake and cessation of pacifiers. The following summarises our findings relative to each of these topics.

Motivation and reasons for choosing pacifier use:

- Pacifiers have a soothing effect on pre-term babies and babies in intensive care units and may contribute to pain management in these infants (1) however long term offers of pacifiers can provoke agitated infants on discharge (39)
- In Australia, pacifier use is linked to education level. Pacifiers were more prevalent in those with a high school education than those with a university education. This was consistent with results from Brazil (41)
- Pacifier use is linked to decreased breastfeeding outcomes and length of time breastfeeding in healthy mothers (37)
- In contrast, mothers suffering Post Natal Depression (PND), approximately 19%, have better breastfeeding outcomes when their infant is using a pacifier (34)
- Most women chose to use a pacifier based on their own volition, advice from mother or mother-in-law or advice from a mid-wife/child health nurse (41)
- Very few primary and allied healthcare practitioners have input into a mother's decision for or against pacifier use (41, 73)
- Published guidelines for health practitioners to follow when advising mothers are very limited and/or not published despite continued evidence on the deleterious nature of pacifier use (22, 66)
- Many mothers choose to use pacifiers as they believe "it is normal for babies to suck" or "babies need to suck" (66)

Emotional and behavioural ramifications:

- Pacifiers are believed to influence social and emotional development due to prevention of facial mimicry. Humans interact and bond by recognising and mimicking facial cues and expressions. Pacifier use prevents the infant from mimicking especially during play/interaction time. Infants should therefore minimise the use of pacifiers during waking hours (2)
- Mothers have been found to describe themselves as calm and more peaceful more often when their infants used a pacifier (2)
- Pacifier use appears to influence the infant/child's development of differentiation of abstract versus concrete concepts (3)
- Boys using pacifiers have more marked adverse social/emotional effects from pacifier use. Outcomes for boys are directly linked to length of use (3)
- Pacifiers disrupt both sound formation and mouthing movements that form the basis of speech and correct biomechanics of the mouth (21)

- It is proposed that the mouth is rich in Merkel cells (sensory receptors that respond to light touch) and pacifier use disrupts and dulls down the afferent sensory information necessary for speech, social and mouthing actions that contribute to development (51)
- There is a proposed theory of “imprinting” of an infant to a mother’s breast. Displacement of this imprint via NNS can lead to a sequelae of conditions associated with oxytocin deficit (51)
- One study reported there is a five fold risk for persons using a pacifier for at least 24 months to become a smoker in early adolescence or adulthood (42)
- Pacifier use can also disrupt the emotional cues of carers and siblings to the infant via perceptions of an infant’s ability to regulate mood and via loss of the infant’s facial expression (51)
- The mouth is used for sensorial interpretation of a child’s environment. Pacifiers disrupt an infant or child’s ability to place objects within their mouth (59)
- Alternatives include soothing mechanisms such as swaddling, rocking, soft music, singing and infant massage (59). All adverse social/emotional outcomes from pacifier sucking are correlated to length of use (3, 42, 59)

Interventions for cessation of pacifier habits (79):

- Cessation of NNS especially pacifier use can cause a high degree of discomfort for both parent/carer and child
- A review paper of cessation methods demonstrated there are a number of potential cessation interventions however it is not known which is most effective, if any are even effective and which are favoured by parents or children • Interventions included behavioural modification, positive and negative reinforcement, adverse taste and use of intra-oral orthodontic appliances such as palatal cribs.
- Evidence in this review was considered to be of low quality mostly due to bias of published interventions being related to specific products
- There exists a lack of quality evidence and well-designed studies for the cessation of pacifier use in infants and young children
- The data does suggest interventions involving both psychological and structural/functional intervention to be the most effective.
- This topic is critical for both parents and children due to the lengthy, uncomfortable and expensive nature of correction of structural and dental mis-alignment

CONCLUSIONS:

The use of the pacifier or “dummy” has a long and controversial history with a vast range of opinions, social pressures, misinformation and inconsistency of guidelines and advice among healthcare professionals.

Despite this there exists a large body of evidence drawing recurring and consistent conclusions. The inconsistencies of information and guidelines are amplified due to the complex relationship between each mother and baby dyad. Within every presentation there exists a unique mix of experiential, mental, cultural and educational inputs that must be taken into account.

Compassion, empathy and understanding is critical for new mothers and their babies. When discussing pacifier use health professionals must be respectful and maintain unconditional positive regard for the mother and baby. This is further highlighted where post-natal conditions such as pre-term or critically ill babies are involved or for mothers suffering PND.

Thus while the evidence is clear, the need to navigate often difficult post-natal period can resort to mothers adopting pacifiers as a “means of survival”. A most critical outcome and finding across all the literature examined pertains to the length of use of pacifiers. All outcomes whether structural, biochemical or psychophysical were related to length of use in months and daily duration of use. The longer the pacifier was in the baby’s mouth and the length of time the infant/child used a pacifier for, the less favourable the outcome.

To summarise;

- Pacifiers may be helpful up to 6 months however they should be used in a limited capacity and for the least amount of time possible unless a baby is critically ill or highly unsettled
- Discontinue the use of pacifiers after 6 months, particularly when the infant is transitioning to solid foods as sucking interferes with the establishment of functional chewing patterns, their associated neurology and with craniofacial growth.
- If pacifiers are continued beyond 6 months the duration of use should be as minimal as possible and alternative settling and comforting should be encouraged
- Evidence clearly shows pacifier use continued for greater than 24 months significantly increases the likelihood of adverse outcomes.

RECOMENDATIONS:

Having reviewed the critical factors of development that pacifiers appear to disrupt, we believe there are some important collective actions required by the healthcare cohort at large.

1. Education

- Initiation of mainstream public health promotion activities for the general public to help parents understand the risk to cost to benefit ratios of pacifier use and effect of length and duration of use. Specific attention should be given to education related to occlusion, recurrent otitis media and negative social outcomes which provide both the highest quality of evidence and the greatest costs to parents and society.
- Specific education to contact points for mother/baby dyads including GPs, community health nurses, midwives and lactation consultants regarding pacifier use and breastfeeding outcomes plus alternatives to the pacifier
- Specific education for mainstream dental and allied health practitioners who may be in contact with young families targeted to evidence on malocclusion and otitis media.

2. Guidelines for use

- Development and vetting of a consistent set of guidelines for healthcare practitioners and providers to assist in advising parents on their options and alternatives to pacifier use and useful information and protocols for cessation

3. Cessation Advice

- Further research is required to ascertain the best practice in cessation for both parent and child
- The quality of evidence within the realms of cessation is currently very poor so there exists great opportunity to innovate within this context
- At Munchee we have a “Munchee Hypothesis” that the prongs on the Munchee coupled with the chewing action can offer very young children who are sensorially attached to their pacifier an easy alternative. We have trialled this anecdotally within both chiropractic and myofunctional therapy contexts and are developing products and programs to help children progress from a prolonged infant suck pattern maintained by a pacifier to a correct chewing and swallowing action.

The issue of pacifier use seems to remain embedded in emotion and uncertainty coupled with a degree of misunderstanding and misinformation. The reference list for this report indicates a large body of work that demonstrates consistency across papers relating to malocclusion, otitis media, breastfeeding outcomes and length and duration of use.

While these outcomes may be eluded to within the sentiment of general public it is our hope that by collating this research we can help arm health professionals with the information and context required to consciously educate the public. In particular, we hope mothers can become aware of the potentially deleterious effects of pacifier use, the safe timeframes and the available alternatives.

Mary Bourke
Cole Clayton
Munchee 2019

References

The following comprehensive reference list cites the major papers we examined and subsequent citations contained within that have influenced the reported findings. Thus forming a comprehensive resource list for those wishing to further investigate the evidence on pacifier use.

Introduction

1. Marter A, Agruss JC. Pacifiers: An update on use and misuse. Journal for Specialists in Pediatric Nursing. 2007 Oct;12(4):278-85.

2. Nelson, A.M., A comprehensive review of evidence and current recommendations related to pacifier usage. J Pediatr Nurs, 2012. 27(6): p. 690-9.

3. Mauch CE, Scott JA, Magarey AM, Daniels LA. Predictors of and reasons for pacifier use in first-time mothers: an observational study. BMC pediatrics. 2012 Dec;12(1):7.

4. Pansy J, Zotter H, Sauseng W, Schneuber S, Lang U, Kerbl R. Pacifier use: What makes mothers change their mind?. Acta Paediatrica. 2008 Jul;97(7):968-71.

5. Courtney R. Breathing training for dysfunctional breathing in asthma: taking a multidimensional approach. ERJ open research. 2017 Oct 1;3(4):00065-2017.

Biomechanics

1. Nelson, A.M., A comprehensive review of evidence and current recommendations related to pacifier usage. J Pediatr Nurs, 2012. 27(6): p. 690-9.

2. Moon, R.Y., et al., Physician recommendations regarding SIDS risk reduction: a national survey of pediatricians and family physicians. Clin Pediatr (Phila), 2007. 46(9): p. 791-800.

3. Smith, L.J. and J. Riordan, Postpartum care, in Breastfeeding and human lactation. 2010, Jones & Bartlett: Sudbury, MA.

4. Zimmer, S., et al., Anterior Open Bite In 27 Months Old Children after Use of a Novel Pacifier - A Cohort Study. J Clin Pediatr Dent, 2016. 40(4): p. 328-33.

5. Gois, E.G., et al., Influence of nonnutritive sucking habits, breathing pattern and adenoid size on the development of malocclusion. Angle Orthod, 2008. 78(4): p. 647-54.

6. Poyak, J., Effects of pacifiers on early oral development. Int J Orthod Milwaukee, 2006. 17(4): p. 13-6.

7. de Sousa, R.V., et al., Prevalence and associated factors for the development of anterior open bite and posterior crossbite in the primary dentition. Braz Dent J, 2014. 25(4): p. 336-42.

8. Moimaz, S.A., et al., Longitudinal study of habits leading to malocclusion development in childhood. BMC Oral Health, 2014. 14: p. 96.

9. Adair, S.M., et al., Effects of current and former pacifier use on the dentition of 24- to 59-month-old children. Pediatr Dent, 1995. 17(7): p. 437-44.

10. Hebling, R.S., et al., Relationship between malocclusion and behavioural, demographic and socioeconomic variables: a cross-sectional study of 5-year-olds. The Journal of Clinical Pediatric Dentistry, 2008. 33(1): p. 75-80.

11. Kair, L.R. and T.T. Colaizy, Association Between In-Hospital Pacifier Use and Breastfeeding Continuation and Exclusivity: Neonatal Intensive Care Unit Admission as a Possible Effect Modifier. Breastfeed Med, 2017. 12: p. 12-19.
Add a little bit of body text
12. Jaafar, S.H., et al., Effect of restricted pacifier use in breastfeeding term infants for increasing duration of breastfeeding. Cochrane Database Syst Rev, 2016(8): p. CD007202.

13. Levy, S.M., et al., Associations of pacifier use, digit sucking, and child care attendance with cessation of breastfeeding. J Fam Pract, 2002. 51(5): p. 465.

14. Vogel, A.M., B.L. Hutchison, and E.A. Mitchell, The impact of pacifier use on breastfeeding: a prospective cohort study. J Paediatr Child Health, 2001. 37(1): p. 58-63.

15. Boccolini, C.S., M.L. Carvalho, and M.I. Oliveira, Factors associated with exclusive breastfeeding in the first six months of life in Brazil: a systematic review. Rev Saude Publica, 2015. 49.

16. Mascarenhas, M.L., et al., Prevalence of exclusive breastfeeding and its determiners in the first 3 months of life in the South of Brazil. J Pediatr (Rio J), 2006. 82(4): p. 289-94.

17. Gomes, C.F., et al., Surface electromyography of facial muscles during natural and artificial feeding of infants. J Pediatr (Rio J), 2006. 82(2): p. 103-9.

18. Righard, L. and M.O. Alade, Sucking technique and its effect on success of breastfeeding. Birth, 1992. 19(4): p. 185-9.

19. Neifert, M., R. Lawrence, and J. Seacat, Nipple confusion: toward a formal definition. J Pediatr, 1995. 126(6): p. S125-9.

20. Jackson, J.M. and A.P. Mourino, Pacifier use and otitis media in infants twelve months of age or younger. Pediatr Dent, 1999. 21(4): p. 255-60.

21. Darwazeh, A.M. and A. al-Bashir, Oral candidal flora in healthy infants. J Oral Pathol Med, 1995. 24(8): p. 361-4.

22. Caglar, E., et al., Feeding, artificial sucking habits, and malocclusions in 3-year-old girls in different regions of the world. J Dent Child (Chic), 2005. 72(1): p. 25-30.

23. Callaghan, A., et al., Association between pacifier use and breast-feeding, sudden infant death syndrome, infection and dental malocclusion. Int J Evid Based Healthc, 2005. 3(6): p. 147-67.

24. Martins, D.R., R.R. Almeida, and E.A. Dainesi, Posterior Cross Bite In Mixed Dentition. Revista de Ontologia, 1994. 29(1): p. 66-74.

25. Humphreys, H.F. and B.C. Leighton, A survey of antero-posterior abnormalities of the jaws in children between the ages of 2 and 5 1/2 years of age. Br Dent J, 1950. 88(1): p. 3-15.

26. Warren, J.J. and S.E. Bishara, Duration of nutritive and nonnutritive sucking behaviors and their effects on the dental arches in the primary dentition. Am J Orthod Dentofacial Orthop, 2002. 121(4): p. 347-56.

27. Farsi, N.M. and F.S. Salama, Sucking habits in Saudi children: prevalence, contributing factors and effects on the primary dentition. Pediatr Dent, 1997. 19(1): p. 28-33.

28. Katz, C.R., A. Rosenblatt, and P.P. Gondim, Nonnutritive sucking habits in Brazilian children: effects on deciduous dentition and relationship with facial morphology. Am J Orthod Dentofacial Orthop, 2004. 126(1): p. 53-7.

29. Ogaard, B., E. Larsson, and R. Lindsten, The effect of sucking habits, cohort, sex, intercanine arch widths, and breast or bottle feeding on posterior crossbite in Norwegian and Swedish 3-year-old children. Am J Orthod Dentofacial Orthop, 1994. 106(2): p. 161-166.

30. Adair, S.M., M. Milano, and J.C. Dushku, Evaluation of the effects of orthodontic pacifiers on the primary dentitions of 24- to 59-month-old children: preliminary study. Pediatr Dent, 1992. 14(1): p. 13-8.

31. Svedmyr, B., Dummy sucking. A study of its prevalence, duration and malocclusion consequences. Swed Dent J, 1979. 3(6): p. 205-10.

32. Ravn, J.J., Sucking habits and occlusion in 3-year-old children. Scand J Dent Res, 1976. 84(4): p. 204-9.

33. Infante, P.F., An epidemiologic study of finger habits in preschool children, as related to malocclusion, socioeconomic status, race, sex, and size of community. ASDC J Dent Child, 1976. 43(1): p. 33-8.

34. Helle, A. and K. Haavikko, Prevalence of earlier sucking habits revealed by anamnestic data and their consequences for occlusion at the age of eleven. Proc Finn Dent Soc, 1974. 70(5): p. 191-6.

35. Kohler, L. and K. Holst, Malocclusion and sucking habits of four-year-old children. Acta Paediatr Scand, 1973. 62(4): p. 373-9.

36. Nanda, R.S., I. Khan, and R. Anand, Effect of oral habits on the occlusion in preschool children. ASDC J Dent Child, 1972. 39(6): p. 449-52.

37. Bowden, B.D., The effects of digital and dummy sucking on arch widths, overbite, and overjet: a longitudinal study. Aust Dent J, 1966. 11(6): p. 396-404.

38. Bowden, B.D., A longitudinal study of the effects of digit- and dummy-sucking. Am J Orthod, 1966. 52(12): p. 887-901.

39. Larsson, E., Dummy- and finger-sucking habits with special attention to their significance for facial growth and occlusion. 5. Improvement of malocclusion after termination of the habit. Sven Tandlak Tidskr, 1972. 65(12): p. 635-42.

40. Scavone-Junior, H.F., R.; Mendes, T.; Ferreira, F., Prevalence of posterior crossbite among pacifier users: a study in then deciduous dentition. Brazilian Oral Research, 2007. 21(2): p. 153-158.

41. Warren, J.J., et al., Effects of oral habits' duration on dental characteristics in the primary dentition. J Am Dent Assoc, 2001. 132(12): p. 1685-93; quiz 1726.

42. Kurol, J. and L. Berglund, Longitudinal study and cost-benefit analysis of the effect of early treatment of posterior cross-bites in the primary dentition. Eur J Orthod, 1992. 14(3): p. 173-9.

43. Kutin, G. and R.R. Hawes, Posterior cross-bites in the deciduous and mixed dentitions. Am J Orthod, 1969. 56(5): p. 491-504.

44. Lindner, A., Longitudinal study on the effect of early interceptive treatment in 4-year-old children with unilateral cross-bite. Scand J Dent Res, 1989. 97(5): p. 432-8.

45. Thilander, B., S. Wahlund, and B. Lennartsson, The effect of early interceptive treatment in children with posterior cross-bite. Eur J Orthod, 1984. 6(1): p. 25-34.

46. Schopf, P., Indication for and frequency of early orthodontic therapy or interceptive measures. J Orofac Orthop, 2003. 64(3): p. 186-200.

47. Malandris, M. and E.K. Mahoney, Aetiology, diagnosis and treatment of posterior cross-bites in the primary dentition. Int J Paediatr Dent, 2004. 14(3): p. 155-66.

48. Al-Hussyeen, A.J., Attitudes of Saudi mothers towards prolonged non-nutritive sucking habits in children. Saudi Dent J, 2010. 22(2): p. 77-82.

49. Souki, B.Q., et al., Prevalence of malocclusion among mouth breathing children: do expectations meet reality? Int J Pediatr Otorhinolaryngol, 2009. 73(5): p. 767-73.

50. Fujimoto, S., K. Yamaguchi, and K. Gunjigake, Clinical estimation of mouth breathing. Am J Orthod Dentofacial Orthop, 2009. 136(5): p. 630 e1-7; discussion 630-1.

51. Petren, S., L. Bondemark, and B. Soderfeldt, A systematic review concerning early orthodontic treatment of unilateral posterior crossbite. Angle Orthod, 2003. 73(5): p. 588-96.

52. Nihi, V.S.C., et al., Pacifier-sucking habit duration and frequency on occlusal and myofunctional alterations in preschool children. Brazilian Oral Research, 2015. 29(1).

53. Bishara, S.E., et al., Changes in the prevalence of nonnutritive sucking patterns in the first 8 years of life. Am J Orthod Dentofacial Orthop, 2006. 130(1): p. 31-6.

54. Melink, S., et al., Posterior crossbite in the deciduous dentition period, its relation with sucking habits, irregular orofacial functions, and otolaryngological findings. Am J Orthod Dentofacial Orthop, 2010. 138(1): p. 32-40.

55. Larsson, E., Prevalence of crossbite among children with prolonged dummy- and finger-sucking habit. Swed Dent J, 1983. 7(3): p. 115-9.

56. Ovsenik, M., Incorrect orofacial functions until 5 years of age and their association with posterior crossbite. Am J Orthod Dentofacial Orthop, 2009. 136(3): p. 375-81.

57. Ovsenik, M., et al., Follow-up study of functional and morphological malocclusion trait changes from 3 to 12 years of age. Eur J Orthod, 2007. 29(5): p. 523-9.

58. Melsen, B., K. Stensgaard, and J. Pedersen, Sucking habits and their influence on swallowing pattern and prevalence of malocclusion. Eur J Orthod, 1979. 1(4): p. 271-80.

59. Pirttiniemi, P., T. Kantomaa, and P. Lahtela, Relationship between craniofacial and condyle path asymmetry in unilateral cross-bite patients. Eur J Orthod, 1990. 12(4): p. 408-13.

60. Larsson, E., The effect of dummy-sucking on the occlusion: a review. Eur J Orthod, 1986. 8(2): p. 127-30.

61. Kerr, W.J., J.S. McWilliam, and S. Linder-Aronson, Mandibular form and position related to changed mode of breathing--a five-year longitudinal study. Angle Orthod, 1989. 59(2): p. 91-6.

62. Bresolin, D., et al., Mouth breathing in allergic children: its relationship to dentofacial development. Am J Orthod, 1983. 83(4): p. 334-40.

63. Behlfelt, K., et al., Dentition in children with enlarged tonsils compared to control children. Eur J Orthod, 1989. 11(4): p. 416-29.

64. Lindsten, R., E. Larsson, and B. Ogaard, Dummy-sucking behaviour in 3-year old Norwegian and Swedish children. Eur J Orthod, 1996. 18(2): p. 205-9.

65. Cozza, P., et al., Sucking habits and facial hyperdivergency as risk factors for anterior open bite in the mixed dentition. Am J Orthod Dentofacial Orthop, 2005. 128(4): p. 517-9.

66. Graber, T.M., T. Rakosi, and A.G. Petrovic, Dentofacial orthopedics with functional appliances. 2nd ed. 1997, St. Louis : Mosby.

67. Modeer, T., L. Odenrick, and A. Lindner, Sucking habits and their relation to posterior cross-bite in 4-year-old children. Scand J Dent Res, 1982. 90(4): p. 323-8.

68. Charchut, S.W., E.N. Allred, and H.L. Needleman, The effects of infant feeding patterns on the occlusion of the primary dentition. J Dent Child (Chic), 2003. 70(3): p. 197-203.

69. Westover, K.M., M.K. DiLoreto, and T.R. Shearer, The relationship of breastfeeding to oral development and dental concerns. ASDC J Dent Child, 1989. 56(2): p. 140-3.

70. Auerbach, K.G., Breastfeeding fallacies: their relationship to understanding lactation. Birth, 1990. 17(1): p. 44-9.

71. Turgeon-O'Brien, H., et al., Nutritive and nonnutritive sucking habits: a review. ASDC J Dent Child, 1996. 63(5): p. 321-7.

72. Larsson, E., Dummy- and finger-sucking habits in 4-year-olds. Sven Tandlak Tidskr, 1975. 68(6): p. 219-24.

73. Victora, C.G., et al., Pacifier use and short breastfeeding duration: cause, consequence, or coincidence? Pediatrics, 1997. 99(3): p. 445-53.

74. Vadiakas, G., C. Oulis, and E. Berdouses, Profile of non-nutritive sucking habits in relation to nursing behavior in pre-school children. J Clin Pediatr Dent, 1998. 22(2): p. 133-6.

75. Verrastro, A.P., et al., Occlusal and orofacial myofunctional evaluation in children with primary dentition, anterior open bite and pacifier sucking habit. Int J Orofacial Myology, 2006. 32: p. 7-21.

76. Peres, K.G., et al., Social and biological early life influences on the prevalence of open bite in Brazilian 6-year-olds. Int J Paediatr Dent, 2007. 17(1): p. 41-9.

77. Warren, J.J., et al., Non-nutritive sucking behaviors in preschool children: a longitudinal study. Pediatr Dent, 2000. 22(3): p. 187-91.

78. Romero, C.C., et al., Breastfeeding and non-nutritive sucking patterns related to the prevalence of anterior open bite in primary dentition. J Appl Oral Sci, 2011. 19(2): p. 161-8.

79. Ganesh, M., S. Tandon, and B. Sajida, Prolonged feeding practice and its effects on developing dentition. J Indian Soc Pedod Prev Dent, 2005. 23(3): p. 141-5.

80. Legovic, M. and L. Ostric, The effects of feeding methods on the growth of the jaws in infants. ASDC J Dent Child, 1991. 58(3): p. 253-5.

81. Lopez Del Valle, L.M., et al., Associations between a history of breast feeding, malocclusion and parafunctional habits in Puerto Rican children. P R Health Sci J, 2006. 25(1): p. 31-4.

82. Viggiano, D., et al., Breast feeding, bottle feeding, and non-nutritive sucking; effects on occlusion in deciduous dentition. Arch Dis Child, 2004. 89(12): p. 1121-3.

83. Howard, C.R., et al., Randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding. Pediatrics, 2003. 111(3): p. 511-8.

84. Zardetto, C.G., C.R. Rodrigues, and F.M. Stefani, Effects of different pacifiers on the primary dentition and oral myofunctional strutures of preschool children. Pediatr Dent, 2002. 24(6): p. 552-60.

85. Proffit, W.R., On the aetiology of malocclusion. The Northcroft lecture, 1985 presented to the British Society for the Study of Orthodontics, Oxford, April 18, 1985. Br J Orthod, 1986. 13(1): p. 1-11.

86. Paunio, P., P. Rautava, and M. Sillanpaa, The Finnish Family Competence Study: the effects of living conditions on sucking habits in 3-year-old Finnish children and the association between these habits and dental occlusion. Acta Odontol Scand, 1993. 51(1): p. 23-9.

87. Larsson, E., Artificial sucking habits: etiology, prevalence and effect on occlusion. Int J Orofacial Myology, 1994. 20: p. 10-21.

88. Black, B., E. Koì^vesi, and I.J. Chusid, Haì^bitos bucais nocivos. Ortodontia, 1990. 23: p. 40-44.

89. Tomita, N.M.A., V.T. Bijella, and L.J. Franco, Relacì§aì ƒo entre haì^bitos bucais e maì^ oclusaì ƒo em preì^-escolares. Rev Sauì^de Puì^blica, 2000. 34: p. 299-303.

90. Haruki, T., K. Kishi, and J. Zimmerman, The importance of orofacial myofunctional therapy in pediatric dentistry: reports of two cases. ASDC J Dent Child, 1999. 66(2): p. 103-9, 84.

91. Duncan, K., et al., Sucking habits in childhood and the effects on the primary dentition: findings of the Avon Longitudinal Study of Pregnancy and Childhood. Int J Paediatr Dent, 2008. 18(3): p. 178-88.

92. Moore, G.J., R.W. McNeill, and J.A. D'Anna, The effects of digit sucking on facial growth. J Am Dent Assoc, 1972. 84(3): p. 592-9.

93. Franco, V.V. and G.B. Gorritxo, Pacifier sucking habit and associated dental changes. Importance of early diagnosis. An Pediatr (Barc), 2012. 77(6): p. 374-380.

94. Larsson, E., Sucking, chewing, and feeding habits and the development of crossbite: a longitudinal study of girls from birth to 3 years of age. Angle Orthod, 2001. 71(2): p. 116-9.

95. Larsson, E., Orthodontic aspects on feeding of young children. 1. A comparison between Swedish and Norwegian-Sami children. Swed Dent J, 1998. 22(3): p. 117-21.

96. Larsson, E., B. Ogaard, and R. Lindsten, Rearing of Swedish, Norwegian, and Norwegian Sami children. Scand J Dent Res, 1993. 101(6): p. 382-5.

97. Stahl, F. and R. Grabowski, Orthodontic findings in the deciduous and early mixed dentition--inferences for a preventive strategy. J Orofac Orthop, 2003. 64(6): p. 401-16.

98. Allen, D., et al., Skeletal and dental contributions to posterior crossbites. Angle Orthod, 2003. 73(5): p. 515-24.

99. Keski-Nisula, K., et al., Occurrence of malocclusion and need of orthodontic treatment in early mixed dentition. Am J Orthod Dentofacial Orthop, 2003. 124(6): p. 631-8.

100. Peng, C.L., et al., Differential diagnosis between infantile and mature swallowing with ultrasonography. Eur J Orthod, 2003. 25(5): p. 451-6.

101. Ovsenik, M., F.M. Farcnik, and I. Verdenik, Comparison of intra-oral and study cast measurements in the assessment of malocclusion. Eur J Orthod, 2004. 26(3): p. 273-7.

102. Larsson, E., Dummy- and finger-sucking habits with special attention to their significance for facial growth and occlusion. 7. The effect of earlier dummy- and finger-sucking habit in 16-year-old children compared with children without earlier sucking habit. Swed Dent J, 1978. 2(1): p. 23-33.

Bio-chemistry

1. Hohman, E.E., et al., Pacifier Use and Early Life Weight Outcomes in the Intervention Nurses Start Infants Growing on Healthy Trajectories Study. Child Obes, 2018. 14(1): p. 58-66.

2. Hanafin, S. and P. Griffiths, Does pacifier use cause ear infections in young children? Br J Community Nurs, 2002. 7(4): p. 206, 208-11.

3. Dogramaci, E.J. and G. Rossi-Fedele, Establishing the association between nonnutritive sucking behavior and malocclusions: A systematic review and meta-analysis. J Am Dent Assoc, 2016. 147(12): p. 926-934 e6.

4. Ferreira, H.R., et al., Prolonged pacifier use during infancy and smoking initiation in adolescence: evidence from a historical cohort study. Eur Addict Res, 2015. 21(1): p. 33-8.

5. Task Force On Sudden Infant Death, S., SIDS and Other Sleep-Related Infant Deaths: Updated 2016 Recommendations for a Safe Infant Sleeping Environment. Pediatrics, 2016. 138(5).

6. Dentistry, A.A.o.P., Guideline on Periodicity of Examination, Preventive Dental Services, Anticipatory Guidance/Counseling, and Oral Treatment for Infants, Children, and Adolescents. Pediatr Dent, 2016. 38(6): p. 133-141.

7. Anzman-Frasca, S., C.A. Stifter, and L.L. Birch, Temperament and childhood obesity risk: a review of the literature. J Dev Behav Pediatr, 2012. 33(9): p. 732-45.

8. Yonezu, T.A.-K., A.; Kumazawa, K.; Shintani, S., Association between Feeding Methods and Sucking Habits: A Cross-sectional Study of Infants in Their First 18 Months of Life. The Bulletin of Tokyo Dental College, 2013. 54(4): p. 215-221.

9. Victora, C.G., et al., Pacifier use and short breastfeeding duration: cause, consequence, or coincidence? Pediatrics, 1997. 99(3): p. 445-53.

10. Warren, J.J., et al., Effects of oral habits' duration on dental characteristics in the primary dentition. J Am Dent Assoc, 2001. 132(12): p. 1685-93; quiz 1726.

11. Warren, J.J., et al., Effects of nonnutritive sucking habits on occlusal characteristics in the mixed dentition. Pediatr Dent, 2005. 27(6): p. 445-50.

12. Organisation/UNICEF, W.H., Innocenti Declaration on the protection, promotion and support of breastfeeding. Ecol Food Nutr, 1991. 26: p. 271-273.

13. Al-Talib, T., et al., The Impact of Non-nutritive Sucking on the Risk for Sleep-disordered Breathing in Children. J Dent Child (Chic), 2017. 84(1): p. 30-34.

14. Montgomery-Downs, H.E., et al., Infant-feeding methods and childhood sleep-disordered breathing. Pediatrics, 2007. 120(5): p. 1030-5.

15. Guimaraes, K.C., et al., Effects of oropharyngeal exercises on patients with moderate obstructive sleep apnea syndrome. Am J Respir Crit Care Med, 2009. 179(10): p. 962-6.

16. Redline, S., et al., Risk factors for sleep-disordered breathing in children. Associations with obesity, race, and respiratory problems. Am J Respir Crit Care Med, 1999. 159(5 Pt 1): p. 1527-32.

17. Sauer, C., et al., Childhood obstructive sleep apnea syndrome: an interdisciplinary approach: a prospective epidemiological study of 4,318 five-and-a-half-year-old children. J Orofac Orthop, 2012. 73(5): p. 342-58.

18. Salah, M., et al., Recurrent acute otitis media in infants: analysis of risk factors. Int J Pediatr Otorhinolaryngol, 2013. 77(10): p. 1665-9.

19. Niemela, M., M. Uhari, and M. Mottonen, A pacifier increases the risk of recurrent acute otitis media in children in day care centers. Pediatrics, 1995. 96(5 Pt 1): p. 884-8.

20. Niemela, M., et al., Pacifier as a risk factor for acute otitis media: A randomized, controlled trial of parental counseling. Pediatrics, 2000. 106(3): p. 483-8.

21. Niemela, M., M. Uhari, and A. Hannuksela, Pacifiers and dental structure as risk factors for otitis media. Int J Pediatr Otorhinolaryngol, 1994. 29(2): p. 121-7.

22. Manning, D.J., R.P. Coughlin, and E.M. Poskitt, Candida in mouth or on dummy? Arch Dis Child, 1985. 60(4): p. 381-2.

23. Sio, J.O., et al., Oral candida: is dummy carriage the culprit? Arch Dis Child, 1987. 62(4): p. 406-8.

24. Ollila, P., et al., Risk factors for colonization of salivary lactobacilli and Candida in children. Acta Odontol Scand, 1997. 55(1): p. 9-13.

25. Ollila, P., et al., Prolonged pacifier-sucking and use of a nursing bottle at night: possible risk factors for dental caries in children. Acta Odontol Scand, 1998. 56(4): p. 233-7.

26. Larsson, E., B. Ogaard, and R. Lindsten, Dummy- and finger-sucking habits in young Swedish and Norwegian children. Scand J Dent Res, 1992. 100(5): p. 292-5.

27. Schappert, S.M., Office visits for otitis media: United States, 1975-90. Adv Data, 1992(214): p. 1-19.

28. Gates, G.A., Cost-effectiveness considerations in otitis media treatment. Otolaryngol Head Neck Surg, 1996. 114(4): p. 525-30.

29. Niemela, M., et al., Costs arising from otitis media. Acta Paediatr, 1999. 88(5): p. 553-6.

30. Luotonen, M., et al., A nation-wide, population-based survey of otitis media and school achievement. Int J Pediatr Otorhinolaryngol, 1998. 43(1): p. 41-51.

31. Luotonen, M., et al., Recurrent otitis media during infancy and linguistic skills at the age of nine years. Pediatr Infect Dis J, 1996. 15(10): p. 854-8.

32. Rovers, M.M., et al., Is pacifier use a risk factor for acute otitis media? A dynamic cohort study. Fam Pract, 2008. 25(4): p. 233-6.

33. Rovers, M.M., et al., Otitis media. Lancet, 2004. 363(9407): p. 465-73.

34. Lanphear, B.P., et al., Increasing prevalence of recurrent otitis media among children in the United States. Pediatrics, 1997. 99(3): p. E1.

35. Veenhoven, R., et al., Effect of conjugate pneumococcal vaccine followed by polysaccharide pneumococcal vaccine on recurrent acute otitis media: a randomised study. Lancet, 2003. 361(9376): p. 2189-95.

36. Saarinen, U.M., Prolonged breast feeding as prophylaxis for recurrent otitis media. Acta Paediatr Scand, 1982. 71(4): p. 567-71.

37. Warren, J.J., et al., Pacifier use and the occurrence of otitis media in the first year of life. Pediatr Dent, 2001. 23(2): p. 103-7.

38. Jackson, J.M. and A.P. Mourino, Pacifier use and otitis media in infants twelve months of age or younger. Pediatr Dent, 1999. 21(4): p. 255-60.

39. Levy, S.M., et al., Infants' fluoride ingestion from water, supplements and dentifrice. J Am Dent Assoc, 1995. 126(12): p. 1625-32.

40. Van Winkle, S., et al., Water and formula fluoride concentrations: significance for infants fed formula. Pediatr Dent, 1995. 17(4): p. 305-10.

41. Adair, S.M., Pacifier use in children: a review of recent literature. Pediatr Dent, 2003. 25(5): p. 449-58.

42. Post, J.C. and M.C. Goessier, Is pacifier use a risk factor for otitis media? Lancet, 2001. 357(9259): p. 823-4.

43. Uhari, M., K. Mantysaari, and M. Niemela, A meta-analytic review of the risk factors for acute otitis media. Clin Infect Dis, 1996. 22(6): p. 1079-83.

44. North, K., P. Fleming, and J. Golding, Pacifier use and morbidity in the first six months of life. Pediatrics, 1999. 103(3): p. E34.

45. Larsson, E., Dummy- and finger-sucking habits in 4-year-olds. Sven Tandlak Tidskr, 1975. 68(6): p. 219-24.

46. Larsson, E., Treatment of children with a prolonged dummy or finger-sucking habit. Eur J Orthod, 1988. 10(3): p. 244-8.

47. Larsson, E., Prevalence of crossbite among children with prolonged dummy- and finger-sucking habit. Swed Dent J, 1983. 7(3): p. 115-9.

48. Stewart, D.J. and D.C. Kernohan, Traumatic gingival recession in infants. The result of a dummy sucking habit. Br Dent J, 1973. 135(4): p. 157-8.

49. Karabulut, E., et al., Effect of pacifier use on exclusive and any breastfeeding: a meta-analysis. Turk J Pediatr, 2009. 51(1): p. 35-43.

50. Righard, L., Are breastfeeding problems related to incorrect breastfeeding technique and the use of pacifiers and bottles? Birth, 1998. 25(1): p. 40-4.

51. Aarts, C., et al., Breastfeeding patterns in relation to thumb sucking and pacifier use. Pediatrics, 1999. 104(4): p. e50.

52. Kronborg, H. and M. Vaeth, The influence of psychosocial factors on the duration of breastfeeding. Scand J Public Health, 2004. 32(3): p. 210-6.

53. Anderson, G.C., et al., Early skin-to-skin contact for mothers and their healthy newborn infants. Birth, 2003. 30(3): p. 206-7.

54. Renfrew, M.J., et al., Feeding schedules in hospitals for newborn infants. Cochrane Database Syst Rev, 2000(2): p. CD000090.

55. Scott, J.A. and C.W. Binns, Factors associated with the initiation and duration of breastfeeding: a review of the literature. Breastfeed Rev, 1999. 7(1): p. 5-16.

56. Scott, J.A., et al., Predictors of breastfeeding duration: evidence from a cohort study. Pediatrics, 2006. 117(4): p. e646-55.

57. Alm, B., et al., Breast feeding and the sudden infant death syndrome in Scandinavia, 1992-95. Arch Dis Child, 2002. 86(6): p. 400-2.

58. Hoffman, H.J., et al., Risk factors for SIDS. Results of the National Institute of Child Health and Human Development SIDS Cooperative Epidemiological Study. Ann N Y Acad Sci, 1988. 533: p. 13-30.

59. McVea, K.L., P.D. Turner, and D.K. Peppler, The role of breastfeeding in sudden infant death syndrome. J Hum Lact, 2000. 16(1): p. 13-20.

60. Orenstein, S.R., Effect of nonnutritive sucking on infant gastroesophageal reflux. Pediatr Res, 1988. 24(1): p. 38-40.

61. Gale, C.R. and C.N. Martyn, Breastfeeding, dummy use, and adult intelligence. Lancet, 1996. 347(9008): p. 1072-5.

Psychophysical:

1. Field, T.M., Neonatal Stress and Coping in Intensive Care. Infant Mental Health Journal, 1990. 11(1): p. 57-65.

2. Rychlowska, M., et al., Pacifiers Disrupt Adultsâ€™ Responses to Infantsâ€™ Emotions. Basic and Applied Social Psychology, 2014. 36(4): p. 299-308.

3. Niedenthal, P.M., et al., Negative Relations Between Pacifier Use and Emotional Competence. Basic and Applied Social Psychology, 2012. 34(5): p. 387-394.

4. Fonagy, P., et al., Affect, regulation, mentalization, and the development of the self. 2002, New York, NY: Other Press.

5. Jones, S.S., Exploration or imitation? The effect of music on 4-week-old infants' tongue protrusions. Infant Behav Dev, 2006. 29(1): p. 126-30.

6. Calder, A.J., et al., Configural information in facial expression perception. J Exp Psychol Hum Percept Perform, 2000. 26(2): p. 527-51.

7. Smith, M.L., et al., Transmitting and decoding facial expressions. Psychol Sci, 2005. 16(3): p. 184-9.

8. Ponari, M., et al., Mapping correspondence between facial mimicry and emotion recognition in healthy subjects. Emotion, 2012. 12(6): p. 1398-403.

9. Fonagy, P. and M. Target, Attachment and reflective function: their role in self-organization. Dev Psychopathol, 1997. 9(4): p. 679-700.

10. Salovey, P. and J.D. Mayer, Emotional intelligence. Imagination, Cognition, and Personality, 1990. 9: p. 185-211.

11. Palmer, B., C. Donaldson, and C. Stough, Emotional intelligence and life satisfaction. Personality and Individual Differences, 2002. 33: p. 1091-1100.

12. Austin, E., J, D. Sklofske, H, and V. Egan, Personality, well-being and health correlates of trait emotional intelligence. Personality and Individual Differences, 2005. 38: p. 547-558.

13. Slaski, M. and S. Cartwright, Health, performance and emotional intlligence: An exploratory study of retain managers. Stress and Health, 2002. 18: p. 63-68.

14. Gale, C.R. and C.N. Martyn, Breastfeeding, dummy use, and adult intelligence. Lancet, 1996. 347(9008): p. 1072-5.

15. Niedenthal, P., et al., When did her smile drop? Facial mimicry and the influence of emotional state on the detection of change in emotional expression. Cognition and Emotion, 2001. 15: p. 853-864.

16. Maringer, M., et al., Beyond smile dynamics: mimicry and beliefs in judgments of smiles. Emotion, 2011. 11(1): p. 181-7.

17. Stel, M. and A. van Knippenberg, The role of facial mimicry in the recognition of affect. Psychol Sci, 2008. 19(10): p. 984-5.

18. Oberman, L.M., P. Winkielman, and V.S. Ramachandran, Face to face: blocking facial mimicry can selectively impair recognition of emotional expressions. Soc Neurosci, 2007. 2(3-4): p. 167-78.

19. Campos, J.J., S. Thein, and D. Owen, A Darwinian legacy to understanding human infancy: emotional expressions as behavior regulators. Ann N Y Acad Sci, 2003. 1000: p. 110-34.

20. Brody, L., R, Gender and emotion, in The socialisation of emotion: Display rules, infant temperament, and differentiation, A. Fische, Editor. 2000, Cambridge University Press: Cambridge, England. p. 24-47.

21. Marter, A. and J.C. Agruss, Pacifiers: an update on use and misuse. J Spec Pediatr Nurs, 2007. 12(4): p. 278-85.

22. Flam, L., Why are babies pacified? A review of mothers' choices to offer pacifiers and hospital pacifier policies, in Educational Psychology. 2014, California State University Northridge: Northridge.

23. Sexton, S. and R. Natale, Risks and benefits of pacifiers. Am Fam Physician, 2009. 79(8): p. 681-5.

24. Aarts, C., et al., Breastfeeding patterns in relation to thumb sucking and pacifier use. Pediatrics, 1999. 104(4): p. e50.

25. Howard, C.R., et al., The effects of early pacifier use on breastfeeding duration. Pediatrics, 1999. 103(3): p. E33.

26. Vogel, A.M., B.L. Hutchison, and E.A. Mitchell, The impact of pacifier use on breastfeeding: a prospective cohort study. J Paediatr Child Health, 2001. 37(1): p. 58-63.

27. Howard, C.R., et al., Randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding. Pediatrics, 2003. 111(3): p. 511-8.

28. Poyak, J., Effects of pacifiers on early oral development. Int J Orthod Milwaukee, 2006. 17(4): p. 13-6.

29. Warren, J.J., et al., Effects of oral habits' duration on dental characteristics in the primary dentition. J Am Dent Assoc, 2001. 132(12): p. 1685-93; quiz 1726.

30. Uhari, M., K. Mantysaari, and M. Niemela, A meta-analytic review of the risk factors for acute otitis media. Clin Infect Dis, 1996. 22(6): p. 1079-83.

31. Niemela, M., et al., Pacifier as a risk factor for acute otitis media: A randomized, controlled trial of parental counseling. Pediatrics, 2000. 106(3): p. 483-8.

32. Hernandez-Reif, M., T. Field, and M. Diego, Touch perception in neonates, in Touch and Massage in Early Child Development, T. Field, Editor. 2004, Johnson & Johnson Pediatric Institute, LLC: Miami, FL. p. 15-37.

33. Oller, D.K., et al., Functional flexibility of infant vocalization and the emergence of language. Proc Natl Acad Sci U S A, 2013. 110(16): p. 6318-23.

34. Sipsma, H.L., K. Kornfeind, and L.R. Kair, Pacifiers and Exclusive Breastfeeding: Does Risk for Postpartum Depression Modify the Association? J Hum Lact, 2017. 33(4): p. 692-700.

35. O'Hara, M.W. and J.E. McCabe, Postpartum depression: current status and future directions. Annu Rev Clin Psychol, 2013. 9: p. 379-407.

36. Stewart, D.E. and S. Vigod, Postpartum Depression. N Engl J Med, 2016. 375(22): p. 2177-2186.

37. Lehman, E.B., et al., Soft object and pacifier attachments in young children: the role of security of attachment to the mother. J Child Psychol Psychiatry, 1992. 33(7): p. 1205-15.

38. Steir, A.J. and E.B. Lehman, Attachment to transitional objects: role of maternal personality and mother-toddler interaction. Am J Orthopsychiatry, 2000. 70(3): p. 340-50.

39. Dadalto, E.C.V. and E.M. Rosa, The influence of personal characteristics and social support regarding pacifier introduction among preterm infants. Psicologia: ReflexÃ£o e CrÃtica, 2016. 29(1).

40. Bronfenbrenner, U., The bioecological theory of human development, in International Encyclopedia of the Social and Behavioural Sciences, N. Smelser and B. PB, Editors. 2001, Elsevier: Oxford, UK. p. 6963-6970.

41. Mauch, C.E., et al., Predictors of and reasons for pacifier use in first-time mothers: an observational study. BMC Pediatr, 2012. 12: p. 7.

42. Ferreira, H.R., et al., Prolonged pacifier use during infancy and smoking initiation in adolescence: evidence from a historical cohort study. Eur Addict Res, 2015. 21(1): p. 33-8.

43. Nelson, A.M., A comprehensive review of evidence and current recommendations related to pacifier usage. J Pediatr Nurs, 2012. 27(6): p. 690-9.

44. Perez-Suarez, V., et al., Maternal education, dental visits and age of pacifier withdrawal: pediatric dentist role in malocclusion prevention. J Clin Pediatr Dent, 2013. 37(3): p. 315-9.

45. Bricker, J.B., et al., Childhood friends who smoke: do they influence adolescents to make smoking transitions? Addict Behav, 2006. 31(5): p. 889-900

46. Fagan, P., et al., Parental occupation, education, and smoking as predictors of offspring tobacco use in adulthood: a longitudinal study. Addict Behav, 2005. 30(3): p. 517-29.

47. Walther, B., M. Morgenstern, and R. Hanewinkel, Co-occurrence of addictive behaviours: personality factors related to substance use, gambling and computer gaming. Eur Addict Res, 2012. 18(4): p. 167-74.

48. Feldens, C.A., et al., Advising mothers about breastfeeding and weaning reduced pacifier use in the first year of life: a randomized trial. Community Dent Oral Epidemiol, 2013. 41(4): p. 317-26..

49. Victora, C.G., et al., Pacifier use and short breastfeeding duration: cause, consequence, or coincidence? Pediatrics, 1997. 99(3): p. 445-53.

50. Jenik, A.G. and N. Vain, The pacifier debate. Early Hum Dev, 2009. 85(10 Suppl): p. S89-91.

51. Mobbs, E.J., G.A. Mobbs, and A.E. Mobbs, Imprinting, latchment and displacement: a mini review of early instinctual behaviour in newborn infants influencing breastfeeding success. Acta Paediatr, 2016. 105(1): p. 24-30.

52. Mobbs, E., Human imprinting and breastfeeding. Breasfeed Rev, 1989. 1: p. 39-41.

53. Garattini, G., P. Crozzoli, and A. Valsasina, Role of prolonged sucking in the development of dento-skeletal changes in the face. Review of the literature. Mondo Ortod, 1990. 15(5): p. 539-50.

54. Klackenberg, G., Thumbsucking; frequency and etiology. Pediatrics, 1949. 4(4): p. 418-24.

55. Moll, I. and R. Moll, Early development of human Merkel cells. Exp Dermatol, 1992. 1(4): p. 180-4.

56. Delmas, P., J. Hao, and L. Rodat-Despoix, Molecular mechanisms of mechanotransduction in mammalian sensory neurons. Nat Rev Neurosci, 2011. 12(3): p. 139-53.

57. Lumpkin, E.A., K.L. Marshall, and A.M. Nelson, The cell biology of touch. J Cell Biol, 2010. 191(2): p. 237-48.

58. Freud, S., The interpretation of dreams. 1955, New York: Basic Books.

59. Barca, L., C. Mazzuca, and A.M. Borghi, Pacifier Overuse and Conceptual Relations of Abstract and Emotional Concepts. Front Psychol, 2017. 8: p. 2014.

60. Borghi, A.M., et al., The challenge of abstract concepts. Psychol Bull, 2017. 143(3): p. 263-292.

61. Binns, C.W. and J.A. Scott, Using pacifiers: what are breastfeeding mothers doing? Breastfeed Rev, 2002. 10(2): p. 21-5.

62. Barros, F.C., et al., Breast feeding, pacifier use and infant development at 12 months of age: a birth cohort study in Brazil. Paediatr Perinat Epidemiol, 1997. 11(4): p. 441-50.

63. Callaghan, A., et al., Association between pacifier use and breast-feeding, sudden infant death syndrome, infection and dental malocclusion. Int J Evid Based Healthc, 2005. 3(6): p. 147-67.

64. Romero, C.C., et al., Breastfeeding and non-nutritive sucking patterns related to the prevalence of anterior open bite in primary dentition. J Appl Oral Sci, 2011. 19(2): p. 161-8.

65. Nelson, E.A., et al., International Child Care Practices study: breastfeeding and pacifier use. J Hum Lact, 2005. 21(3): p. 289-95.

66. Whitmarsh, J., The good, the bad and the pacifier. Early Childhood Research, 2008. 6(2): p. 145-162.

67. Hanafin, S. and P. Griffiths, Does pacifier use cause ear infections in young children? Br J Community Nurs, 2002. 7(4): p. 206, 208-11.

68. North, K., P. Fleming, and J. Golding, Pacifier use and morbidity in the first six months of life. Pediatrics, 1999. 103(3): p. E34.

69. Warren, J.J., et al., Non-nutritive sucking behaviors in preschool children: a longitudinal study. Pediatr Dent, 2000. 22(3): p. 187-91.

70. North Stone, K., et al., Socio-demographic associations with digit and pacifier sucking at 15 months of age and possible associations with infant infection. Early Human Development, 2000. 60: p. 137-148.

71. Turgeon-O'Brien, H., et al., Nutritive and nonnutritive sucking habits: a review. ASDC J Dent Child, 1996. 63(5): p. 321-7.

72. Larsson, E., Sucking, chewing, and feeding habits and the development of crossbite: a longitudinal study of girls from birth to 3 years of age. Angle Orthod, 2001. 71(2): p. 116-9.

73. Cornelius, A.N., J.P. D'Auria, and L.M. Wise, Pacifier use: a systematic review of selected parenting web sites. J Pediatr Health Care, 2008. 22(3): p. 159-65.

74. Niemela, M., M. Uhari, and A. Hannuksela, Pacifiers and dental structure as risk factors for otitis media. Int J Pediatr Otorhinolaryngol, 1994. 29(2): p. 121-7.

75. Barros, F.C., et al., Use of pacifiers is associated with decreased breast-feeding duration. Pediatrics, 1995. 95(4): p. 497-9.

76. Jackson, J.M. and A.P. Mourino, Pacifier use and otitis media in infants twelve months of age or younger. Pediatr Dent, 1999. 21(4): p. 255-60.

77. Niemela, M., M. Uhari, and M. Mottonen, A pacifier increases the risk of recurrent acute otitis media in children in day care centers. Pediatrics, 1995. 96(5 Pt 1): p. 884-8.

78. Warren, J.J., et al., Pacifier use and the occurrence of otitis media in the first year of life. Pediatr Dent, 2001. 23(2): p. 103-7.

79. Borrie, F.R., et al., Interventions for the cessation of non-nutritive sucking habits in children. Cochrane Database Syst Rev, 2015(3): p. CD008694.

80. Adair, S.M., M. Milano, and J.C. Dushku, Evaluation of the effects of orthodontic pacifiers on the primary dentitions of 24- to 59-month-old children: preliminary study. Pediatr Dent, 1992. 14(1): p. 13-8.

81. Modeer, T., L. Odenrick, and A. Lindner, Sucking habits and their relation to posterior cross-bite in 4-year-old children. Scand J Dent Res, 1982. 90(4): p. 323-8.

82. Patel, A., et al., Digit sucking in children resident in Kettering (UK). J Orthod, 2008. 35(4): p. 255-61.

83. Baalack, I.B. and A.K. Frisk, Finger-sucking in children. A study of incidence and occlusal conditions. Acta Odontol Scand, 1971. 29(5): p. 499-512.

84. Bowden, B.D., A longitudinal study of the effects of digit- and dummy-sucking. Am J Orthod, 1966. 52(12): p. 887-901.

85. Farsi, N.M. and F.S. Salama, Sucking habits in Saudi children: prevalence, contributing factors and effects on the primary dentition. Pediatr Dent, 1997. 19(1): p. 28-33.

86. Fukuta, O., et al., Damage to the primary dentition resulting from thumb and finger (digit) sucking. ASDC J Dent Child, 1996. 63(6): p. 403-7.

87. Svedmyr, B., Dummy sucking. A study of its prevalence, duration and malocclusion consequences. Swed Dent J, 1979. 3(6): p. 205-10.

88. Mistry, P., et al., The occlusal effects of digit sucking habits amongst school children in Northamptonshire (UK). J Orthod, 2010. 37(2): p. 87-92.

89. Vazquez-Nava, F., et al., Association between allergic rhinitis, bottle feeding, non-nutritive sucking habits, and malocclusion in the primary dentition. Arch Dis Child, 2006. 91(10): p. 836-40.

90. Greenlee, G.M., et al., Stability of treatment for anterior open-bite malocclusion: a meta-analysis. Am J Orthod Dentofacial Orthop, 2011. 139(2): p. 154-69.

91. Petren, S. and L. Bondemark, Correction of unilateral posterior crossbite in the mixed dentition: a randomized controlled trial. Am J Orthod Dentofacial Orthop, 2008. 133(6): p. 790 e7-13.

92. Sandler, P.J., A.K. Madahar, and A. Murray, Anterior open bite: aetiology and management. Dent Update, 2011. 38(8): p. 522-4, 527-8, 531-2.

93. Proffit, W., R, et al., Chapter 11: Moderate nonskeletal problems in preadolescent, in Contemporary Orthodontics. 2013, Elsevier: St Louis. p. 413-416.

94. Haryett, R.D., F.C. Hansen, and P.O. Davidson, Chronic thumb-sucking. A second report on treatment and its psychological effects. Am J Orthod, 1970. 57(2): p. 164-78.

95. Larsson, E., Dummy- and finger-sucking habits with special attention to their significance for facial growth and occlusion. 5. Improvement of malocclusion after termination of the habit. Sven Tandlak Tidskr, 1972. 65(12): p. 635-42.

96. Villa, N.L. and G.J. Cisneros, Changes in the dentition secondary to palatal crib therapy in digit-suckers: a preliminary study. Pediatr Dent, 1997. 19(5): p. 323-6.

MYO MUNCHEE
SMALL DEVICE BIG IMPACT