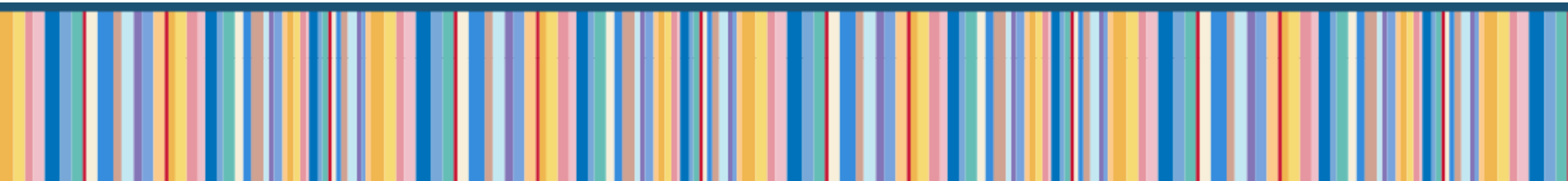
Importance of Parent-Child Touch, Connection & Bonding in a Post-Pandemic World

How Midwives Can Guide Parents to Use Everyday Routines to Support Healthy Baby Development



Welcome and Introductions

Jodi A. Mindell, PhD, DBSM
Children's Hospital of Philadelphia
Saint Joseph's University

Agenda

Welcome & Introduction	Jodi A. Mindell, PhD, DBSM
Brain Development – Early Experiences Matter!	Maria Hernandez-Reif, PhD
Making Sense out of Scents	Pamela Dalton, PhD, MPH
Science Behind Infant Sleep Routines	Jodi A. Mindell, PhD, DBSM
Panel Discussion Question and Answers Session	Moderator Jodi A. Mindell, PhD, DBSM
Closing Remarks Session Evaluation and Adjournment	Jodi A. Mindell, PhD, DBSM

Learning Objectives - Enhance Your Understanding of…

1. The role of sensorial stimulation in early brain development, including nurturing touch and mother's face in bonding
2. The science of the sense of smell in baby's development, potential impact of COVID-19 anosmia (loss of sense of smell) for parents and children, the importance of regular sense of smell screening in children
3. How to help parents optimize care through consistent, everyday routines including sleep, as *touchpoints* for connection and bonding, even in our "new normal"

Disclosures

- The opinions expressed by the speakers are their own and not that of their employers or the program sponsor
- Dr. Hernandez-Reif and Dr. Dalton have participated in past as speakers for educational scientific programs sponsored by the Research & Development group at Johnson & Johnson Consumer Inc.
- Dr. Mindell receives research support from Johnson & Johnson Consumer Inc.
- This presentation and speakers are sponsored by the Research & Development group at Johnson & Johnson Consumer Inc.

Connection and Bonding with Baby

- Early stages of parent and infant relationship exert an important influence over a child's future development and psychological wellbeing
- Positive connection and bonding provides a foundation for a child's future self-esteem and resilience, their ability to regulate their emotions, and their capacity to form close relationships
- Conversely, poor early relationships place children at increased risk of poor cognitive, social and emotional outcomes

Wittkowski et al. (2020). *Clinical Psychology Review;* Ainsworth, M. D. S. (1979). Infant-mother attachment. *American Psychologist,* 34(10), 932–937.*;* Bowlby,(1988). *A secure base: Parent-child attachment and healthy human development. New York: Basic Books.*

Experience, Repetition, Routines

- When a baby experiences the same things over and over, the pathways of connections in the brain become stronger and more complex[1]
- Routines lead to predictable and less stressful environments[2]
- *Everyday loving routines are ideal opportunities to provide positive experiences for babies*

1. Schiller P. Exchange. 2010;Nov/Dec:26–30. 2. Shonkoff JP, Phillips DA. From Neurons to Neighborhoods: The Science of Early Childhood Development. Washington, DC: National Academy Press; 2000.

Touchpoints

- Everyday moments to connect and bond with baby

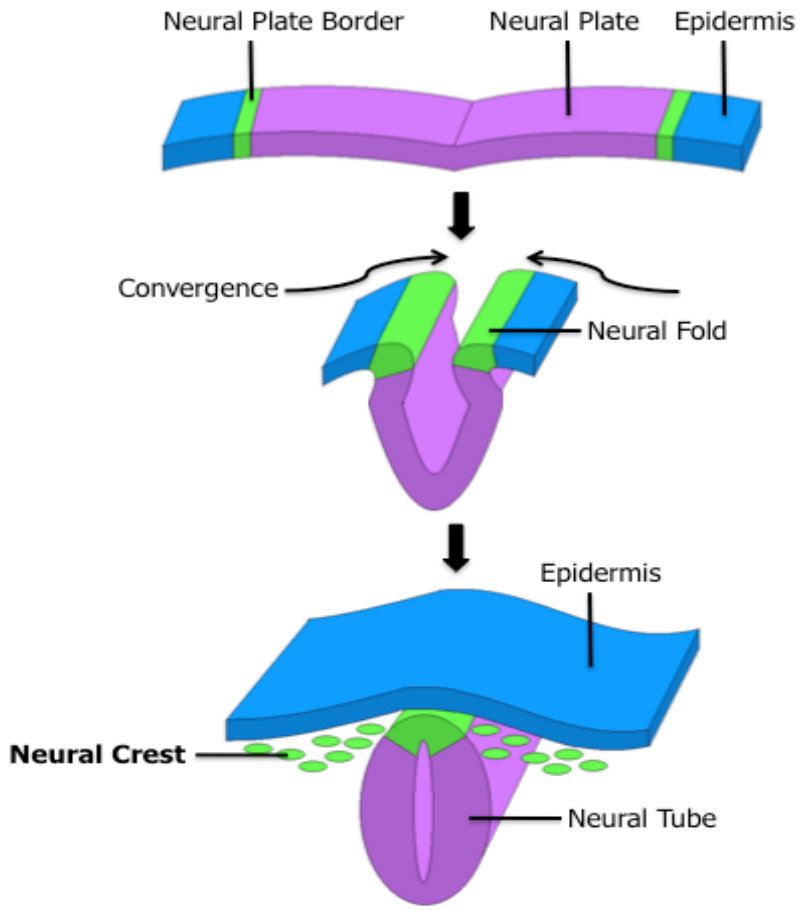
Brain Development: Early Experiences Matter

Maria Hernandez-Reif, PhD
Department of Human Development & Family Studies
The University of Alabama

Stages of Brain Development

Prenatal

- Neural tube develops (21 days of gestation)
- Neurogenesis (birth of cells)



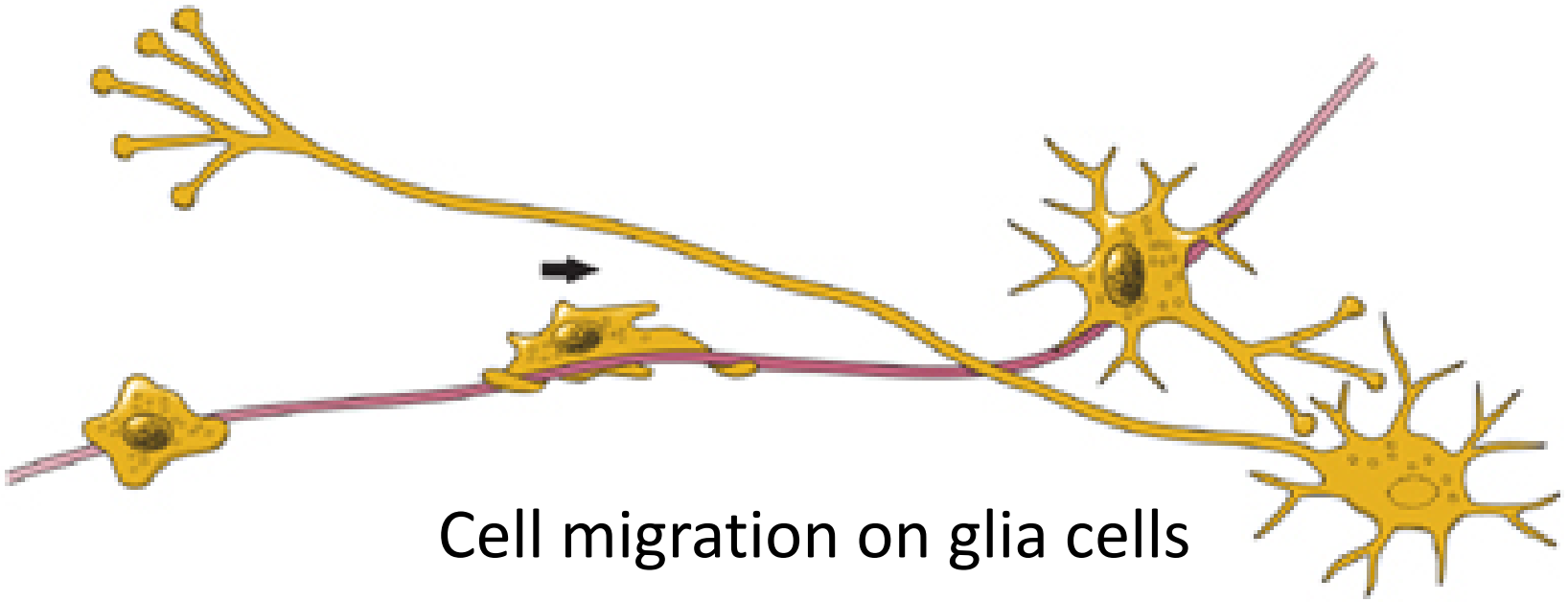
Kolb B, et al. J Can Acad Child Adolesc Psychiatry. 2011;20(4):265–276.

https://commons.wikimedia.org/wiki/File:Neural_Crest.png

Stages of Brain Development

Prenatal

- Cells migrate



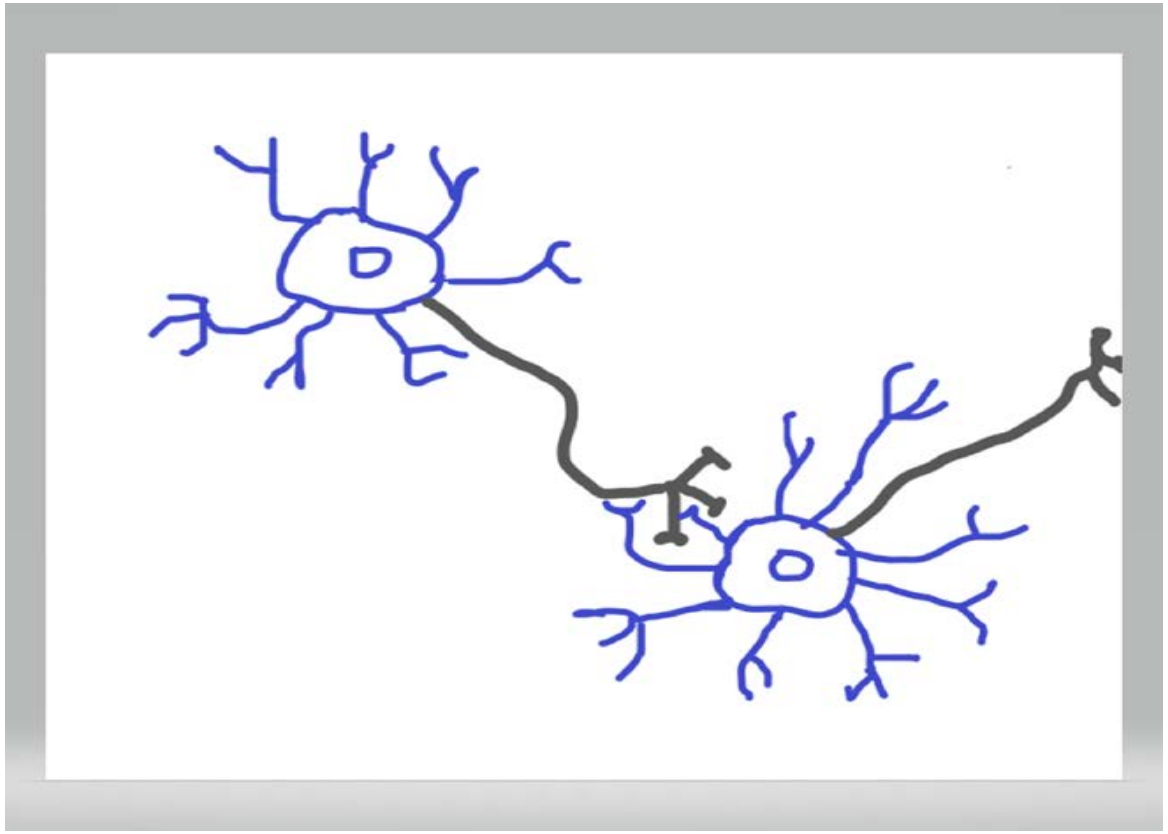
Cell migration on glia cells

(www.ninds.nih.gov)

Stages of Brain Development

Prenatal to Postnatal

- Differentiation of cells occurs
- Mature cells develop dendrite and axon growth
- Synapse formations
- Cell death and synaptic pruning



Kolb B, et al. *J Can Acad Child Adolesc Psychiatry.* 2011;20(4):265–276. Tierney, A. L., & Nelson, C. A., 3rd (2009). Brain Development and the Role of Experience in the Early Years. *Zero to three*, *30*(2), 9–13.

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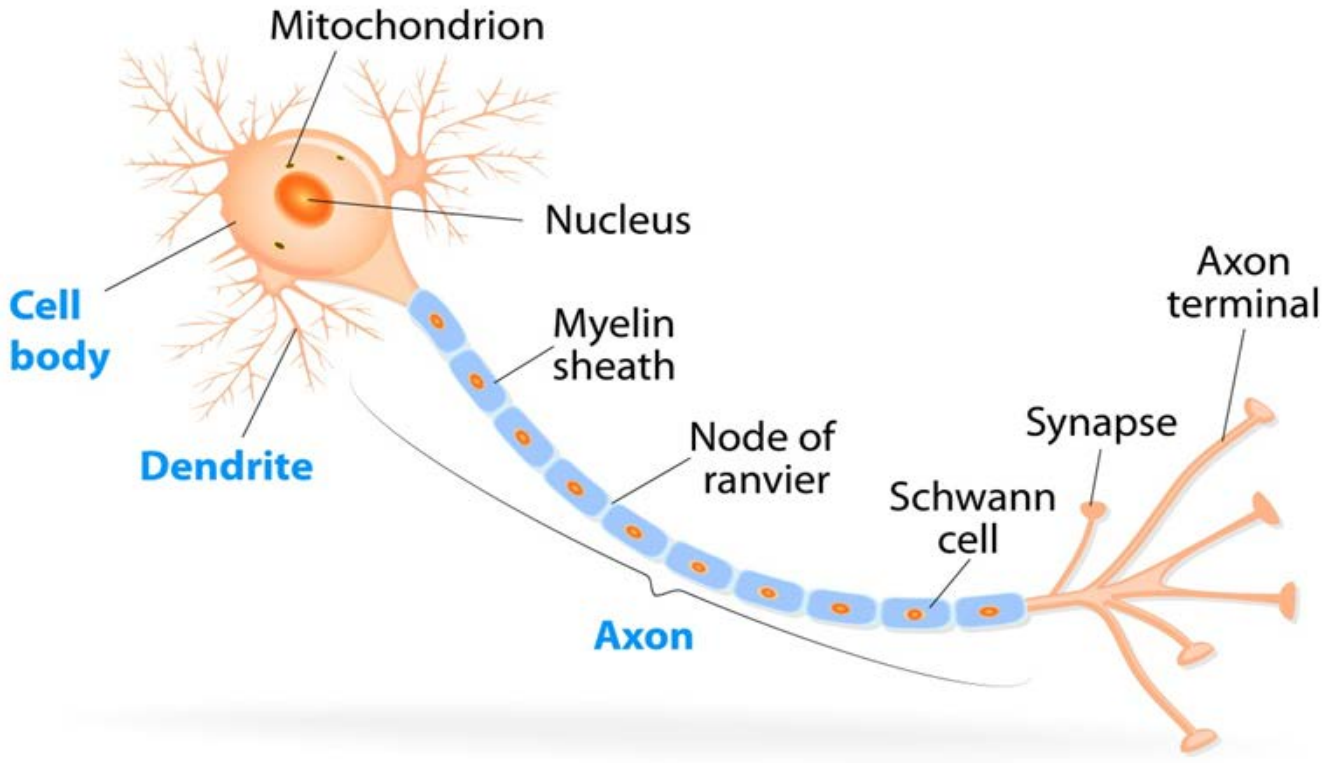
Stages of Brain Development

Postnatal

- Myelin formation



Kolb B, et al. *J Can Acad Child Adolesc Psychiatry.* 2011;20(4):265–276. Tierney, A. L., & Nelson, C. A., 3rd (2009). Brain Development and the Role of Experience in the Early Years. *Zero to three*, *30*(2), 9–13.

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Stages of Brain Development

Postnatal

- Early synapse formations are ***experience-expectant***
  - Stimulating the skin (FGF-2)[1]
  - Enriched environments[2]

[1]Kolb & Gibb, 2010. Tactile stimulation facilitates functional recovery and dendritic change after neonatal medial frontal or posterior parietal lesions in rats. *Behavioural Brain Research.*214:115–120. [2] Kolb & Gibb, 2011. Brain Plasticity and Behaviour in the Developing Brain. J Can Acad Child Adolesc Psychiatry. 2011 Nov; 20(4): 265–276.

Stages of Brain Development

Postnatal

- Later synapse formations are ***experience-dependent***

[1]Kolb & Gibb, 2010. Tactile stimulation facilitates functional recovery and dendritic change after neonatal medial frontal or posterior parietal lesions in rats. *Behavioural Brain Research.*214:115–120. [2] Kolb & Gibb, 2011. Brain Plasticity and Behaviour in the Developing Brain. J Can Acad Child Adolesc Psychiatry. 2011 Nov; 20(4): 265–276.

WHO: “The environment in which a child grows up has a profound impact on sculpting the brain.” [1]

- Infant brain creates 1.8 million new synaptic connections per second[2]

- Multisensory stimulation promotes the long-term survival of these synaptic connections during brain development[2]

[1]World Health Organization. Integrating Early Childhood Development (ECD) Activities Into Nutrition Programmes in Emergencies. Why, What and How. 2014;1–16; [2]Eliot L. *What's Going On in There? How the Brain and Mind Develop in the First Five Years of Life.* New York, NY: Bantam Books; 1999.

Image owned by Johnson & Johnson Consumer Inc.

Audience Question – Select Answer in *Live-Poll*!

By AGE 3, what percentage of the brain is developed?

A. 58%
B. 70%
C. 85%
D. 99%

By Age Three (3), 85% of a Child's Brain is Developed[1]

Every experience helps to shape a baby's brain[1]

- Stable, caring & interactive relationships with adults promote healthy brain development[2]
- Development and organization of the brain reflects experiences[3]
- Repetitive, consistent, predictable and nurturing experiences can promote the healthy development of a child's brain[3]

[1] Shelov SP. *Caring for Your Baby and Young Child: Birth to Age 5.* 5th ed. New York, NY: Bantam Books; 2009:154–57

[2] World Health Organization. 10 Facts About Early Child Development as a Social Determinant of Health. Maternal, Newborn, Child and Adolescent Health. 2014. http://www.who.int/maternal_child_adolescent/topics/child/development/10facts/en/

[3] Perry, BD. *J Loss Trauma.* 2009;14:240–255.

Touch and Sight

Baby's First Emotional Bonds are Built from Physical Contact, or *Touch*, with Parent or Caregiver

Skin-to-skin contact is linked to more positive interactions between mothers and infants one year later.

Bystrova K, et al. Early contact versus separation: effects on mother-infant interaction one year later. *Birth.* 2009;36(2):97–109.

Touch is Fundamental for Typical Development

Touch has a positive effect on

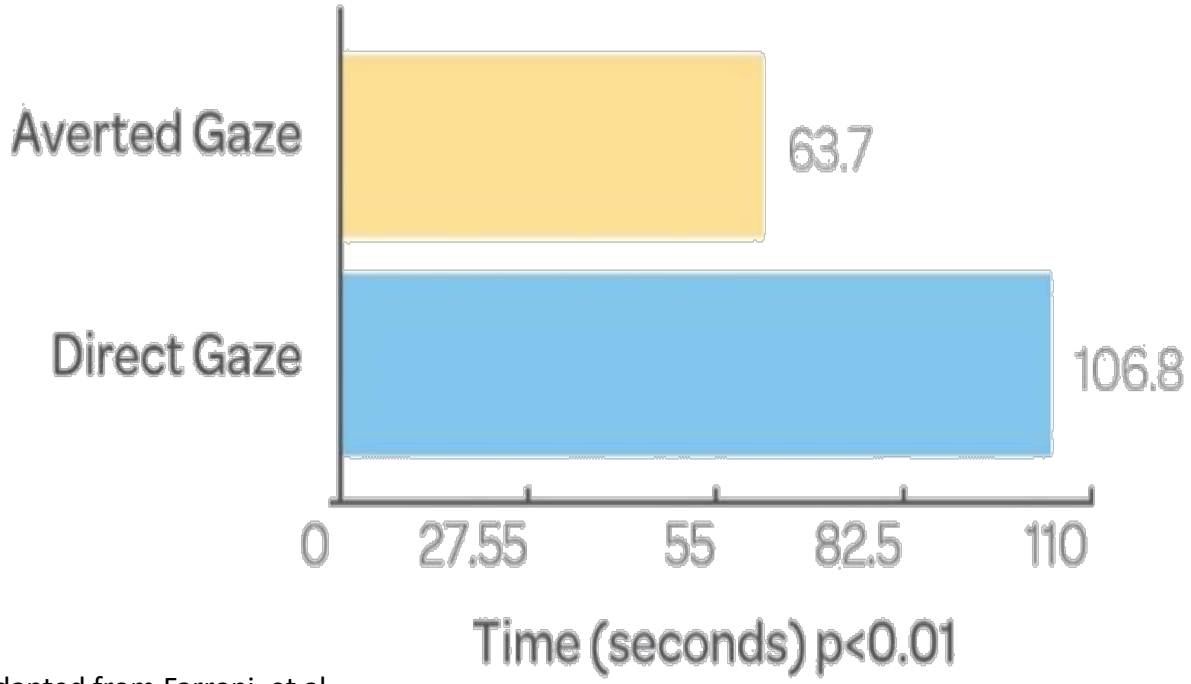
- Infants' motor and cognitive/ mental development[1]
- Breastfeeding[2]
- Parenting[1]

[1] Feldman, et al. *Pediatrics* 2002; 110: 16–26

[2]Parikh et al., 2018; Intl J Rep, Contr, ObGyn, 12, 5011

Visualization and Eye Contact Facilitates Early Communication, Provides Foundation for Social Development

Duration of Infant Eye Contact
Direct vs. Averted Visual Stimulation



Adapted from Farroni, et al.

Farroni T, et al. *Proc Natl Acad Sci U S A*. 2002;99(14):9602–9605.

Do Face Masks have Potential Implications for Babies?

- Infant's face processing involves[1]
  - Detecting faces
  - Learning about faces
  - Needing to see and learn faces to develop attachment and feel safe

- Wearing a mask[1]
  - Muffles speech
  - Hides features of faces that identify the person
  - Hides mouth prevents detection of emotions, pains, etc.
  - May affect infants' ability to orient to and focus on faces
  - May impair infants' ability to develop facial processing

[1] Green, Staff, Bromley, Jones & Petty (2021). The implications of face masks for babies and families during the COVID-19 pandemic: A discussion paper *Journal of Neonatal Nursing 27,21–25*

Some Recommendations When Face Masks are Used

- Minimize mask wearing, whenever possible
- When not wearing mask, maximize face-to-face interactions
- Use clear mask, if possible, particularly for long-term infants in NICU
- Talk to baby through the mask
- Play peek-a-boo with the mask on and then remove the mask to reveal a smile so that babies know that the caregiver is still smiling under the mask
- Help the child learn from looking at the eyes and eyebrows to understand the expression and feeling

Green, Staff, Bromley, Jones & Petty (2021). The implications of face masks for babies and families during the COVID-19 pandemic: A discussion paper. Journal of Neonatal Nursing 27, 21–25

Touchpoint Tips – Experiences, Touch, Sight

Touchpoints

1. When baby wakes, make eye contact and talk about the day, as you begin your baby's morning routine.
2. Use every interaction – even a diaper change – to stimulate your baby's senses through your touch, through direct eye contact and as you talk about what's happening and what comes next. *Be intentional.*
3. Stimulate the baby's skin with Kangaroo Care or infant massage; talk with your baby to stimulate language development; read to your baby or show him/her things to stimulate the visual sense.

Making Sense Out of Scents

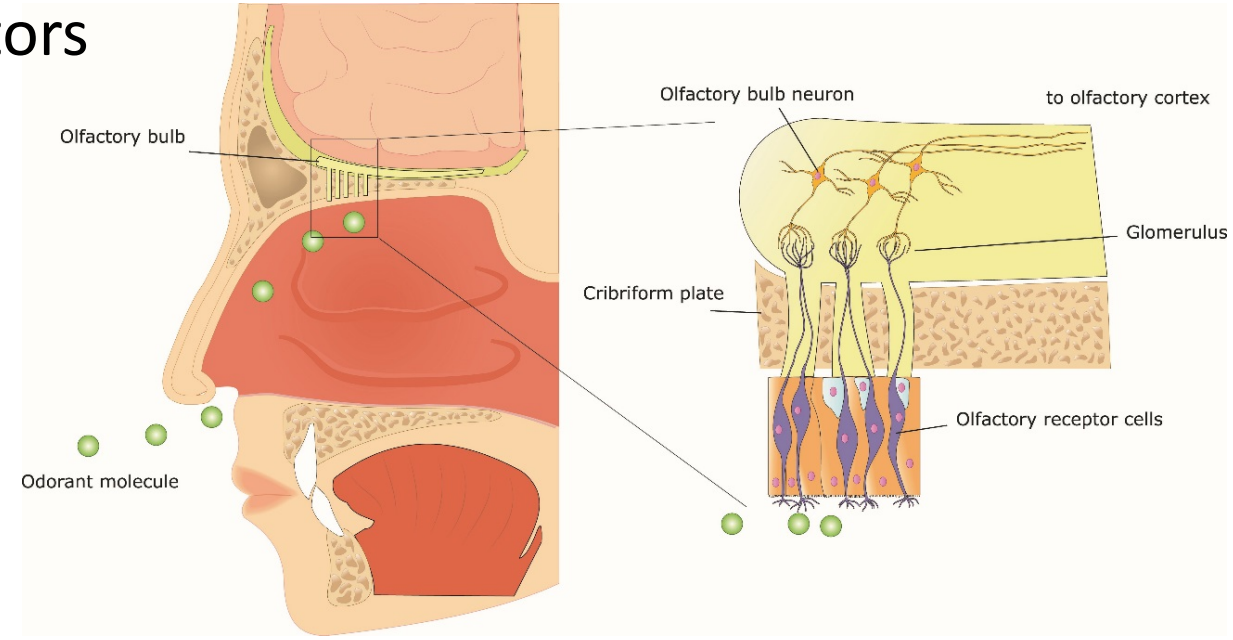
Pamela Dalton, PhD, MPH

Senior Research Scientist

Monell Chemical Sciences, Philadelphia, PA USA

The Olfactory System and Sensory Organ

- Olfactory system
  - Sensory organ (the olfactory epithelium and bulb)
  - Specific olfactory brain regions (the primary and secondary olfactory cortex)
- Odor sensory organ
  - Thousands of scents can be detected based on small airborne concentrations of odorant molecules; many specific receptors
  - Touch, hearing, and vision senses respond to pressure, sound, and light, respectively, and are interpreted and predictable via frequency



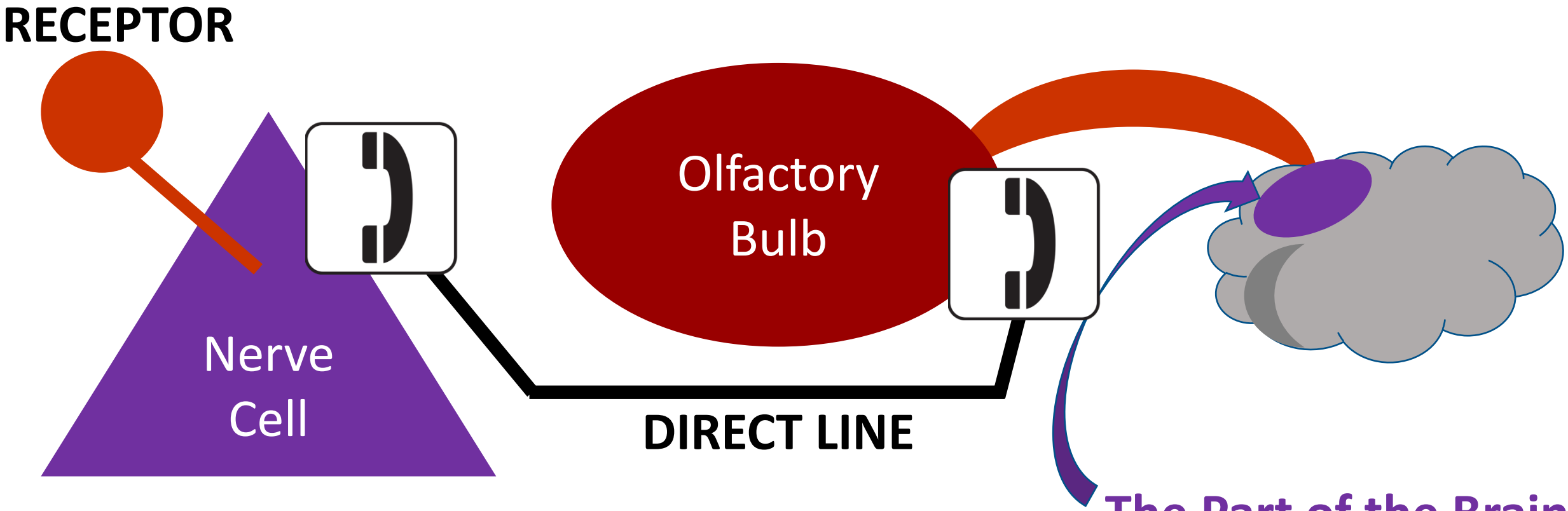
Kivity S, et al. *Isr Med Assoc J*. 2009;11:238-243.

Smell Differs from Other Senses in Important Ways

- Sense of smell played key role in human adaptation and survival from the earliest periods of evolution[1,2]
  - Olfactory areas of cortex phylogenetically older than those of other senses
- Contact between the external environment and the brain is more direct compared with other senses[2,3]
  - Signals triggered by other senses (sight, hearing, touch) are processed through the thalamus (serving as gate keeper)
  - Signals triggered by the sense of smell are transmitted directly to the brain (piriform cortex) via the olfactory bulb, without thalamic delay

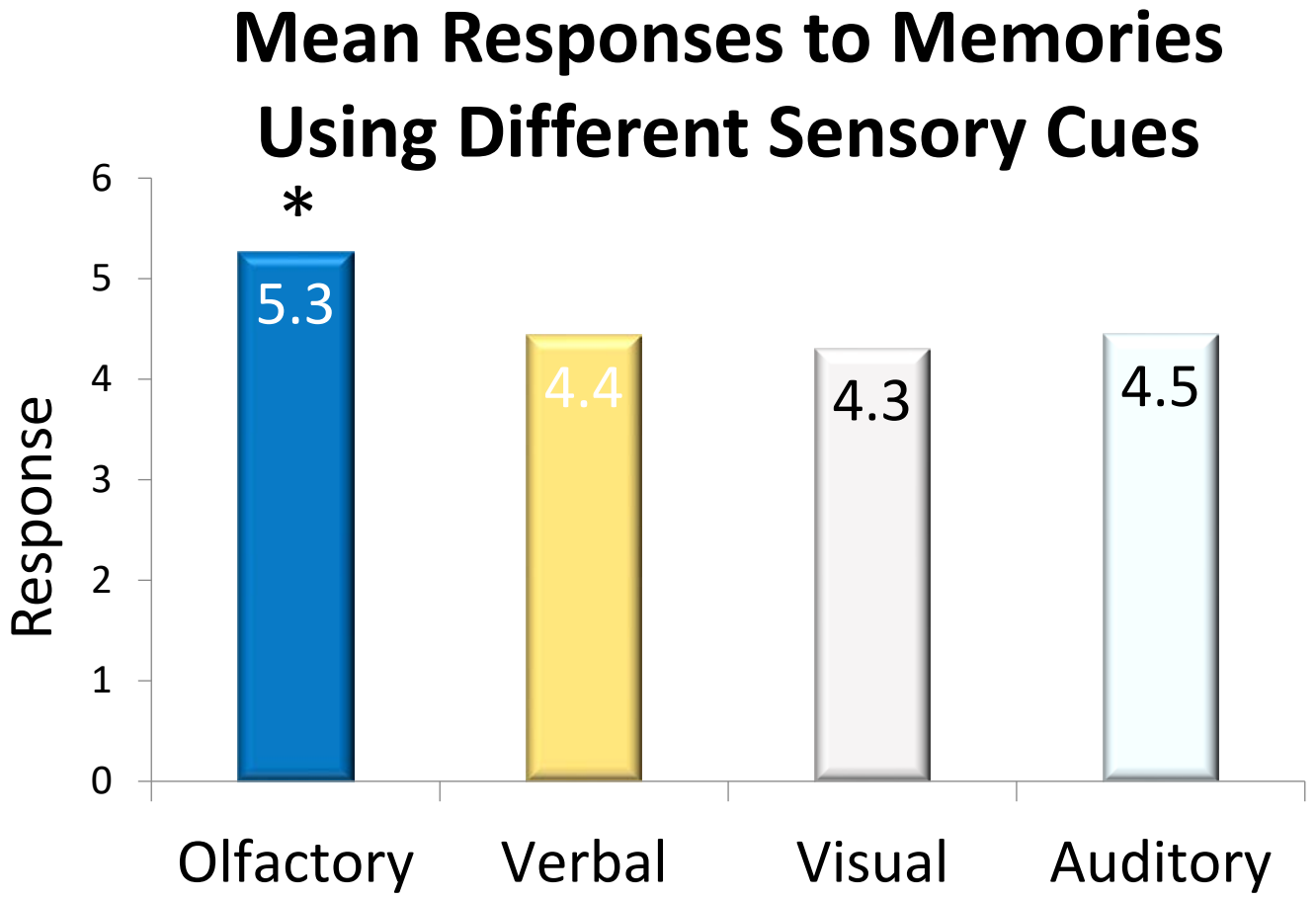
[1]Kivity S, et al. *Isr Med Assoc J*. 2009;11:238-243. [2]Stevenson RJ. *WIREs Cogn Sci*. 2013;4:273-284. [3]Zelano C, Sobel N. *Neuron.* 2005;48:431-454.

Odor & Emotions – What's the Connection?



Memories are More Emotional when Triggered by Smell than by Other Senses

- Memories rated significantly more emotional and evocative with olfactory cues than with other sensory cues
- **Unique relationship exists among olfaction, memory, and emotion**



Responses were made using a 1–9 Likert scale.

*$P < .05$ vs verbal, visual, and auditory.

Herz RS. Chem Senses. 2004;29:217-224.

Audience Question – Select Answer in *Live-Poll*!

At what age can a baby already recognize their mother's smell?

A. *In utero* – 1st trimester
B. *In utero* – 3rd trimester
C. At birth
D. 24 hours after birth

Odor Responses and Memories can be Established Prior to Birth

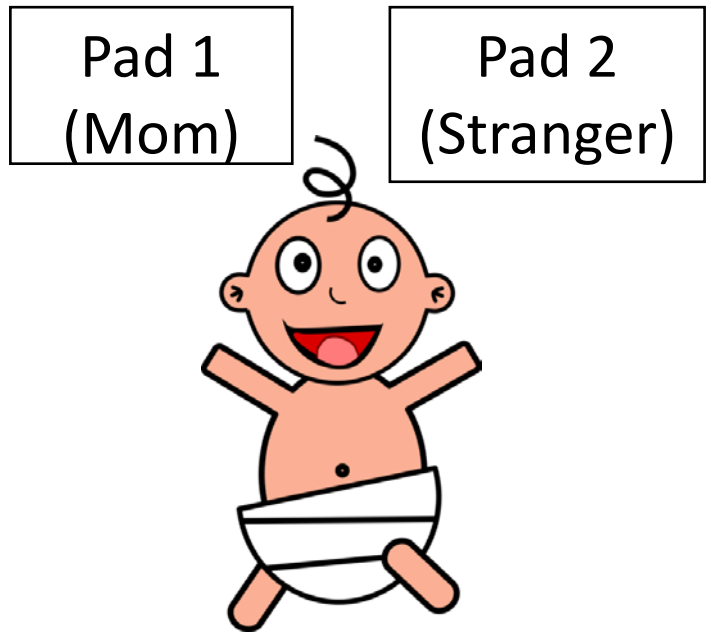
- The olfactory system is functional by the 3rd trimester
- Odors worn or consumed by the mother stimulate the olfactory receptors of the fetus via amniotic fluid

Robust Odor Learning Occurs *In Utero*, Infancy and Childhood

Maternal Odor Recognition is Evident Early
2-day old Infants Recognize Maternal Axillary Odor

Average Length of Orientation Towards the Olfactory Stimuli and Recognition Times

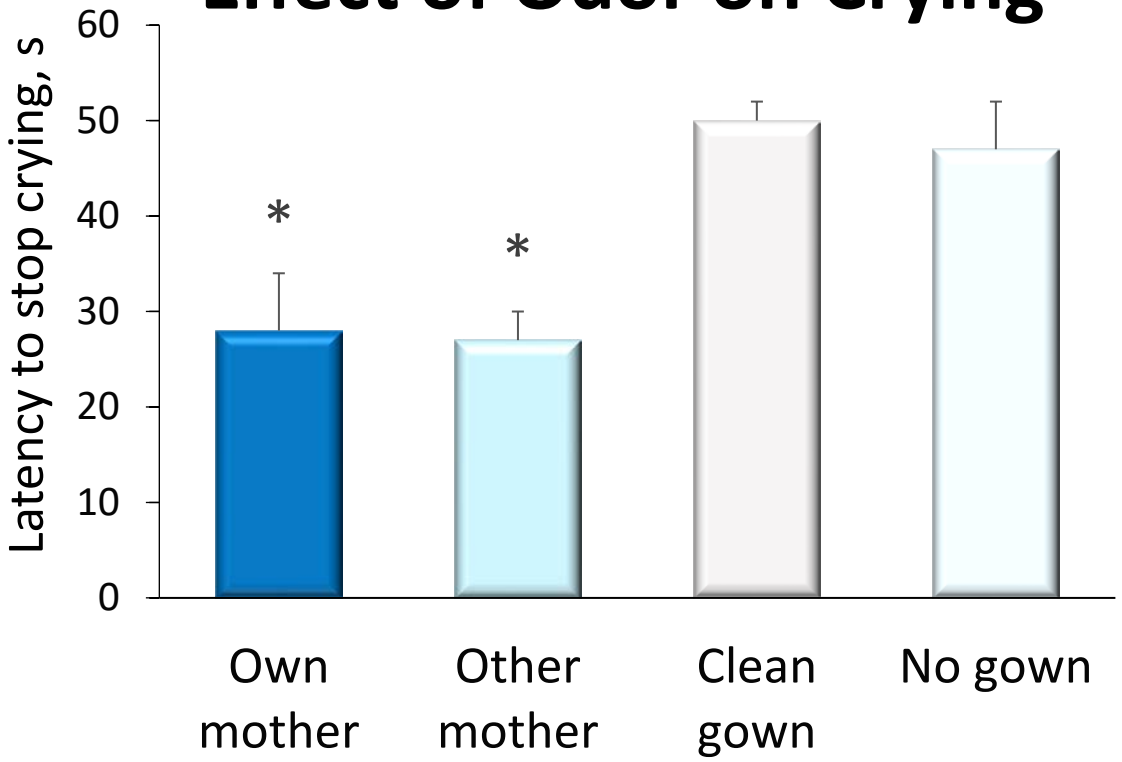
	Range	Time (in seconds) Mean ± SD
Orientation towards own mother's axillary odour	3-41	20.53 ± 12.08
Orientation towards unfamiliar woman's axillary odour	2-26	11.13 ± 9.06
Recognition of own mother's axillary odour	3-47	20.58 ± 12.09



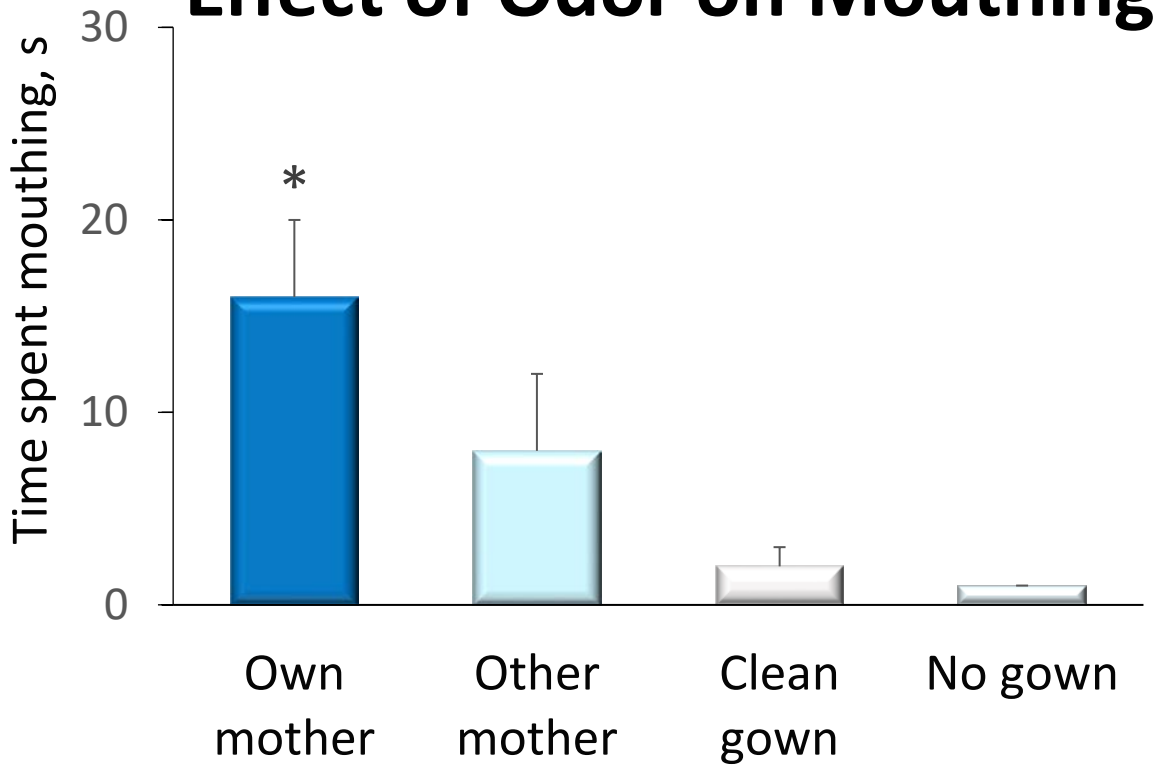
Marin, M. M., Rapisardi, G. and Tani, F. (2015), Two-day-old newborn infants recognise their mother by her axillary odour. Acta Paediatrica, 104: 237–240. doi: 10.1111/apa.12905

Maternal Scent has Soothing Effect and Prepares Infants for Feeding

Effect of Odor on Crying



Effect of Odor on Mouthing

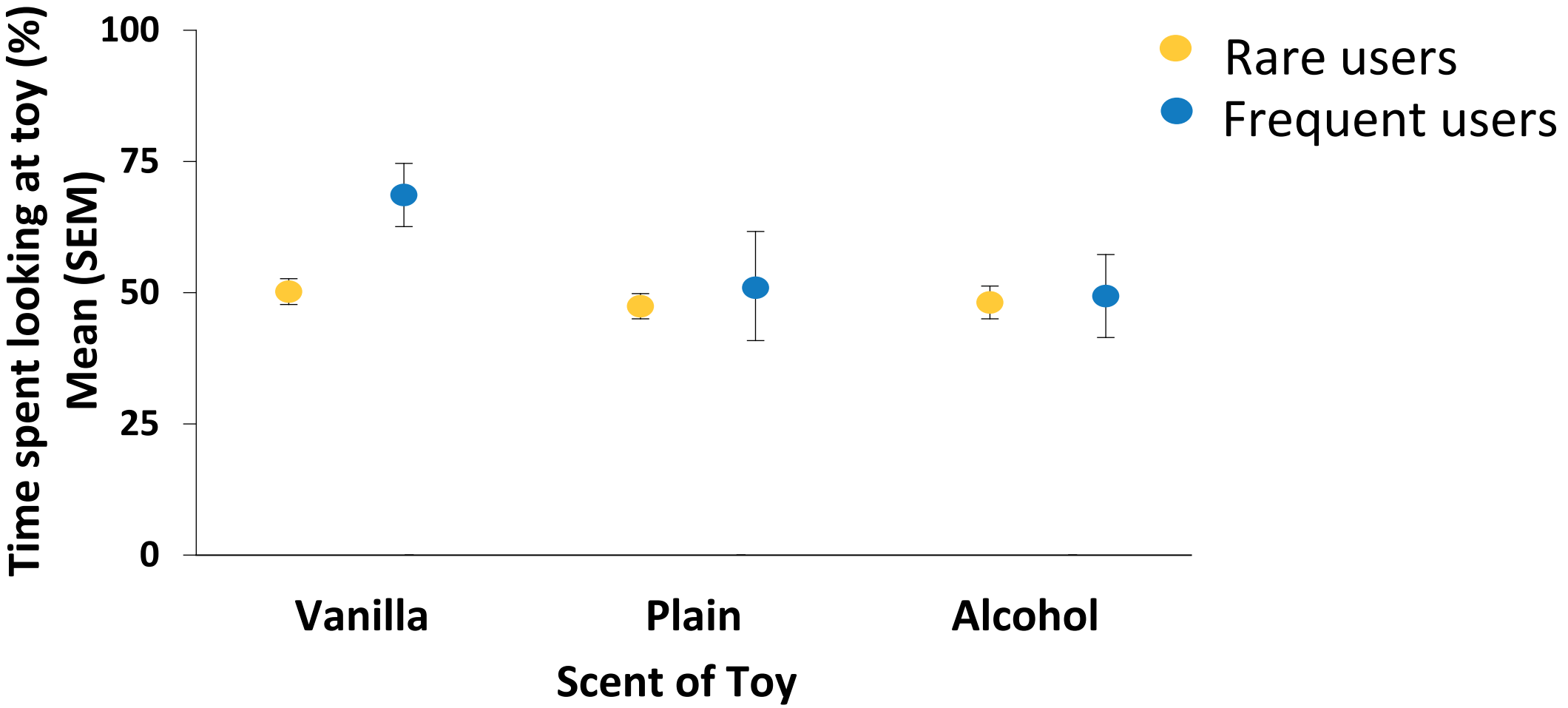


Mother's scent helped infants stop crying and prepared them for feeding.

Sullivan RM, Toubas P. *Biol Neonate.* 1998;74:402-408.

*$P < .05$ vs clean gown and no gown.

Relationship Between Mothers' Use of Scented Products During Pregnancy and Infants' Response

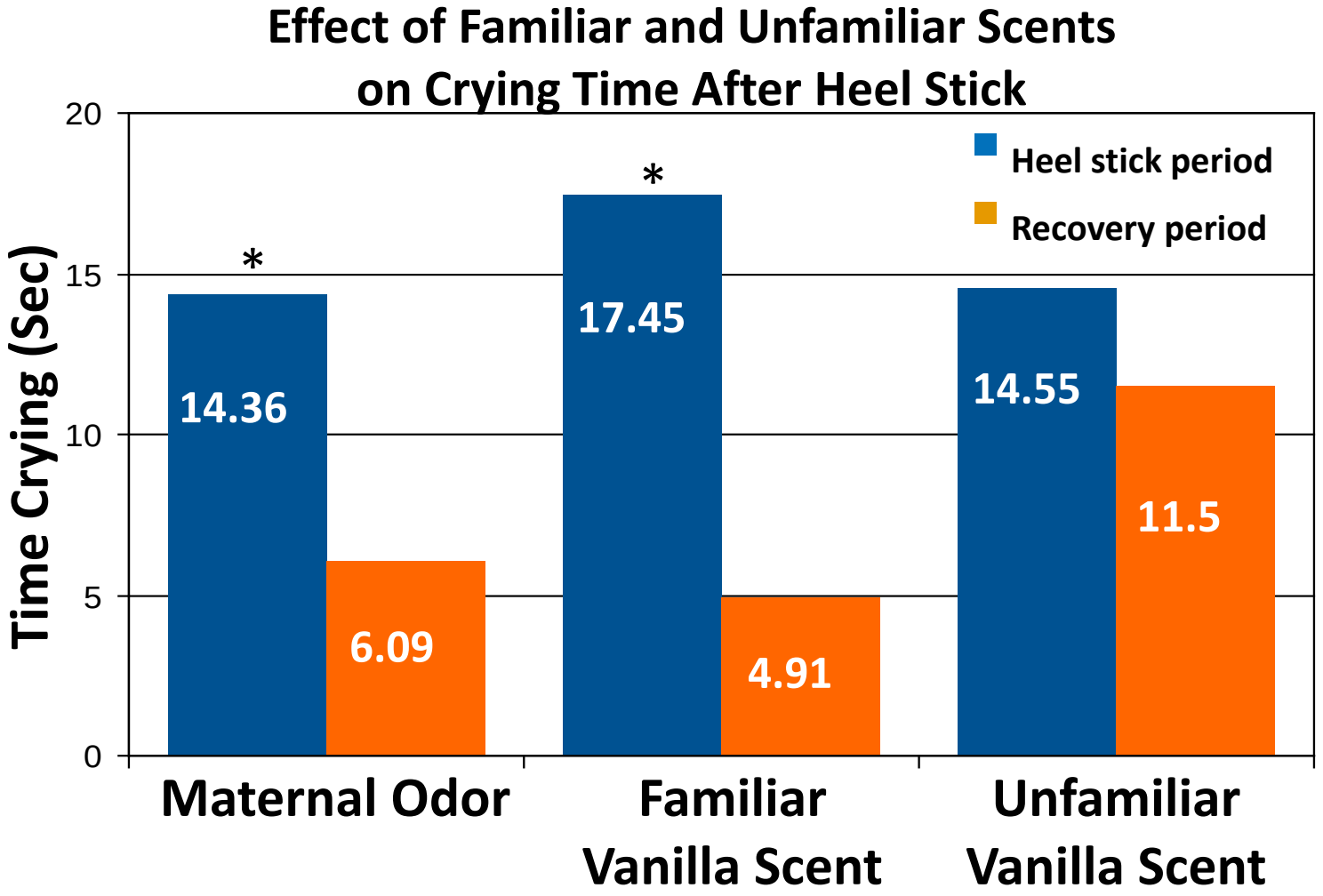


Mennella, J.A. & Beauchamp, G.K. (1998) Infants' exploration of scented toys: effects of prior experiences Chem Senses, 23, 11-17.

Maternal Odor and Fragrance Associated with Mother have Equally Soothing Effect on Infant

- Infants who smelled a familiar odor after heel stick† **cried significantly less** than those who smelled an unfamiliar odor
- Results were the same for **maternal odor** and for a **familiar fragrance**

†Study was coordinated with routine phenylketonuria heel prick test.



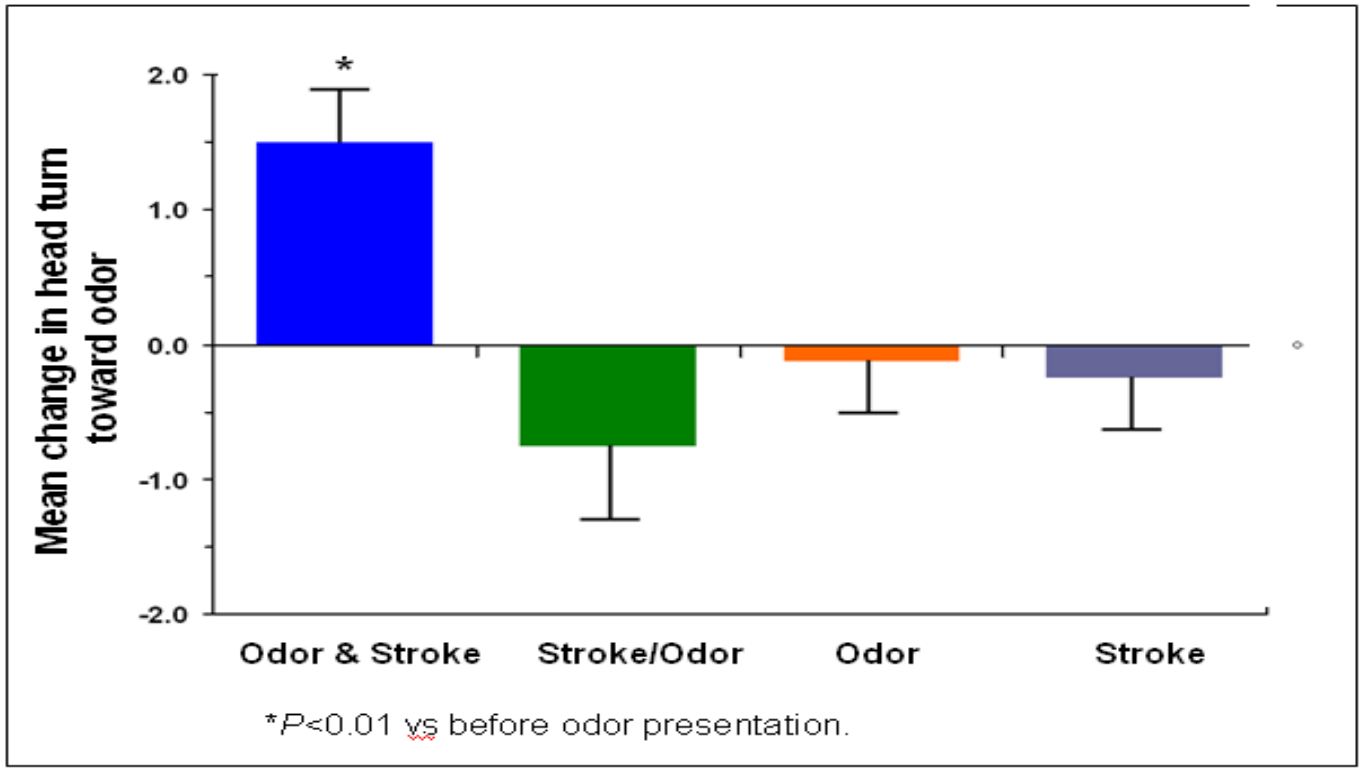
*P<0.01, difference in crying time between heel stick period and recovery period after heel stick.

Rattaz C, et al. *J Dev Behav Pediatr.* 2005;26:86-92.

Infants Learn to Respond to Important Odors Rapidly after Birth & Respond Better if Odor is Combined with Touch

- Infants (N = 66) were randomly assigned to 1 of 4 groups
  - Odor and stroking (touch) concurrently
  - Stroking followed by odor
  - Odor alone
  - Stroke alone
- 48 hours after birth, 48 infants (12 in each group) were exposed to odor
- Combined odor and stroking group showed **complex learned response** to the odor within 48 hours after birth

Learned Response to Odor at 48 Hours After Birth



Sullivan R, et al. Pediatrics. 1991;87:511-518.

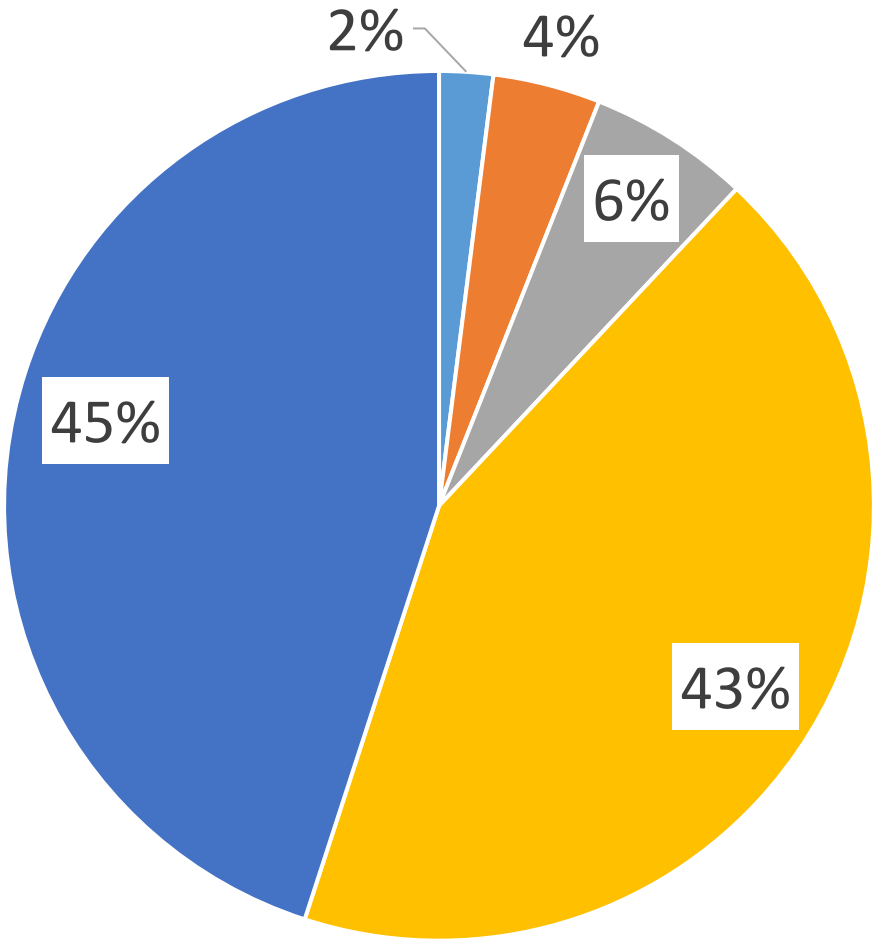
Sense of Smell is Fundamental to Human Development and Functioning

- Brain Development and Learning
- Social Development and Functioning
- Mood and Cognitive Functioning
- Nutrition

The importance of smell to healthy development strongly argues for regular testing of smell acuity from birth.

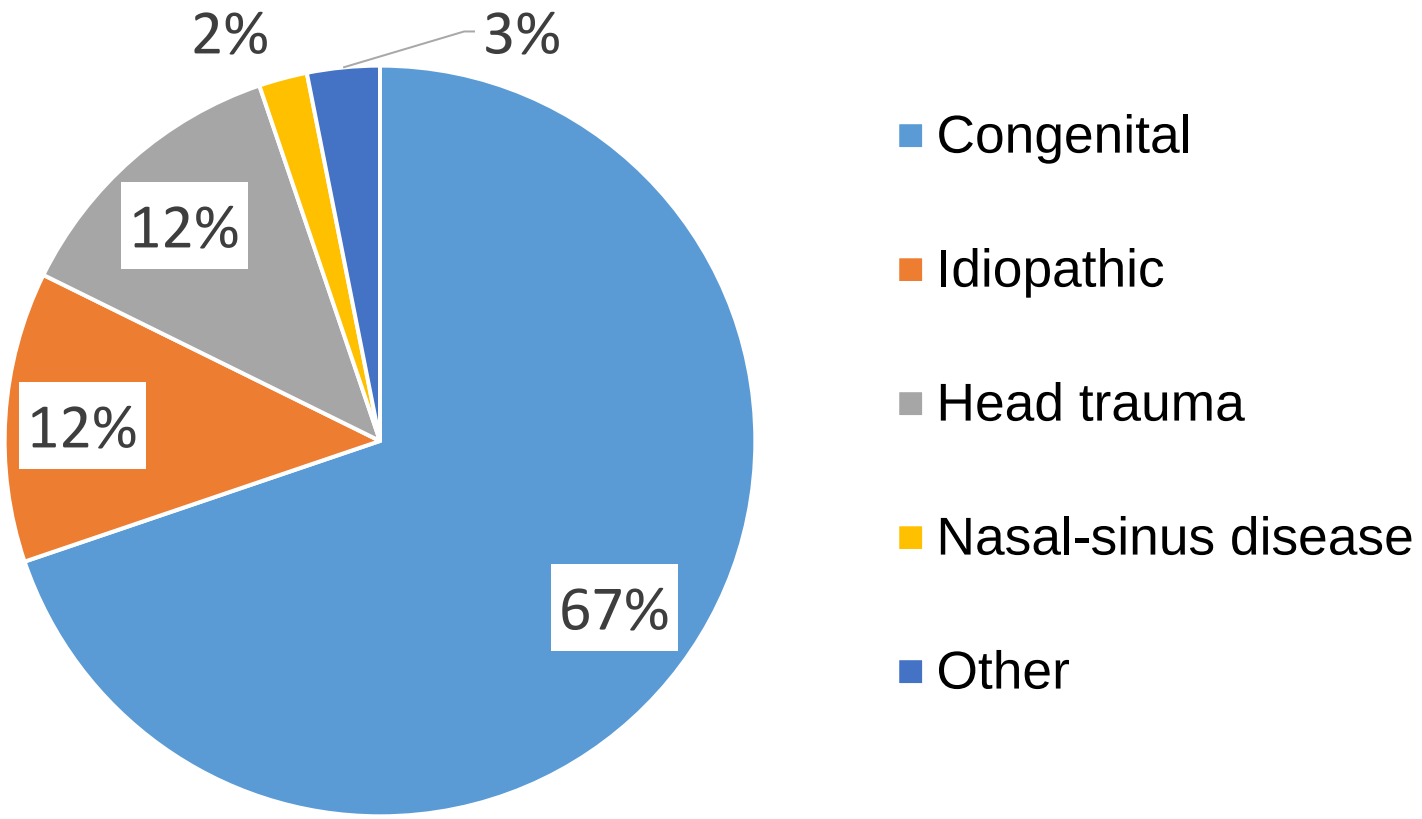
So…. What Happens if We Lose our Ability to Smell?

Smell Loss Can Be Due to Many Causes



Objective smell checks **reveal more loss** than reliance on self-report

Causes of Smell Loss in Childhood



Because **most smell loss in childhood is congenital**, testing smell function shortly after birth is important

- Infants will turn their head towards familiar odors (e.g., mother's clothing)
- Older children can play a 'smell game' where they close their eyes and try to identify different foods or scents

Schriever, V.A., Hummel, T. Etiologies of olfactory dysfunction in a pediatric population: based on a retrospective analysis of data from an outpatient clinic. *Eur Arch Otorhinolaryngol* **277,** 3213–3216 (2020). https://doi.org/10.1007/s00405-020-06087-4

Consequences of Smell Loss

- Anosmia leads to feelings of disorientation, fear of dangers from smoke, gas leaks, spoiled food and detachment in relationships
  - Parents with new smell loss report feeling less ‘attached’ to the baby than with their previous newborns
  - Also report worrying about safety issues for themselves and their family
- Smell loss in infancy and childhood may impede social bonding and alter food preferences

COVID-19 has caused smell loss for millions worldwide and up to 10% may have a persistent loss.

Touchpoint Tips – Sense of Smell

Touchpoints

1. “Stop and smell the roses.” Be *present.*
2. Share the scents and smells of your culture, such as at mealtimes. Interactive games involving “smelling” help babies learn about their world.
3. Remember, “bad” smells are important to learn about, too! (like food that’s spoiled)

Science Behind Sleep Routines

Jodi A. Mindell, Ph.D., DBSM
Children's Hospital of Philadelphia
Saint Joseph's University

Sleep

- Accounts for ~1/2 of babies’ lives

Sleep Impacts all Aspects of Functioning

- Cognitive functioning
- Behavior
- Social-emotional
- Health
- Family

Mindell & Owens (2015). *Clinical Guide to Pediatric Sleep.*

Audience Question – Select Answer in *Live-Poll*!

What percent of parents want to change something about their child's sleep?

A. 20%
B. 45%
C. 72%
D. 96%

Sleep Issues are Universal

- **20-75%** report sleep problems
- **96%** desire to change something about their child's sleep
  - N = 2,220 (0-36 months)
  - Indonesia, Japan, Singapore, Thailand, New Zealand, United States

Collins et al. (2021). *International Pediatric Sleep Association annual meeting.*

Sleep During Pandemic

- Early impact of confinement on infant sleep
  - 0-36 months; Switzerland

Markovic et al. (2021). *J of Sleep Research*

Sleep During Pandemic

- Impact on maternal and infant/child sleep
  - 0-72 months; Israel
  - April 2020 (4 weeks into lockdown)
- Overall no change in infant/child sleep, with some reporting no change, some reporting negative change and some positive change
- Maternal sleep negatively impacted

Zreik et al. (2020). *J of Sleep Research*

Predictors of Positive Sleep Outcomes

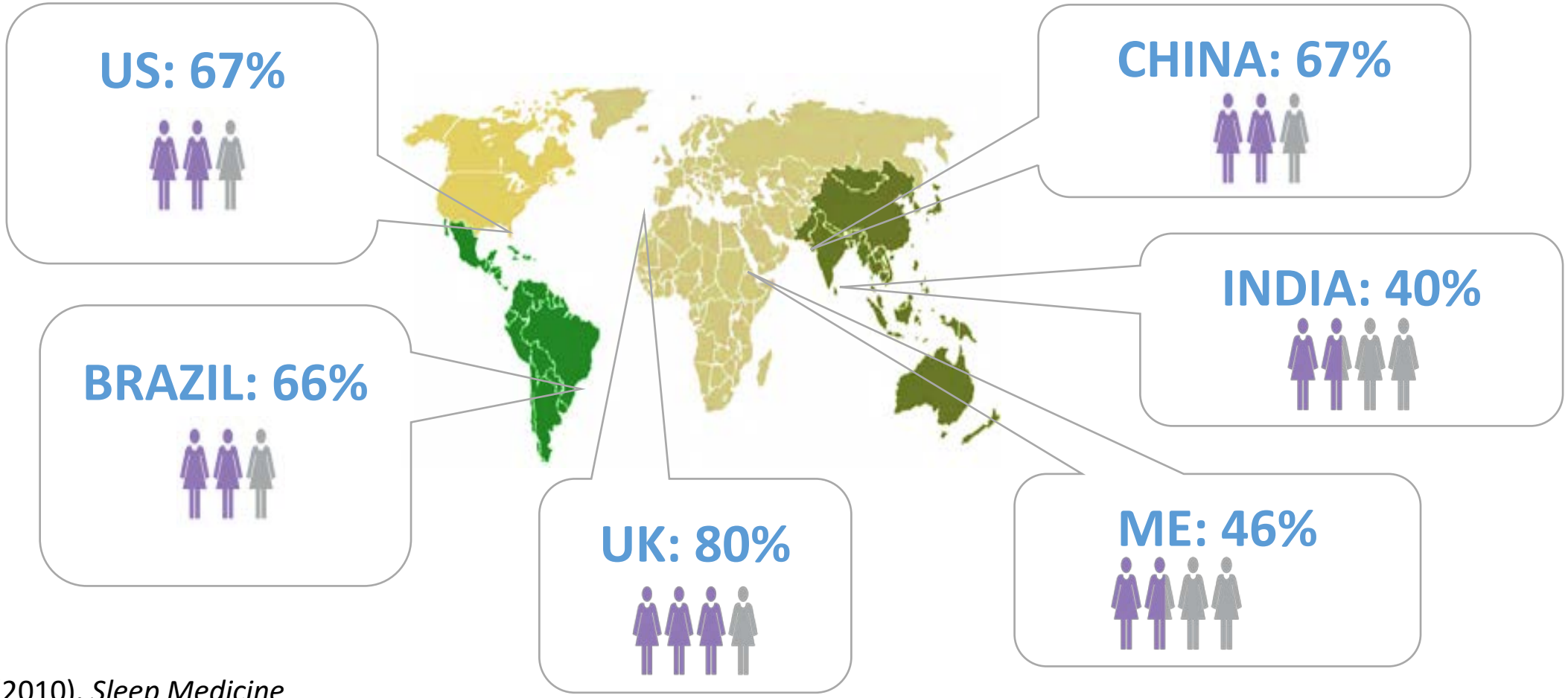
1. Bedtime before 9:00
   - Regular sleep schedule sets internal clock
2. Consistent bedtime routine
   - Same every night (30-45 mins)
   - 3 to 4 quiet activities
     - Bath/washing
     - Massage
     - Stories
     - Cuddle time

Mindell et al. (2010). *Sleep Medicine.*

Bedtime Routines

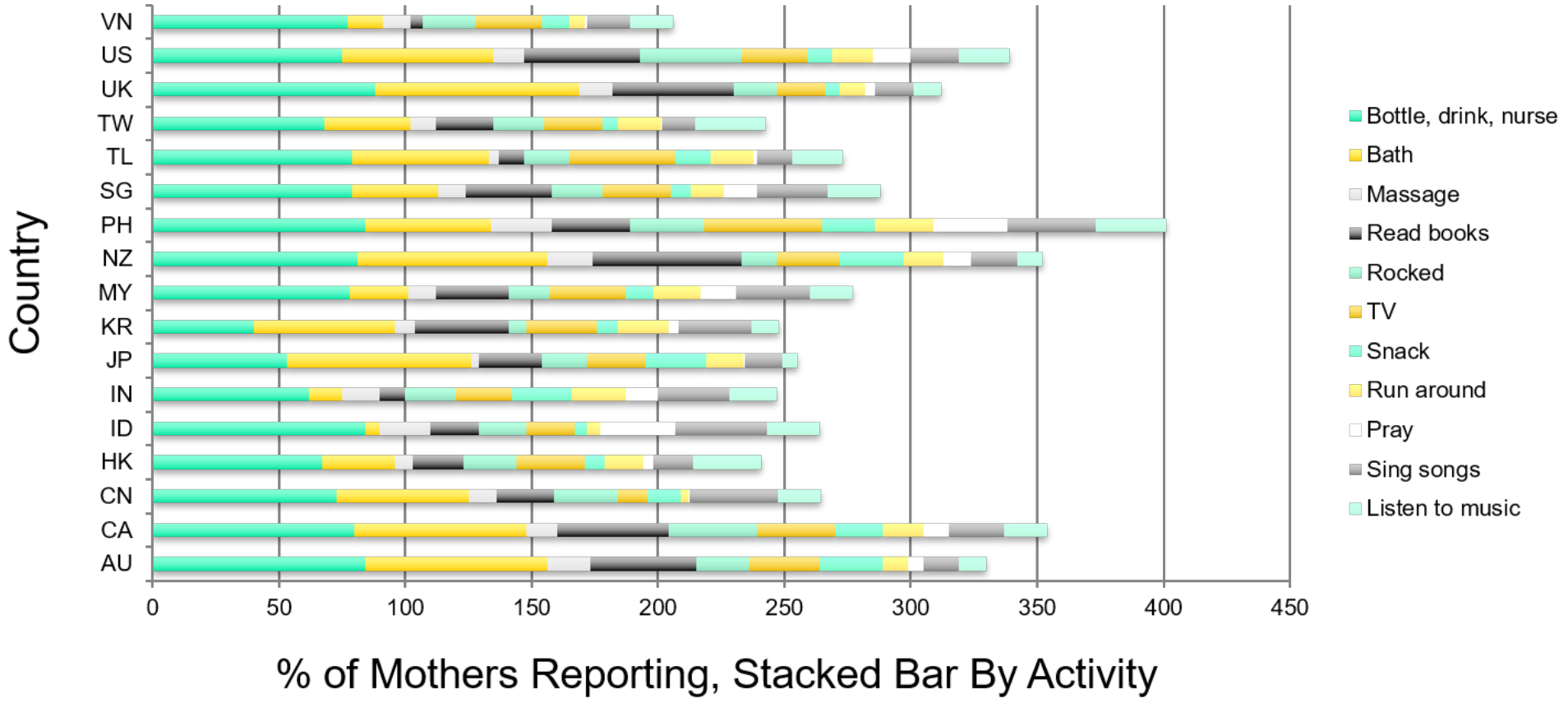
Prevalence of Bedtime Routines

% who report a bedtime routine 5+ nights per week



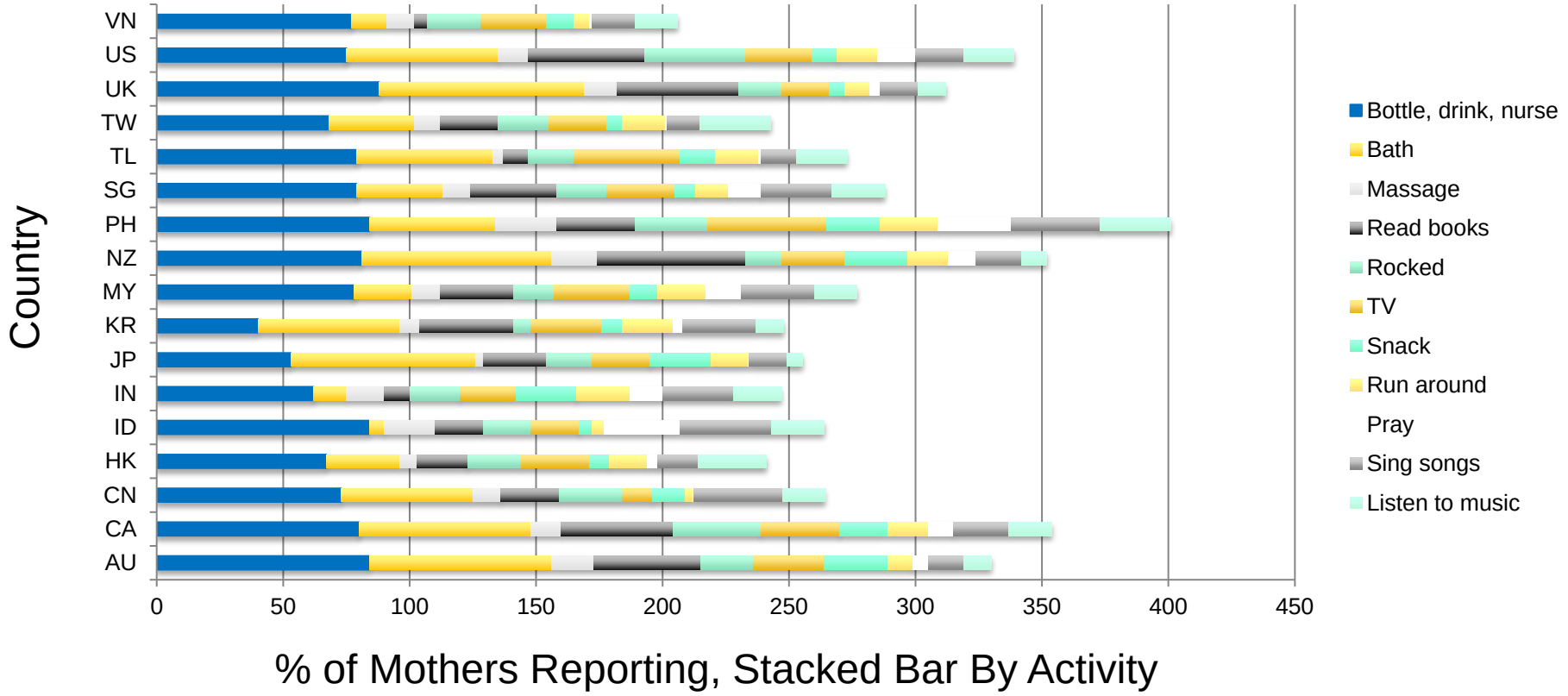
Mindell et al. (2010). *Sleep Medicine*

Bedtime Routines are Culturally-Specific



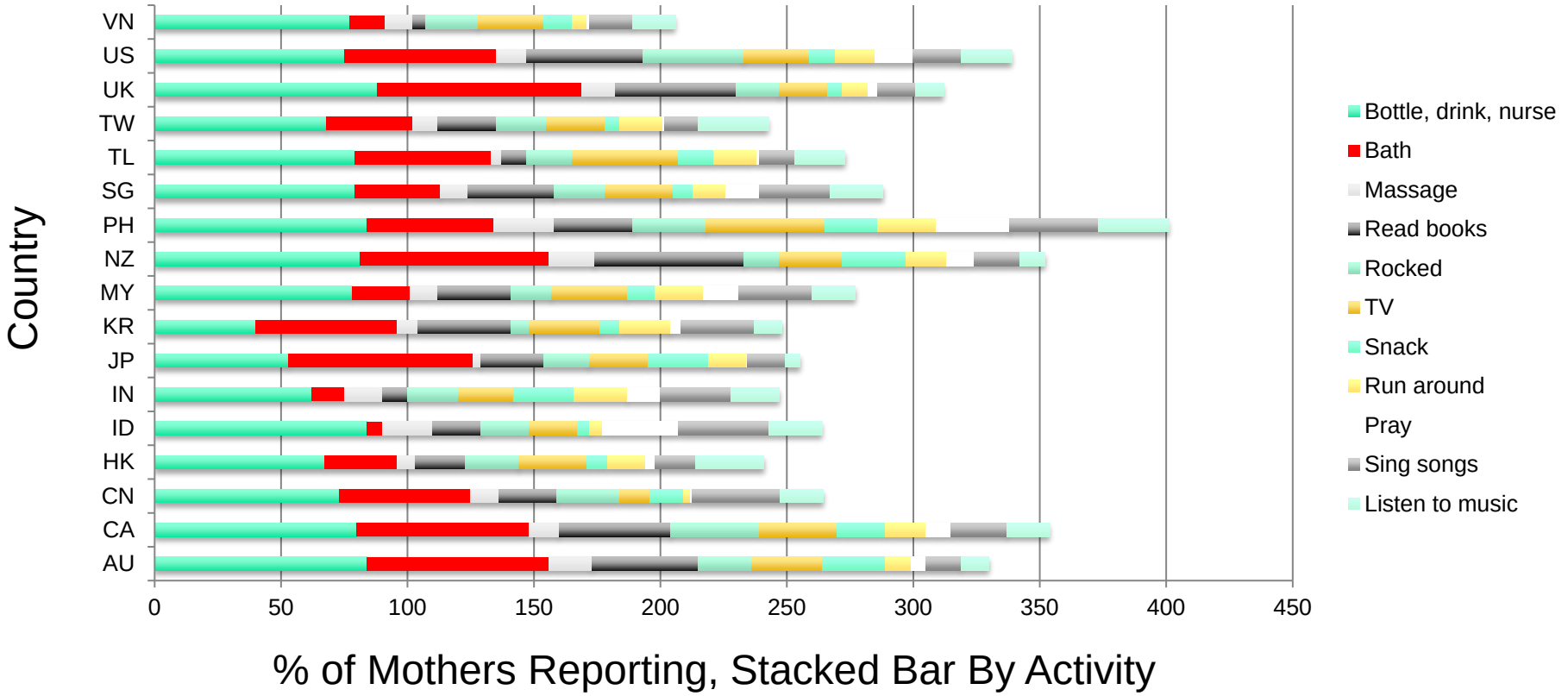
Mindell & Williamson (2018). *Sleep Medicine Reviews.*

Bedtime Routines are Culturally-Specific



Mindell & Williamson (2018). *Sleep Medicine Reviews.*

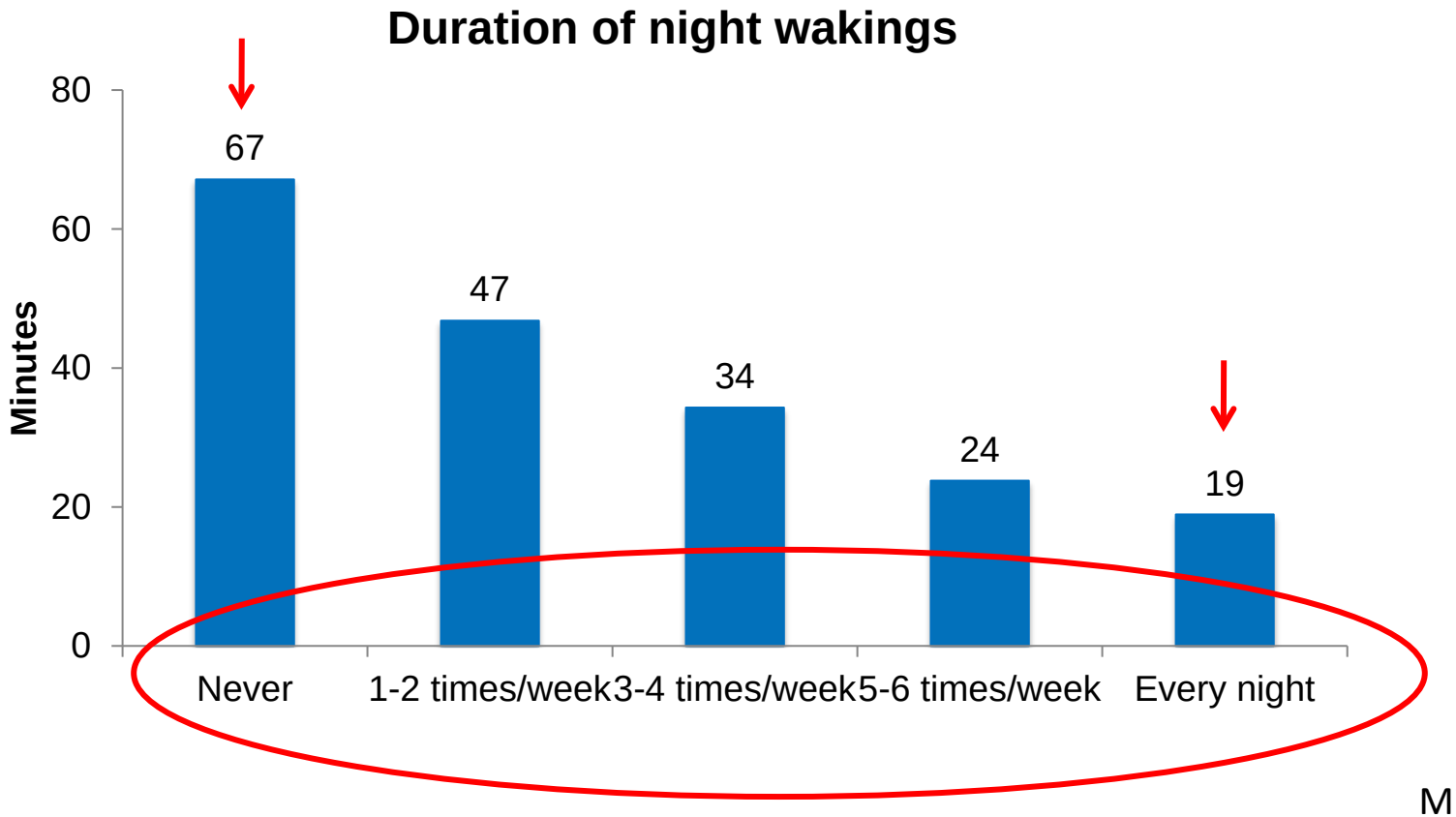
Bedtime Routines are Culturally-Specific



Mindell & Williamson (2018). *Sleep Medicine Reviews.*

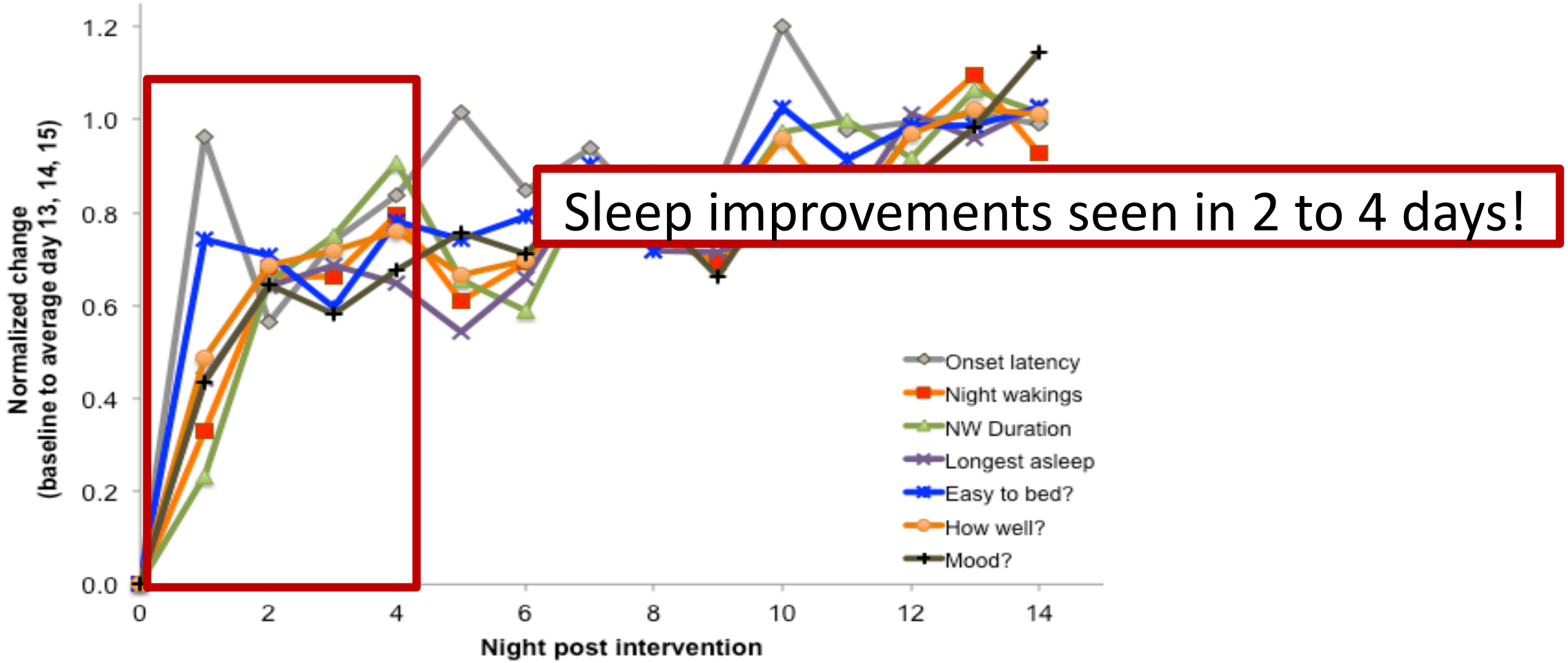
Bedtime Routines are Dose-Dependent

- Increasing “doses” of having a bedtime routine associated with better sleep outcomes



Mindell et al. (2015). *Sleep.*

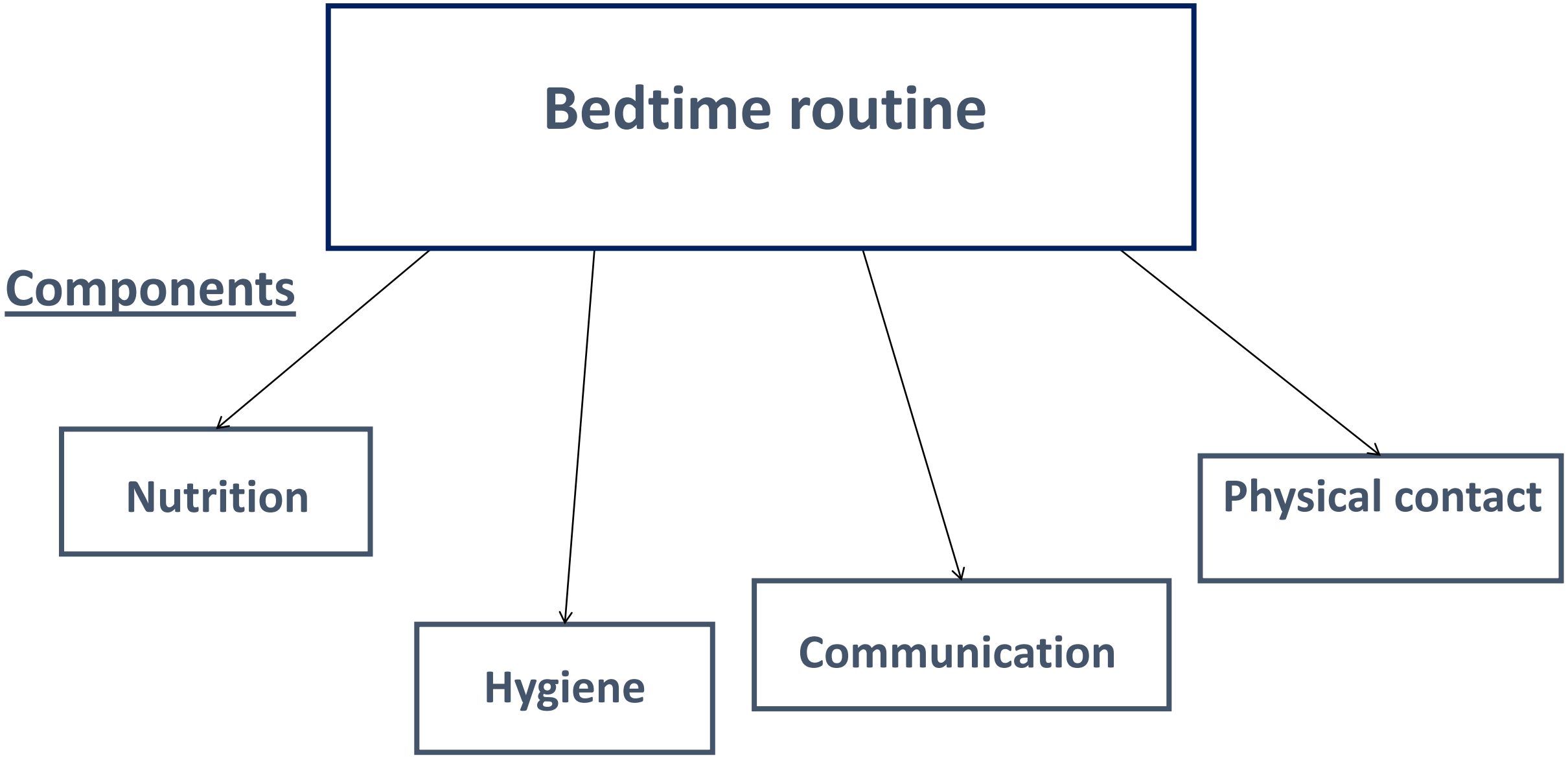
Bedtime Routines Improve Sleep Quickly

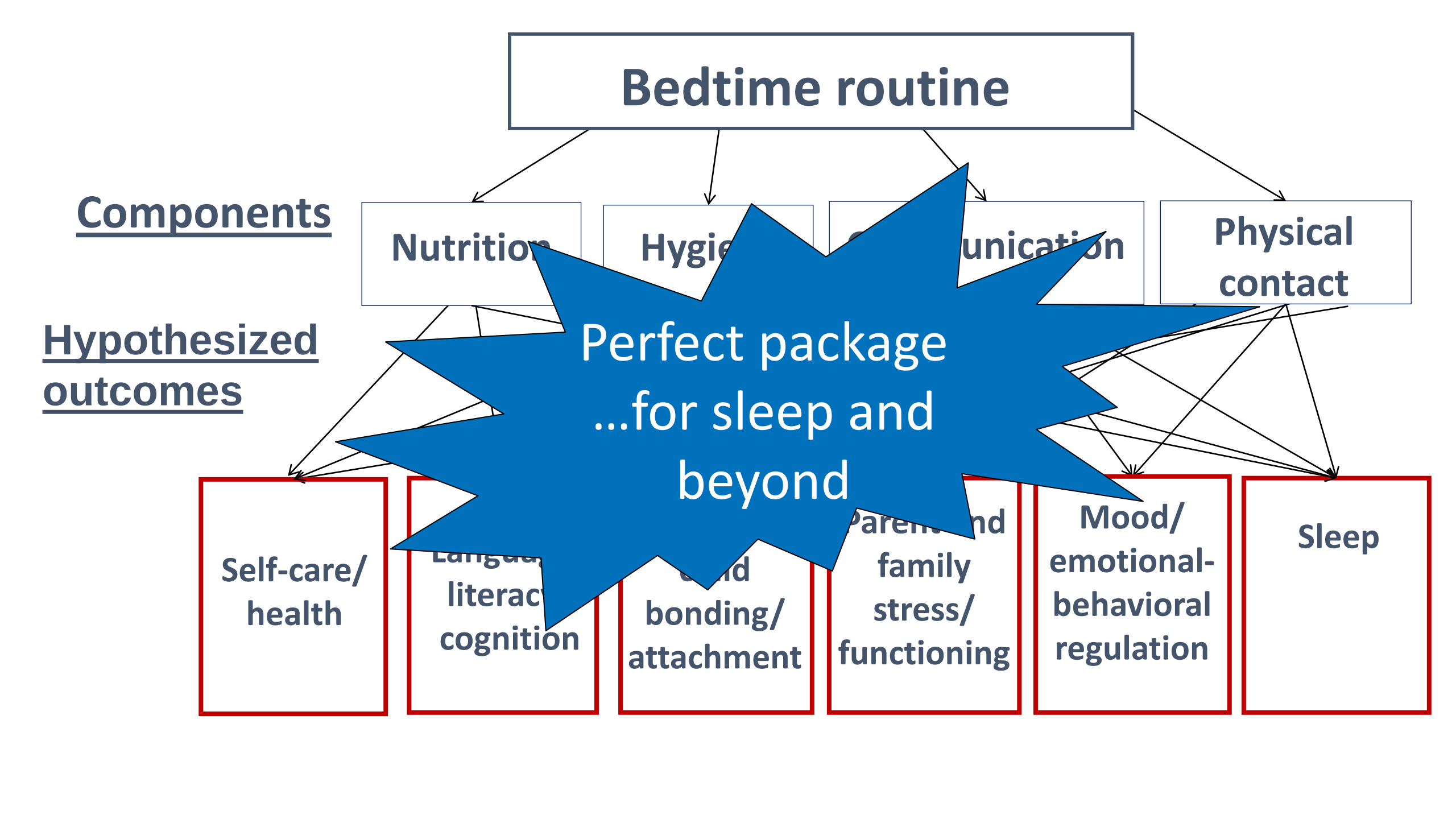


Mindell et al. (2017). *Infant Behavior and Development.*

Bedtime Routines are so Much More…

Bedtime Routines are the Perfect Package


Bedtime routine
Components
Nutrition
Hygiene
Communication
Physical contact


Bedtime routine
Components
Hypothesized outcomes
Physical contact
Perfect package
…for sleep and beyond
Self-care/ health
bonding/ attachment
family stress/ functioning
Mood/ emotional-behavioral regulation
Sleep

Bedtime Routines are Multi-Sensorial

Touch (bathing, massaging, dressing)

Smell (bathing, snuggling)

Taste (feeding, teeth brushing)

Sight (reading, eye contact)

Sound (reading, lullabies, talking)

Touchpoint Tips - Sleep

Touchpoints

1. Start a bedtime routine from day 1
2. Set aside 20-30 minutes every night to bond with baby
3. Sing a special song, read the same book, say the same silly rhyme

Importance of Parent-Child Touch, Connection & Bonding in a Post-Pandemic World

How midwives can guide parents to use everyday routines to support healthy baby development.

Touchpoints

Everyday Moments Parents can Connect and Bond with Baby

Panel Discussion and Questions

Maria Hernandez-Reif, PhD
Human Development & Family Studies
The University of Alabama

Pamela Dalton, PhD, MPH
Monell Chemical Sciences,
Philadelphia, PA USA

Jodi A. Mindell, PhD, DBSM
Children's Hospital of Philadelphia
Saint Joseph's University

Closing Remarks

Jodi A. Mindell, Ph.D., DBSM
Children's Hospital of Philadelphia
Saint Joseph's University

Multi-Sensorial Experiences and Everyday Routines…
More Important than you Think!

Touchpoints!

Spread
the word!

Asante Sana

Ngiyabonga

Takk

Obrigada

Děkuji

Arigato

شكرًا

Dankie

Bedankt

Thank You !

Danke

Tack

Xie xie

Gracias

Merci

Ευχαριστώ

e dupe

Terima Kasih

Obrigado

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