

Welcome to

Shaken Baby Syndrome: Mechanisms, Risk, & Prevention Across Care Systems

THE TRAINING WILL BEGIN SHORTLY! WHILE YOU'RE WAITING...

 Icebreaker Question
(answer in the chat)

What color best describes your mood today?



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Who we are

- The California Training Institute
- Funded by the State of California, Dept. of Social Services, Office of Child Abuse Prevention (OCAP) to support child abuse prevention through professional development and extended learning opportunities.
- Designed for staff of family strengthening and child abuse prevention organizations in California, including Family Resource Centers, Child Abuse Prevention Councils, community-based organizations, and other child and family serving systems.

What we offer

- Live webinars & small group training
- Virtual, self-paced courses
- Job aids & other resources



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October 30 & November 4 | Essential Employee Conversations



November 5 | Opportunities for Expanding Parent Leadership



November 14 | Paternal Perinatal Mental Health: The Changing Face of New Fatherhood



November 18 | Social & Emotional Competence of Children



November 19 | Recognizing & Regulating Workplace Distress Through the Window of Capacity

Before We Begin...

DURING



Access the notetaking slides now! The link can be found in the chat.



Review interactive features for today's session. Locate the controls on the toolbar at the bottom of your screen.



This presentation is being recorded.



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AFTER



Complete the survey at the end of this webinar to receive your Certificate of Attendance.



A follow-up email will be sent to all participants within two days.



Shaken Baby Syndrome: Mechanisms, Risk, & Prevention Across Care Systems

Presented by Danielle Vazquez, BSW, and Shantel Wakley, BS





Danielle Vazquez, BSW

Executive Director,
National Center on Shaken
Baby Syndrome



Shantel Wakley, BS

PURPLE Program Director,
National Center on Shaken
Baby Syndrome



WHO WE ARE

NATIONAL CENTER ON SHAKEN BABY SYNDROME

- The National Center on Shaken Baby Syndrome (NCSBS) is a non-profit 501(c)3 public charity founded in 2000.
- Provide education and resources to organizations aligned to keep babies safe.
- Leader in research-based development of AHT prevention programs, training courses, and public education campaigns.
- Host biennial world-renowned International Conference on Shaken Baby Syndrome/Abusive Head Trauma.
- Our research-based resources reach over a **million** people worldwide each year.

Mission: The National Center on Shaken Baby Syndrome commits to prevent shaken baby syndrome/abusive head trauma and promote the well-being of infants through supporting and educating families, caregivers and professionals.

WHAT IS SBS/AHT?

Abusive Head Trauma (AHT) is a severe form of physical child abuse that results in head injury.

- AHT is an injury to the skull or intracranial contents of an infant or young child (<5 years of age) due to inflicted blunt impact and/or violent shaking (CDC, 2012)
- AHT remains a significant cause of morbidity and mortality in the pediatric population, especially in young infants. (AAP. 2020)

WHAT IS SBS/AHT: DR. BLOCK



National Center on
Shaken Baby Syndrome



**THERE HAVE
BEEN SOME**

SHAKING MECHANISMS & FACTORS CONTRIBUTING TO INJURY

The shaking mechanism that results in SBS/AHT is complex.

- Head size - large compared to its body, supported by weak neck muscles.
- Brain - only partially myelinated at this early stage of development
 - Contains increased water resulting in a soft, gelatinous organ that is susceptible to distortion.
 - White matter and gray matter - differ in consistency and mass.
- The infantile skull is composed of rather loosely connected curved plates with intertwined soft membranes.

SHAKING MECHANISMS & FACTORS CONTRIBUTING TO INJURY

Rapid acceleration and deceleration rotational movement of the brain tissues

- Structures will move at different speeds in different locations.
- Veins anchored to the brain and to the dura are stretched and torn due to this rotational movement,
- Lead to bleeding under the dura or under the arachnoid layers of the membranes covering the brain.

Common Potential Injuries:

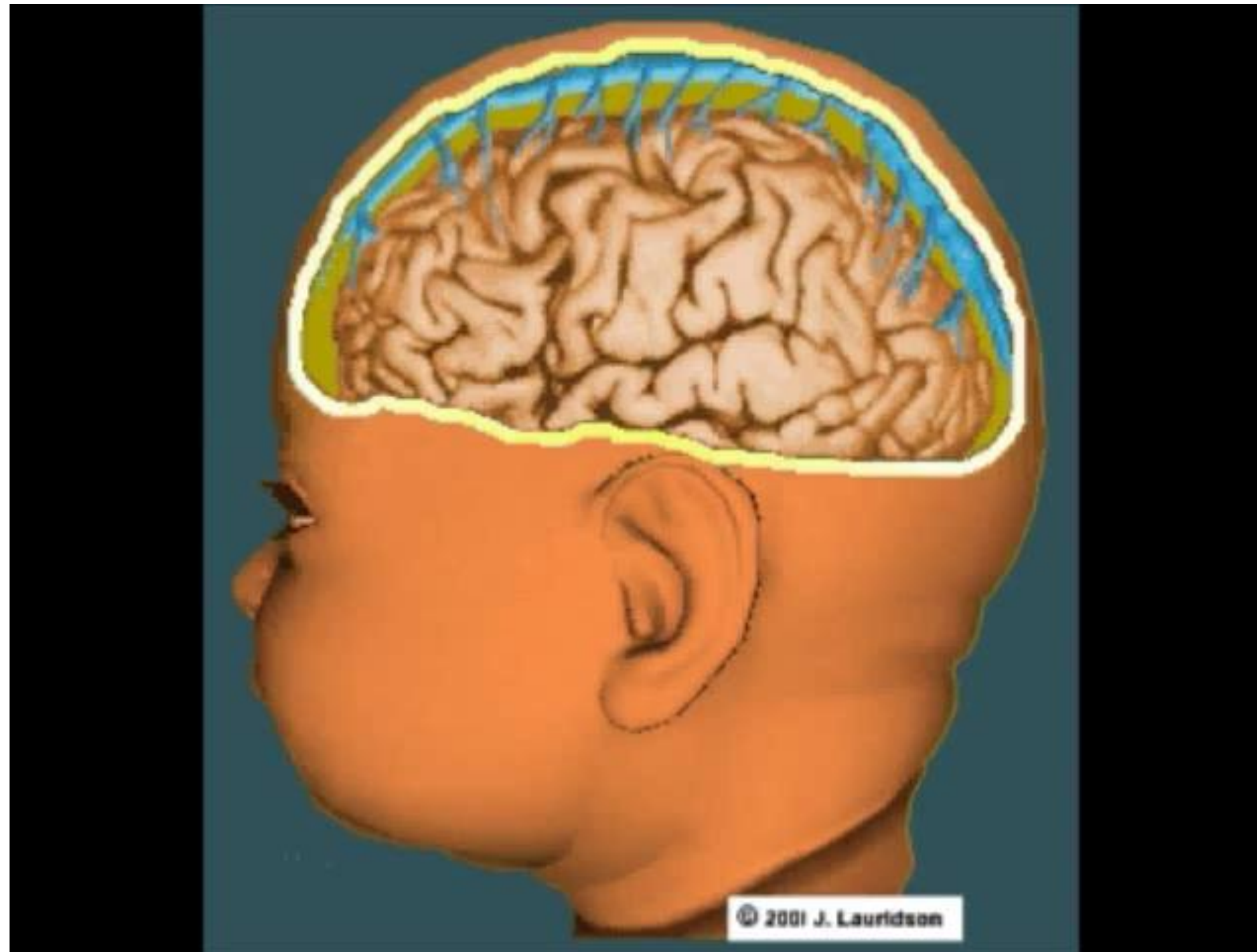
- Subdural hemorrhages
- Subarachnoid hemorrhages
- Retinal hemorrhages

PHYSICAL SIGNS OF SHAKING

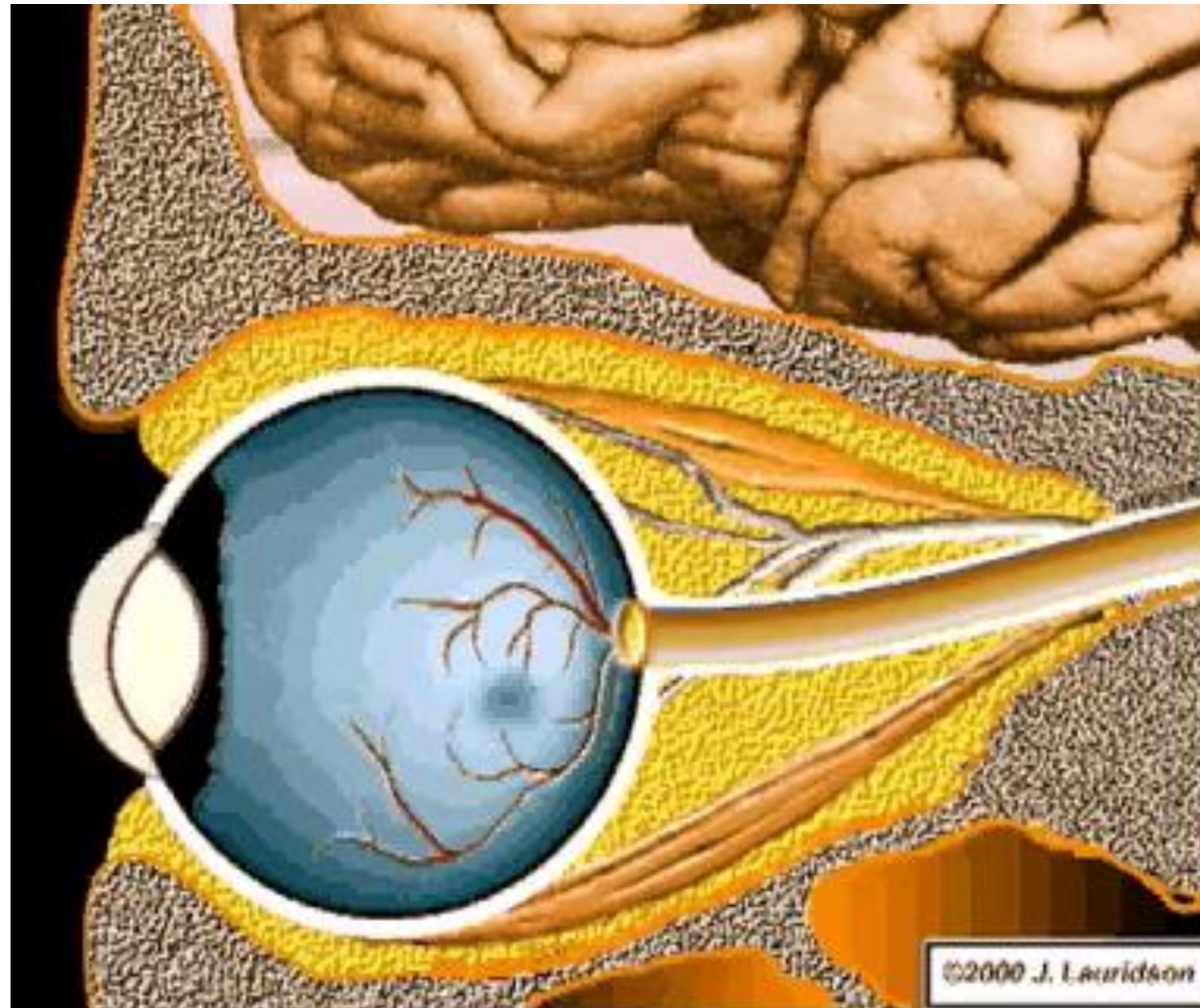


- Weak neck muscles
- Person doing the shaking is much bigger
- Large head-to-body ratio
- **Violent, sustained** force

INTRACRANIAL CASCADE FROM SHAKING



MECHANICAL STRESSES AND EYE LESIONS



HOW MUCH FORCE IS NEEDED?

Unknown

No way to measure this

Many variables to be considered

VIOLENT and SUSTAINED shaking, with or without impact,
is thought by most experienced clinicians to produce these
injuries.

INJURIES

Skull:

- fractures
- soft tissue swelling
- Fluid collection (subdural space)

Eyes:

- extensive, multi-layered retinal hemorrhages

Other injuries:

- Bruises (face, ear, neck, torso)
- Frenular tears/contusions
- fractures (ribs, long bone)

SENTINEL INJURIES

Bruising in nonmobile children has a strong association with abuse over accident.

- A sentinel injury is a fairly minor abusive injury that often comes before a more serious physical abuse injury in infants.
- 27.5% of abused infants had a previous sentinel injury.
- Sentinel injuries happened in early infancy: 66% at <3 months of age and 95% at or before the age of 7 months.
- Doctors are reportedly only aware of the sentinel injury in 41.9% of abuse cases.



TEN-4-FACESp

- Clinicians using tools such as TEN-4-FACESp to accurately diagnose (Pierce et al., 2021)
 - Bruising on the torso, ears, neck, frenulum, angle of jaw, cheeks, eyelids, subconjunctivae, any bruising on children under 4 months old
 - Bruising in these regions has a 96% sensitivity and 87% specificity for identifying abuse injury.

PHYSICAL SIGNS OF SHAKING

Milder Signs

- Trouble sucking or swallowing
- Decreased appetite
- Trouble sleeping
- Lethargy
- Low level of consciousness
- Vomiting
- Irritability

Severe Signs

- Unable to make sounds or follow movement
- Problems breathing or turning blue
- Seizures
- Unable to suck or swallow
- Unconscious
- Unresponsive

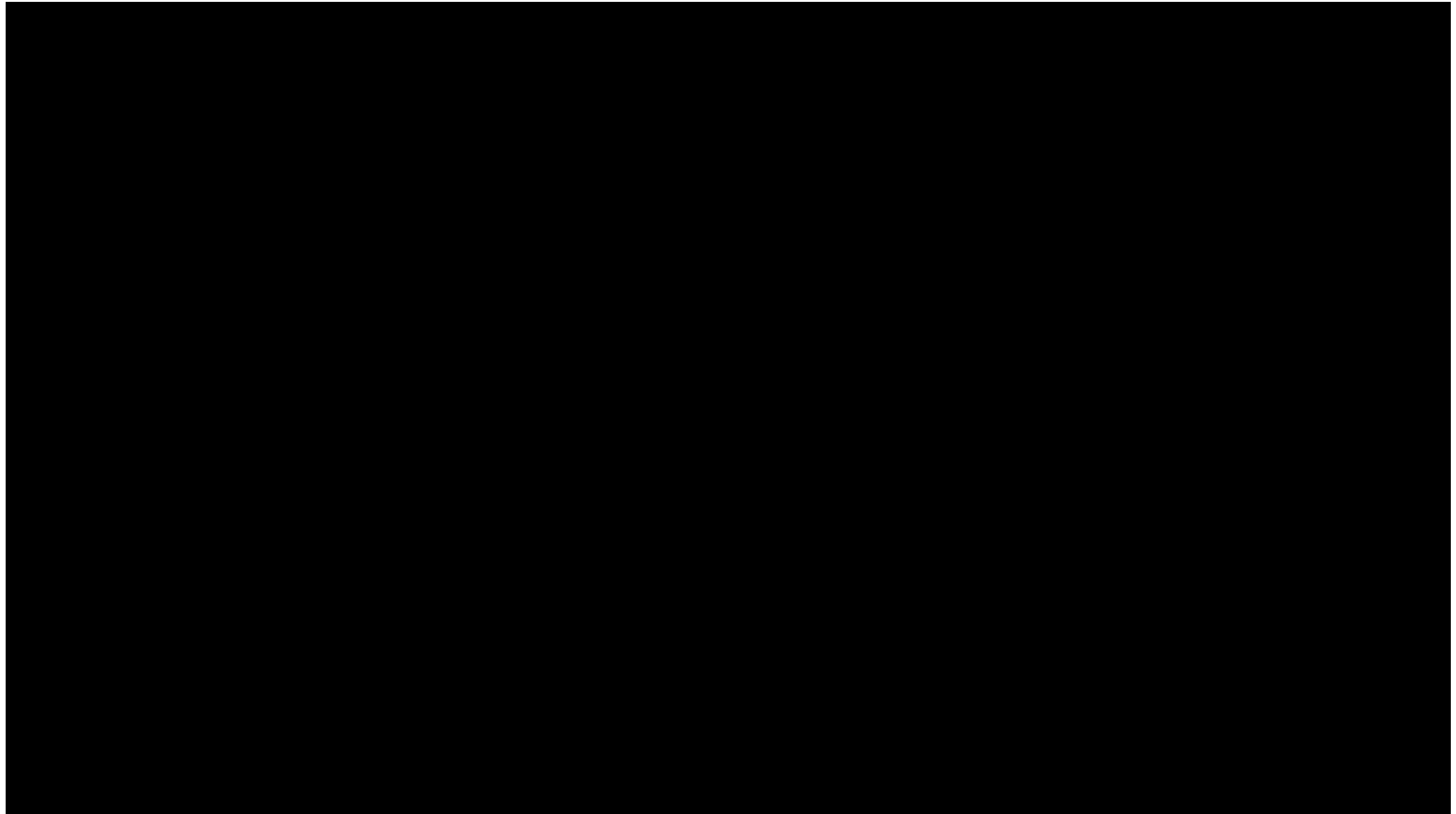
CONSEQUENCES OF SHAKING

- Cognitive disabilities
- Physical disabilities
- Visual disabilities or blindness
- Hearing loss
- Speech disabilities
- Cerebral Palsy
- Chronic seizures
- Behavior disorders
- Death

SBS/AHT IS NOT CAUSED BY:

- Bouncing a baby on your knee
- Tossing a baby in the air
- Jogging or bicycling with your baby
- Falls off a couch or other furniture
- Sudden stops in a car or driving over bumps
- Burping your baby

LIVED EXPERIENCES



WHAT TRIGGERS SHAKING?

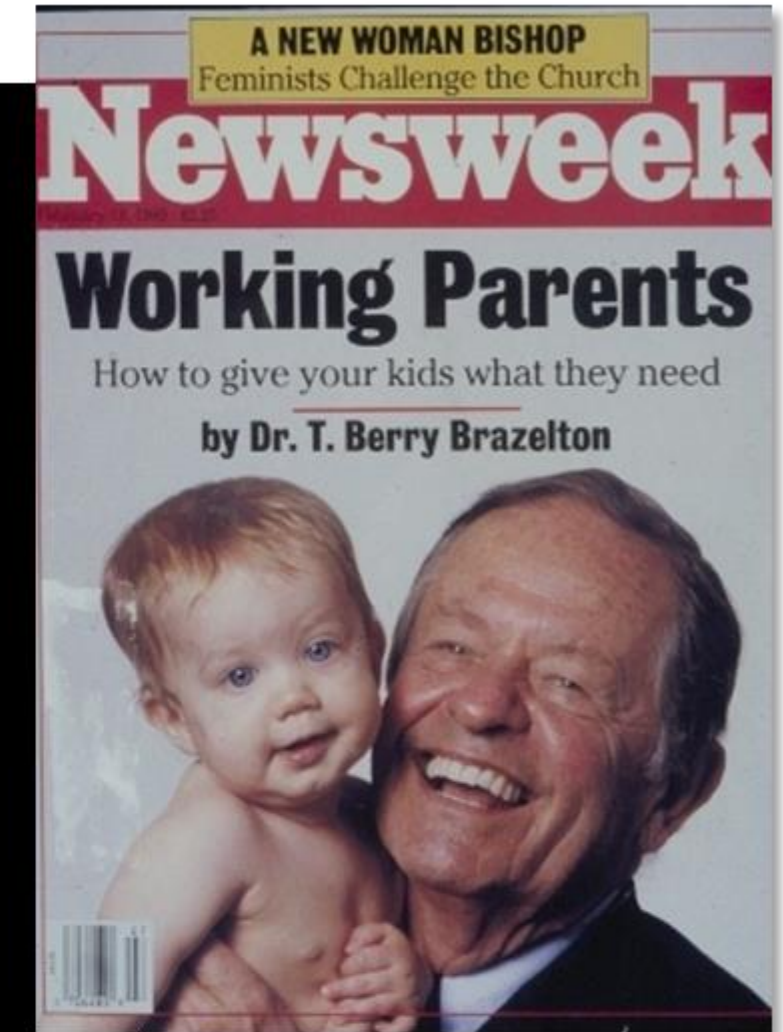
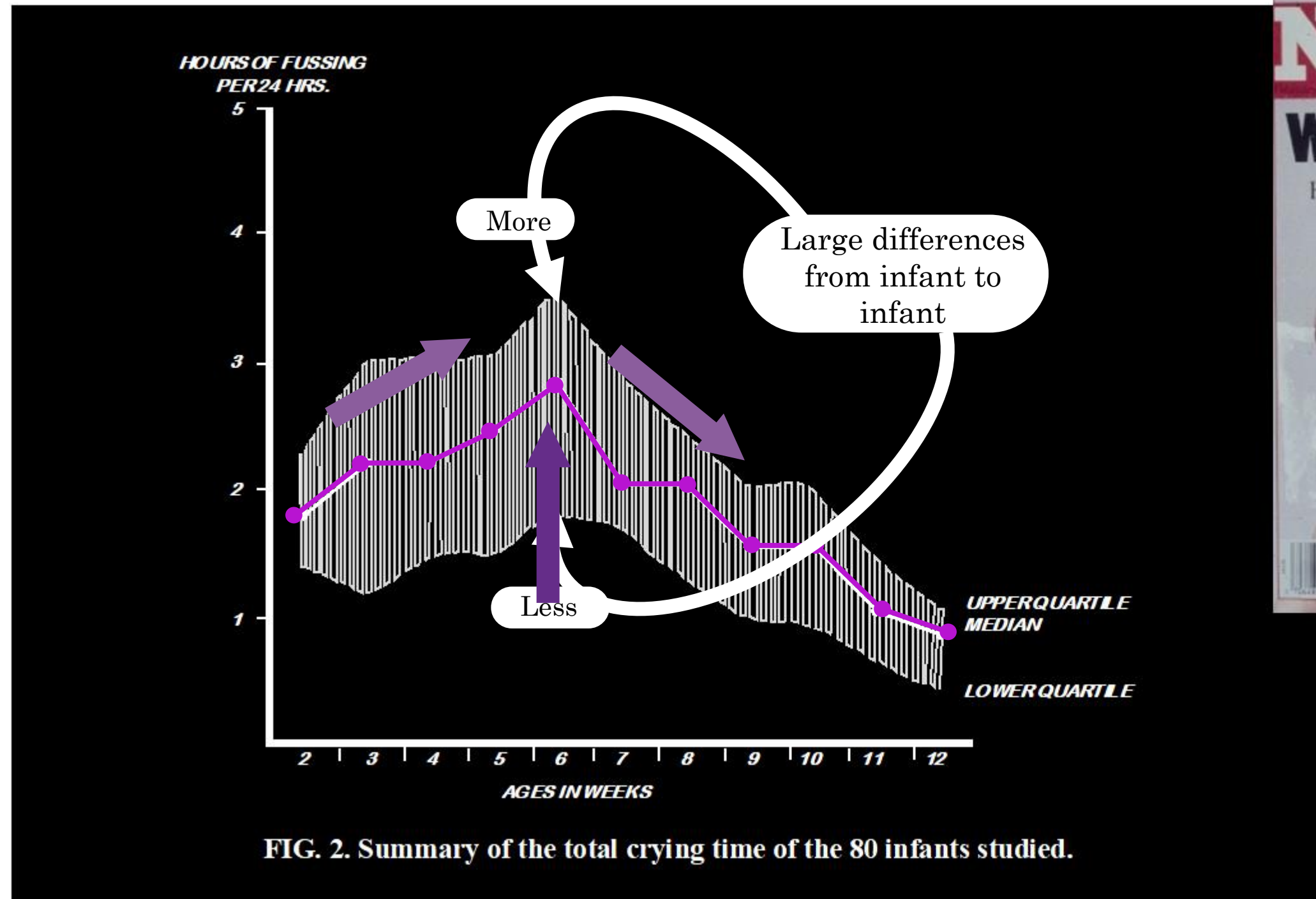
Situational Factors:

- Feeding Difficulties
- Toilet Training Difficulties
- Caregiver Frustration
- Societal Factors
- Perceived Misbehavior – Increased, unsoothable crying

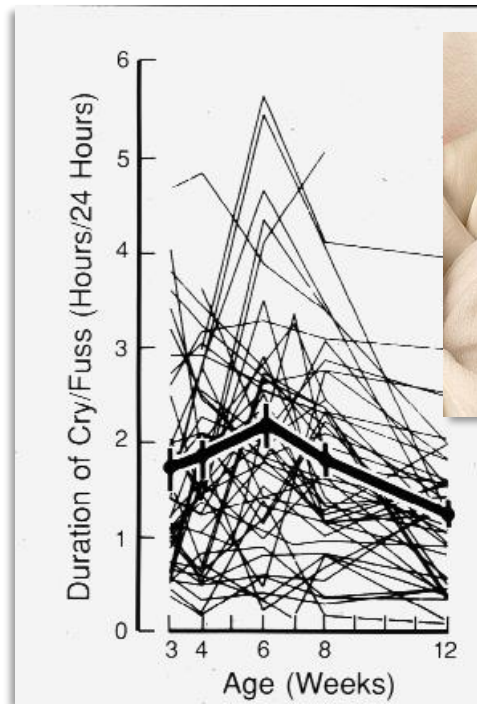
Perpetrator Confessions:

- Perpetrators often say the reason for shaking was because the baby wouldn't stop crying. (Barr, 2012)

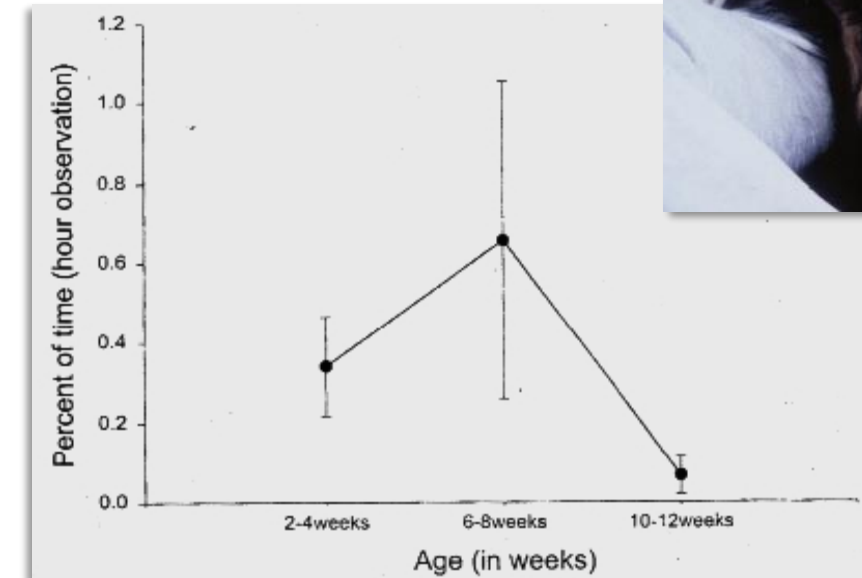
THE CRYING CURVE



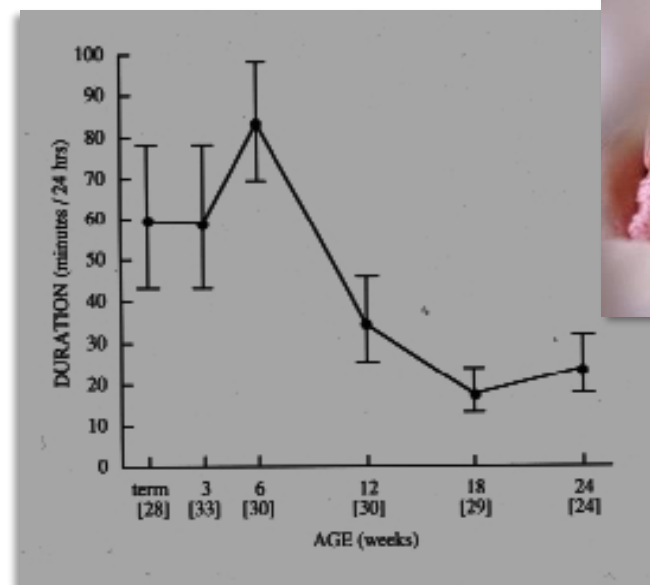
NORMAL CRYING/DISTRESS



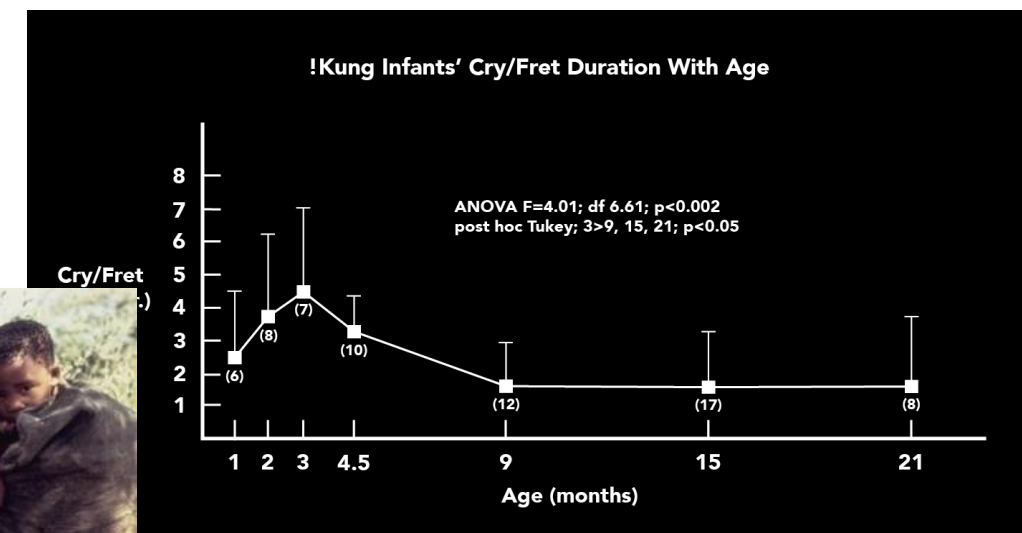
Peak Pattern Of Early Crying Behaviour.
(Hunziker & Barr, 1986)



Parental Responses to Infant Chimp Distress.
(Bard et al., 2000)

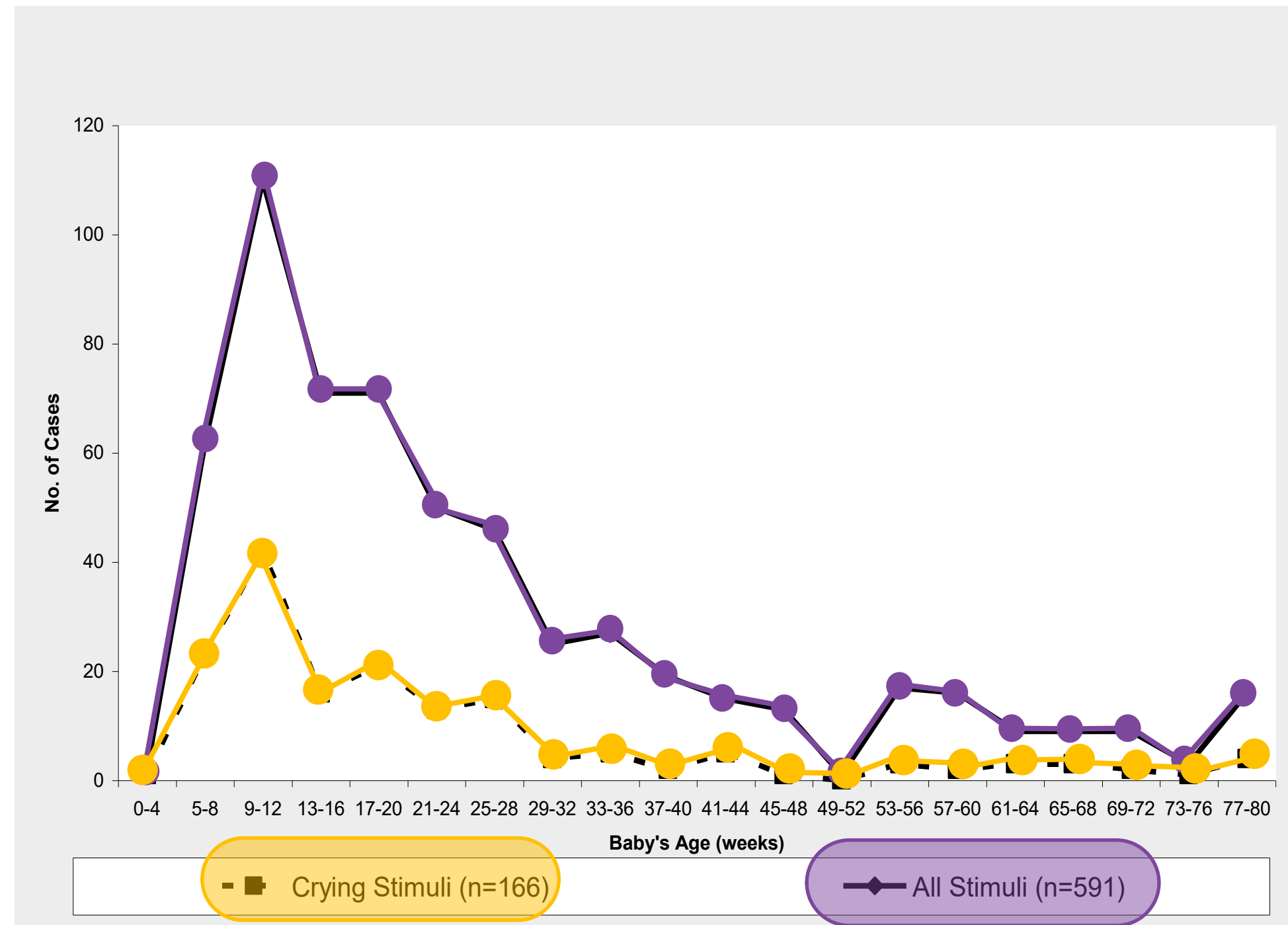


Age-related Crying Patterns in Preterm Infants.
(Barr et al., 1996)



Hourly Cry/Fret Duration in !Kung San Infants.
(Barr et al., 1991)

AGE-SPECIFIC INCIDENCE OF PUBLICLY-REPORTED CASES OF AHT



HOW COMMON IS AHT?

AHT is the leading cause of death from physical child abuse.

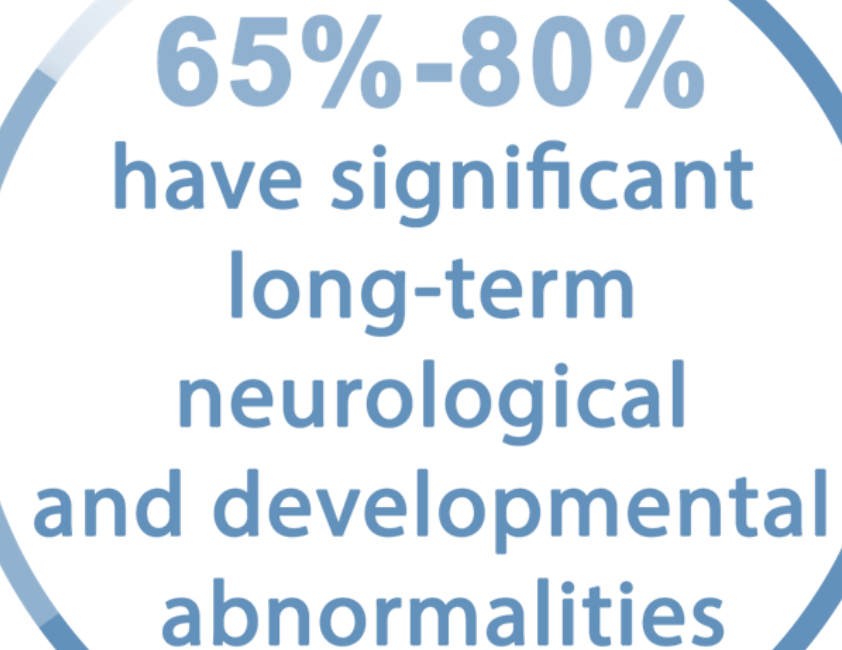
- Approx. 1,200-1,400 clinically recognized cases in the US each year. (Keenen et al., 2004)
- Approx. 32-38 cases per 100,000 children less than 1 year old. (Shanahan et al., 2013)
- 30%-40% of cases are missed at medical institutions. (Jenny et. al., 1999)
- Known incidence is likely just the tip of the iceberg.

Actual incidence is unknown

OUTCOMES OF HOSPITALIZED CASES

10% - 20% of victims die from injuries. (Narang et. al., 2025)

Of those who survive:



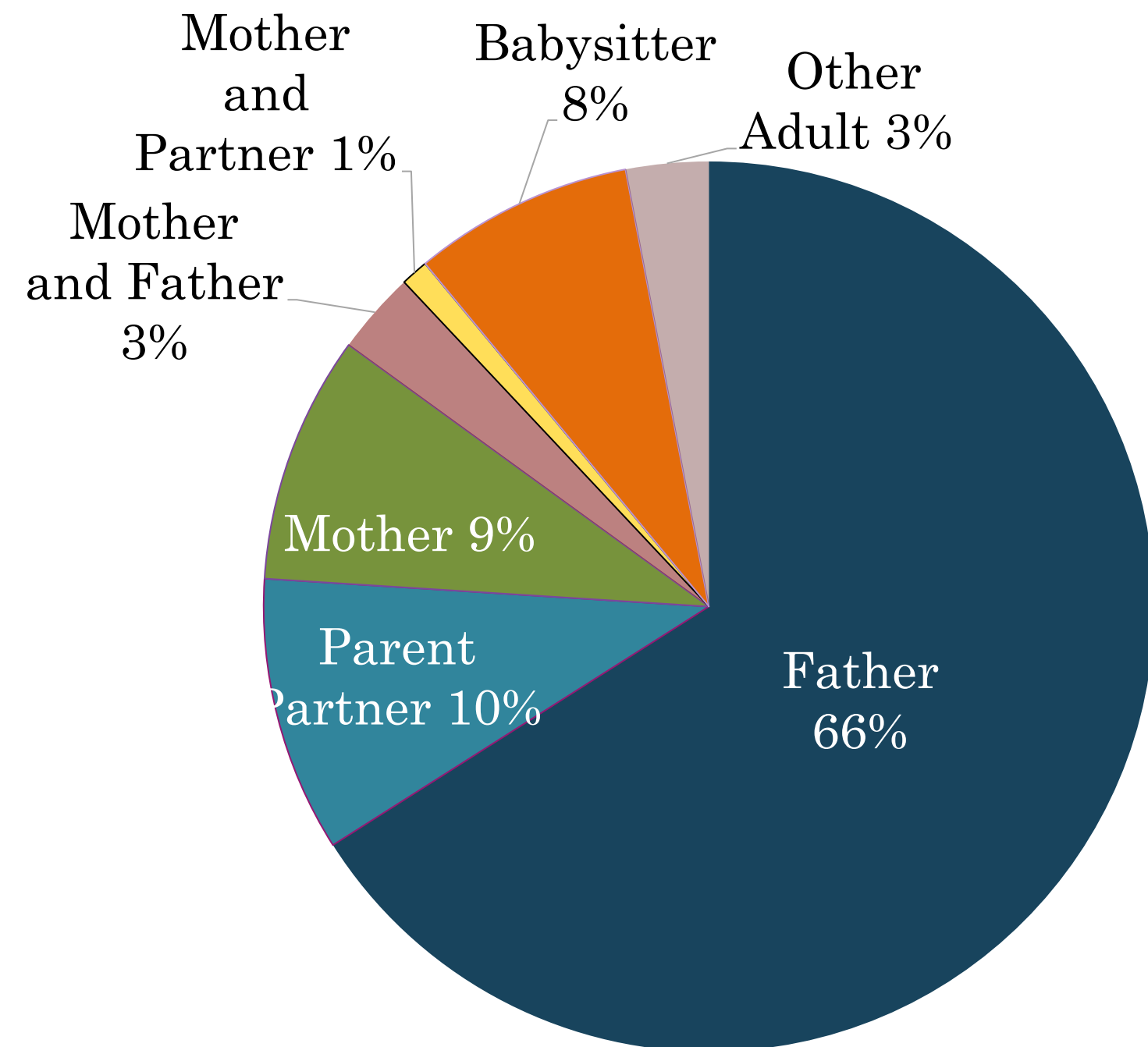
65%-80%
have significant
long-term
neurological
and developmental
abnormalities

VICTIMS OF AHT

- Incidence highest among infants under the age of 8 months.
 - Fatal AHT rates peaking in infants ages 1-2 months.
 - Victims reported in children up to age 5.
- Male infants are at an increased risk of AHT.
 - 62% of children with inflicted Traumatic Brain Injury (TBI) are male.
 - Male infants are more likely to be victims of severe AHT leading to death.
- Infants born to young mothers are at greater risk of infant maltreatment.
 - Maternal age was associated with maltreatment until 28 years of age.
 - <22 years conferred higher risk.
- Minority children are at an increased risk.
 - Higher risk for all TBI, inflicted and non-inflicted.

PERPATRATORS OF SHAKING EVENTS

- Fathers are the most common perpetrator for children under 1 year of age. (Scribano et al., 2013)
- Children under 1 year of age with siblings under the age of 5 years are more likely to be injured by biological parents. (Eismann et al., 2022)



Perpetrators of SBS/AHT <1 yr old

NON-ACCIDENTAL TRAUMA WORKUP

COMMON FEATURES THAT RAISE SUSPICION:

- No history of injury
- History not plausible
- Inconsistent explanation or changing histories
- Non ambulatory child
 - *especially when explanation for injury absent
- Multiple fractures
- Fractures of varying ages
- Delay in seeking care

THE ROLE OF CHILD ABUSE PEDIATRICIANS

- Child Abuse Pediatrician: Board Certified
 - Interpret the Medical Findings
 - Recognize presence of abusive/accidental injuries
 - Likely ways particular injuries may present
 - General biomechanics of injuries
 - Relevant medical diagnoses on the differential diagnosis
 - Interpret laboratory & radiological results
 - Educate Judge & Jury

MULTIDISCIPLINARY TEAM APPROACH

- Collaboration between experts ensures that all aspects of the child's injury, history, and environment are carefully reviewed.
- A team approach helps protect children and families by improving the accuracy of diagnoses, reducing bias, and ensuring that medical findings and investigations are thorough and fair.

Medical & Surgical Subspecialists

- Orthopedics
- Ophthalmology
- Critical Care
- Neurology
- Hematology
- Radiology
- Others

Other Professional Fields

- Law Enforcement
- Child Protective Services (CPS)
- State/District Attorney's Office
- Child Protection Team
- Medical Examiner
- Medical/Hospital Personnel
- Forensic Interviewer
- Child Advocate
- Others as needed

CONTROVERSY SURROUNDING AHT

“The AAP continues to embrace the “shaken baby syndrome” diagnosis as a valid subset of the AHT diagnosis.” (Narang et. al., 2020)

- Few pediatric diagnoses have engendered as much debate in medicolegal circles as AHT. (AAP, 2020)
- These cases are complex because a diagnosis can lead to serious outcomes—such as a child being removed from their home or an adult facing criminal charges.
- The disagreement isn’t about the science, which is well-established, but rather about philosophical and legal interpretations of the evidence.

AAP POLICY & CONSENSUS STATEMENTS

- The “clinical signs of shaken baby syndrome are immediate and identifiable as problematic, even to parents who are not medically knowledgeable.”
 - AAP: Committee on Child Abuse and Neglect, *Shaken Baby Syndrome: Rotational Cranial Injuries—Technical Report*, 108 Pediatrics 206, 207 (2001).
- False controversy exists only in the legal arena- there is no controversy in the relevant medical community- among those who are properly trained and regularly diagnose the cause of injuries in children
 - APSAC Policy Report: Promoting Justice for Victims of AHT: Information and Strategies for Effective Courtroom Presentation

CONSENSUS STATEMENT ON AHT

"There is no controversy concerning the medical validity of the existence of AHT." (Choudhary et. al., 2018)

Professional Societies Involved:

- The Society for Pediatric Radiology (SPR)
- European Society of Paediatric Radiology (ESPR)
- American Society of Pediatric Neuroradiology (ASPNR)
- American Academy of Pediatrics (AAP)
- European Society of Neuroradiology (ESNR)
- American Professional Society on the Abuse of Children (APSAC)
- Swedish Paediatric Society
- Norwegian Pediatric Association
- Japanese Pediatric Society

AAP TECHNICAL REPORT

FROM THE AMERICAN ACADEMY OF PEDIATRICS | TECHNICAL REPORT | FEBRUARY 24 2025

Abusive Head Trauma in Infants and Children: Technical Report **FREE**

The American Academy of Pediatrics provides a comprehensive literature review in support of evidence-based medical evaluations to the diagnose abusive head trauma in children in a technical report.

- AHT is the third leading cause of head trauma in children younger than 5 years.
 - Peak incidence is around 2 months of age; the median is at 4 months of age, with decreasing incidence after infancy.
 - Mortality rate ranges from 10% to 20%.

SHORT FALLS

Short falls from couches, beds, changing tables, or falls while being carried almost never cause the features seen in abusive head trauma (shaken baby syndrome) or death.

- 1991 - children who acquire fatal head injuries from short falls have suspicious trauma histories.
- Rough play unlikely to cause similar devastating effects - but is discouraged.
- 2008 - current estimate of mortality rate for short falls affecting infants and young children is <0.48 deaths per 1 million young children per year.

SHORT FALLS

Chadwick DL, Chin S, Salerno C, Landsverk J, Kitchen L. J
Trauma, 1991. Vol. 31 No. 10. pp.1353-55

317 cases of children with a history from the caretaker that the child had fallen are analyzed.

- Seven deaths occurred in 100 children who fell 4 feet or less.
- One death occurred in 117 children who fell 10 feet to 45 feet.
- The 7 children who died in short falls all had other factors in their cases which suggested false histories.

It is likely that history is incorrect when children incur fatal injuries in falls of less than 4 feet.

“OVERTURNED” AHT CASES

- Evaluated overturned SBS/AHT convictions
 - The prevalence and characteristics of overturned SBS/AHT convictions in appeals system
 - The legal basis for overturned convictions
 - Characteristics of medical evidence-related arguments
- Started with 1431 SBS/AHT convictions with appellate rulings since 2008
- 49 (3%) overturned with 20 (1%) on medical evidence related grounds.
 - Most common theme was controversy over the SBS/AHT diagnosis or accidental injury mechanism
- Upon retrial, 42% defendants either re-plead guilty to or were convicted again of the same offense.

Cases are rarely overturned. When successful – not based on “new scientific discovery” but on differing medical opinions.

MEDIA INFLUENCE ON COURTS




Robert Roberson

- Convicted in 2003 for death of 2y daughter, placed on death row
- Execution halted in fall 2024 after extensive international media attention
 - Theme of the use of “disputed SBS/AHT science” in criminal convictions
 - Influenced legal and policy reconsideration of SBS/AHT cases
- False narrative of SBS/AHT diagnosis potentially puts infants at risk



PREVENTION



Abusive Head Trauma in Infants and Children: Technical Report

American Academy of Pediatrics

February 24, 2025

Primary Prevention Focus: Emphasizes supporting caregivers during early infancy when frustration and infant crying peak—key risk period for AHT.

Parent Education Programs: Endorses evidence-based programs (e.g., *Period of PURPLE Crying*) that educate about normal infant crying patterns and coping strategies.

Hospital-Based Interventions: Recommends universal delivery of AHT prevention materials in birthing hospitals as part of discharge protocols.

Key Prevention Components: Effective programs include education on crying, calming strategies, dangers of shaking, and identifying alternate caregivers when overwhelmed.

System-Level Support: Encourages integration of AHT prevention into pediatric visits, home visiting, and community health services to reinforce messaging.

AHT: IT'S PREVENTABLE



Only form of child maltreatment where we know the specific trigger and timing of the incident.



Crying is the #1 trigger for AHT and infant abuse. Increased infant crying peaks around 2 months of age.



Educating parents that crying is normal reduces incidents of SBS/AHT.

Period of **PURPLE** Crying®

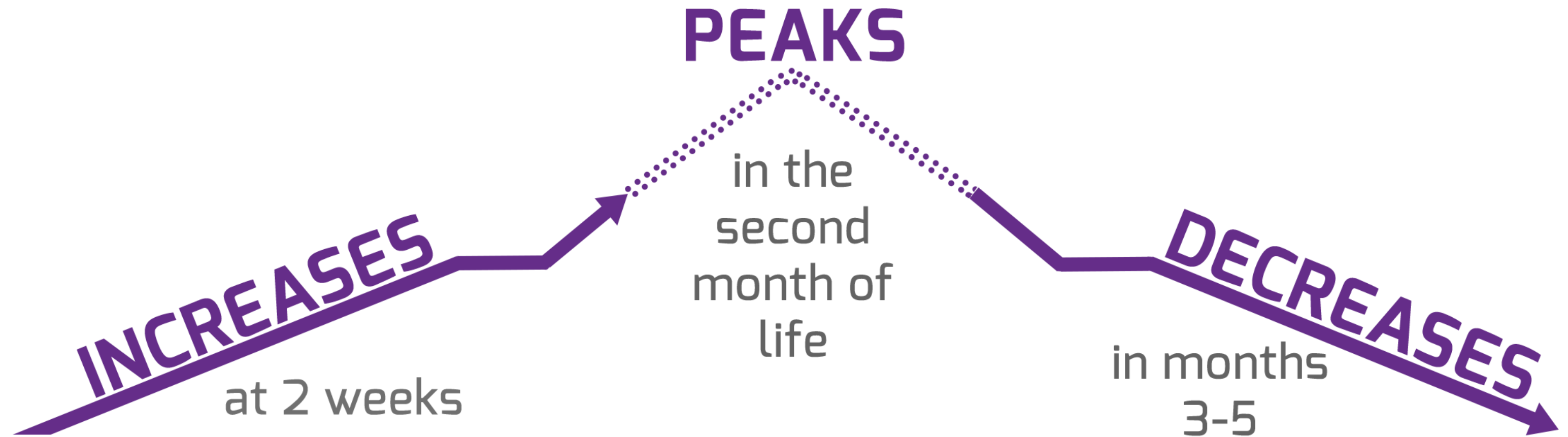
THE *PURPLE* ACRONYM

The Letters in **PURPLE** Stand for



The word ***Period*** means that the crying has a beginning and an end.

THE CRYING CURVE



One of the **BIGGEST STRESSORS** for **PARENTS** is the normal period of increased crying all babies experience in the first few months of life.

PROGRAM MATERIALS

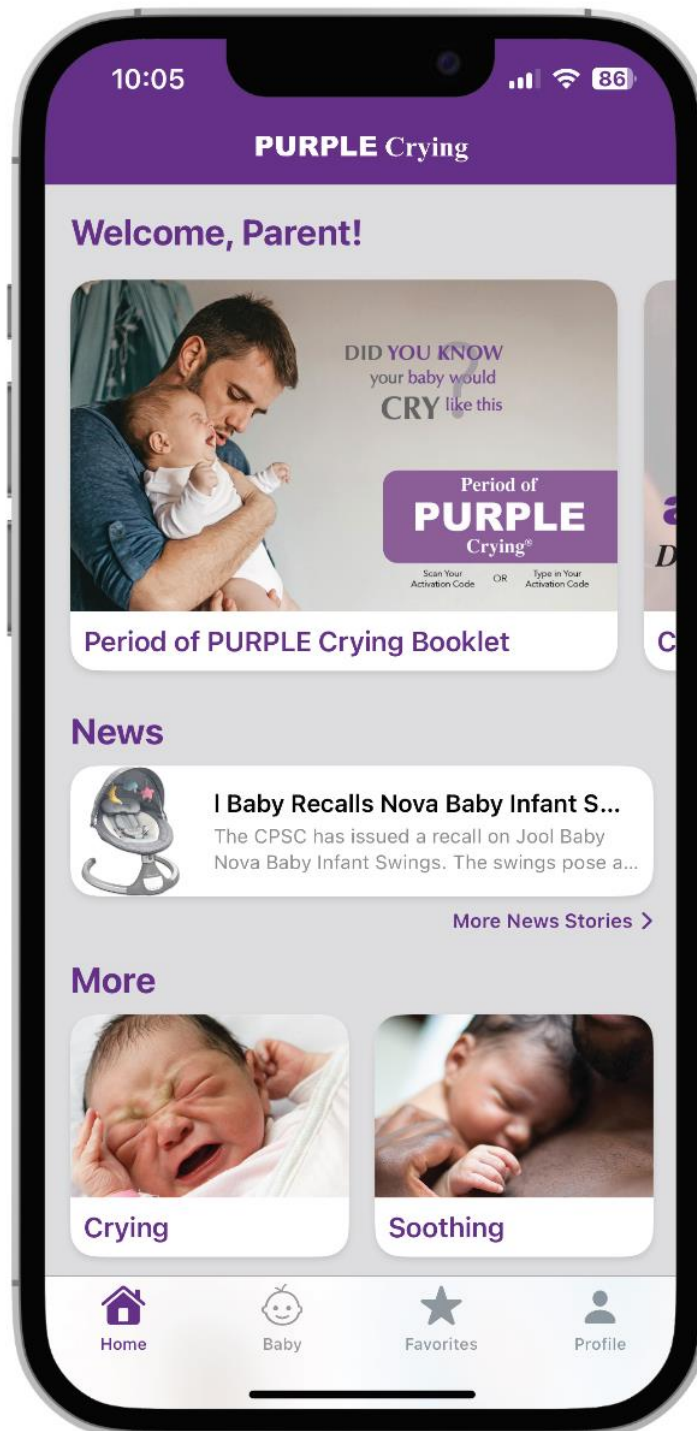
Available in English & Spanish on:



Closed captioning available

Booklet Translated in:

- English
- Spanish
- French
- Arabic
- Haitian Creole
- Somali
- More to come...



THREE DOSE EXPOSURE



Teach

1

Targets parents and caregivers of newborns 0-2 weeks old.

Trained providers deliver education and materials to parents.

Hospital discharge setting, Perinatal/Postnatal Classes, Home Visiting, etc.



2

Reinforce

Targets parents and caregivers of newborns 2 weeks to 3 months old.

Trained providers reinforce key program messages and deliver materials if necessary.

Home Visiting, Pediatric Well Baby Visits, Public & State Department of Health Programs, etc.



Advocate

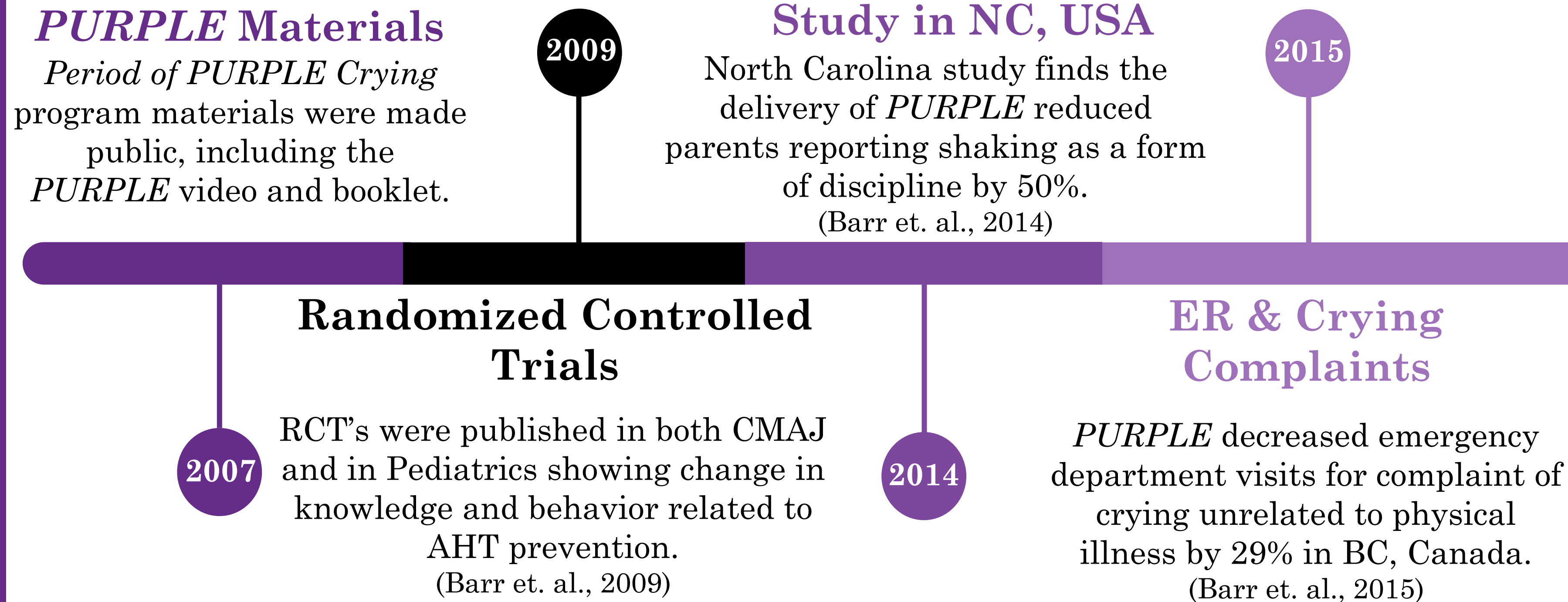
3

Targets the general population. Not set to timing of baby's birth.

Dependent upon organization's capacity to educate the community.

“Normal” Ad Campaign, *PURPLE* Toolkit, etc.

RECENT RELEVANT RESEARCH



RECENT RELEVANT RESEARCH CONTINUED

A horizontal timeline bar with four segments: light purple, medium purple, black, and dark purple. Five circular markers are connected to the bar by vertical lines. The markers for 2018, 2021, and 2023 are purple, while the markers for 2019 and 2022 are black. Each marker points to a research finding.

Cost-Effectiveness

2018

Every dollar spent on *PURPLE* had an associated \$54 savings by society, compared to Zero Tolerance (\$25/\$1) or Child Safety Seat Laws (\$42/\$1).
(Beaulieu et. al., 2019)

2021

Infant Physical Abuse

Hospitalization rates for physical abuse in children under 2 years of age decreased by 30% in BC, Canada after *PURPLE* was universally implemented. (Pike et. al., 2023)

8-Year Study

Study shows *PURPLE* is associated with a 35% reduction in AHT in children under 2 years.
(Barr et. al., 2018)

2019

Hispanic Mothers

Hispanic mother's knowledge of normal infant crying patterns was improved through *PURPLE*.
(Jalloul et. al., 2021)

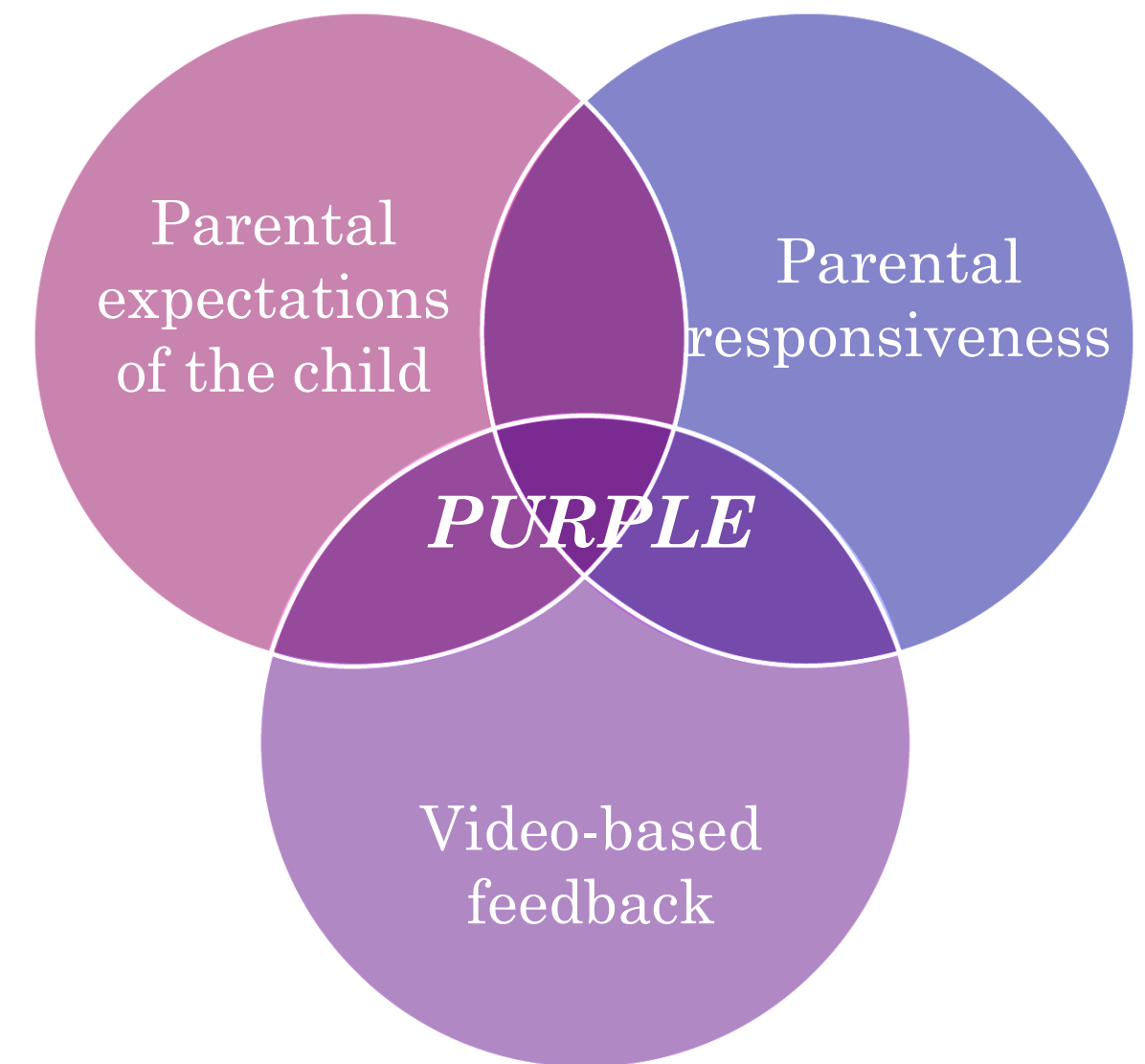
2023

HOME VISITING & PURPLE

Home Visiting programs that include these components show improved effectiveness:

Components:

- Focus on improvement of parental expectations of the child and parenthood in general ($p=0.016$).
- Targeting parental responsiveness or sensitivity to a child's needs ($p<0.001$).
- Video-based feedback ($p=0.038$).

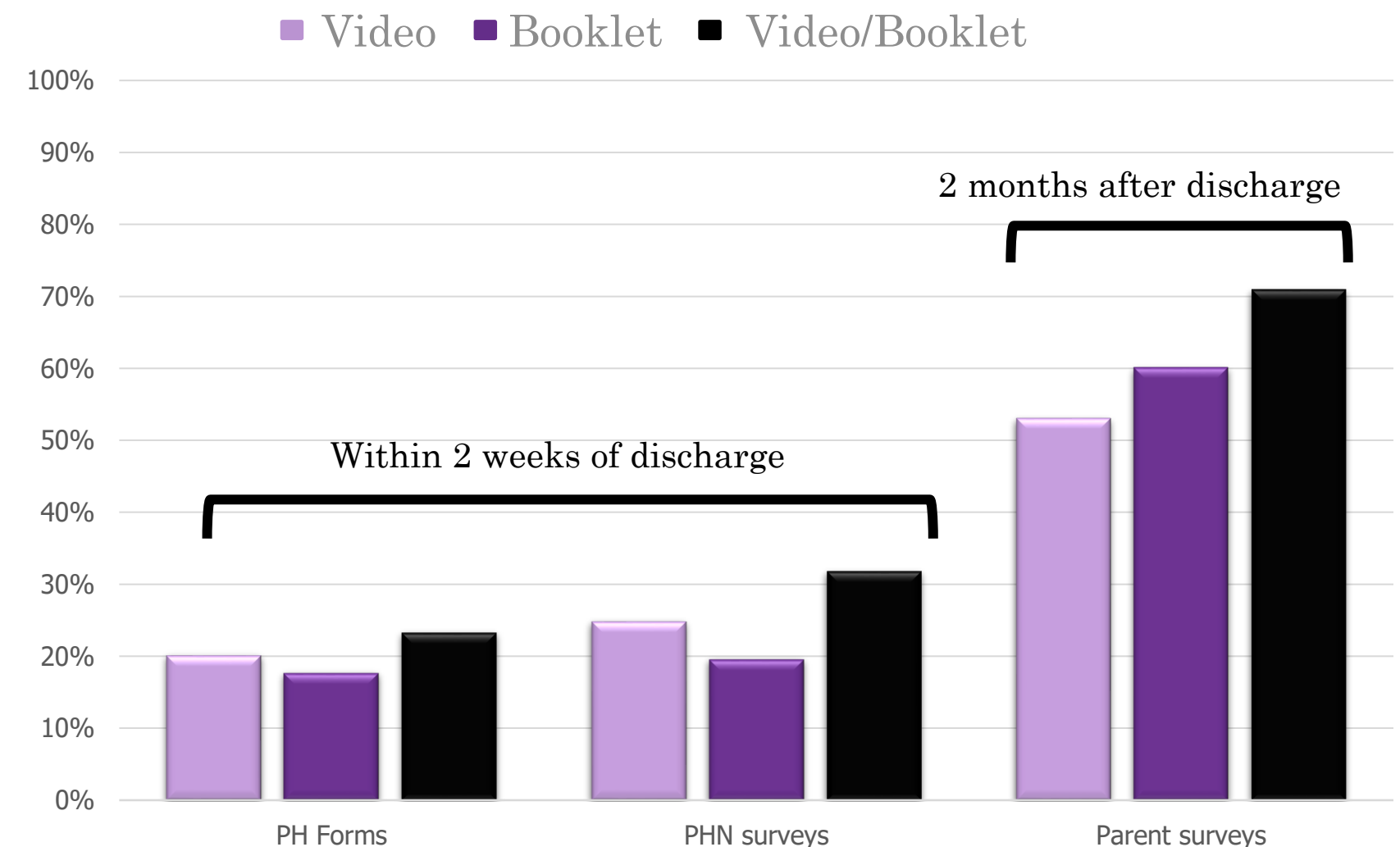


WHY ARE MATERIALS IMPORTANT?

It is critical that parents take a set of program materials home.

Results: Reading and Viewing Materials, Among Mothers:

1. Both booklet and *PURPLE* video were used.
2. Use of booklet and *PURPLE* video **more than doubled** at home post-discharge.

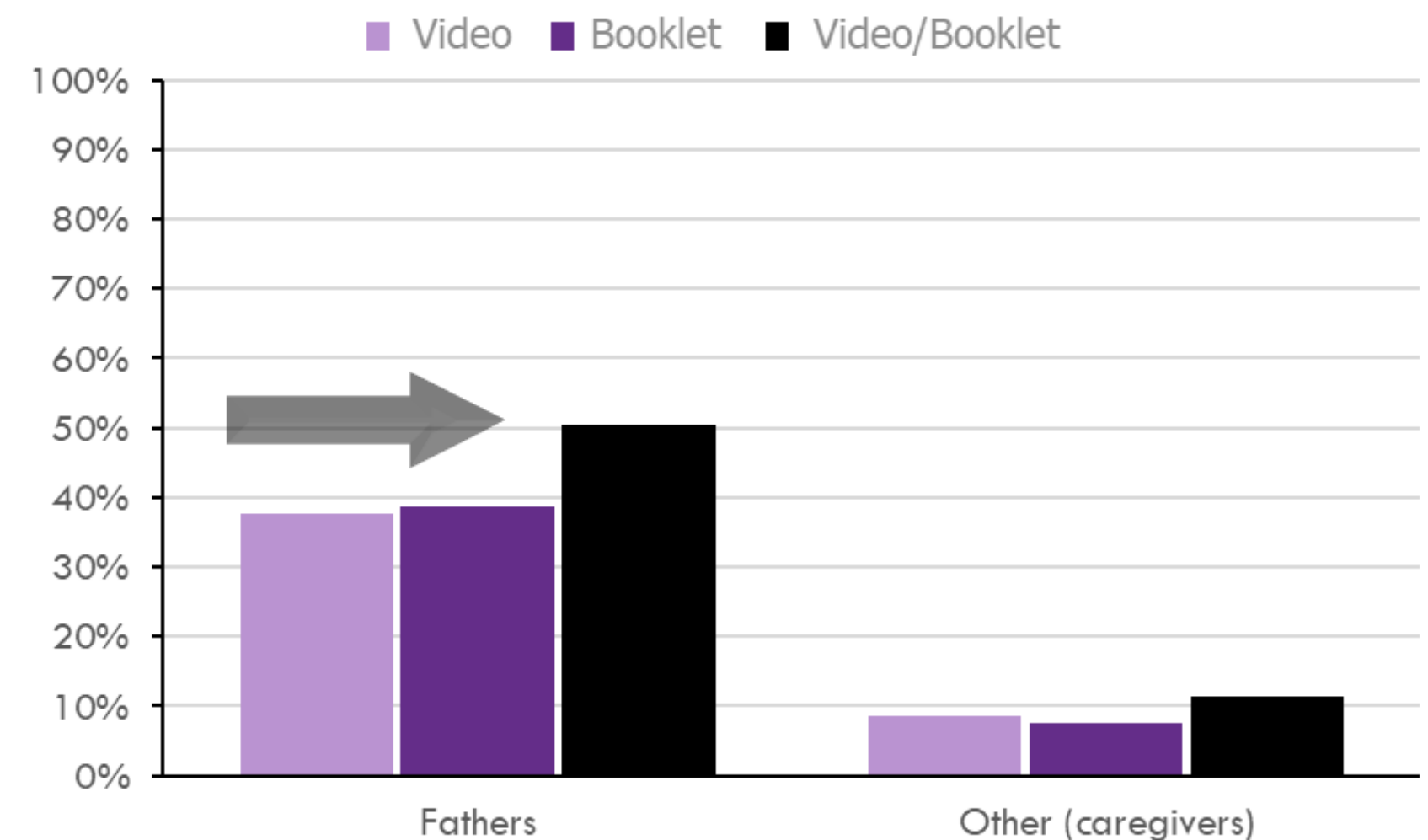


WHY ARE MATERIALS IMPORTANT?

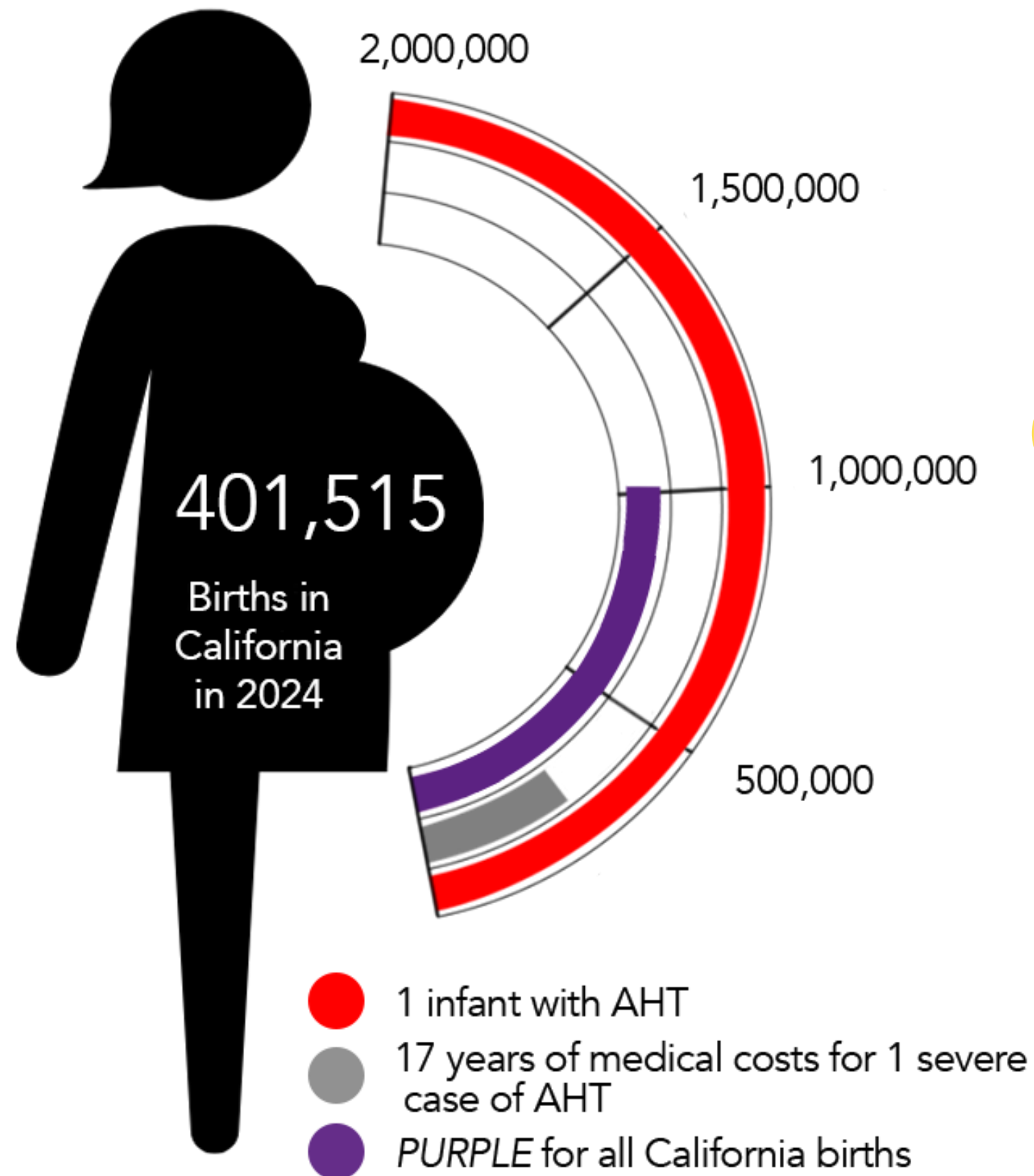
It is critical that parents take a set of program materials home.

Results: Reading and Viewing Materials, Among Fathers:

By 2 months **50% of fathers** had read/viewed the materials



COST BENEFITS OF PREVENTION



Projected Lifetime Costs

- 1 The total cost of AHT per mildly affected case is **over one million dollars**. From a societal perspective, the discounted average lifetime cost of a surviving AHT victim cost \$2.6 million and AHT death \$5.7 million (Miller et al., 2017)

Medical Costs

- 2 A 2020 study revealed that the cost of medical care alone for a severely injured victim (2.5 mo. to age 17) was **\$261,499**. During that time, a total of \$106,607 was paid out-of-pocket by the family (Steinbeigle et al., 2020)

Cost-Effectiveness

- 3 The *PURPLE* program costs \$2.50 per family if there are roughly 401,515 births a year in California the estimated yearly cost would be \$1,003,787. Less than projected lifetime costs to society for one victim.



NCSBS RESOURCES

SCHOOL-BASED SBS/AHT CURRICULUM

- Designed to be taught to grades 6-12
- Comes with script educators can read from as well as Instructor Guide
- Includes curriculum, videos, interactive classroom activities, and a quiz
- Can be adapted to fit anywhere from 15 minutes to 2 hours of classroom time



CHILDCARE PROVIDERS

INTRO TO SBS/AHT

Educates childcare providers and educators about the latest information on:



- Basics of Shaken Baby Syndrome
- The *Period of PURPLE Crying*
- Soothing a Crying Baby
- Coping with a Crying Baby
- Safe Sleep
- Recognizing Child Abuse
- Reporting Child Abuse

WORKING TOWARDS

- National Legislation
 - Mandated prevention education
 - Increased funding for non-profit organizations
- Consistent Messaging
- Universal Support for Families
 - Widespread access to home visiting programs
 - Paid parental leave
 - Support of the family unit as a whole



NATIONAL PREVENTION LEGISLATION

- Minnesota – Minnesota State Department of Health
 - Minnesota Infant Mortality Reduction Initiative Statute 114.574
 - Requests hospitals to provide a commissioner approved video
 - MECSH Model Home Visiting Program *PURPLE* is embedded
- Wisconsin – Child Abuse & Neglect Prevention Board
 - Statewide funding for hospitals, home visiting programs, child advocacy, etc.
 - Children's Wisconsin began delivery in 2009, all units collaborate with program delivery.
- Oklahoma – Oklahoma State Department of Health
 - Preparing for a Lifetime Program – aims to improve infant and maternal outcomes
 - State allocated funding, serves over 80% of families with new babies with hospital partnerships

FLORIDA SENATE BILL 1482

Purpose: Intended to require the Department of Health to adopt and distribute evidence-based parent education materials detailing the dangers of AHT, including SBS.

Scope of Materials: Materials could be delivered via written, visual, or electronic formats. Must explicitly explain signs, risks, and prevention strategies related to shaking.

Implementation Plan: Mandated a multi-year phase-in schedule for distribution.

Effective Date: If enacted - July 1, 2025

Legislative Outcome: Indefinitely postponed on May 3, 2025. Died in the Senate Health Policy Committee on June 16, 2025.



CONSISTENT MESSAGING

- Early infant crying is NORMAL
- There will be times you won't be able to soothe the baby
- The crying is neither the caregiver's nor the baby's fault
- It's OK to put the baby down and take a short break to calm yourself down
- Increase Carry, Comfort, Walk and Talk actions
- NEVER shake a baby or child
- If you have concerns, have your doctor examine the baby
- The crying WILL come to an end

UNIVERSAL SUPPORT FOR FAMILIES

- Research shows that **economic support for families** can help reduce cases of **Abusive Head Trauma (AHT)** in infants and young children.
- In **California**, after a **Paid Family Leave policy** was introduced in 2004, hospital admissions for AHT **significantly decreased** among babies under 1 and 2 years old. (Klevens J. et al., 2016)
- States **without paid family leave** did **not** see the same drop in AHT cases.
- Another study found that states offering a **refundable Earned Income Tax Credit (EITC)** also saw **fewer hospital admissions** for AHT in children under 2.
- These findings suggest that **financial stability and time at home with newborns** can help prevent child abuse — though **more research is needed** to fully understand the connection.



STAY IN TOUCH

Danielle Vázquez

dvazquez@dontshake.org

(801)-447-9360 x 111



National Center on
Shaken Baby Syndrome
Celebrating our **25**th Anniversary

Shantel Wakley

swakley@dontshake.org

(801)-447-9360 x 102



National Center on
Shaken Baby Syndrome
Celebrating our **25**th Anniversary

Thanks for joining us!

WHAT'S NEXT?

- Survey and certificate in the chat now
- Follow-up email with resources within two days
- Watch your inbox for the next issue of *CalTrin Connect*



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