

Methamphetamine Exposure in Pregnancy, Infancy and Childhood

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UNSW
SYDNEY





1 in 20 or >15,000 Australian babies are born
each year to mums who use addictive
substances in pregnancy
1-5% are born to mums with substance use
DISORDERS

**Everything
taken by Mum
in pregnancy
crosses into the
infant**



The Baby Goes Through What Mum Goes Through



Chronic exposure

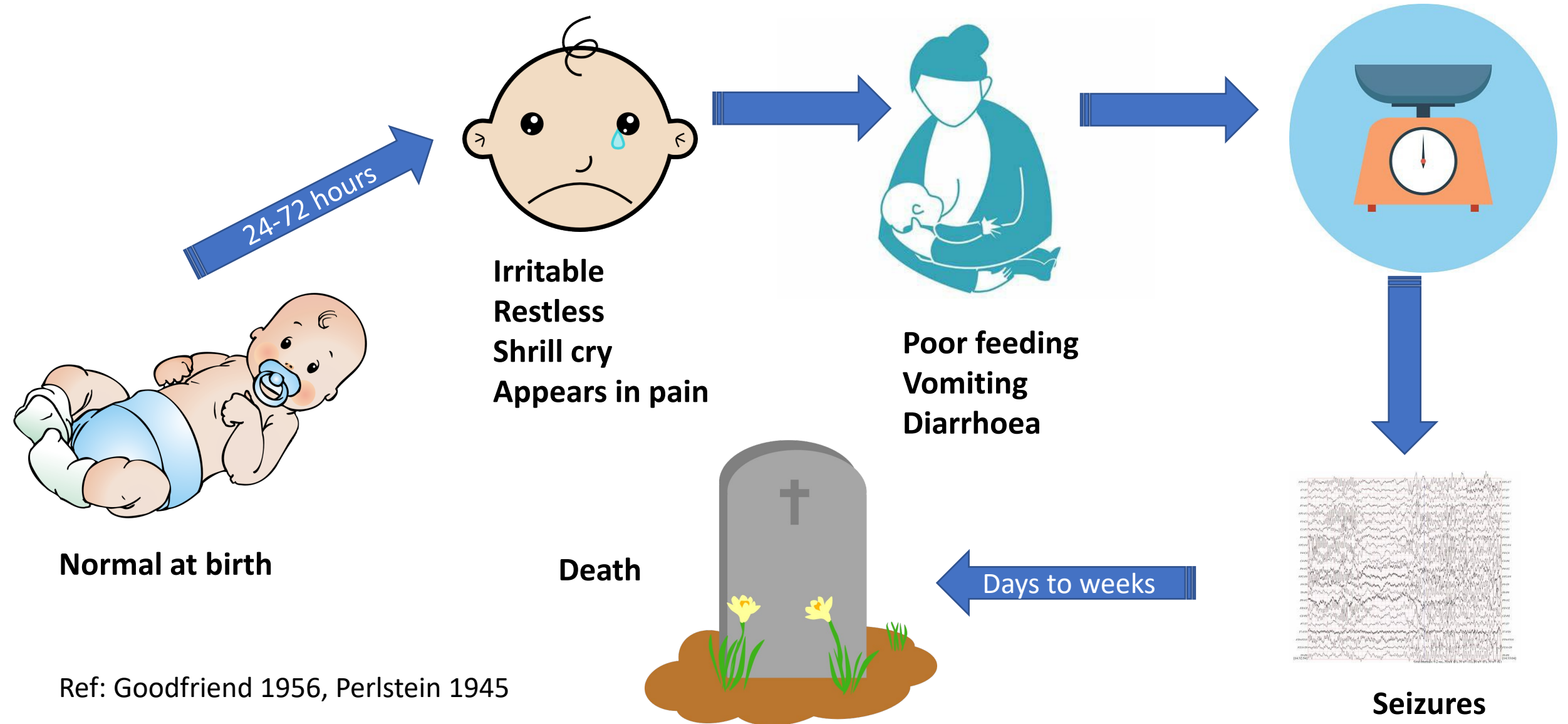


No more drugs



Withdrawal

What Happens to Withdrawing Babies?



Ref: Goodfriend 1956, Perlstein 1945

Neonatal Drug Withdrawal is NOT NEW

CONGENITAL MORPHINISM

A Rare Cause of Convulsions in the Newborn

MEYER A. PERLSTEIN, M.D.
Chicago

A rare and little known cause of convulsions in the newborn is congenital morphinism. Although unmentioned in standard textbooks of pediatrics or medicine, it is known to physicians whose patients include morphine addicts and who thus have learned that children born to addicted mothers often die in the first week of life. The infants are born at full term and are apparently normal, but their addiction matches that of their mothers. Separation from the maternal circulation shuts off the supply of drug to the newborn, and withdrawal symptoms ensue within three days.

Infrequent reports of congenital morphinism have appeared in the literature, the first in 1875.¹ In 1892 Happel reported the cases of 12 infants born to mothers who were drug addicts. Nine of the 12 infants died.² In 1900 he added 5 more cases.³ In 1903 a correspondent, O. D., wrote in "Queries and Minor Notes" of *THE JOURNAL*⁴ of a baby born to a mother who had been addicted to morphine for three years. At birth the infant appeared normal, but on its second day it began to cry and continued to do so for two days, until treated with morphine $\frac{1}{120}$ grain (0.5 mg.) every other day. In 1912 Pettey reported on 20 infants born to 4 addicted mothers. One of these mothers had 16 infants, all but the last of whom died. The last infant was treated early and made an uneventful recovery.⁵ In 1920 Burnett reported a case in which symptoms

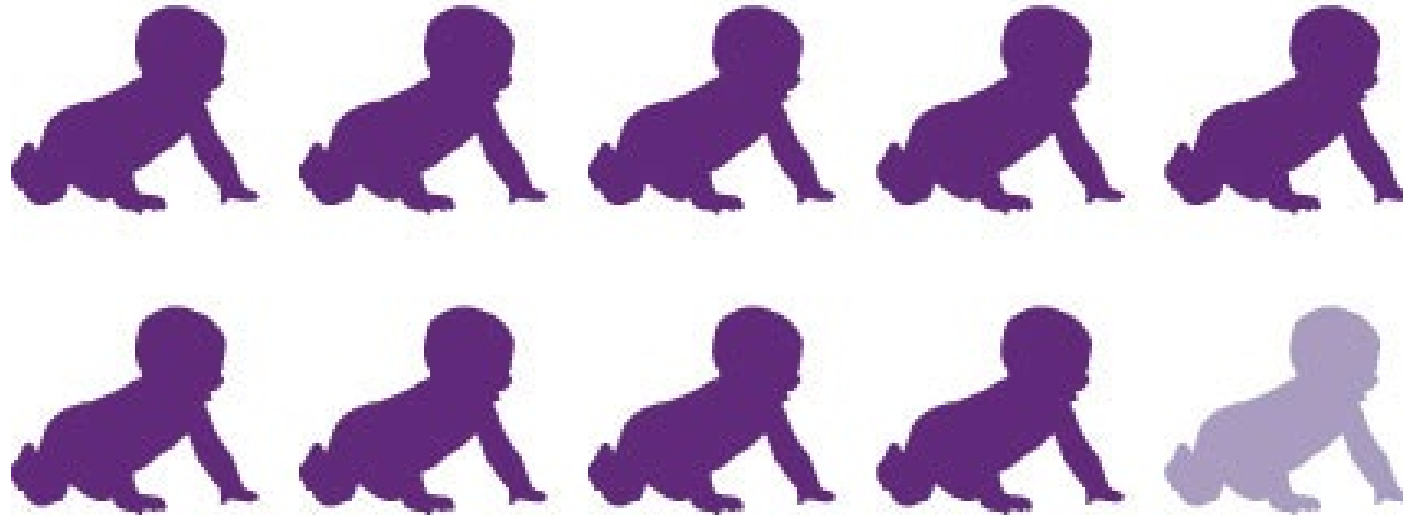


1875
WITHDRAWAL STARTS
IN A FEW DAYS IN
OTHERWISE NORMAL
BABIES

One mother had 16
babies: 15 died

For centuries, neonatal drug withdrawal was not a problem because.....

9 in 10 babies died



Goodriend et al 1956

Overall mortality 34%

Untreated 94%



Neonatal Abstinence Syndrome

ICD 10 = P96.1

“Neonatal withdrawal symptoms
from maternal use of drugs of
addiction”

**Many Drugs Cause Newborn Withdrawal
(some legal, others not quite)**

Opioids





Sedatives including Alcohol



Same Same

Cannabis



Cocaine
Not legal yet



Assorted other substances – all legal



**RED BULL
GIVES YOU
WIINGS.**



Finnegan Score

Developed in 1975 and unchanged since

- A withdrawal score for babies
- Developed for opioid babies
- Never validated for other drugs
- If scores are high (>8) = treat with medication



Now for Methamphetamine

Daily **Mail**
AUSTRALIA

ACT to become a 'fantasyland' of drugs: Police warn Canberra will attract cocaine, heroin, meth and LSD users

- ACT to decriminalise almost all illicit drugs
- Police warn of drug-fuelled sprees in Canberra

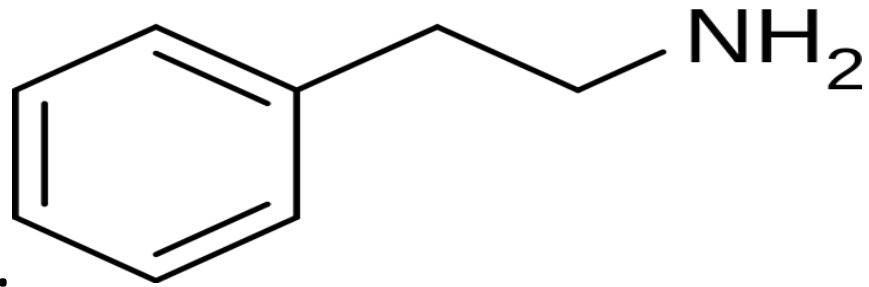
By [SARAH LIVERSIDGE FOR DAILY MAIL AUSTRALIA](#)

UPDATED: 17:33 AEST, 28 August 2023



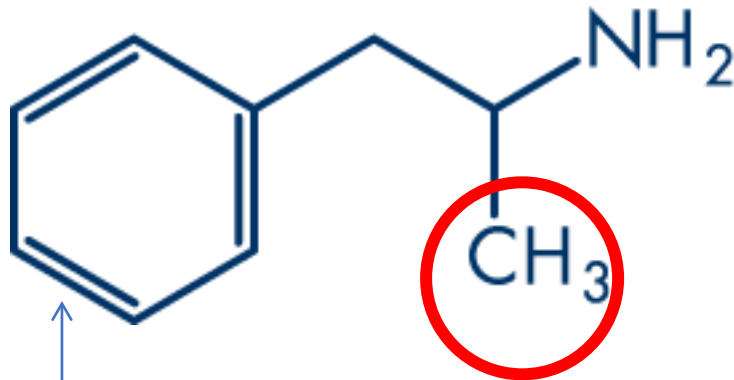
What are Amphetamines?

- Aka Alpha-methyl-phenethylamine
- Primary compound found in:
 - Fungi
 - Bacteria (e.g. e coli)

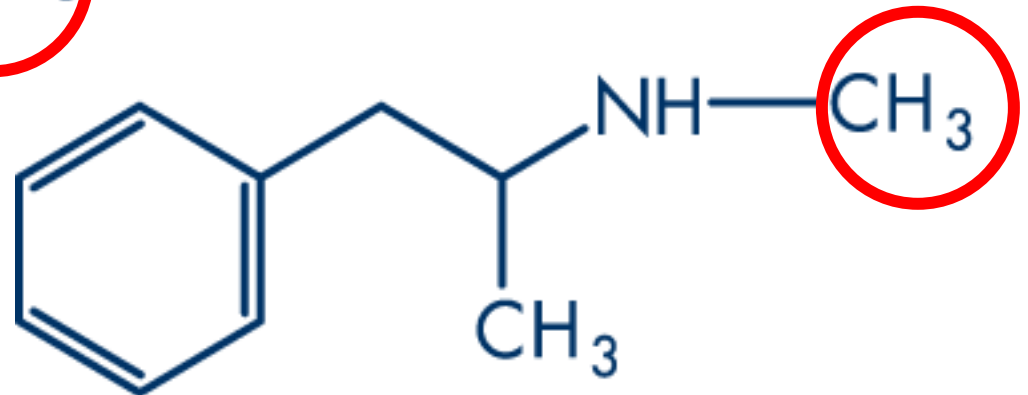


Phenethylamine

Amphetamine



METHAmphetamine



Benzene Ring

Amphetamines are Not New

- 1887 Phenylisopropylamine made by Romanian chemist, Lazar Edeleanu from Ma-Huang (aka ephedra)
- 1893 **methamphetamines** made by Japanese chemist Nagai Nagayoshi
- 1919 MA HCL (crystal meth) made by Akira Ogata (ephedrine with red phosphorus and iodine)
- 1927 Sympathomimetic properties discovered by pharmacologist, Gordon Alles (**tested it on himself**)



THE FIRST TEN YEARS

1928-1938

Ten years ago our research staff began to investigate the therapeutic possibilities of Benzadrine (amphetamine, S.C.P.). These years later, after extensive pharmacological and clinical tests, the compound, in the form of Benzadrine Inhaler, was placed on the market.

By the end of 1938, more than two million Benzadrine Inhalers, including samples to physicians, had been shipped from our laboratories.

Such a record, as the part of a product advertised only to the medical profession, demonstrates conclusively that Benzadrine Inhaler has earned the confidence of the physician.

**BENZEDRINE
INHALER**
A VOLATILE VASOCONSTRICTOR

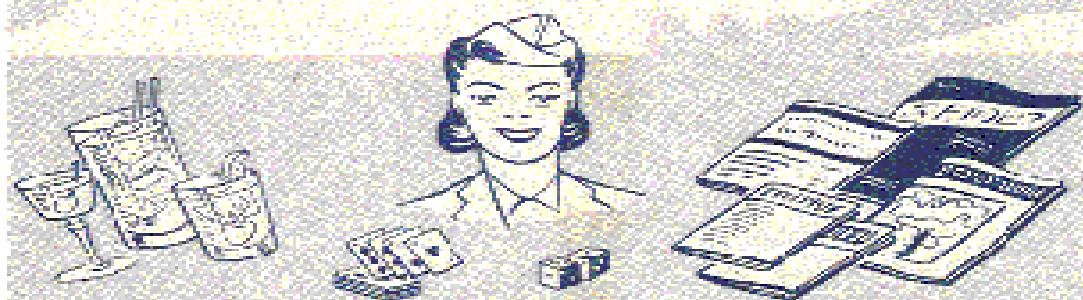
Each Benzadrine Inhaler contains 0.1 G. of Benzadrine (amphetamine, S.C.P.) dissolved in 0.5 G. of Benzadrine Inhaler Solution. Each Inhaler is 0.5 G. in weight and contains 0.1 G. of Benzadrine Inhaler Solution.

Grandad and Grandma Probably Used Amphetamines

- 1934-Benzedrine (racemic amphetamine) inhalers used for nasal decongestion and asthma
- 10 million inhalers sold by Smith, Kline by 1938
- 1935 – **Medically approved:** workers given 20 mg Benzedrine had more “well being, exhilaration, decreased fatigue)

Beverages and Diversions

ABOARD YOUR CLIPPER



PAN AMERICAN WORLD AIRWAYS
The System of the Flying Clippers

- Backgammon
- Checkers
- Dice
- Dominoes

MISCELLANEOUS

- Newspapers
- Stationery
- Magazines
- Post Cards

SERVICE ITEMS

- Electric Razor
- Medical Kit
- Tooth Brushes
- Ice Bag
- Senszdrine Inhalers**
- Sewing Kit
- Chewing Gum
- Kleenex

Divertissements

JEUX

- Trictrac
- Échecs
- Dés
- Cartes de Jeu
- Dés de Poker
- Dominoes

ARTICLES DIVERS

- Journaux
- Papier à écrire
- Revue
- Cartes Postales

ARTICLES DE SERVICE

- Rasoir Électrique
- Sac à glace
- Boîte à coudre

- Boîte à pharmacie
- Tuyau
- Pastilles de Gomme

- Brosse à dents
- Inhalant
- Boisson
- Boisson Kleenex

Beverages COCKTAILS

- Manhattan \$.50
- Martini .. .50

DRINKS

- Rye65
- Scotch65
- Canadian Whiskey65
- Brandy65
- Bourbon65
- Rum65
- Sherry50

(No extra charge for Soda Water)

CIGARETTES

- Assorted Brands20

(No gratuities accepted. Thank you.)

Assortiment de Boissons

COCKTAILS

- Manhattan \$.50
- Martini .. .50

BOISSONS

- Rye65
- Scotch65
- Whiskey Canadien65
- Brandy65
- Bourbon65
- Rhum65
- Vin Xérés50

(L'eau Seltzer est Gratuit)

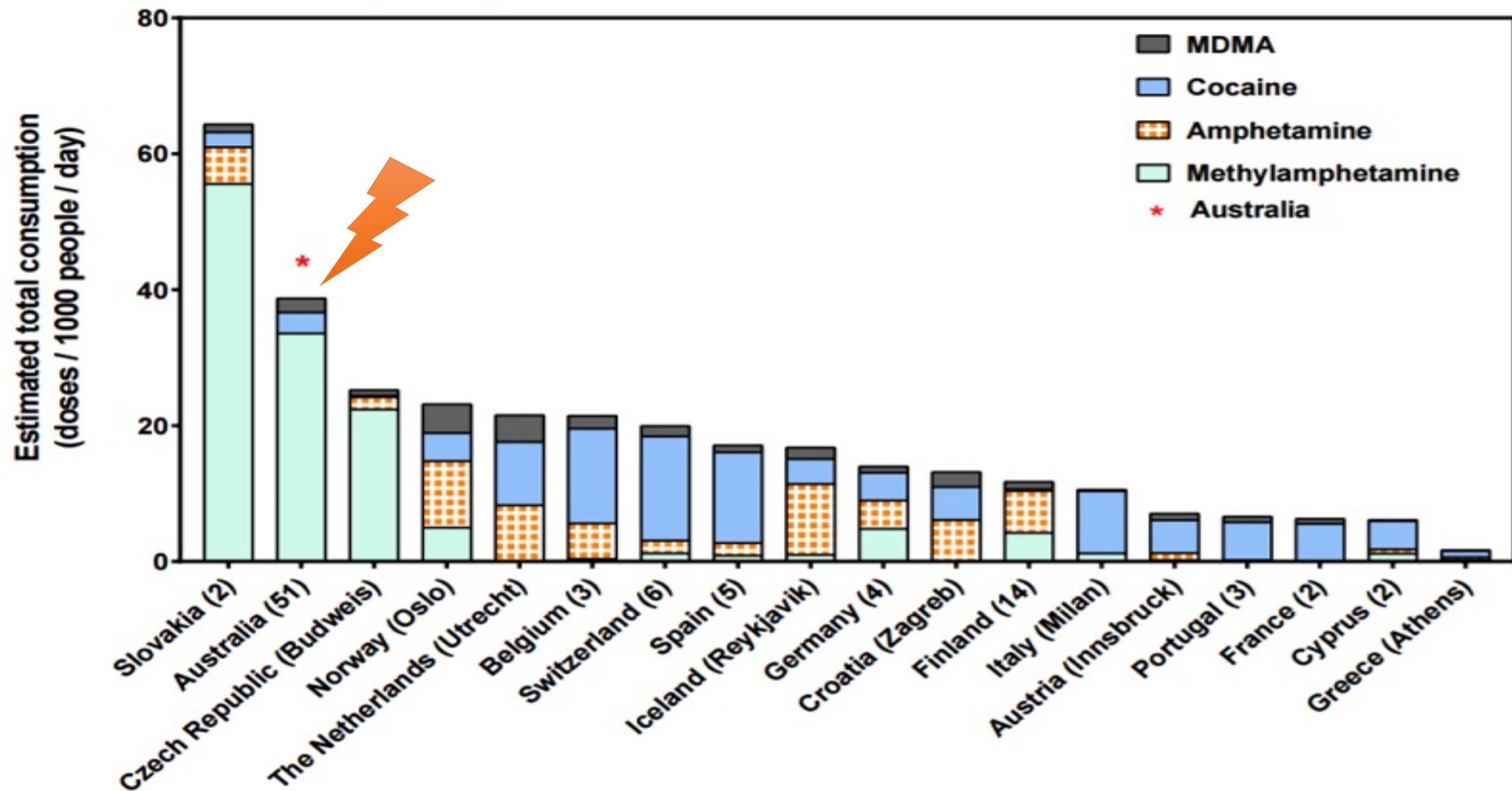
CIGARETTES

- Marques Assorties20

(On s'occupe pas de pourboires. Merci bien)



The total amount of stimulant consumed (as doses per 1 000 people per day) by a country as a population weighted average of the number of reported sites (given in brackets after country name).





NOW SHE
CAN COOK
BREAKFAST
AGAIN

... WHEN YOU PRESCRIBE NEW
MORNIDINETM
(BRAND OF PIPAMAZINE)

A new drug with specific effectiveness in nausea and vomiting of pregnancy, Mornidine eliminates the ordeal of morning sickness.

With its selective action on the vomiting center, or the medullary chemoreceptor "trigger zone," Mornidine possesses the advantages of the phenothiazine drugs without unwanted tranquilizing activity.

Doses of 5 to 10 mg., repeated at intervals of

six to eight hours, provide excellent relief all day. In patients who are unable to retain oral medication when first seen, Mornidine may be administered intramuscularly in doses of 5 mg. (1 cc.).

Mornidine is supplied as tablets of 5 mg. and as ampuls of 5 mg. (1 cc.).

G. D. SEARLE & CO. OF CANADA LTD.
247 QUEEN ST., E., BRAMPTON, ONT.

'Amphedroxyn Hydrochloride
(Methamphetamine Hydrochloride, )

IS OFTEN PREFERABLE TO OTHER FORMS OF AMPHETAMINE—
because—
smaller doses produce longer cerebral stimulation with a minimum of undesirable side-effects.



16.7kg opium = 1 kg heroin

Shake and Bake



• Ingredients

- Battery lithium
- Starter fluid
- Ether
- Water
- Ammonia
- Pseudoephedrine
- Shake (heat reaction)
- Wait 40 minutes
- Enjoy



Effects of Amphetamines



WHAT WE WANT

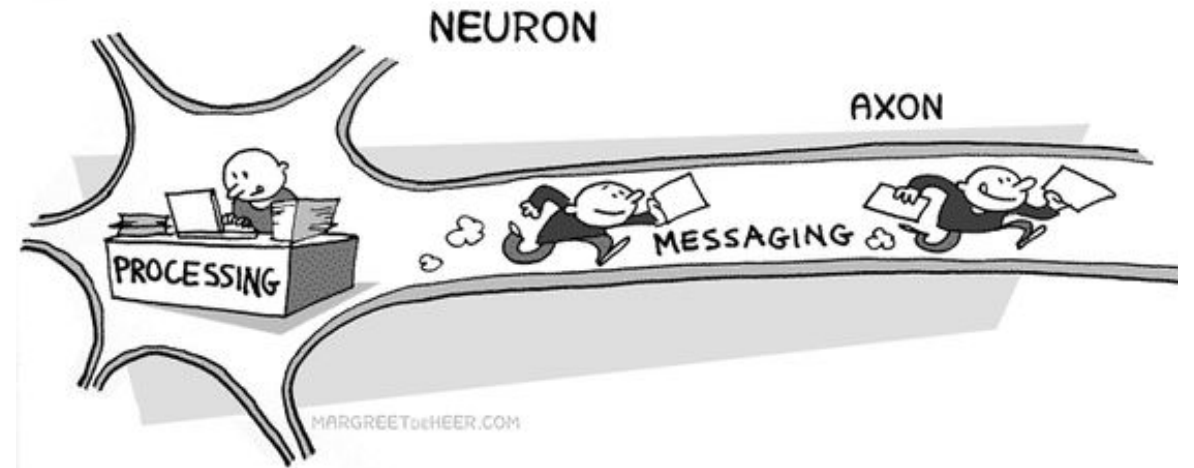
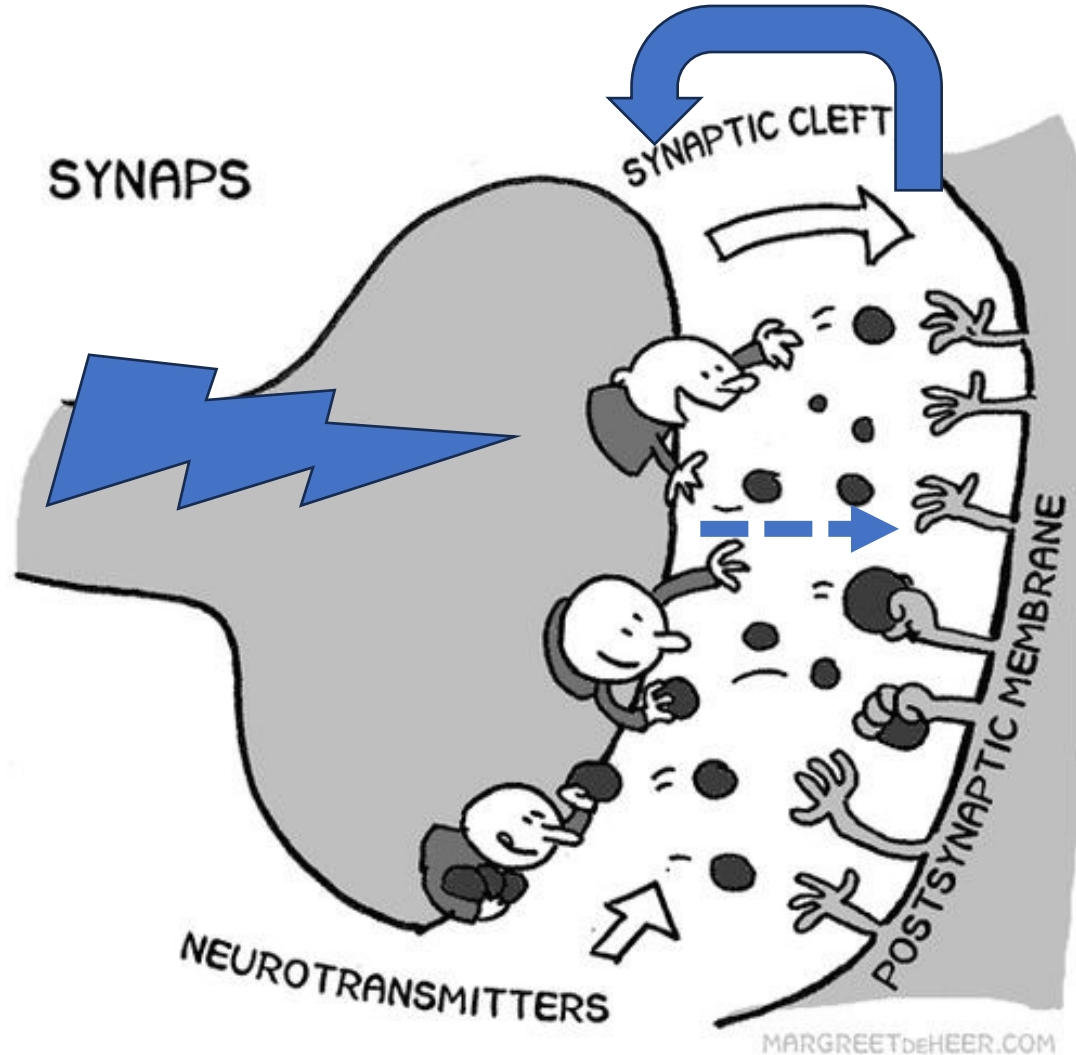
- Euphoria
- Energy
- More awake
- Decreased appetite
- Enhanced sexual behavior
- Release social inhibitions



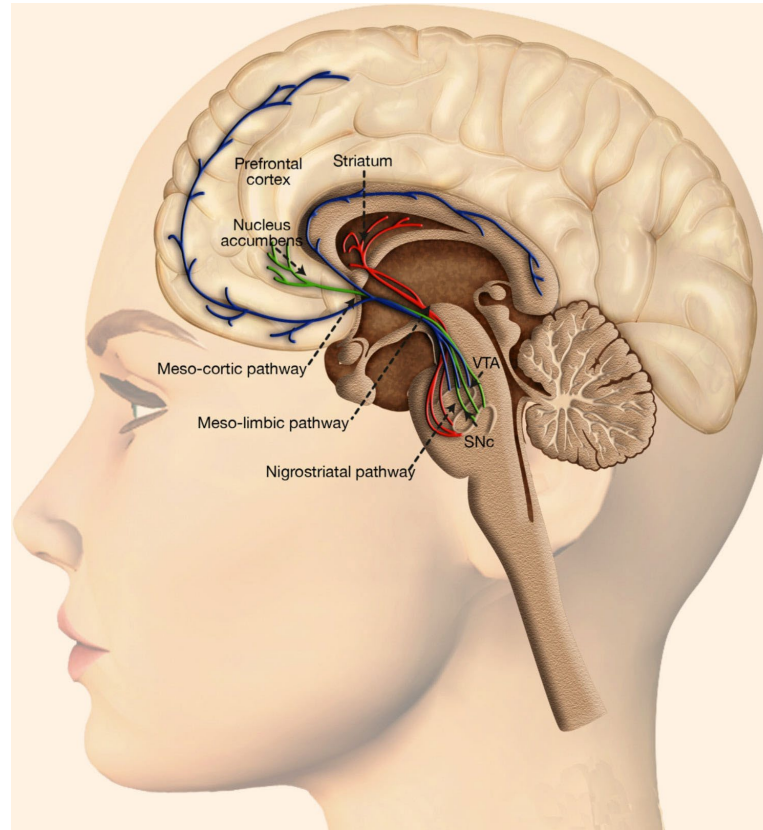
What no one wants

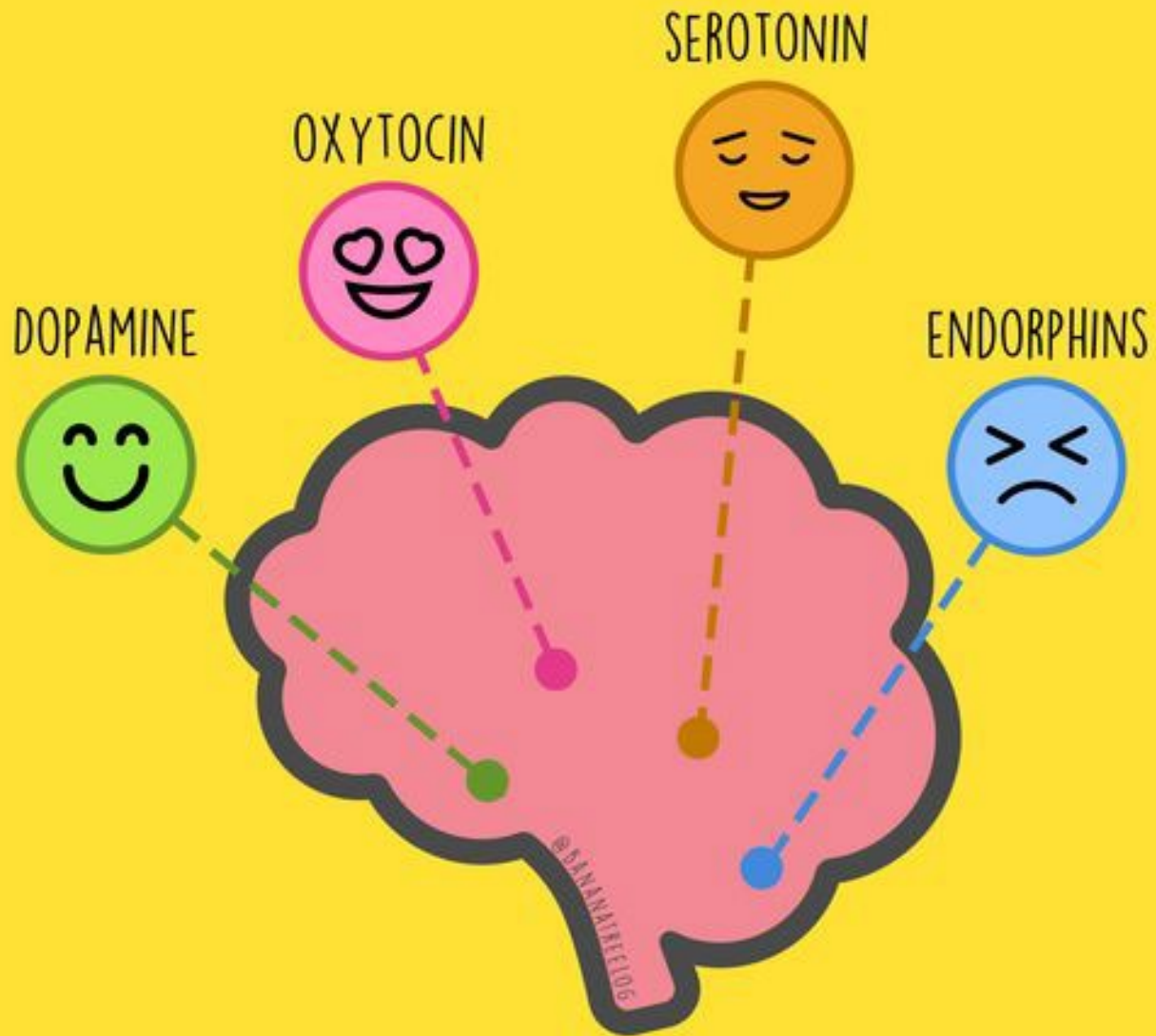
- *Hostility and paranoia*
- *High BP*
- *High and irregular heart rate and palpitations*
- *Dry mouth*
- *Nausea*
- *Headache*
- *Tremors and seizures*
- *Death (really)*

Opioids, methamphetamines and all drugs of addiction work by increasing neurotransmitters



Neurotransmitters are chemical messengers made mostly made in the midbrain

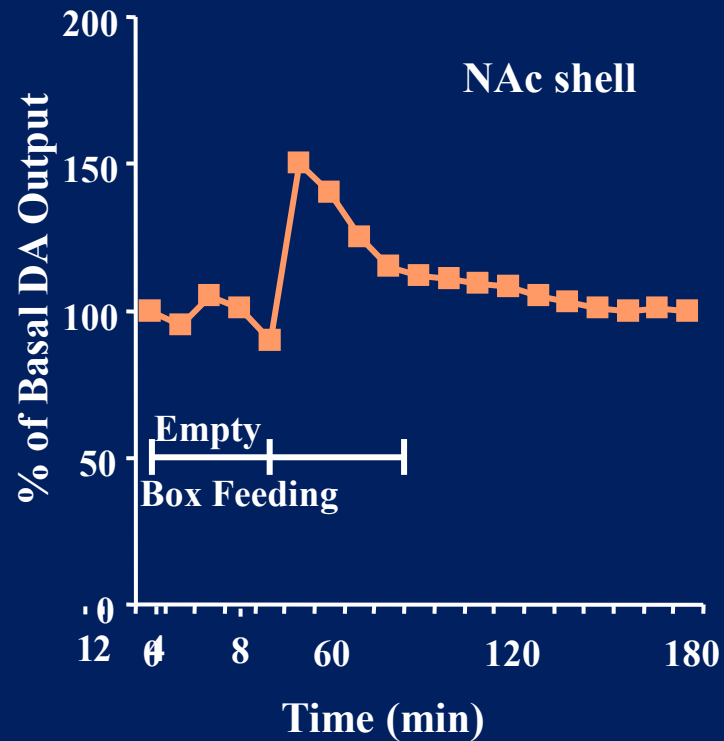




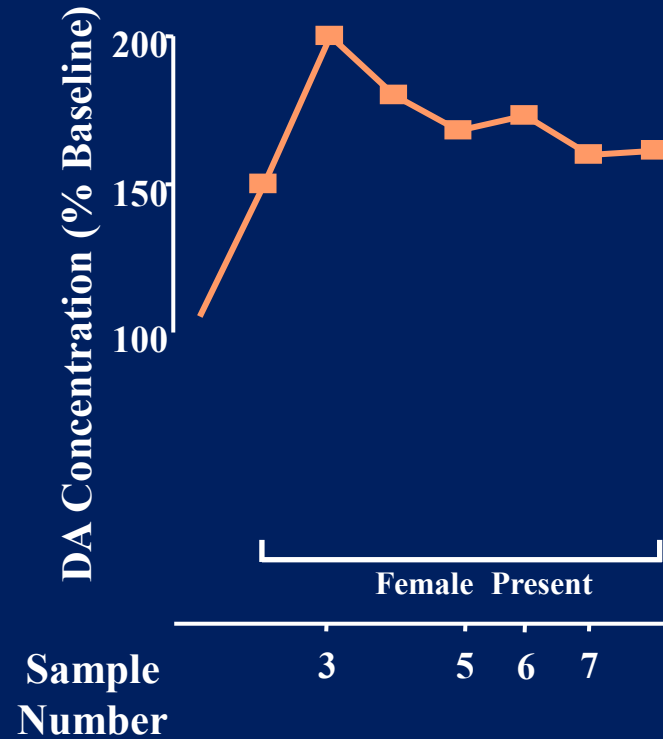
GET YOUR DAILY D.O.S.E.

Neurotransmitters are vital for happiness

Neurotransmitters are also vital for life



Food

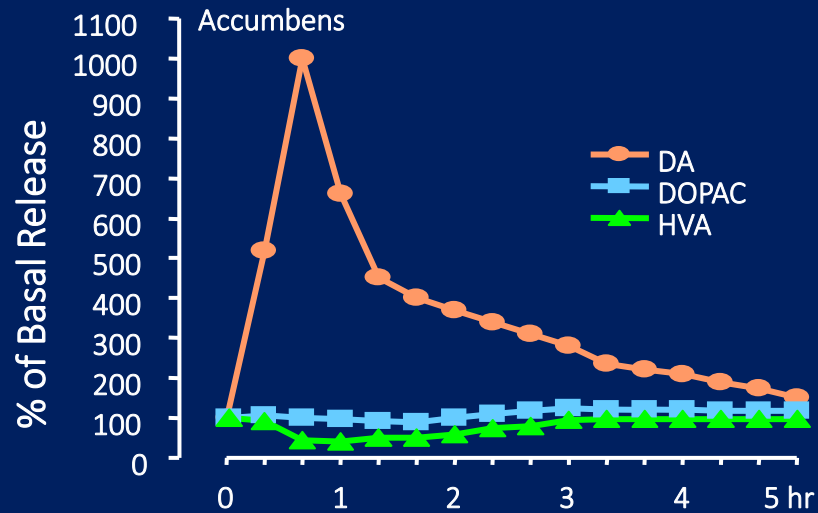


Sex

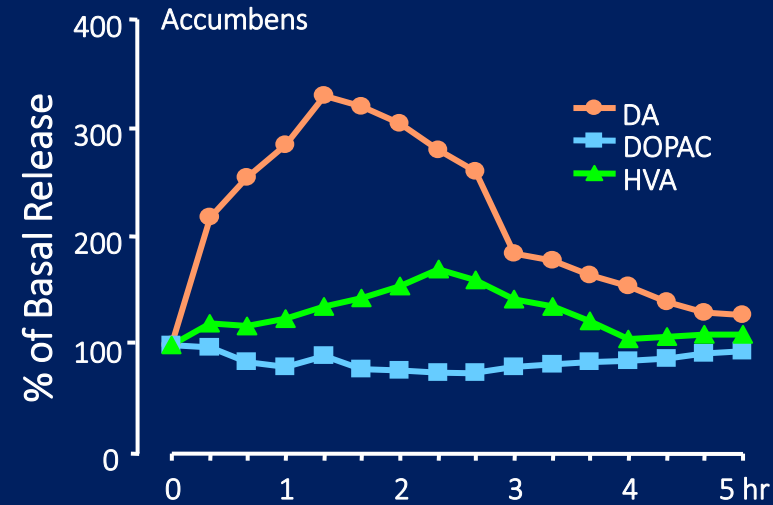


All Drugs Increase Neurotransmitters in the Brain

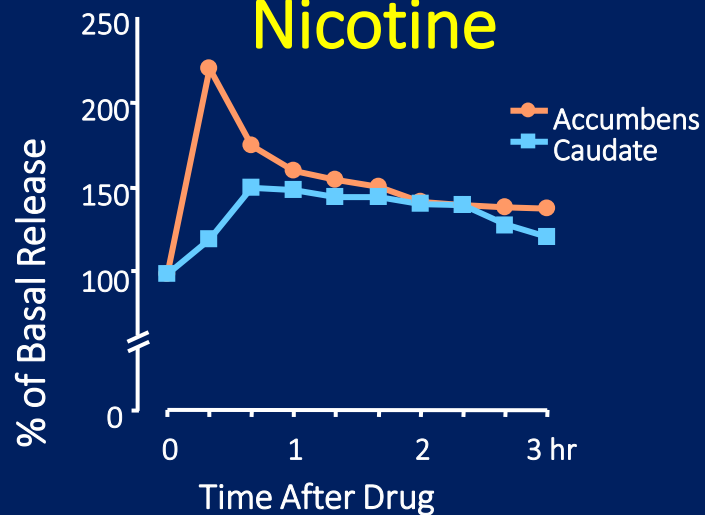
Amphetamine



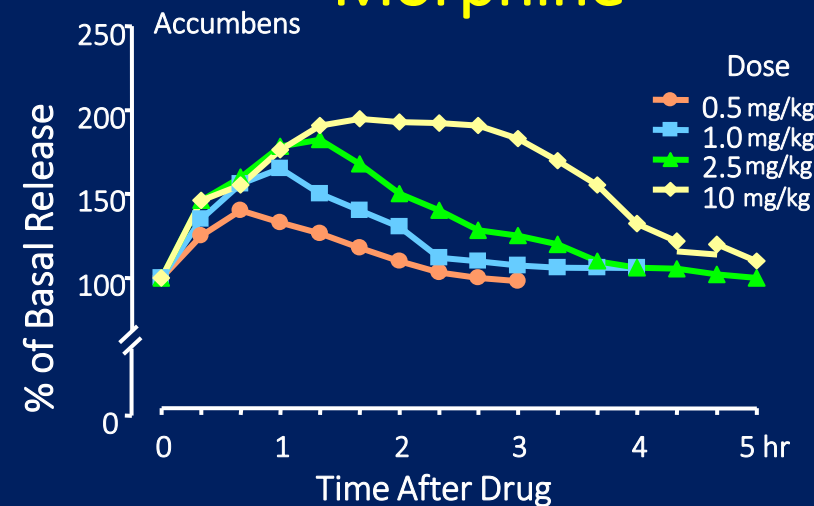
Cocaine



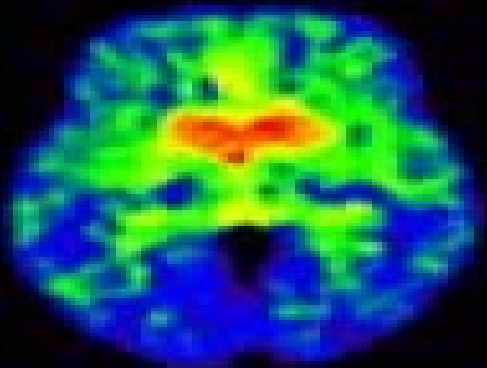
Nicotine



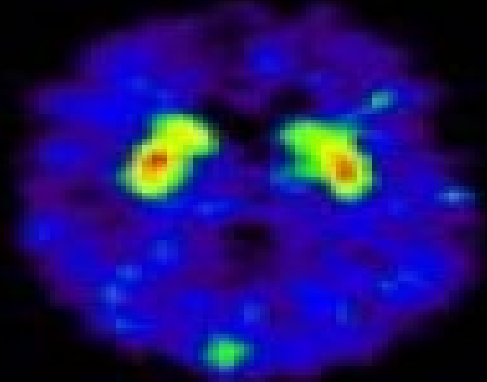
Morphine



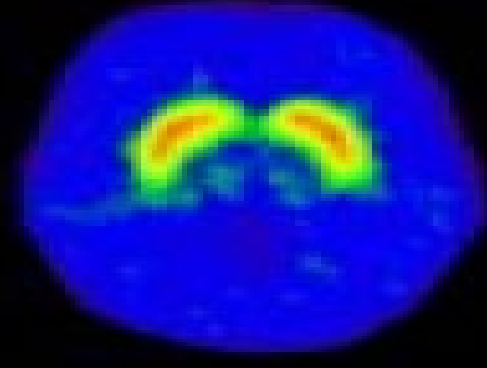
With continued drug use, the neurones that make neurotransmitters are exhausted and DIE



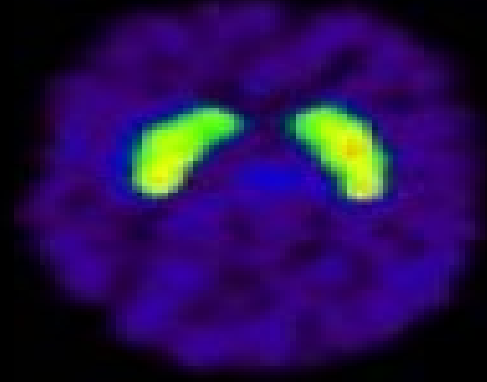
Smoker



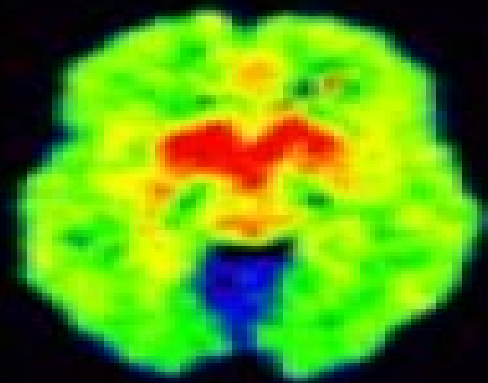
Alcoholic



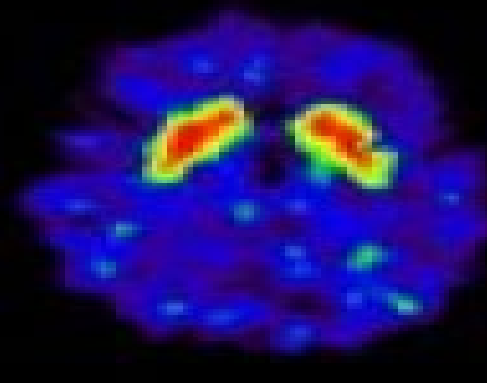
Obese



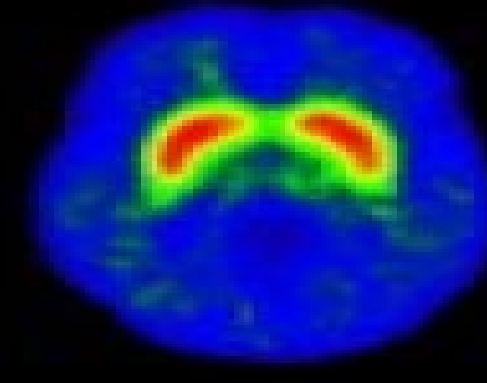
Cocaine



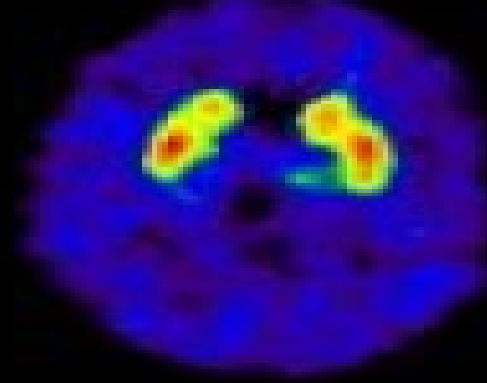
Non-Smoker



Normal



Normal



Normal

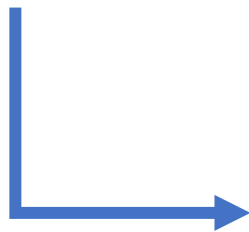
Effects of Methamphetamine



Powerful release of neurotransmitters
The rush

Constrict blood vessels
Lack of oxygen

Cell death



More and more drugs needed as neurons can't keep up

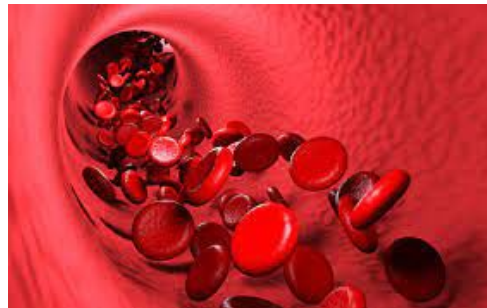




Methamphetamine is **neurotoxic**

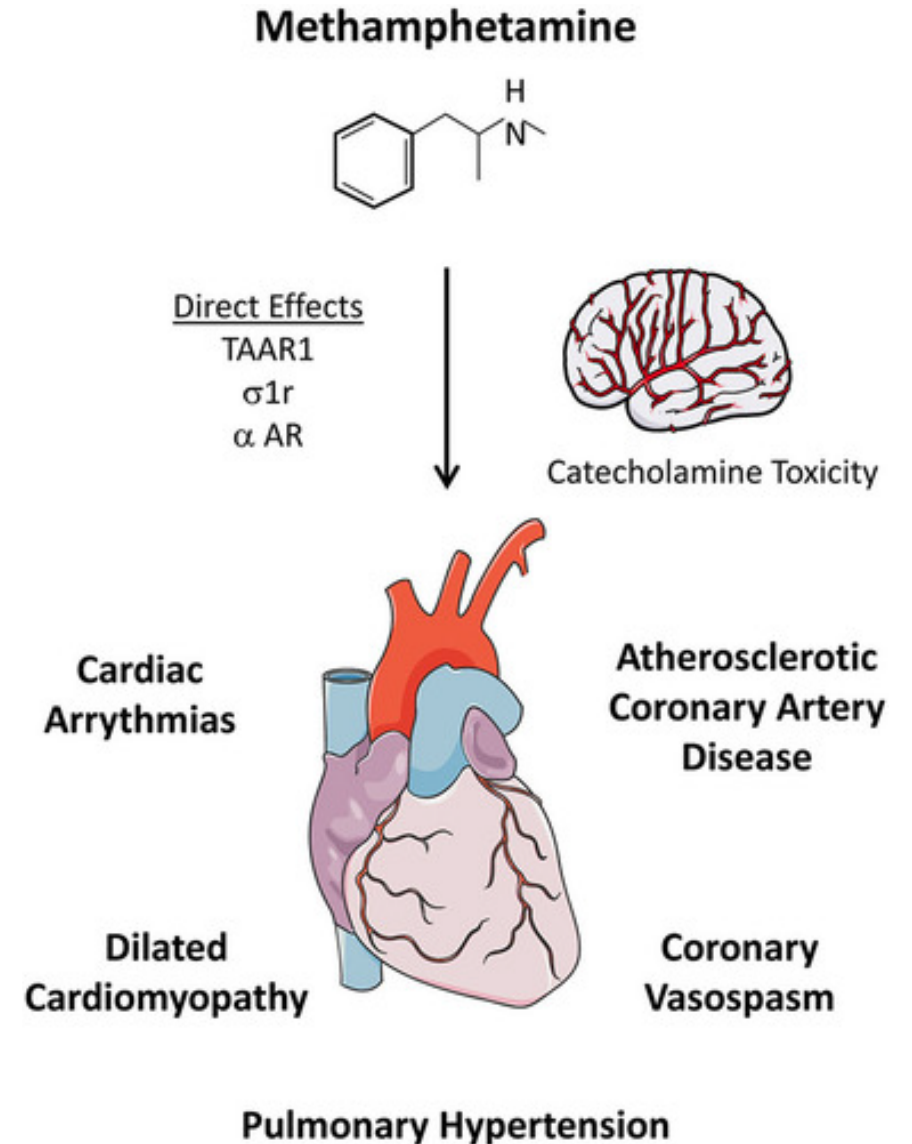


- Exhaust neurotransmitter neurons
- Dead neurons = oxidative injury
- Protective blood brain barrier destroyed
- Blood vessels constrict = no oxygen



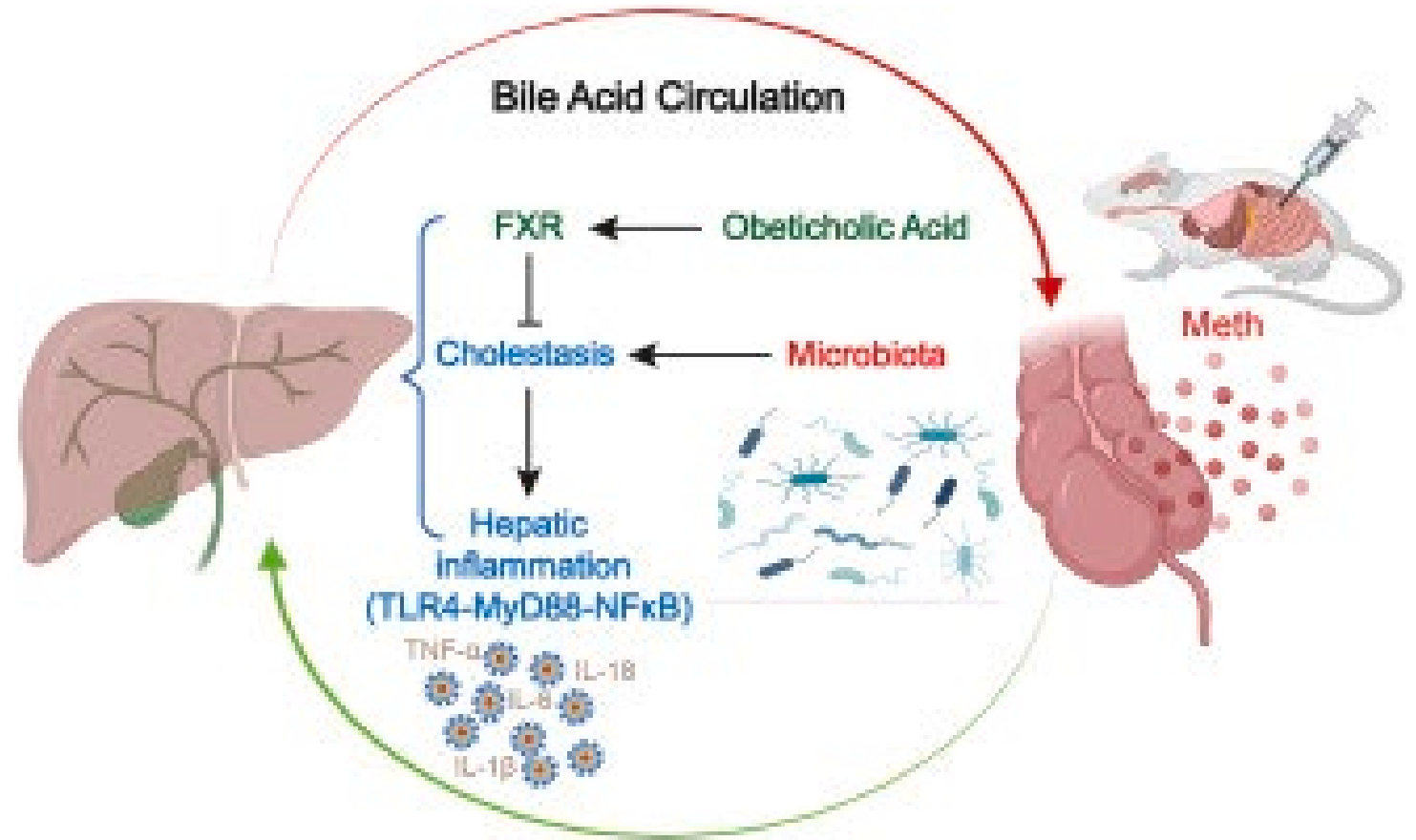
Methamphetamine is Cardiotoxic

- Cardiac infarcts (females)
- In adults
 - ↓cardiac function
 - Cardiac muscle cell death
- Most common cause of death in adult users



Methamphetamine is **hepatotoxic**

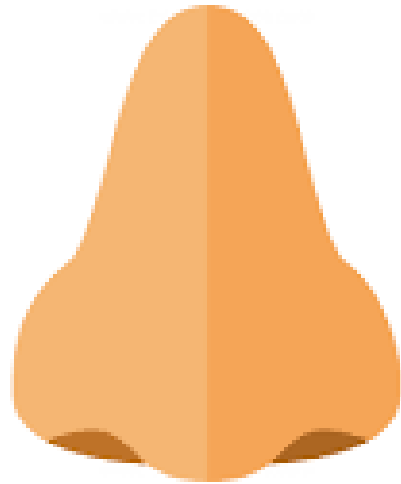
- Methamphetamine is metabolized in liver and concentrates there
- Liver cells inflamed, swollen = liver failure



Methamphetamine is **toxic**



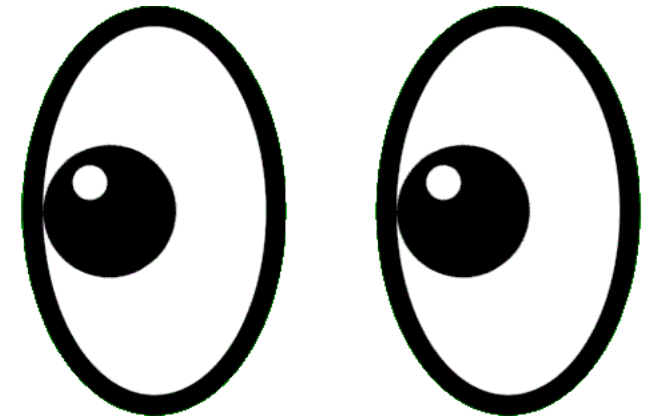
Insulin secretion
Lifelong
Females



Olfactory function



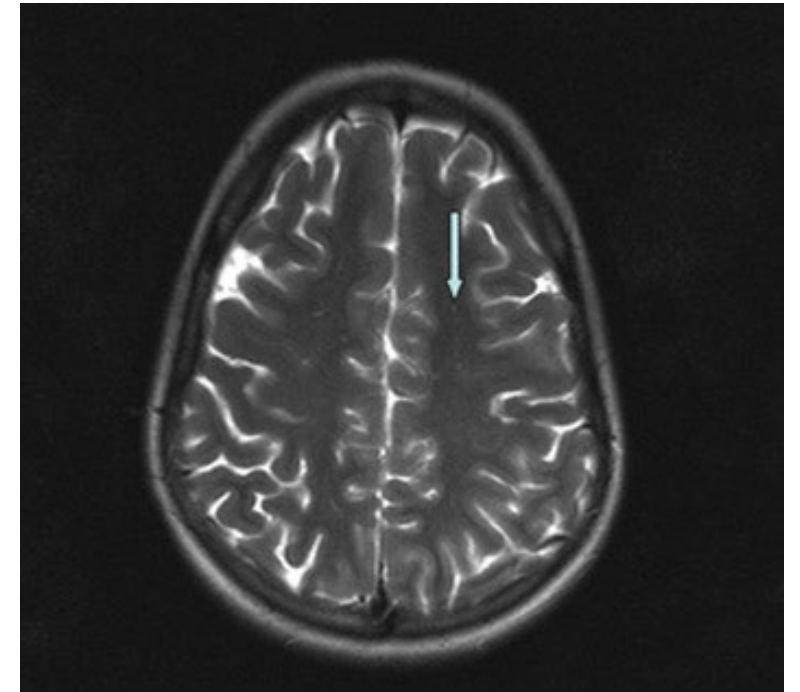
Growth



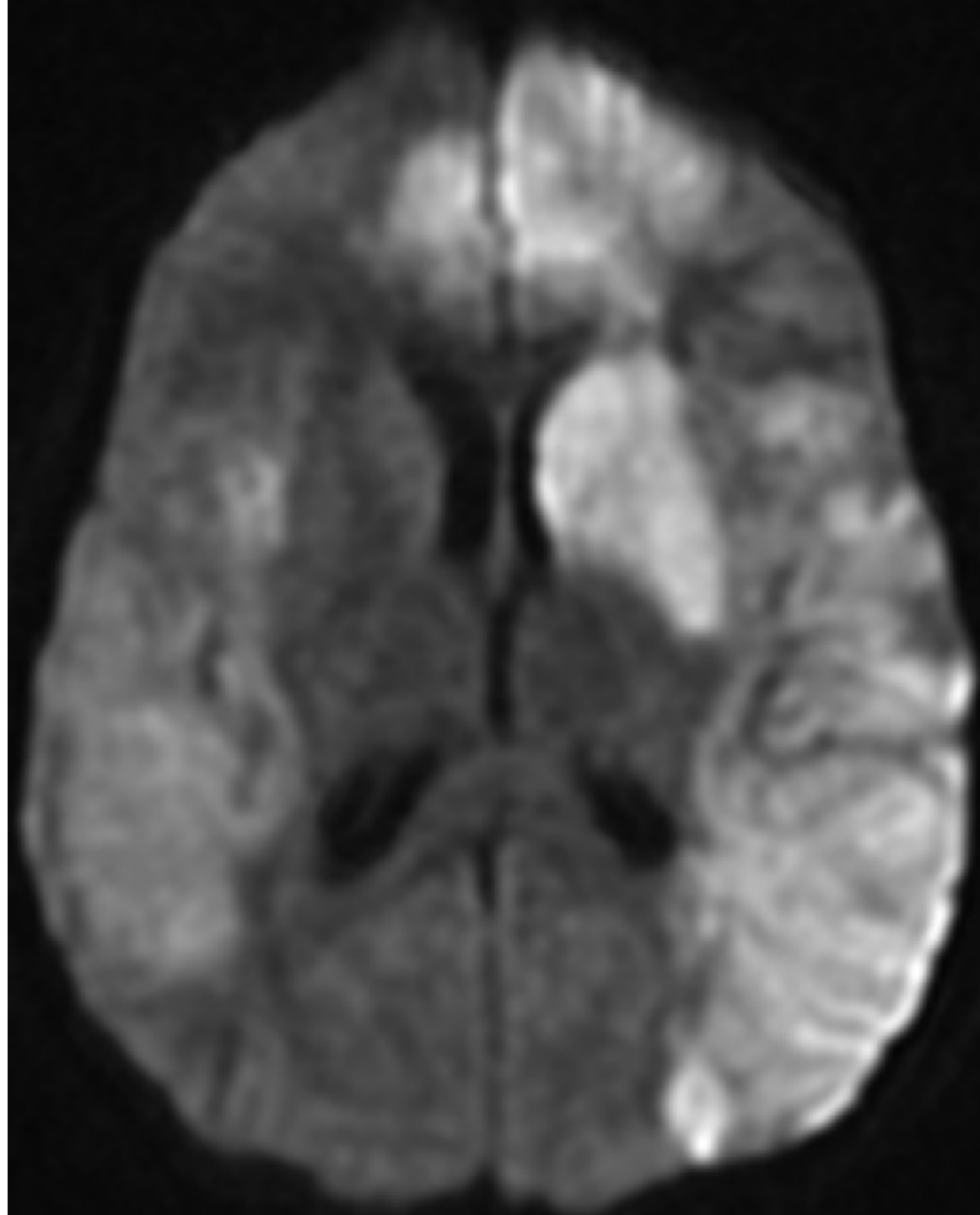
Retinal development

Recreational Amphetamines Are Not Harmless

- 1 in 5 amphetamine users have “UBO” or unidentified bright objects
- Lack of oxygen/blood flow
- Cortical atrophy
- Frontal region (executive function) most likely to be affected



17 year girl
1 ecstasy tablet
Stroke
Speech impairment



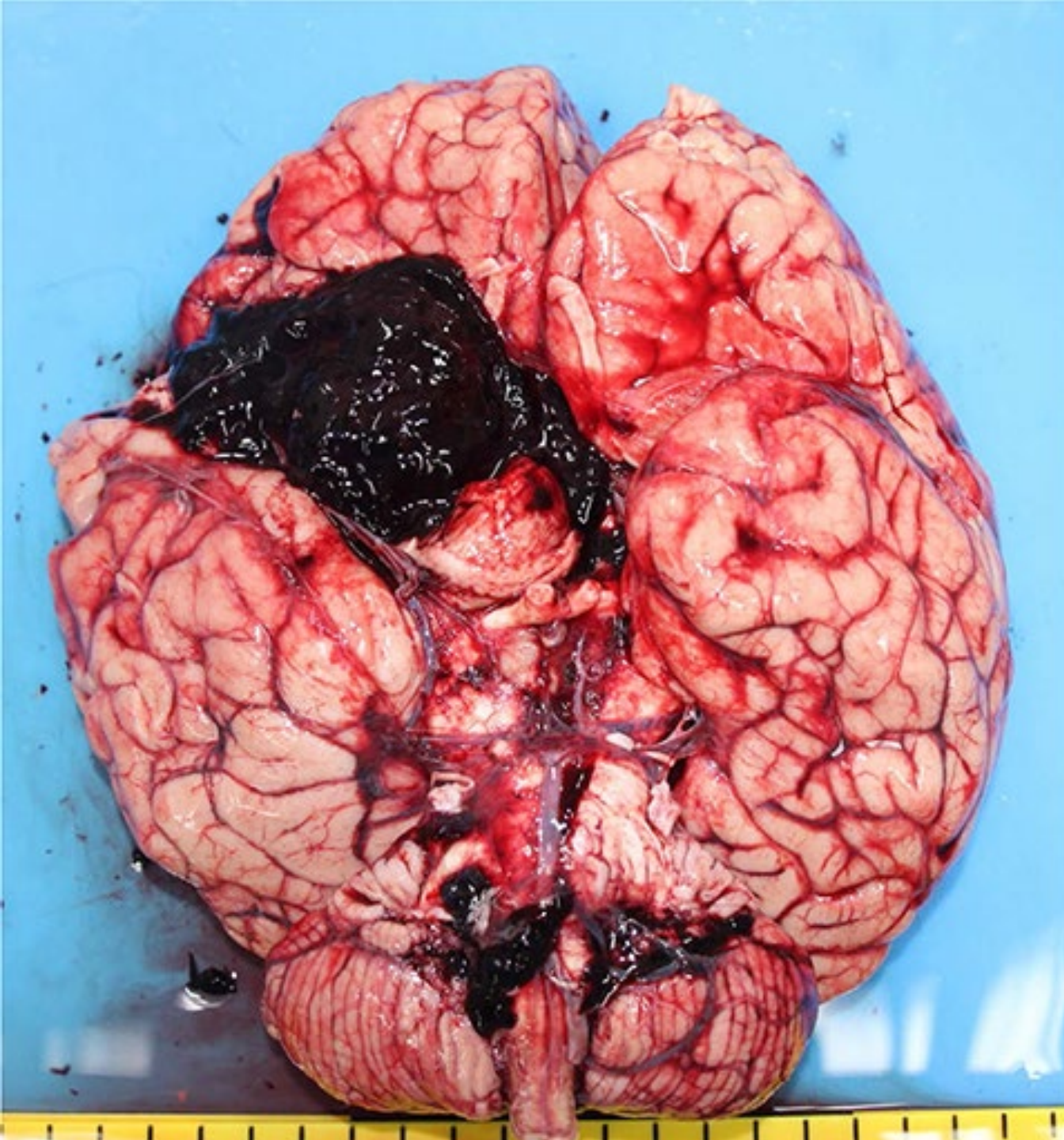
23 year old man

Methamphetamine abuse

Acute infarct

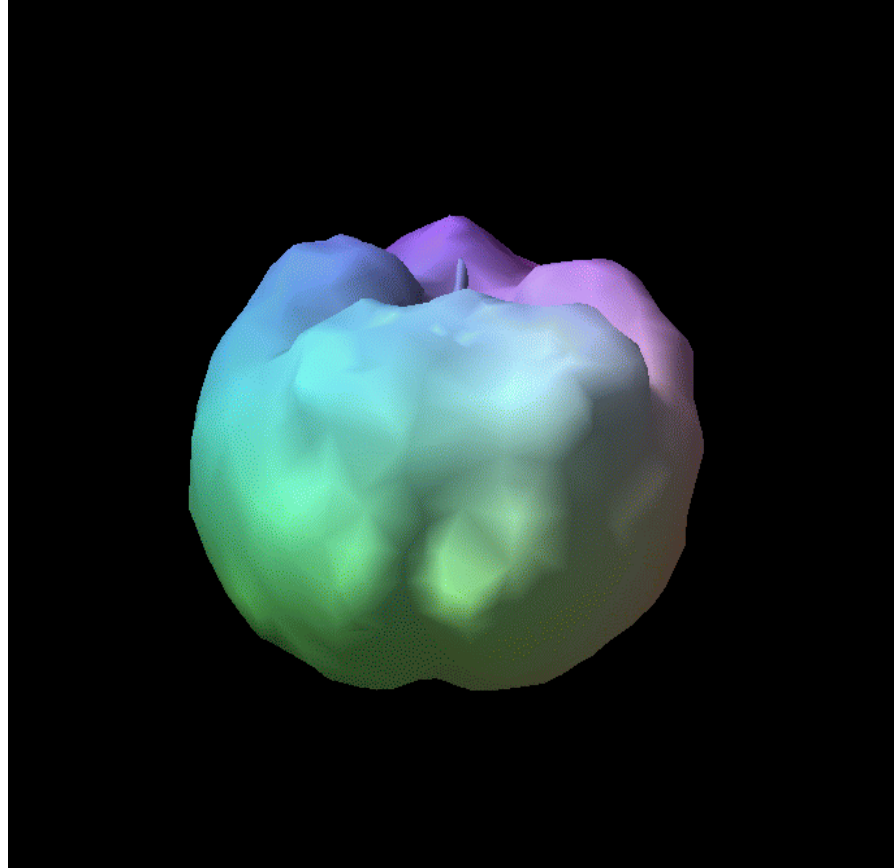
Basal ganglia (where
neurotransmitters are made)

Frontal and parietal lobes

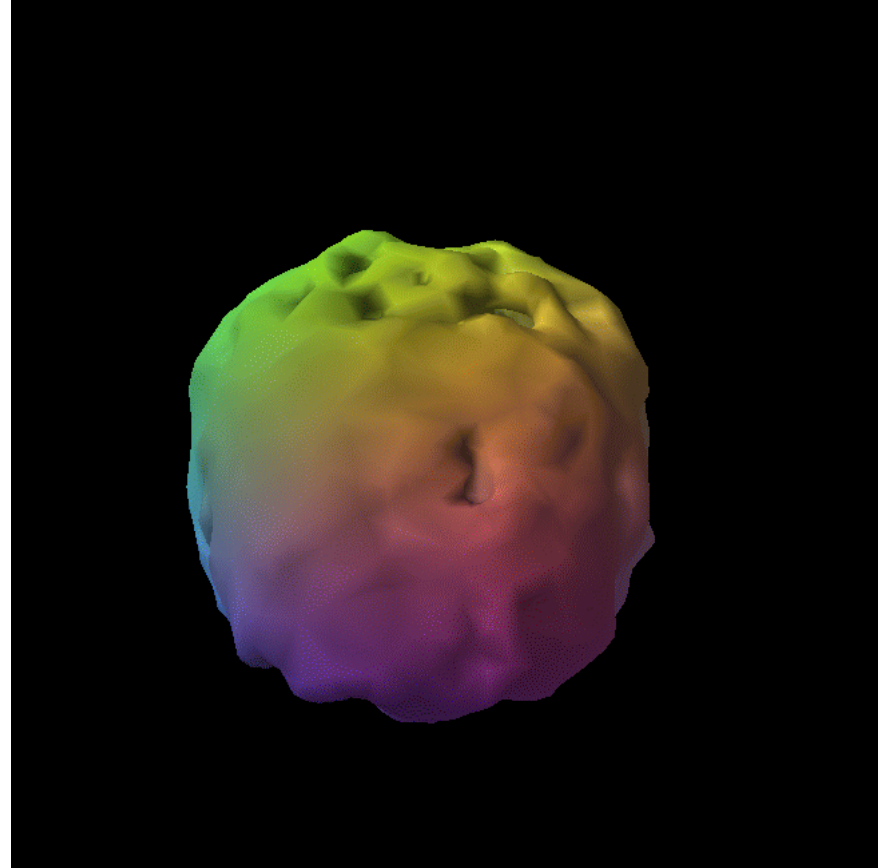


Fatal intracerebral
hemorrhage
21 year old healthy man
Blood methamphetamine
level: 6.9mg/L (lethal)

SPECT Scans



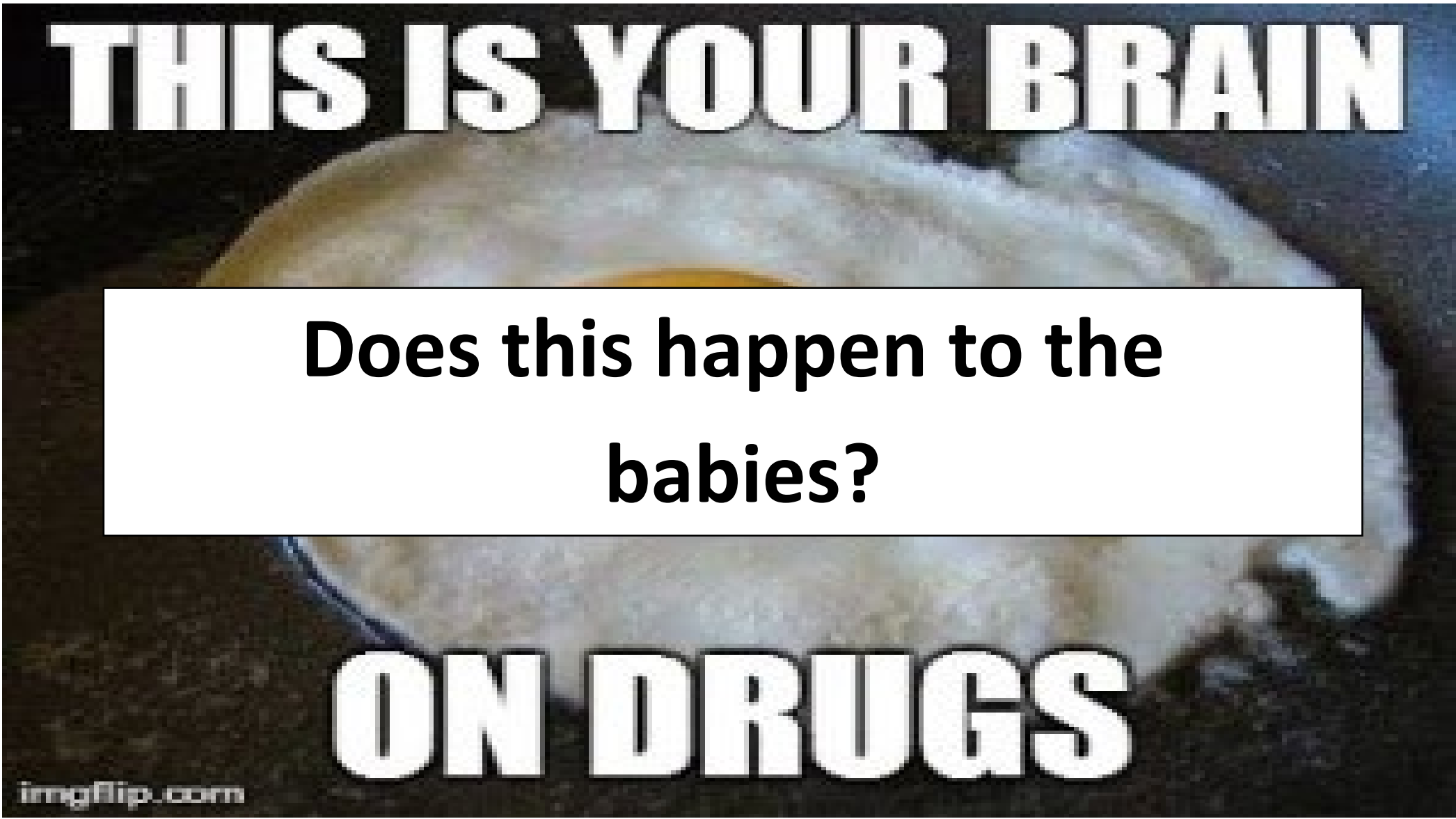
Heroin User





Methamphetamine User's Spect Scan





THIS IS YOUR BRAIN

**Does this happen to the
babies?**

ON DRUGS



MRI Of Babies Exposed To Prenatal Opioids

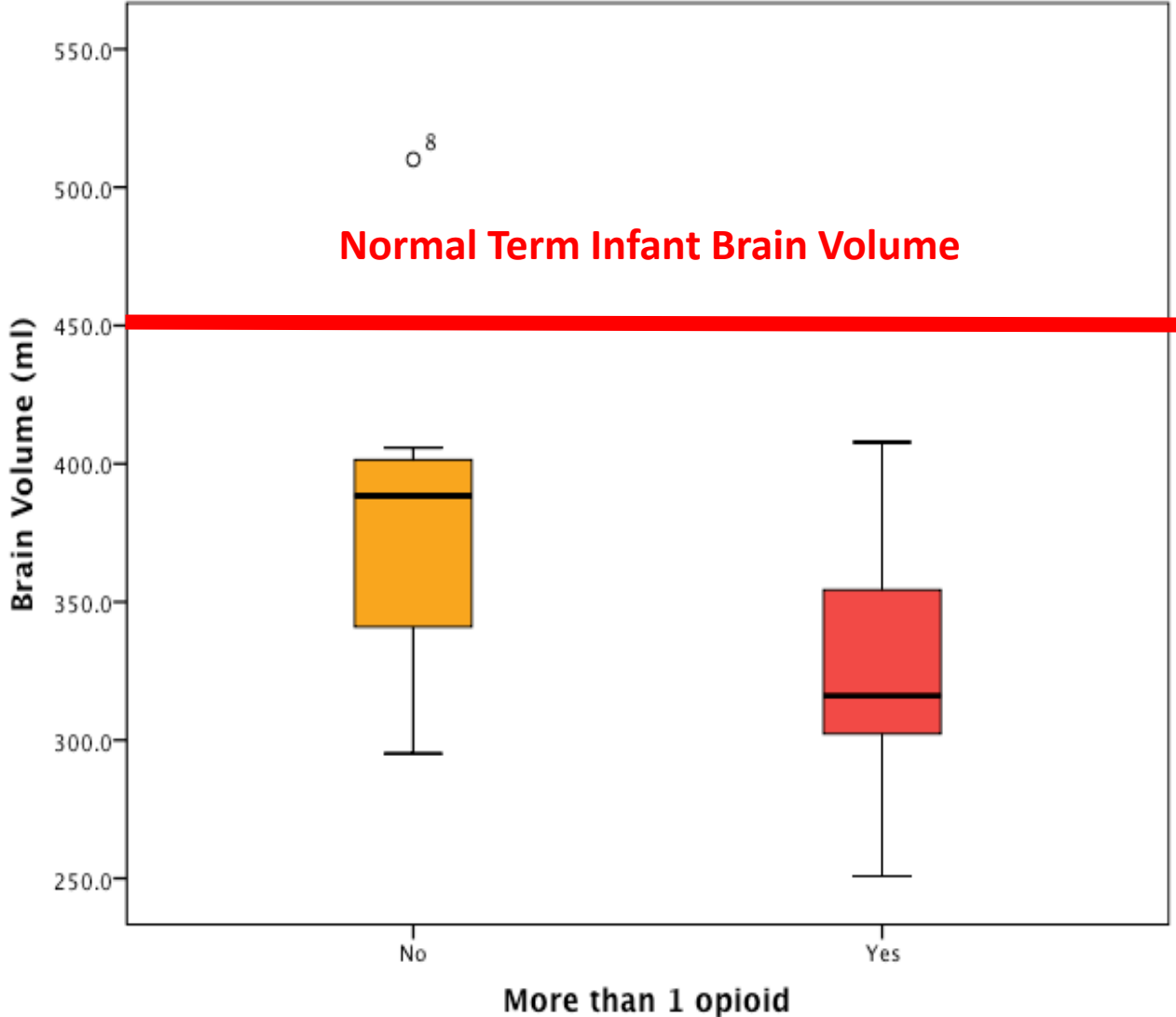
MRI brain of 32 full-term babies of opioid-using mothers

- **Babies of mothers who used only one opioid e.g. methadone/buprenorphine**
- **Vs**
- **Babies of mothers who used multiple opioids e.g. methadone + heroin**

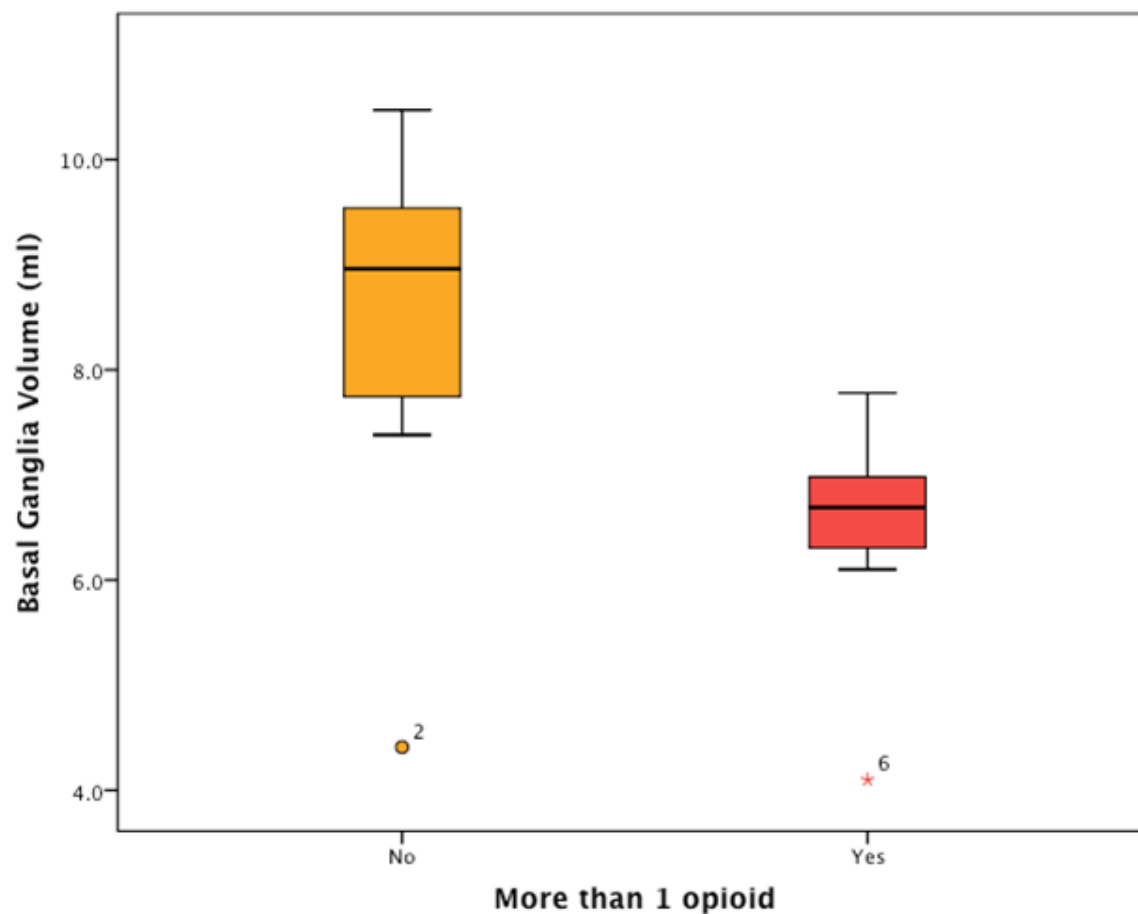
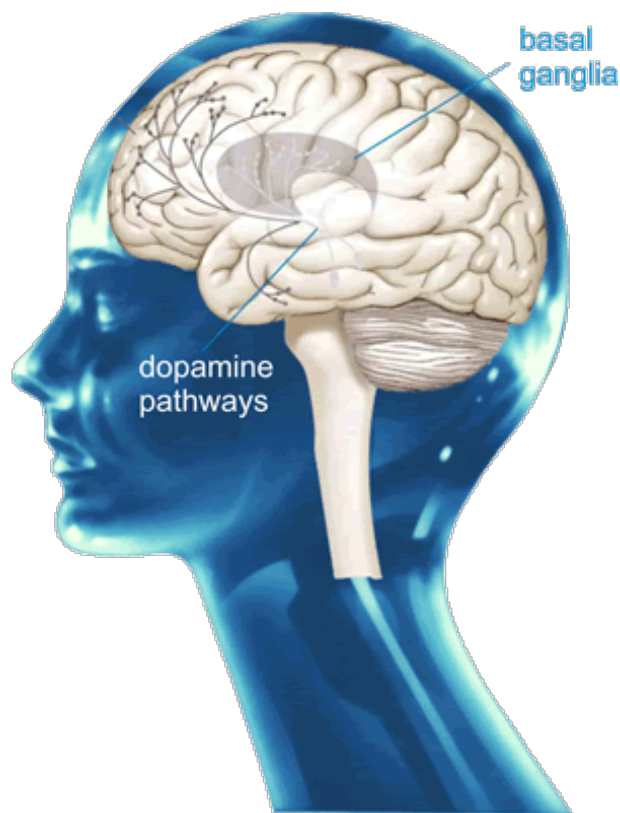
Babies of multiple opioid users had smaller brains



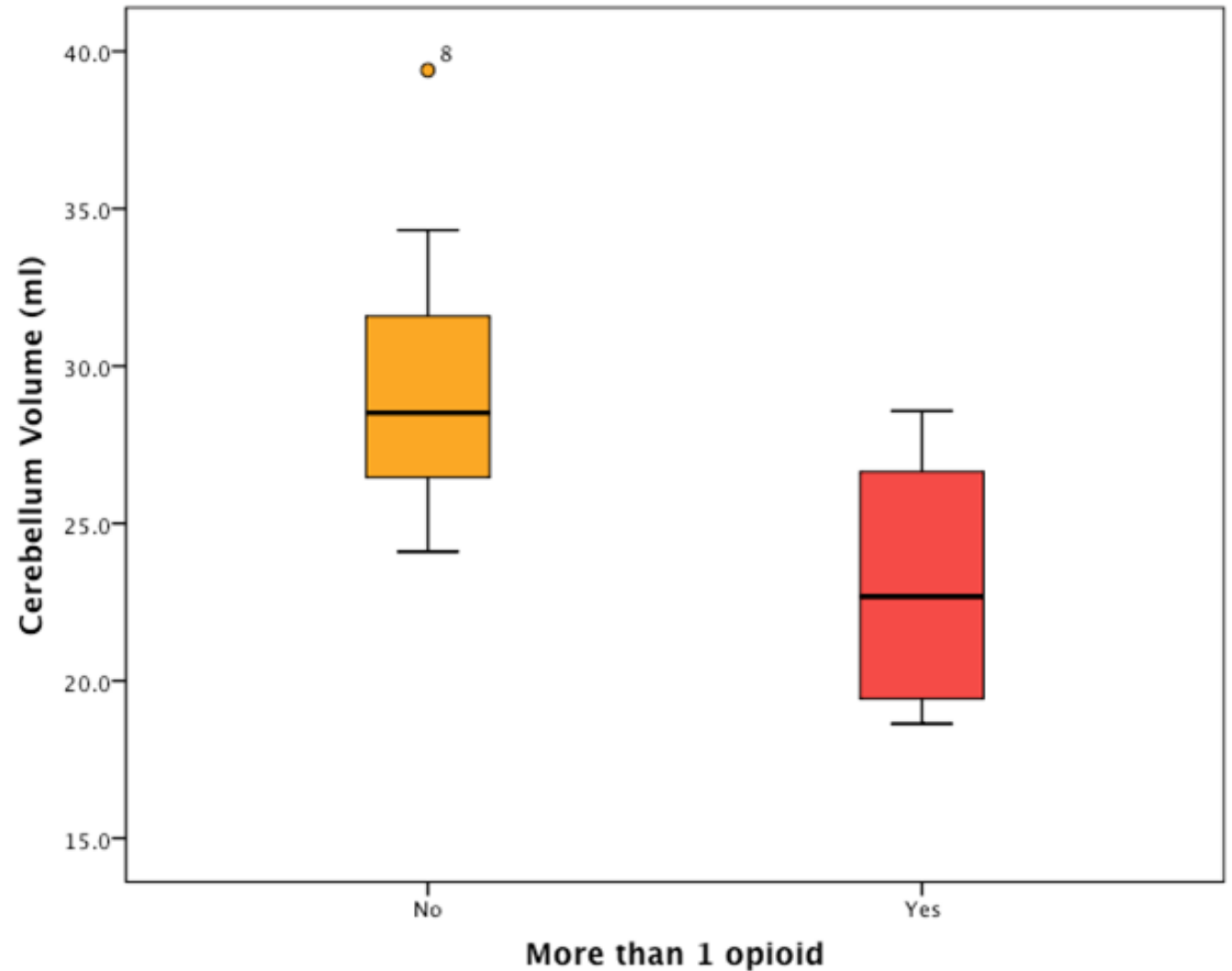
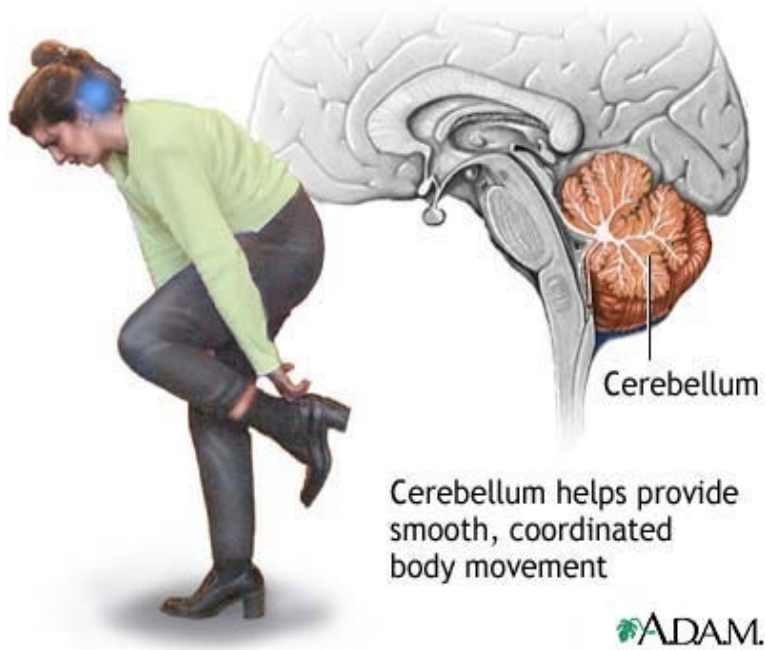
Small brain = lower IQ

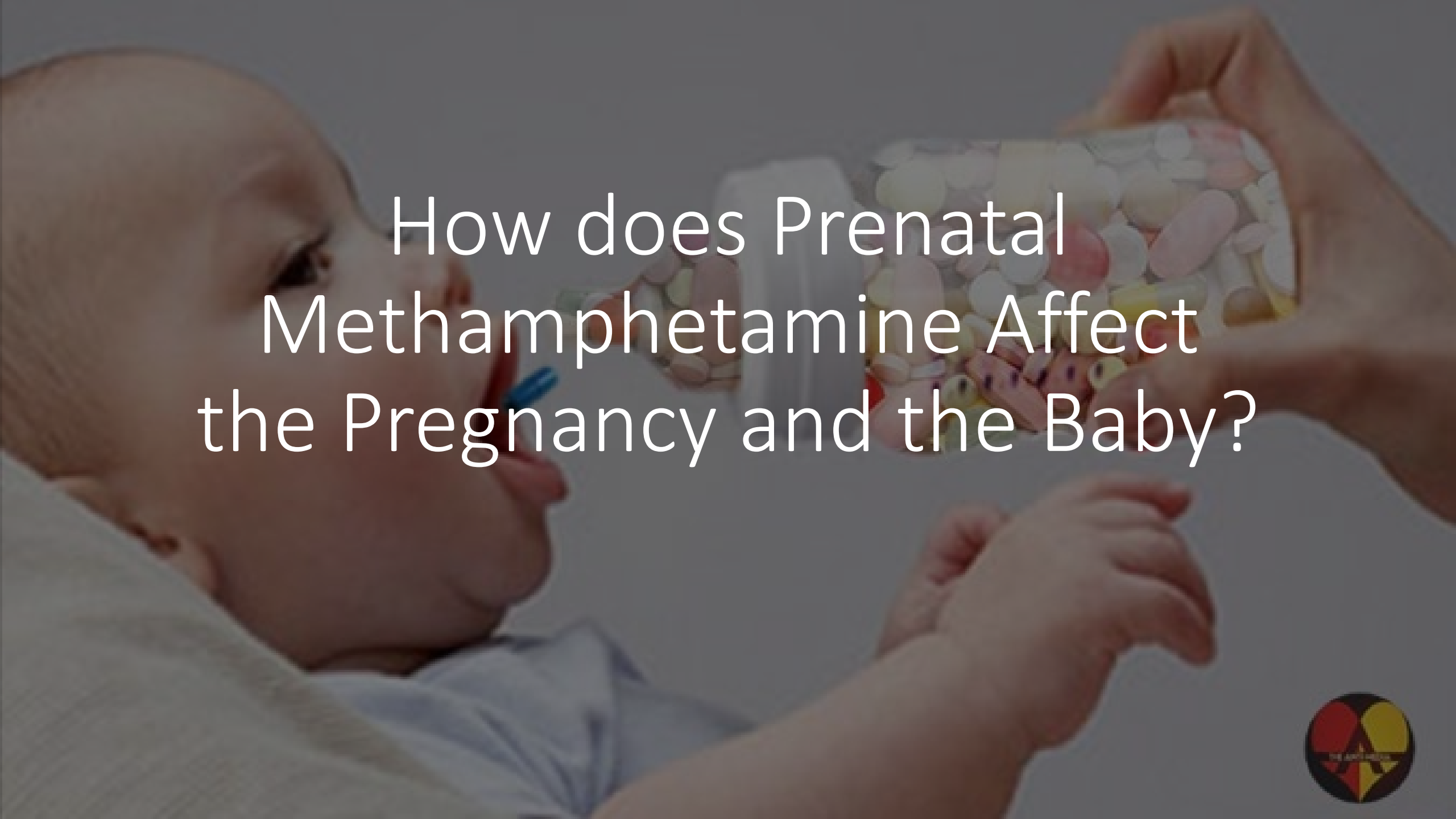


*They also had very small basal ganglia
(where the neurotransmitters are made)*



And VERY SMALL CEREBELLUMS



A photograph of a baby lying in a hospital bed, partially covered by a white blanket. A hand is visible in the foreground, holding a white pill tray filled with various colored pills (white, pink, yellow, red). The background is a plain, light-colored wall. The overall image has a semi-transparent dark overlay.

How does Prenatal Methamphetamine Affect the Pregnancy and the Baby?



Characteristics of Methamphetamine Using Mothers

- ???
- Disclosure a major issue
- Many users consider themselves to be “recreational” and not “addicted”
- **Compared to other drug users, KNOWN** methamphetamine using mothers more likely to be:
 - Socially deprived
 - Younger
 - Less antenatal care
 - Less educated
 - More criminal involvement
 - 2X **psychiatric problems** (depression, anxiety) that may affect parenting skills and neurodevelopment



Methamphetamine crosses the placenta. Rapidly. And stays a long time.

- Methamphetamine (and all amphetamines) are easily detectable in umbilical cord, placenta and amniotic fluid
- Increased risk
 - Hemorrhage
 - Uterine contractions
 - Preterm labour
- Animal studies show VERY RAPID (<30s) placental transfer
- Fetal levels higher than mothers (longer half life)
- Highest levels in **placenta, kidney, intestine, liver, brain, heart**
- May be detected in fetus up to 7 days after maternal ingestion

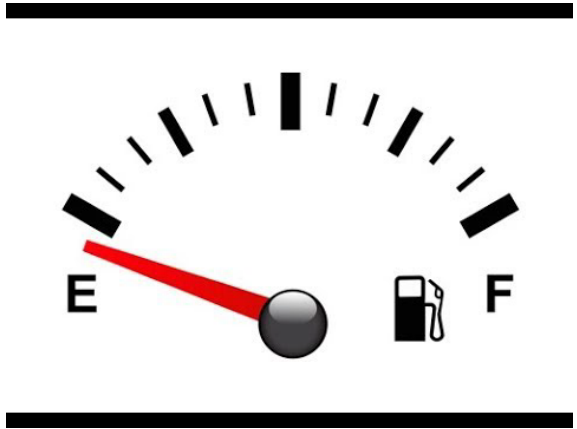
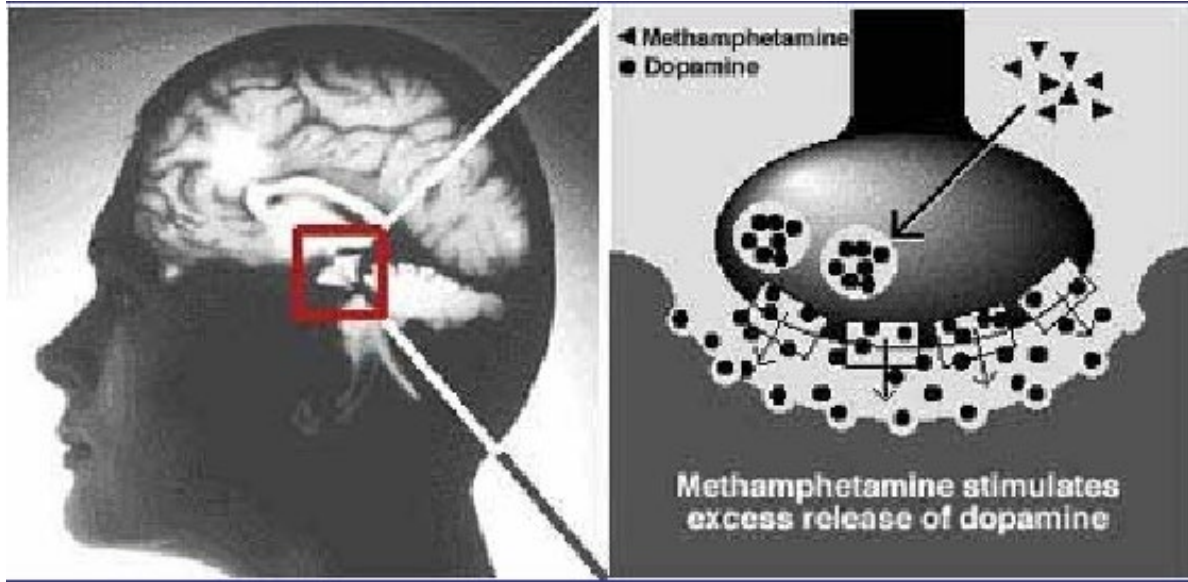
Pregnancy Outcomes

- Unclear, many women do not disclose use
- Reports of *increased fetal loss*
- Concentrations of amphetamines can be high in fetus after overdose
- Amphetamine users may have problems with antenatal care and be at risk of complications e.g. **hypertension and abruption**
- Outcomes may be improved if mother receives antenatal care

The Fetus

- ***Not teratogenic (that we know of)***
- But may interfere with folic acid synthesis like other drugs (e.g. nicotine and alcohol) – potential fetotoxin
- Most data are preclinical





Prolonged use: dopamine depletion

+ Birth

No more dopamine and other neurotransmitters

Withdrawal Scores are LOW



- Neurotransmitter depletion
- Common comments:
 - *Sleeps like an angel*
 - *Eats anything you give them*
 - *Won't even know she is there*



Beware the Good Baby





Breast-feeding: No

- Amphetamines inhibit prolactin and reduces breast milk
- Amphetamine effects on the mother may be dangerous:
 - Excessive somnolence
 - Erratic behavior
- **Concentrates** in breast milk (levels may be 3-7 times maternal plasma levels)
- Reports of *restlessness, poor sleep & infant death*
- Infant plasma levels much lower than mothers (6-14% and mostly undetectable)

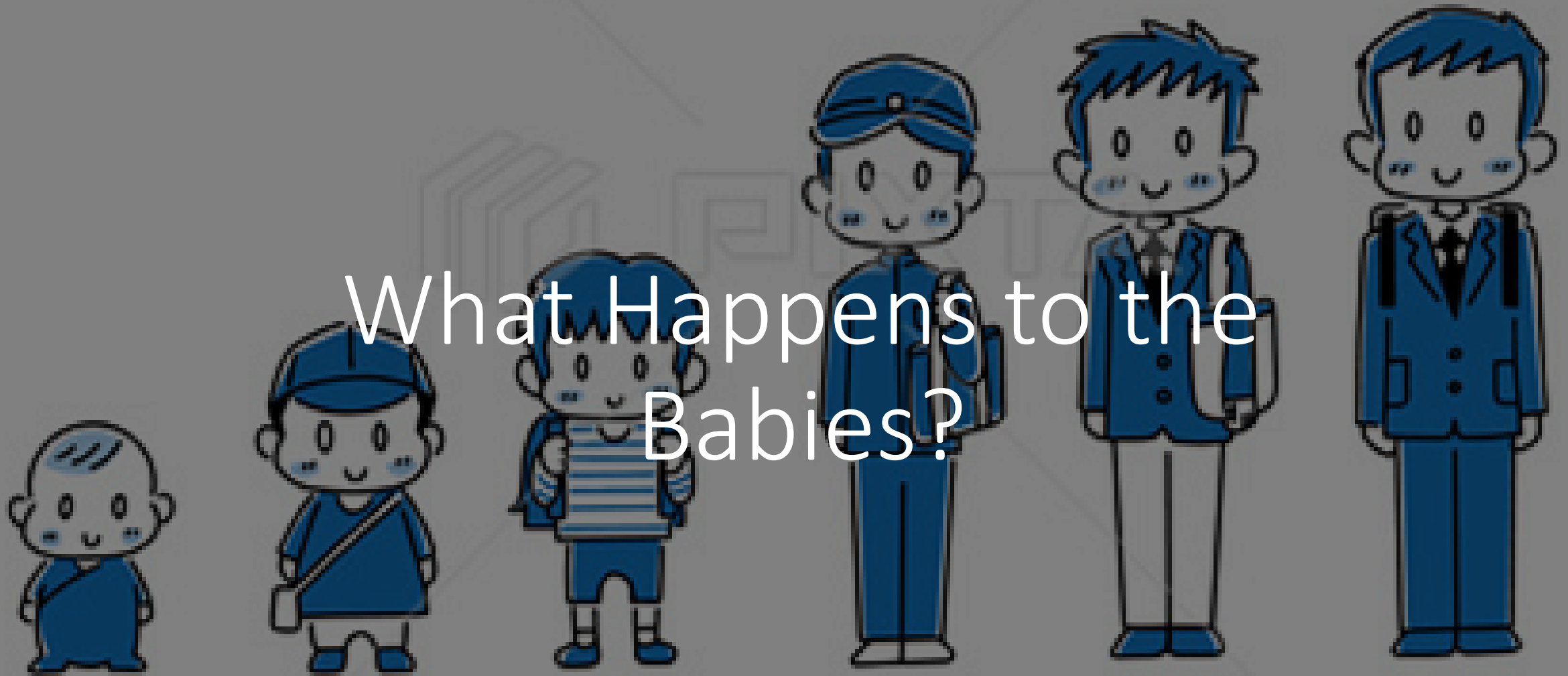
Diagnosis of Methamphetamine Exposure in the Infant

- Drugs are detected in a lot of infant products
- History usually better
- Lasts in infant urine up to 3-4 days
- False positive: **labetalol (anti-hypertensive) and tomatoes**
- Meconium (1st poo) false positives up to 43%



Management in Pregnancy and Immediate Post Partum Period

- Supportive – encourage antenatal care and CESSATION OF USE
- Refer for psychiatric evaluation. - >50% have mental health co-morbidity
- Be vigilant – amphetamine use probably more common than realised
- Beware the sleepy baby and the sleepy mother
- Make sure baby feeds and has no respiratory distress
- Stay **AT LEAST 5 days**



What Happens to the Babies?

As the Child Grows

Infancy

Poor adaptation
No difference in developmental tests at 1 year



Toddler

3 years
Emotional reactivity
Anxiety
Depression
Withdrawn behaviours



Preschool

5 years
Aggression
Externalizing behaviour
ADHD
Worse for boys



School

7.5 years
2.8x risk cognitive problems
Externalizing and rule breaking behaviour
Aggression

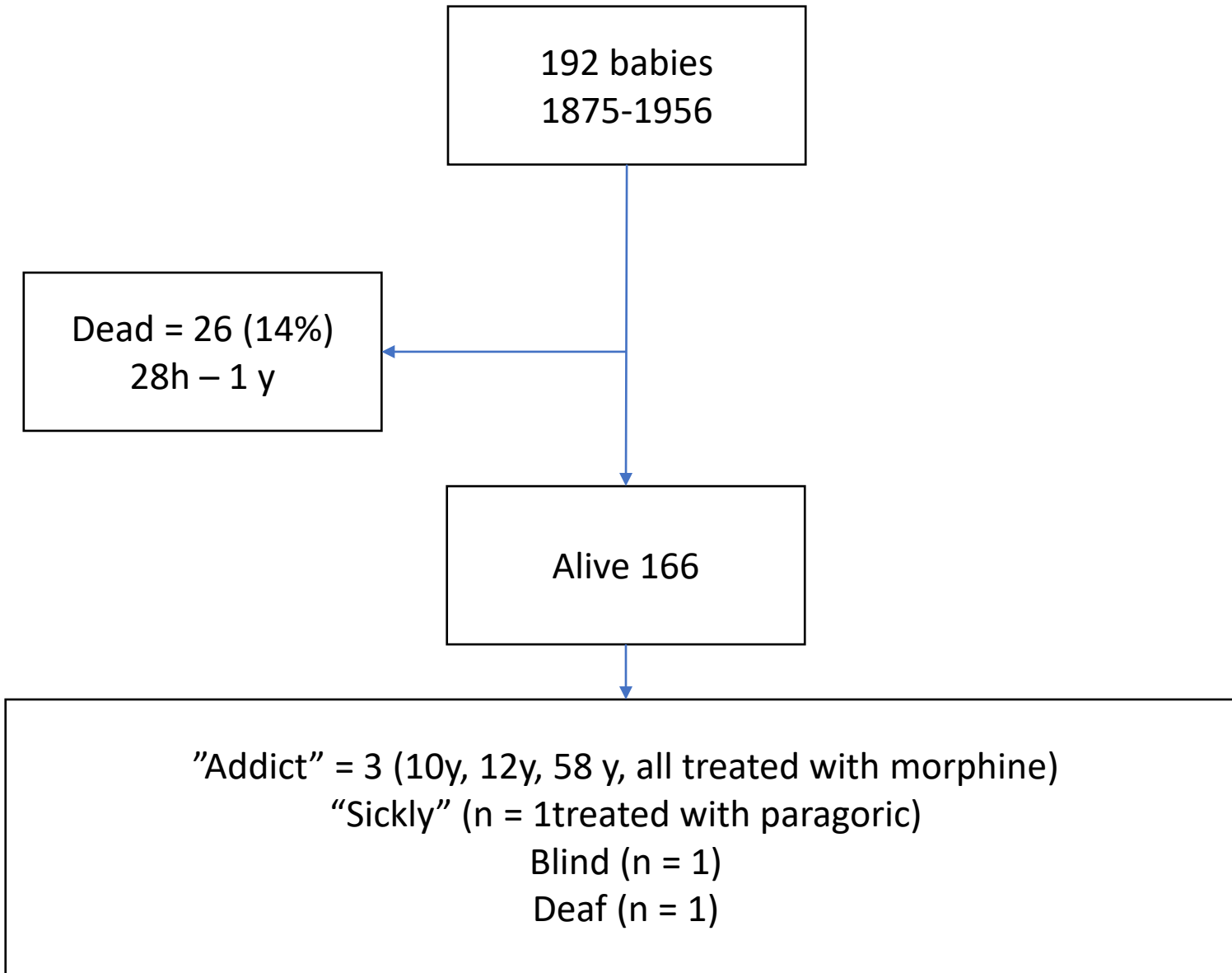
Adulthood

- Impaired neural reward pathways
- Sensitizing to locomotor stimulating and conditioning drug effects
- Psychiatric disorders?
- Increased risk of addiction?



What Happens to the Children?
1 in 20 Births
>15,000 Babies per year in Australia





Cobrinik et al 1959

"After early successful therapy, it has been urged that the infant be taken immediately and, perhaps permanently from the mother and her environment"

"This is best"

"It is rare for an addicted mother to make a permanent recovery"

"Newborn addicts are the only curable addicts"

Data Linkage



Birth records

Identifiers

Name

Date of birth

Address

Hospital numbers



Hospital data
P96.1 = NAS

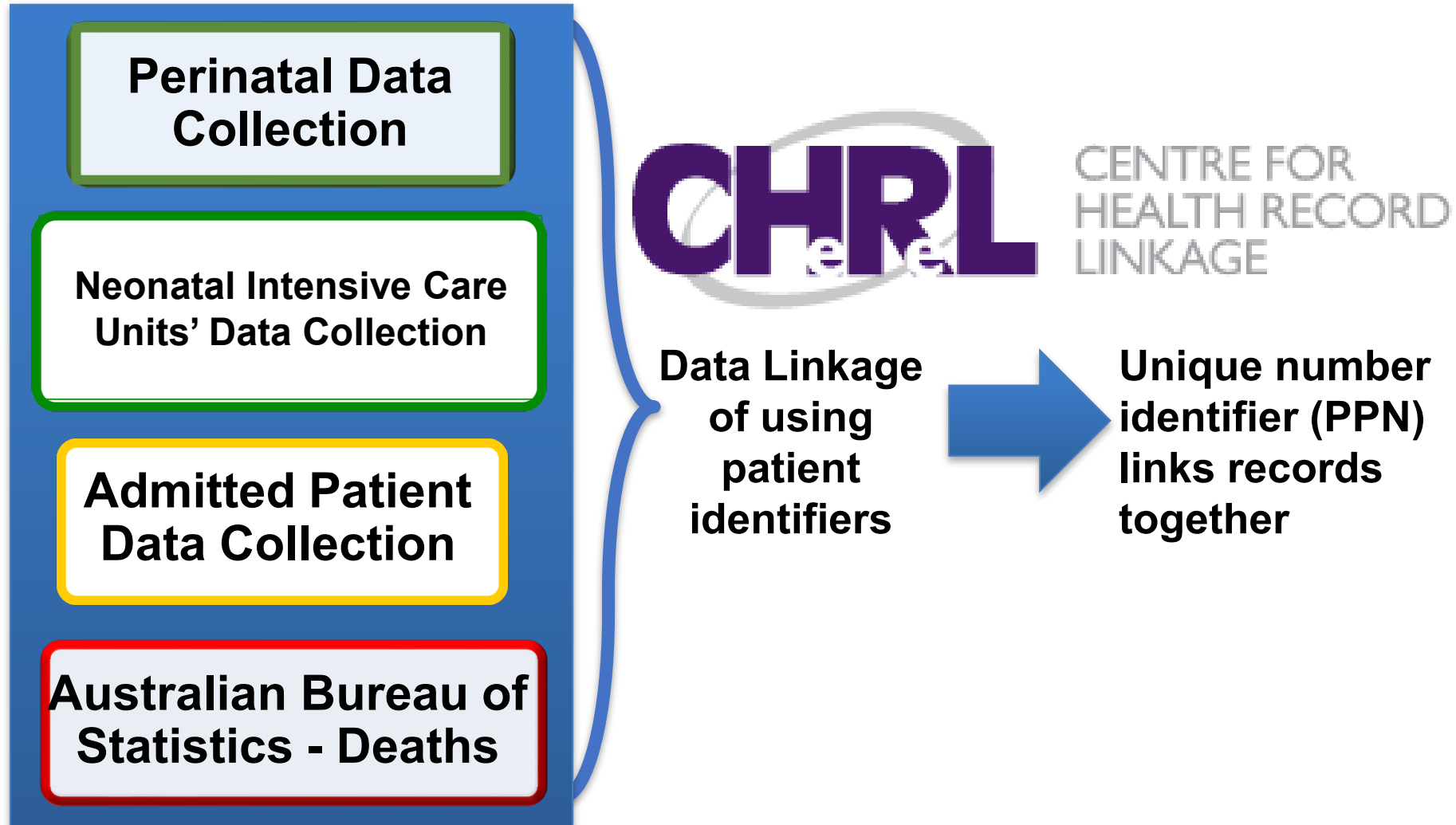


Death

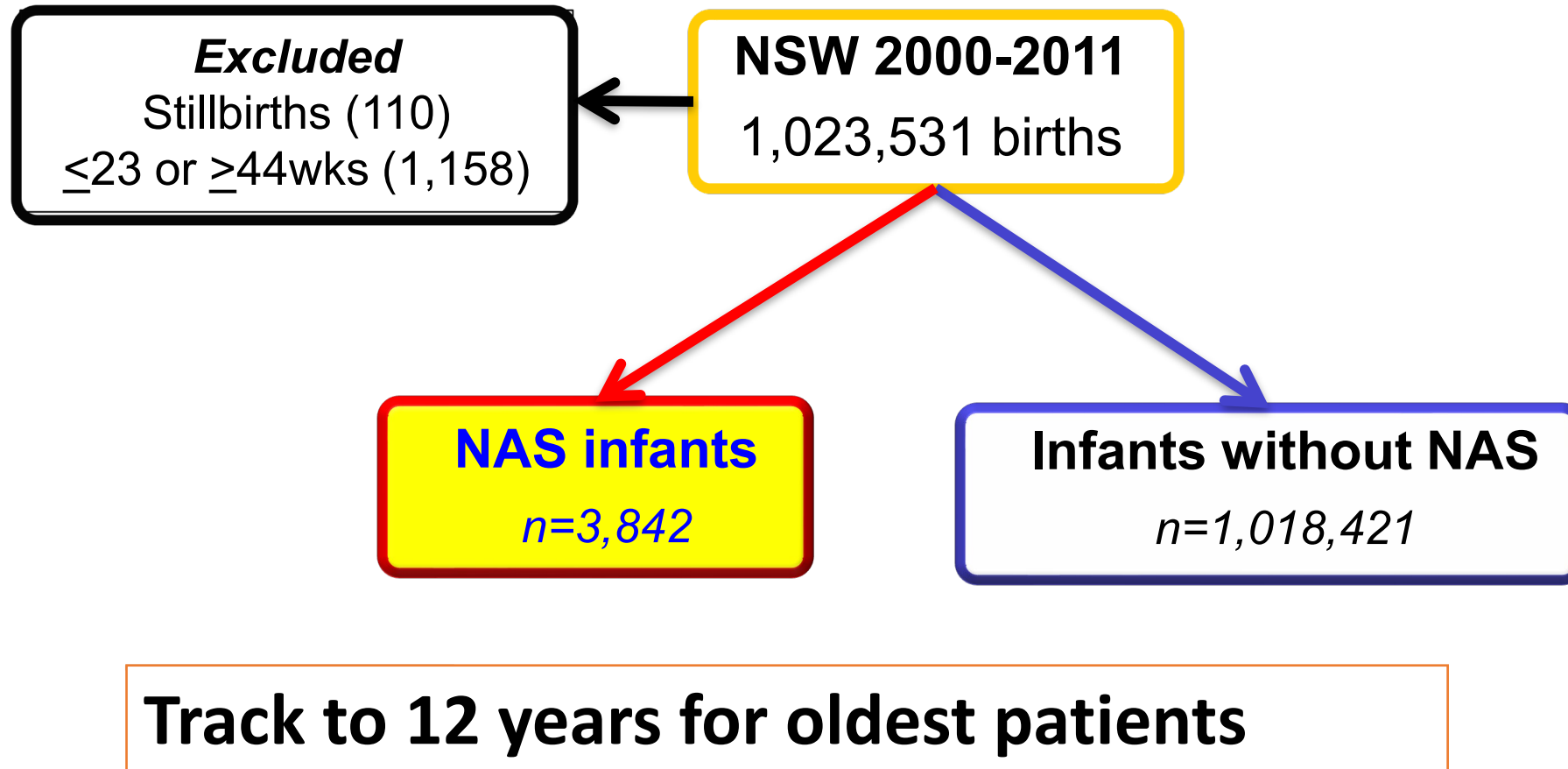


School

Data Linkage Uses Identifiers



Study Population



Mums

	NAS (n = 3,803)	No NAS (n = 1,003,012)	OR (95% CI)
Mean maternal age, yrs	29.1 (5.8)*	30.4 (5.6)	
Indigenous ethnicity	15.6%	2.8%	6.4 (6.0-7.0)*
Cigarette smoking	76.9%	12.4%	23.6 (21.8-25.4)*
No antenatal care	8.4%	1.4%	6.6 (5.9-7.4)*
Lowest Economic Quintile	13.3%	8.9%	1.6 (1.4-1.7)*

*p<0.001

Babies

	NAS (n=3,842)	No-NAS (n=1,018,421)	OR (95% CI)
Male	52.5%	51.4%	1.0 (0.9-1.1)
Low Birthweight <2500g	25.0%	5.8%	5.4 (5.1-5.9)*
<37wks gestation	22.4%	6.7%	4.0 (3.7-4.3)*
Apgar <7 at 5 minutes	3.7%	1.4%	2.8 (2.3-3.3)*
Admission to nursery	74.6%	15.8%	15.6 (14.5-16.8)*
Length of stay, days (median)	10.0*	3.0	

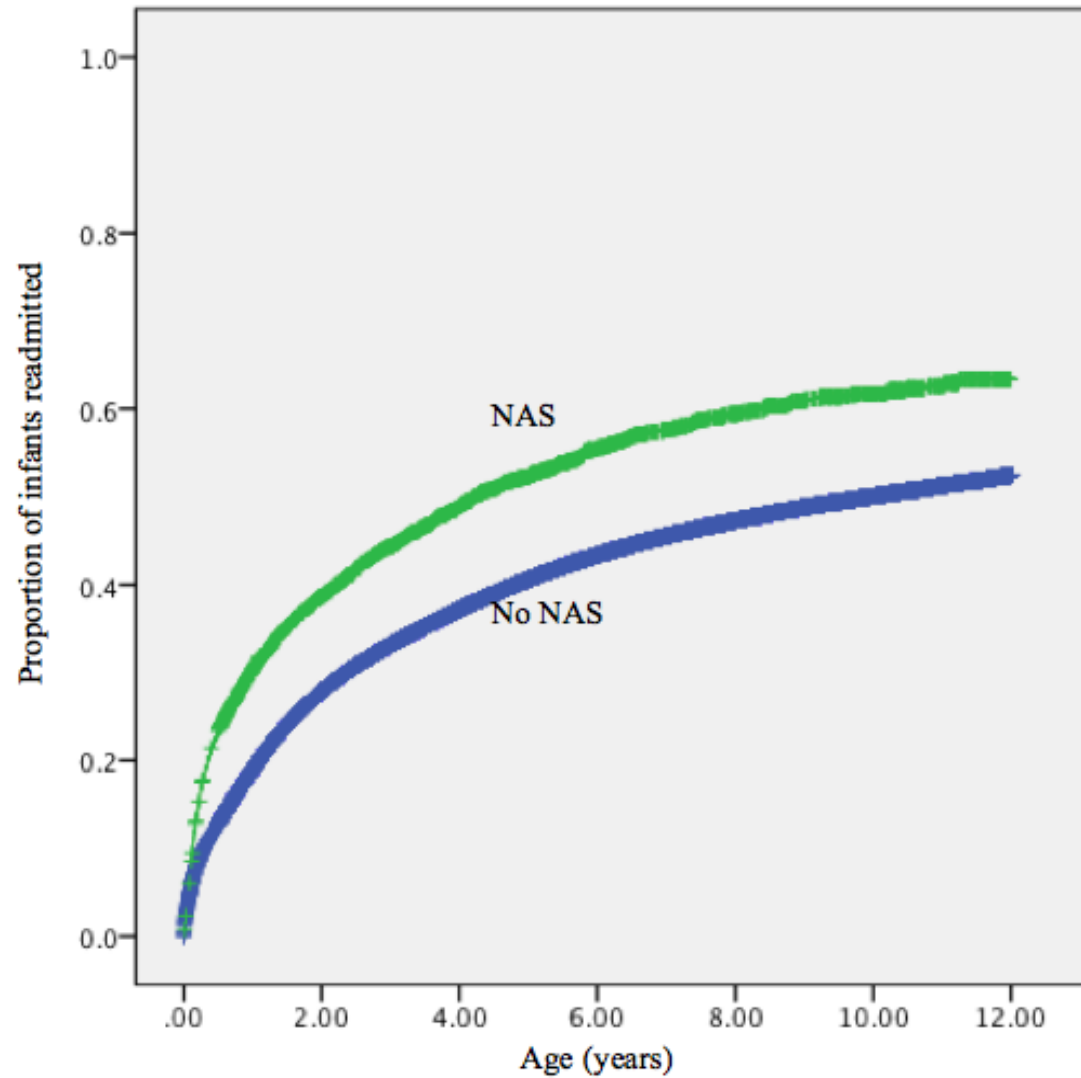
*p<0.001

Children with NAS were Hospitalized More

	NAS (n=3,837)	Non-NAS (n=1,016,565)	OR (95% CI)
Episodes of Care	5,154	887,227	
Admitted after birth	52%	40%	1.6 (1.5-1.7)*
Number of episodes	1.3/child	0.9/child	
Mean total episodes	2.1±4.0*	1.6±3.8	

*p<0.001

Risk of hospitalization continues to teenage years



Reasons for Hospitalization

ICD10 Classification	Number of children (%)		
	NAS (n=3,837)	No NAS (n=1,016,565)	OR (95% CI)
Injury, poisoning & consequences of external causes	478 (12.5)	69,977 (6.9)	1.9 (1.8-2.1)*
Burns and corrosions	41 (1.1)	4,139 (0.4)	2.6 (1.9-3.6)*
Poisoning	43 (1.1)	3,231 (0.3)	3.6 (2.6-4.8)*
Maltreatment (neglect & abuse)	28 (0.7)	355 (0.0)	21.0 (14.3-31.0)*
Accidents	440 (11.5)	64,497 (6.3)	1.9 (1.7-2.1)*
Assault	45 (1.2)	791 (0.1)	15.2 (11.3-20.6)*

*p<0.001; **p<0.05

Median age (months): **4**** vs **11**

NAS Is an Independent Risk Factor for Assault

Factors	β	Standard Error	P value	OR	95% CI
Male gender	0.25	0.07	0.01	1.28	1.11-1.47
NAS	1.45	0.16	<0.001	4.47	3.35-6.13
Lowest Economic Quintile	0.36	0.08	<0.001	1.44	1.23-1.67
Mother <20 years at delivery	1.31	0.08	<0.001	3.69	3.11-4.39
Rural residence	0.28	0.08	<0.001	1.33	1.14-1.55
Indigenous ethnicity	0.96	0.09	<0.001	2.61	2.16-3.15
Prematurity (<37 weeks)	0.81	0.96	<0.001	2.24	1.86-2.71
Smoking during pregnancy	1.53	0.08	<0.001	4.62	3.40-4.52

Mental and Behavioural Disorders

ICD10 Classification	Number of children (%)		
	NAS (n=3,837)	No NAS (n=1,016,565)	OR (95% CI)
Mental & behavioural disorders	96 (2.5)	9924 (1.0)	2.6 (2.1-3.2)*
Mental Retardation	13 (0.3)	1,238 (0.1)	2.8 (1.6-4.8)*
Psychological development disorder	39 (1.1)	3,592 (0.4)	2.9 (2.1-4.0)*
Speech/language disorder	12 (0.3)	887 (0.1)	3.6 (2.0-6.4)*
Autism	15 (0.4)	1,113 (0.1)	3.6 (2.2-6.0)*
Behavioural & emotional disorders	32 (0.8)	2,090 (0.2)	4.1 (2.9-5.8)*

*p<0.001

Median age (years): **5.4*** vs **3.4**

(Ornoy, 1996, 2010, 2011)
(Wahlsten, 2013; Wu, 2014)

NAS is an independent predictor of mental and behavioural disorders

Factors	β	Standard Error	P value	OR	95% CI
Male	0.33	0.21	<0.001	1.39	1.34-1.46
NAS	0.85	0.11	<0.001	2.34	1.89-2.88
Lowest Economic Quintile	-0.16	0.03	<0.001	0.85	0.81-0.90
Rural residence	-0.62	0.03	<0.001	0.54	0.50-0.57
Indigenous ethnicity	-0.82	0.07	0.242	0.92	0.80-1.06
Prematurity (<37 weeks)	0.62	0.03	<0.001	1.86	1.74-1.98
Smoking during pregnancy	0.05	0.03	0.09	1.05	0.99-1.12



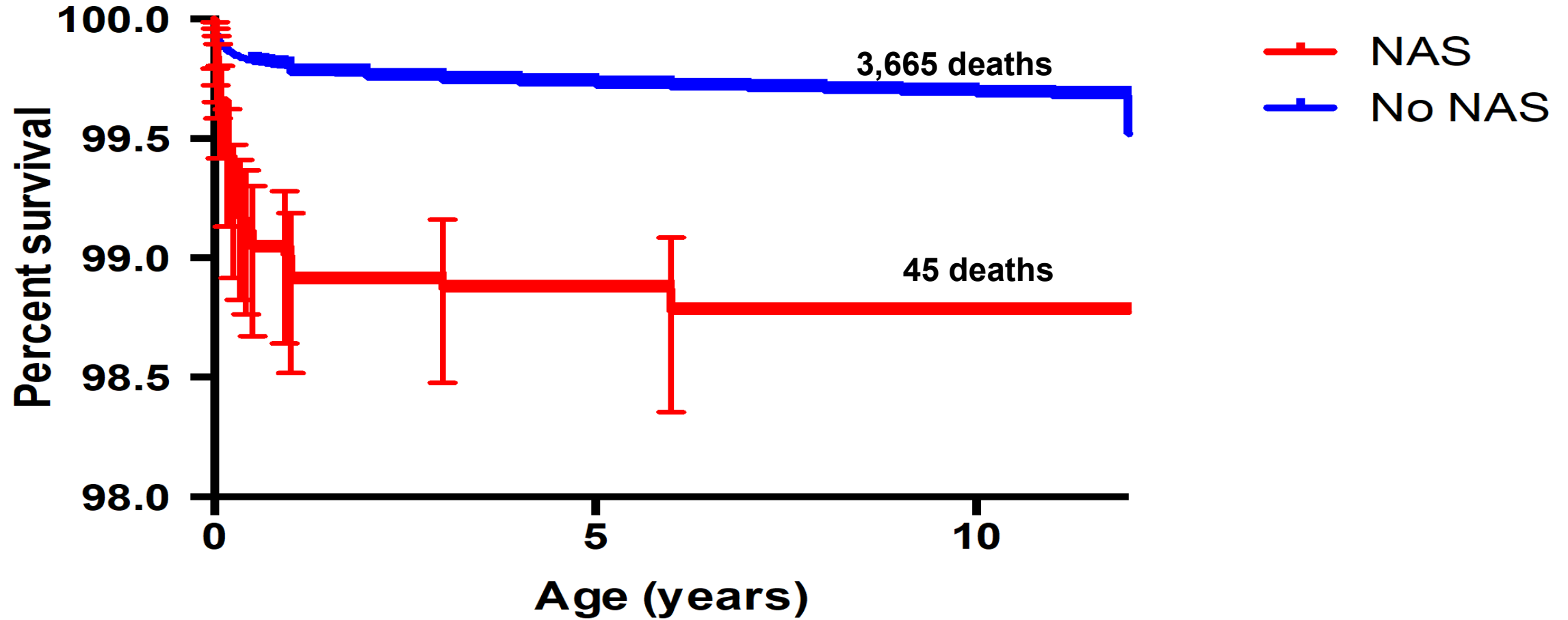
Are Children with NAS More Likely to Die?

Children with NAS Die After They Leave Hospital

	<i># of deaths (% of deaths)</i>		
	<i>NAS</i>	<i>No NAS</i>	OR(95% CI)
Death before discharge	5 (11.1)	1856 (50.6)	0.7 (0.3-1.7)
0 – <28 days	8 (17.8)	1,809 (49.5)	1.2 (0.6-2.4)
28 days – 1 yr	30 (66.7)	1,051 (28.6)	7.6 (5.3-11.1)*
1-4 yrs	5 (8.9)	547 (12.2)	2.4 (1.0-5.9)
>4 yrs	2 (6.7)	258 (9.7)	2.1 (0.5-8.3)
Total	45 (100)	3,665 (100)	3.3 (2.4-4.4)*
Death rate	1.2%	0.4%	

*p<0.001

Risk of Death in Children With NAS Continues to Adolescence



Causes of Death are Unclear

		<i>Admission before Death</i>		
		<i>NAS</i>	<i>No NAS</i>	
Mean total admissions		1.8±1.8*	3.3±8.3	
		<i>Postmortem</i>		
		<i>NAS</i>	<i>No NAS</i>	OR(95% CI)
Autopsy performed		16 (59.3)	905 (29.2)	3.5 (1.6-7.6)*

*p<0.001

They Don't Die from Medical Problems

	NAS (n=3,842)	No NAS (n=1,018,421)	OR (95% CI)	P
ICD-10 Code	# of deaths (% of deaths)			
Perinatal conditions	6 (20.0)	811 (36.5)	2.0 (0.9 – 4.4)	0.14
Congenital & chromosomal abnormalities	0	522 (23.5)	-	-
Ill-defined causes	15 (50.0)	272 (12.2)	14.7 (8.7 – 24.7)	<0.001
<i>Sudden Infant Death Syndrome</i>	8 (26.7)	198 (8.9)	10.7 (5.3 – 21.8)	<0.001
External causes	8 (26.7)	166 (7.5)	12.8 (6.3 – 26.0)	<0.001
<i>Accidents</i>	4 (13.3)	144 (6.5)	7.4 (2.7 – 19.9)	0.002
<i>Assault</i>	3 (10.0)	20 (0.9)	39.8 (11.8 – 134.0)	<0.001

What about school?

- School failure affects:
 - Physical health
 - Psychological well being
 - Depression
 - Anxiety
 - Employability
 - Adjustment in society





THE SCHOOL TO PRISON PIPELINE

★ now you know

The State of Texas determines how many prison spaces will be needed solely by the number of students who are held back a year in the third grade. It is astonishingly accurate.

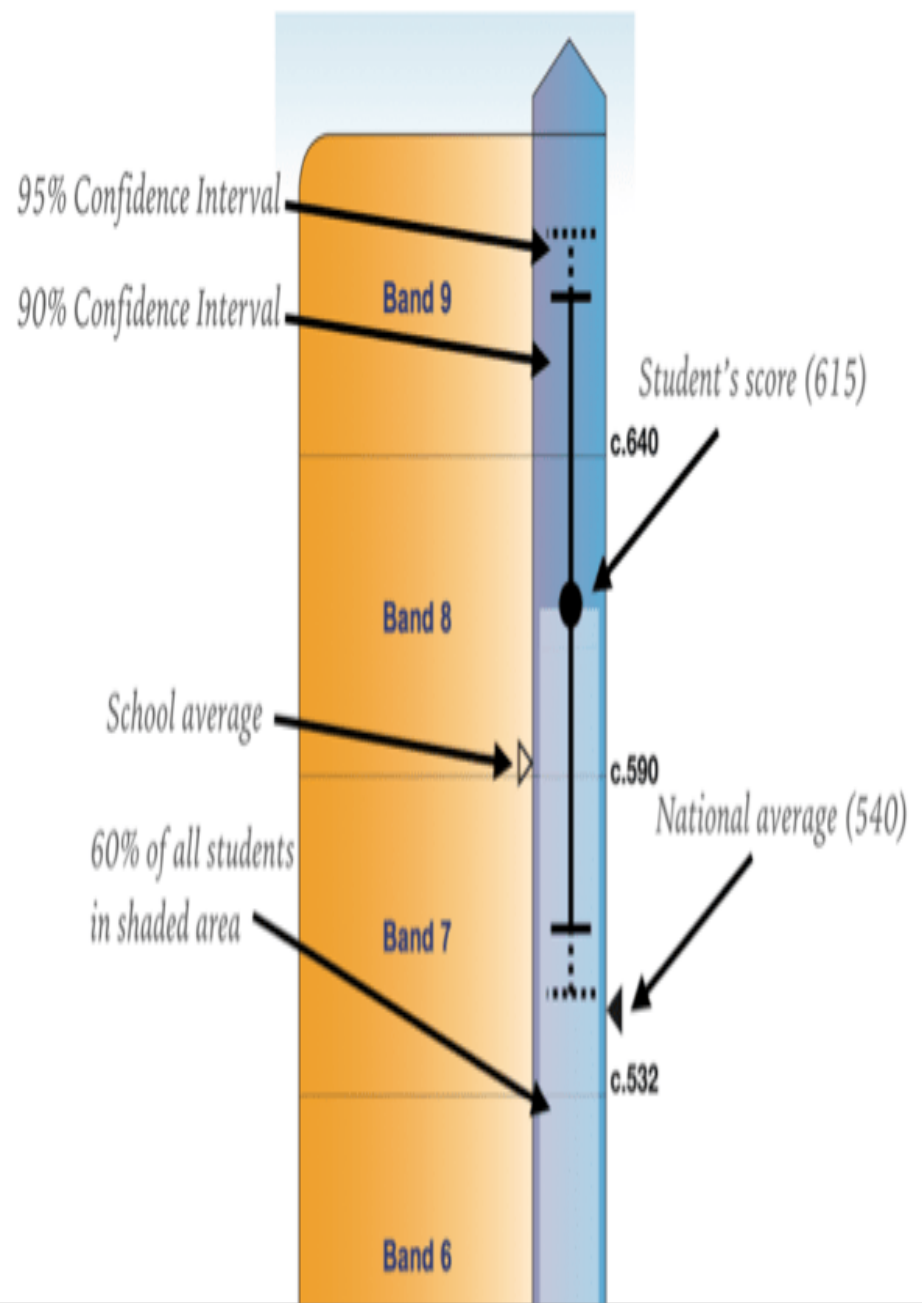
nowyouknow.com ★

Children with Prenatal Drug Exposures have Many Competing Factors in Life

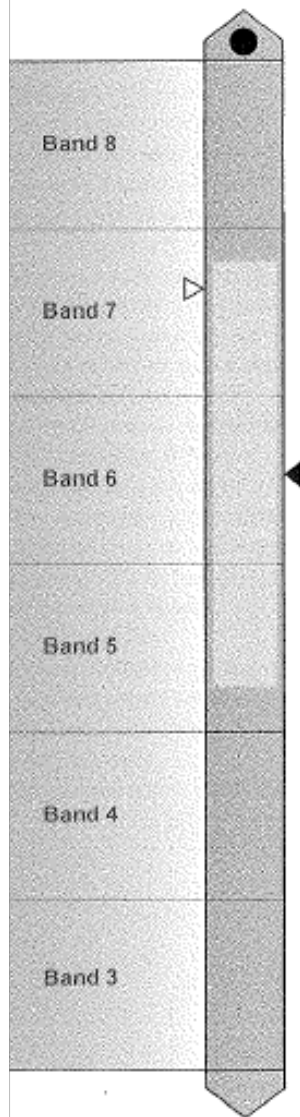
- Parental psychiatric co-morbidities (>50% depressed, anxious, post-traumatic stress)
- Lower parental education
- Genetic and epigenetic changes
- Family mobility (>50% fostered by age 5)
- Poverty
- Poor nutrition
- Poor parenting references

THE NAPLAN TEST – National Assessment Program- Literacy and Numeracy

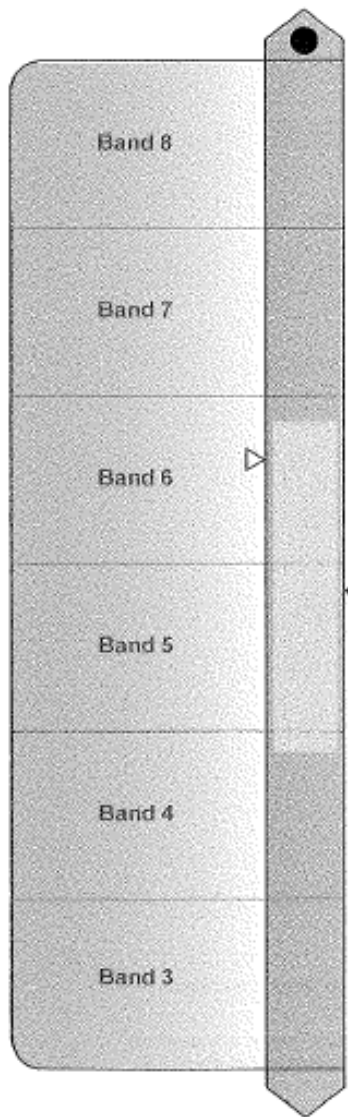
- Australia-wide COMPULSORY Test (i.e. no excuse)
- **Introduced in 2008**
- Test is taken in May each year
- Results available in September
- Each student assessed 4 times in school life:
 - Year 3 – ages 8-9
 - Year 5 – ages 10-11
 - Year 7- ages 12-13
 - Year 9- ages 14-15



Reading

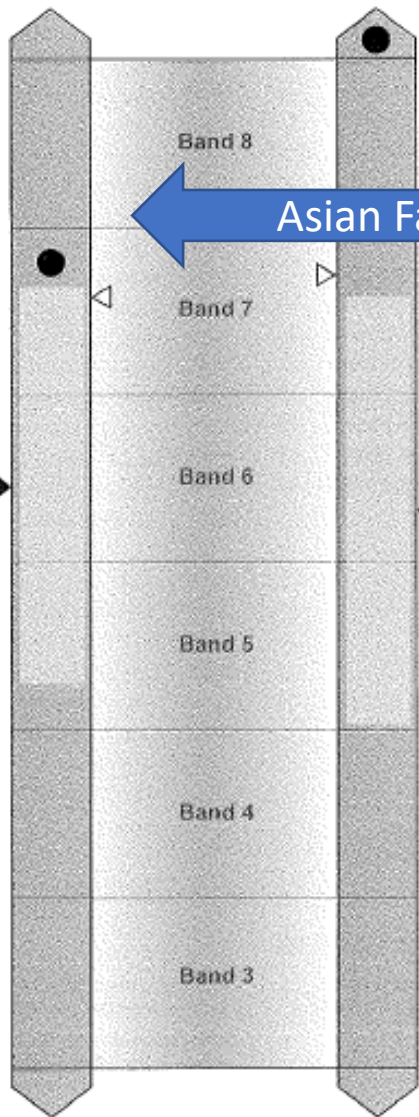


Writing

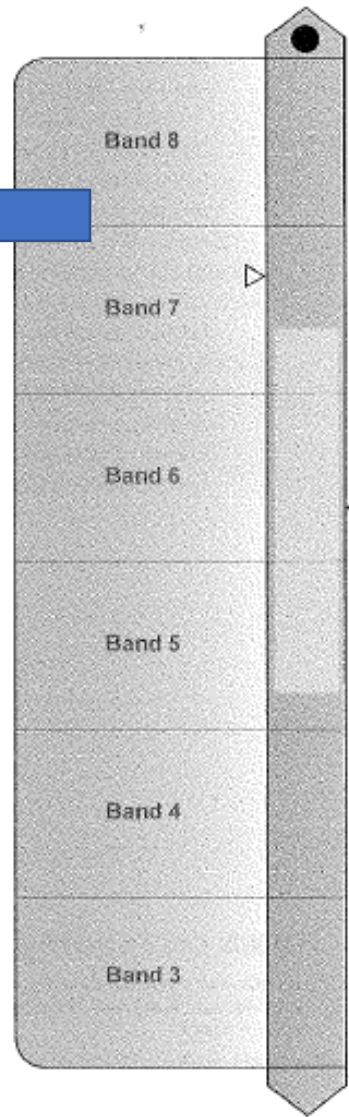


Language Conventions

Spelling Grammar & Punctuation



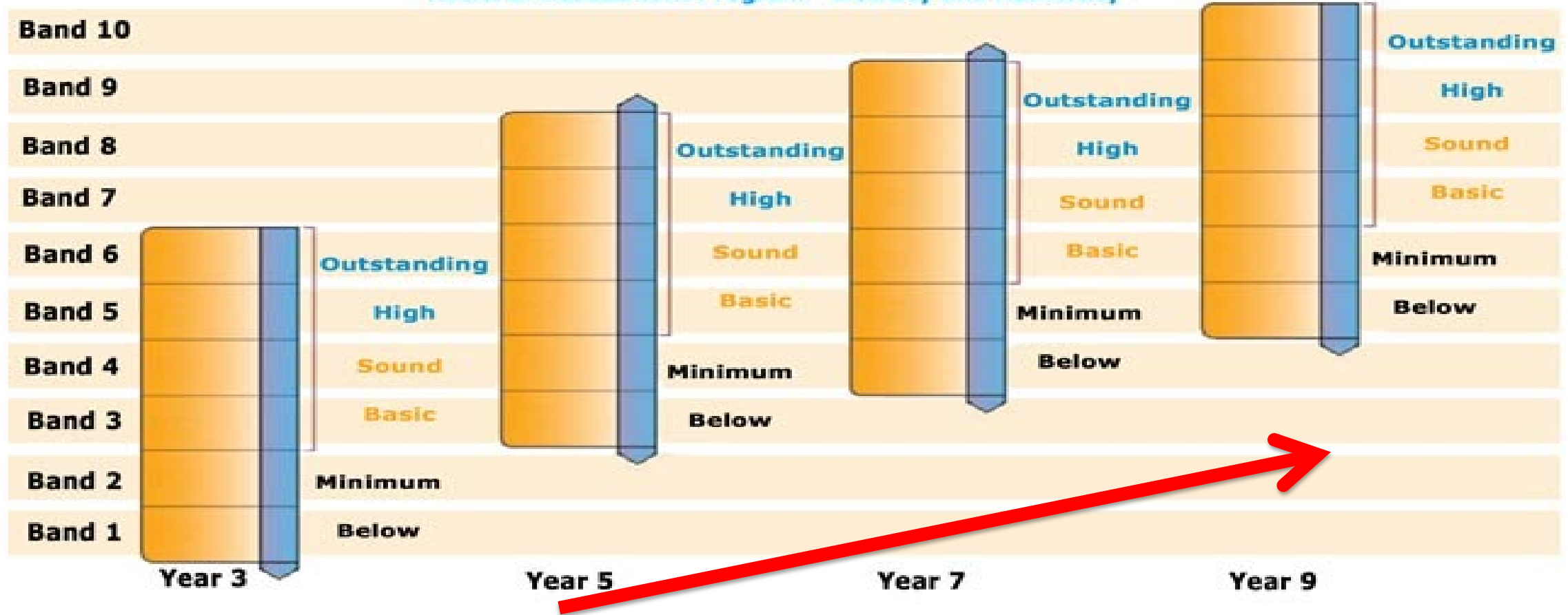
Numeracy



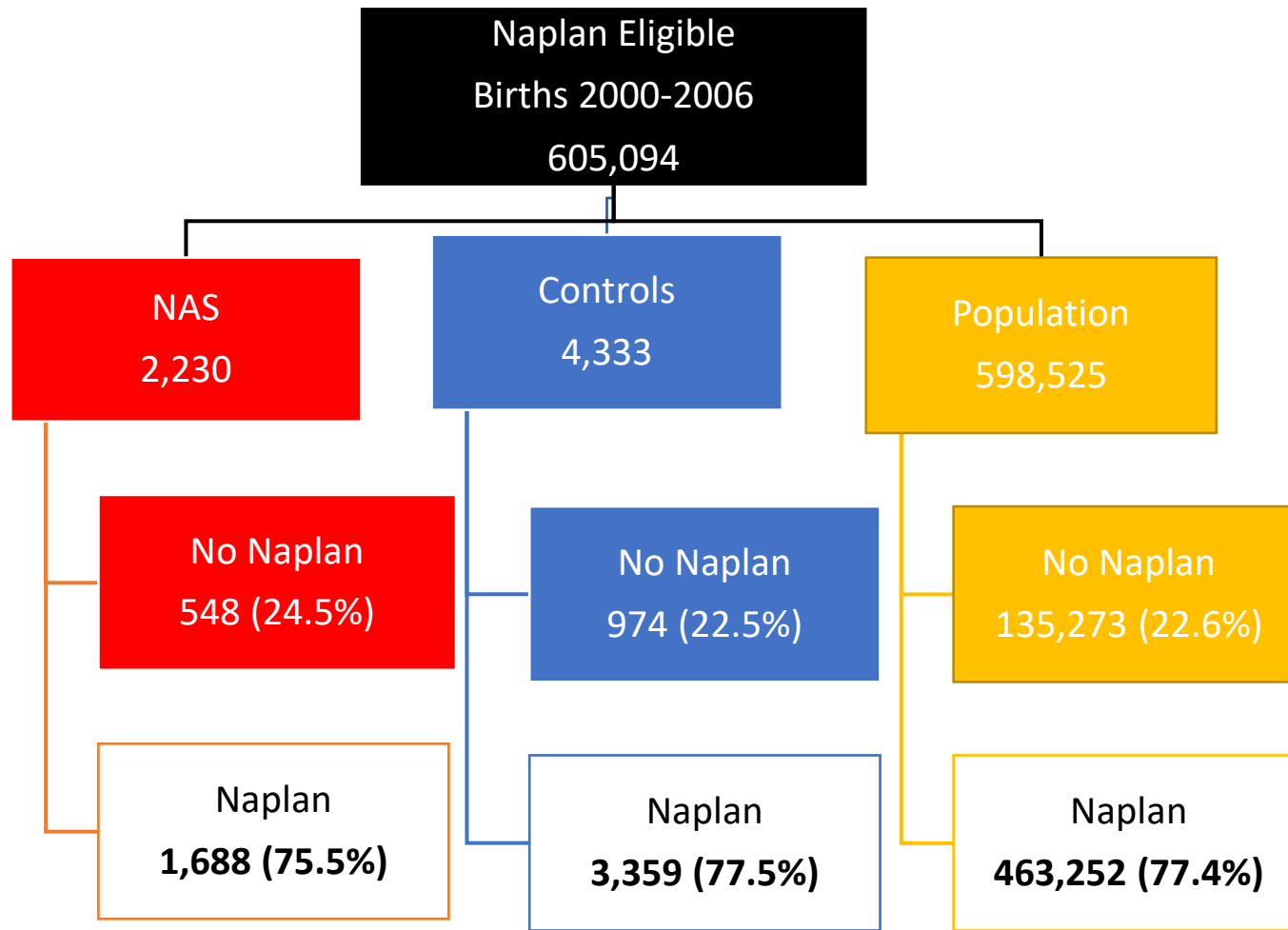
The Report

Children BELOW Minimum Standards do not have skills to proceed on to the next level of school

National Assessment Scale for NAPLAN National Assessment Program - Literacy and Numeracy

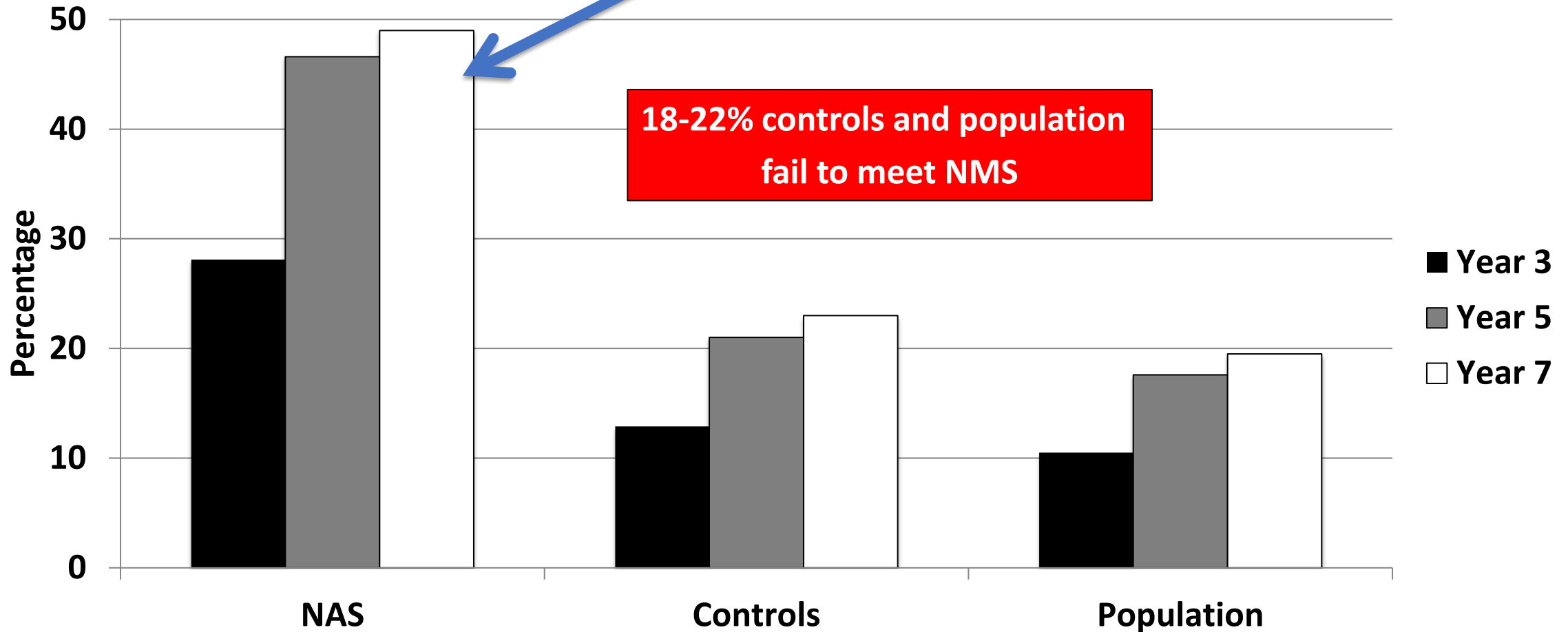


Scores should go up as the student gets older

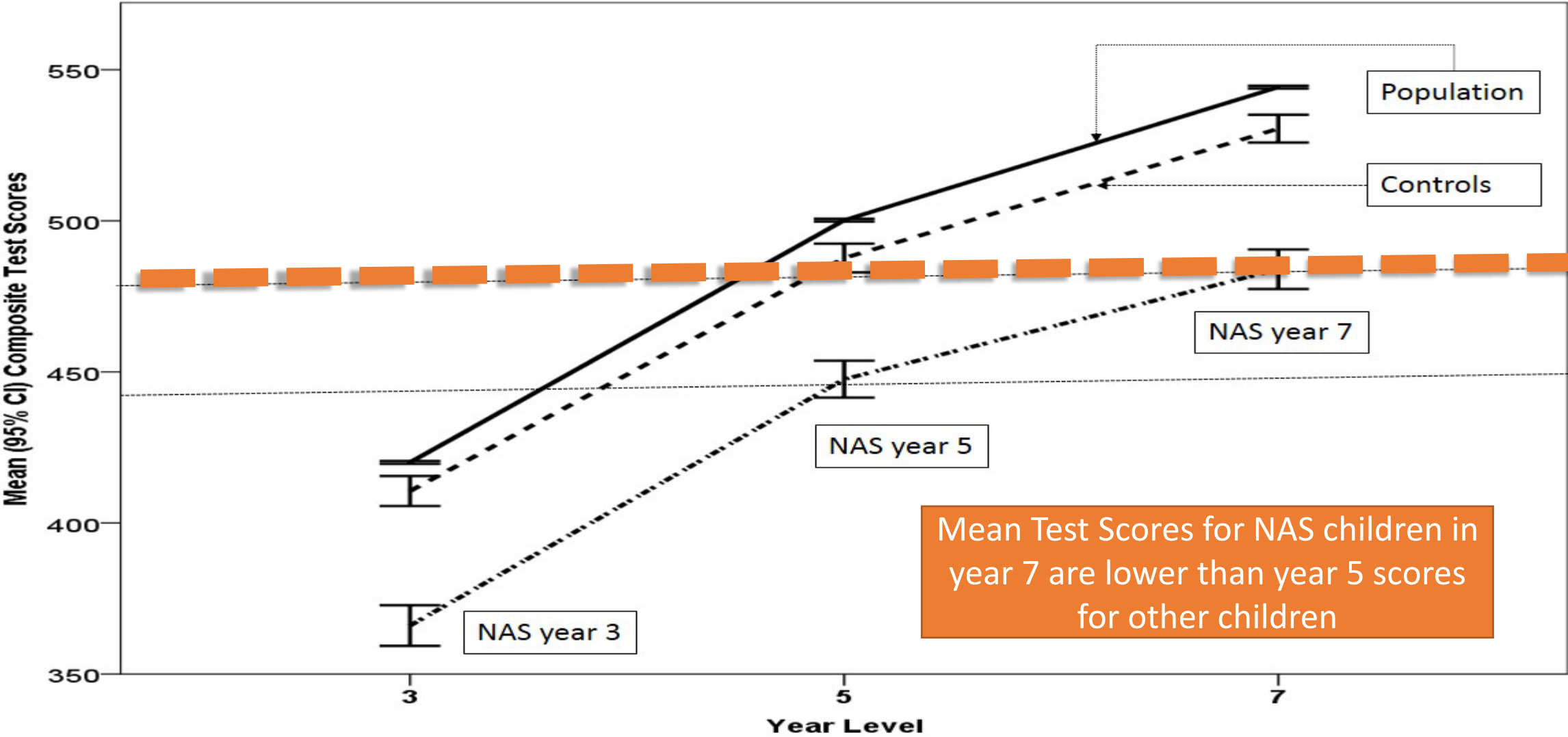


NAS 20% more likely than rest of population or controls to not have a NAPLAN record

Almost 1/2 of NAS children fail to meet national minimum standards by year 5



Scores Deteriorate Even Further by High School



Mean Test Scores for NAS children in year 7 are lower than year 5 scores for other children

Child Protection and Prenatal Drug Exposure

- Parental drug use:
 - Account for >40% of referrals to child protection services
 - Up to 174% of excess child mortality even until age 9 years
- Enormous resources are spent on keeping children safe when their parents use drugs
- Article 33 of the United Nations Right of the Child:

Children must be protected from drugs

A SIMPLIFIED VERSION OF THE UNITED NATIONS CONVENTION ON THE RIGHTS OF THE CHILD.



© UNICEF/NYHQ1996-0390/Charlon

Article 1 Everyone under 18 years of age has all the rights in this Convention.	Article 16 Children have the right to privacy. The law should protect them from attacks against their way of life, their good name, their family and their home.	Article 29 Education should develop each child's personality and talents to the full. It should encourage children to respect their parents, their cultures and other cultures.
Article 2 The Convention applies to everyone whatever their race, religion, abilities, whatever they think or say, whatever type of family they come from.	Article 17 Children have the right to reliable information from the media. Mass media such as television, radio and newspapers should provide information that children can understand and should not promote materials that could harm children.	Article 30 Children have the right to learn and use the language and customs of their families, whether or not these are shared by the majority of the people in the country where they live, as long as this does not harm others.
Article 3 All organisations concerned with children should work towards what is best for each child.	Article 18 Both parents share responsibility for bringing up their children and should always consider what is best for each child. Governments should help parents by providing services to support them, especially if both parents work.	Article 31 Children have the right to relax, play and to join in a wide range of leisure activities.
Article 4 Governments should make these rights available to children.	Article 19 Governments should ensure that children are properly cared for and protect them from violence, abuse and neglect by their parents or anyone else who looks after them.	Article 32 Governments should protect children from work that is dangerous or that might harm their health or education.
Article 5 Governments should respect the rights and responsibilities of families to guide their children so that, as they grow up, they learn to use their rights properly.	Article 20 Children who cannot be looked after by their own family must be looked after properly by people who respect their religion, culture and language.	Article 33 Governments should provide ways of protecting children from dangerous drugs.
Article 6 Children have the right to live a full life. Governments should ensure that children survive and develop healthily.	Article 21 When children are adopted the first concern must be what is best for them. The same rules should apply whether children are adopted in the country of their birth or if they are taken to live in another country.	Article 34 Governments should protect children from sexual abuse.
Article 7 Children have the right to a legally registered name and nationality. Children also have the right to know their parents and, as far as possible, to be cared for by them.	Article 22 Children who come into a country as refugees should have the same rights as children who are born in that country.	Article 35 Governments should make sure that children are not abducted or sold.
Article 8 Governments should respect a child's right to a name, a nationality and family ties.	Article 23 Children who have any kind of disability should receive special care and support so that they can live a full and independent life.	Article 36 Children should be protected from any activities that could harm their development.
Article 9 Children should not be separated from their parents unless it is for their own good. For example, if a parent is mistreating or neglecting a child. Children whose parents have separated have the right to stay in contact with both parents, unless this might harm the child.	Article 24 Children have the right to good quality health care, clean water, nutritious food and a clean environment so that they will stay healthy. Richer countries should help poorer countries achieve this.	Article 37 Children who break the law should not be treated cruelly. They should not be put in a prison with adults and should be able to keep in contact with their family.
Article 10 Families who live in different countries should be allowed to move between those countries so that parents and children can stay in contact, or get back together as a family.	Article 25 Children who are looked after by their local authority rather than their parents should have their situation reviewed regularly.	Article 38 Governments should not allow children under 15 to join the army. Children in war zones should receive special protection.
Article 11 Governments should take steps to stop children being taken out of their own country illegally.	Article 26 The Government should provide extra money for the children of families in need.	Article 39 Children who have been neglected or abused should receive special help to restore their self-respect.
Article 12 Children have the right to say what they think should happen when adults are making decisions that affect them and to have their opinions taken into account.	Article 27 Children have the right to a standard of living that is good enough to meet their physical and mental needs. The government should help families who cannot afford to provide this.	Article 40 Children who are accused of breaking the law should receive legal help. Prison sentences for children should only be used for the most serious offences.
Article 13 Children have the right to get and to share information, as long as the information is not damaging to them or to others.	Article 28 Children have the right to an education. Discipline in schools should respect children's human dignity. Primary education should be free. Wealthier countries should help poorer countries achieve this.	Article 41 If the laws of a particular country protects children better than the articles of the Convention, then those laws should override the Convention.
Article 14 Children have the right to think and believe what they want and to practise their religion, as long as they are not stopping other people from enjoying their rights. Parents should guide children on these matters.		Article 42 Governments should make the Convention known to all parents and children.
Article 15 Children have the right to meet with other children and young people and to join groups and organisations, as long as this does not stop other people from enjoying their rights.		



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Does CPS Protect Children with Prenatal Drug Exposure from Harm?

- Children with PDE are heterogeneous
- Tracking is difficult
- In and out of CPS
- 2 problems:
 - CPS = excess child deaths
 - PDE = excess child deaths
- Small short term studies suggest CPS programs beneficial
 - Delaware USA
 - 1436 PDE infants, 1347 (90%) supported with CPS programs
 - 90% not placed in care BUT
 - Serious problems continued = 5 fractures, SIDS deaths

QUESTION: Does CPS reduce risk of death?

Aim

To determine the **impact of OOHC** on **mortality** in children with PDE.

Hypothesis

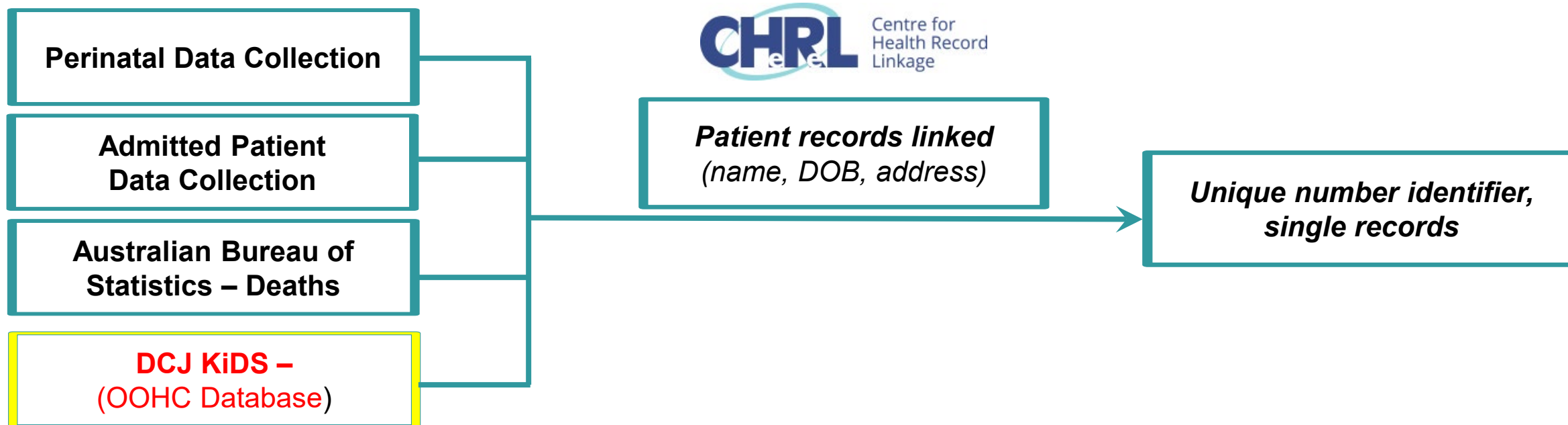
That OOHC will be associated with **reduced mortality** in children with PDE.

Methods

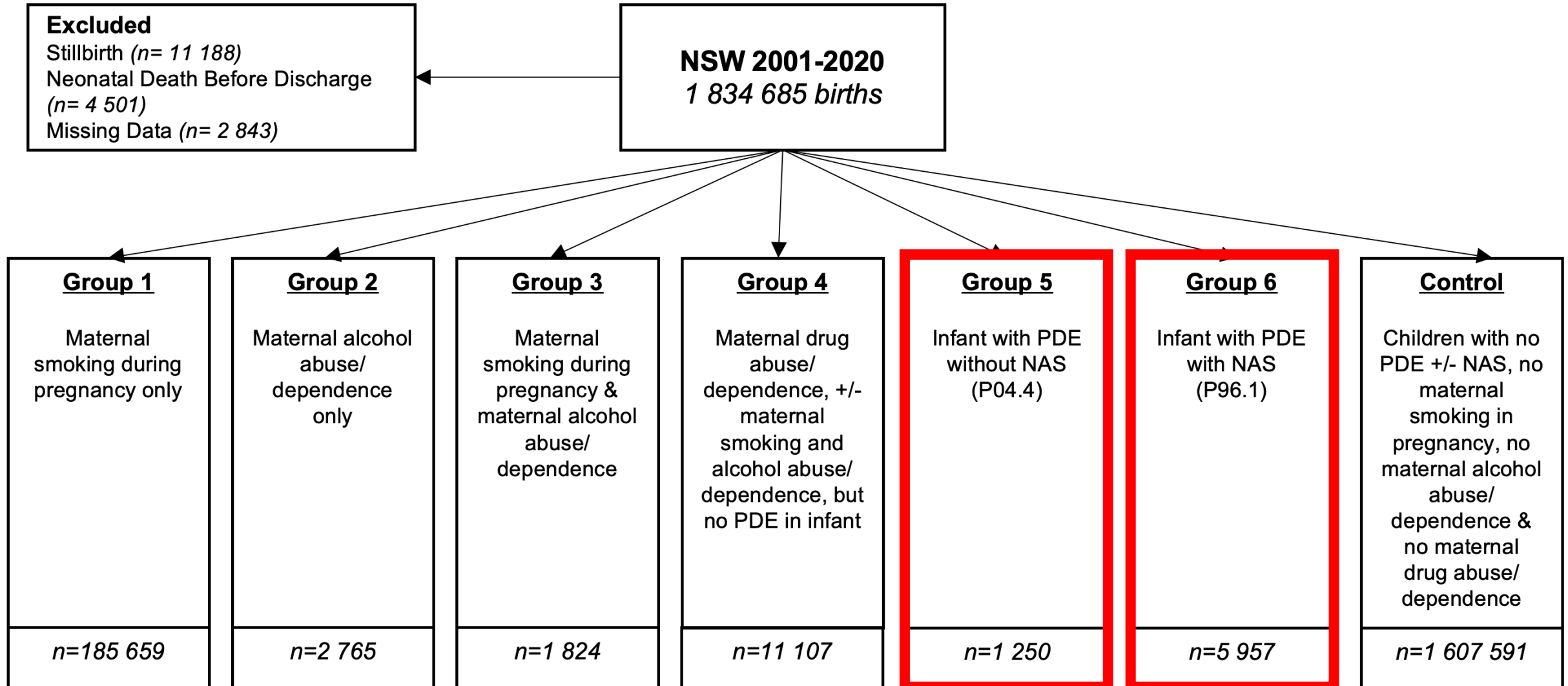
Population-based study, retrospective data linkage

- NSW children born 2001–2020
- Discharged alive after birth.

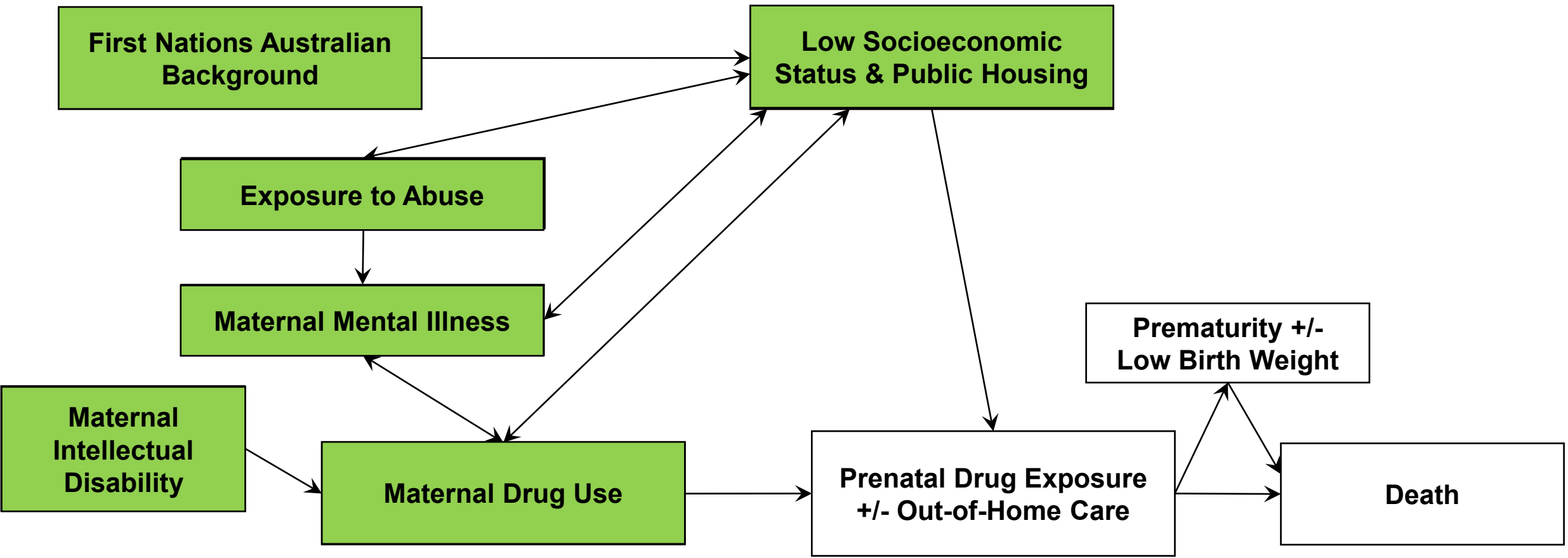
Data Linkage:



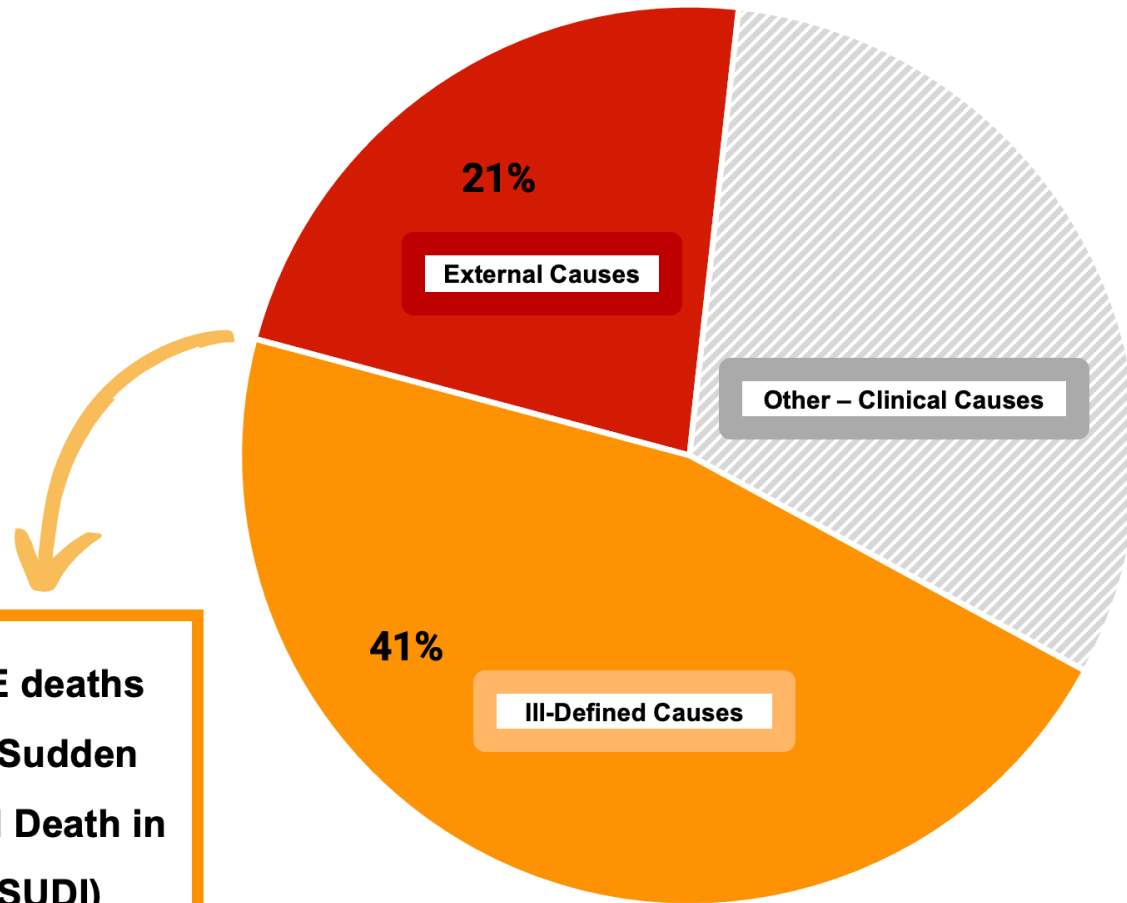
Infants grouped according to TYPES of drug exposure and/or NAS



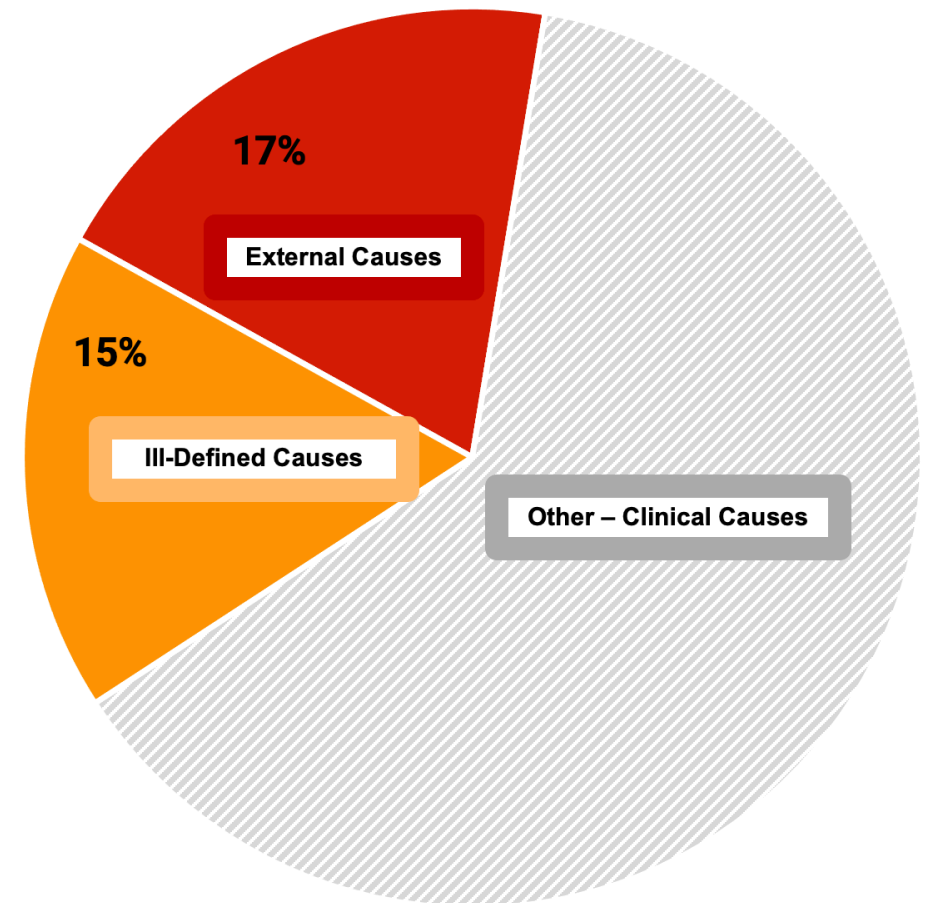
Factors which ↑ risk of death



Main causes of death: ill-defined or external



Children with PDE



Children without PDE

PDE ↑ need for out-of-home care (OOHC)

8x more likely to have **at least one episode** of OOHC

*(aIRR 8.74, 95%CI 8.28-9.30)**

Lower median age of

1st OOHC entry

for children with PDE

(7 months vs 3.5 years)

29x more likely to have OOHC by **6 months of age**

	Adjusted Incidence Rate Ratio (95% Confidence Interval)	P-value
OOHC by 6 months of age	29.05 (26.78-31.52)	<0.001
OOHC by 1 year of age	23.32 (21.62-25.15)	<0.001

23x more likely to have OOHC in the **1st year of life**

OOHC ↓ risk of death by 75% for children with PDE

	Adjusted Hazard Ratio (95% Confidence Interval)	P-value
PDE & OOHC	0.25 (0.11-0.55)	0.001

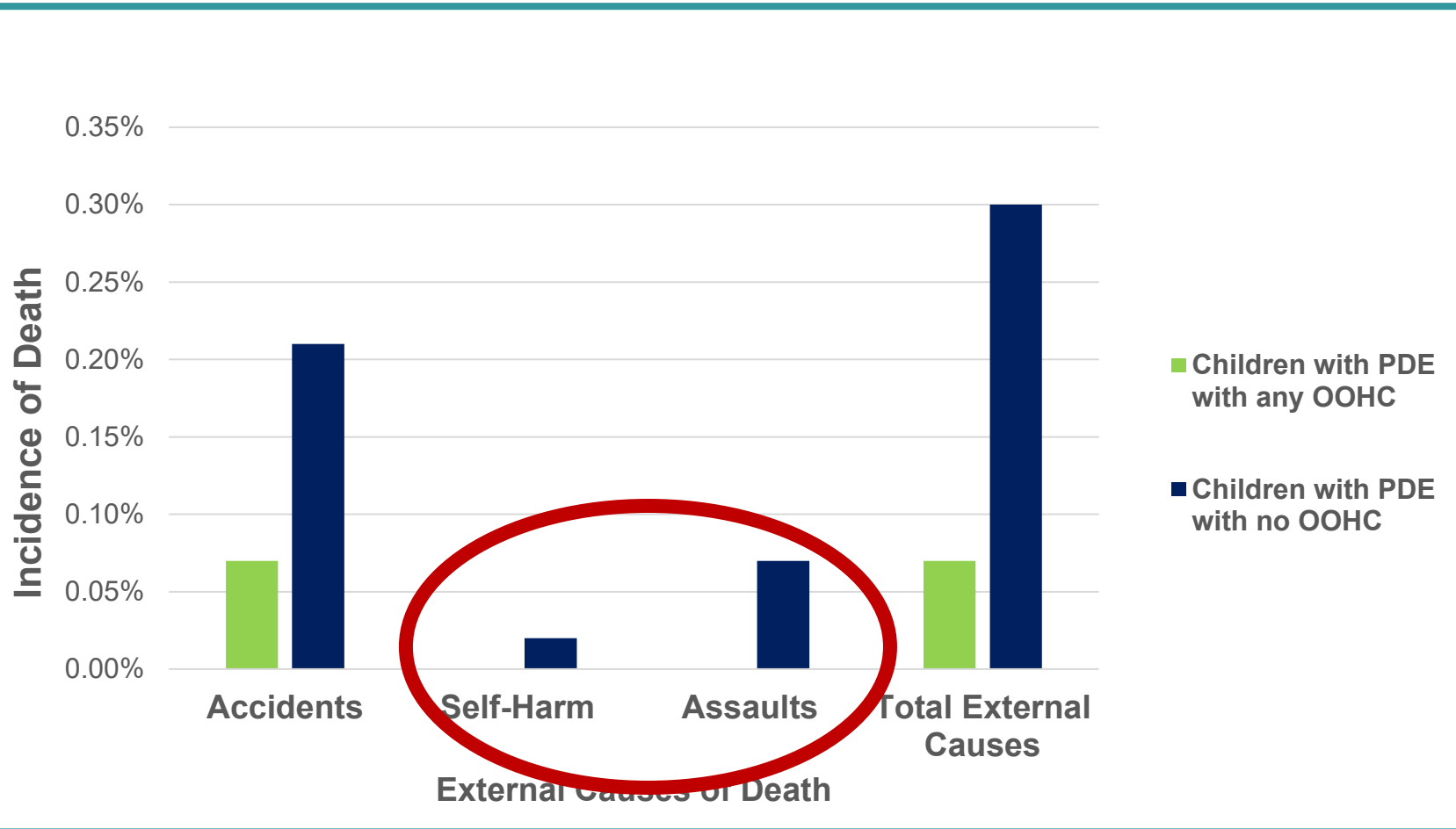
Both main types ↓ death for children with PDE

Foster Care:
77% ↓ in mortality risk*

	Adjusted Hazard Ratio (95% Confidence Interval)	P-value
PDE & Foster Care	0.23 (0.09-0.62)	0.004
PDE & Relative/Kinship Care	0.35 (0.10-1.23)	0.102

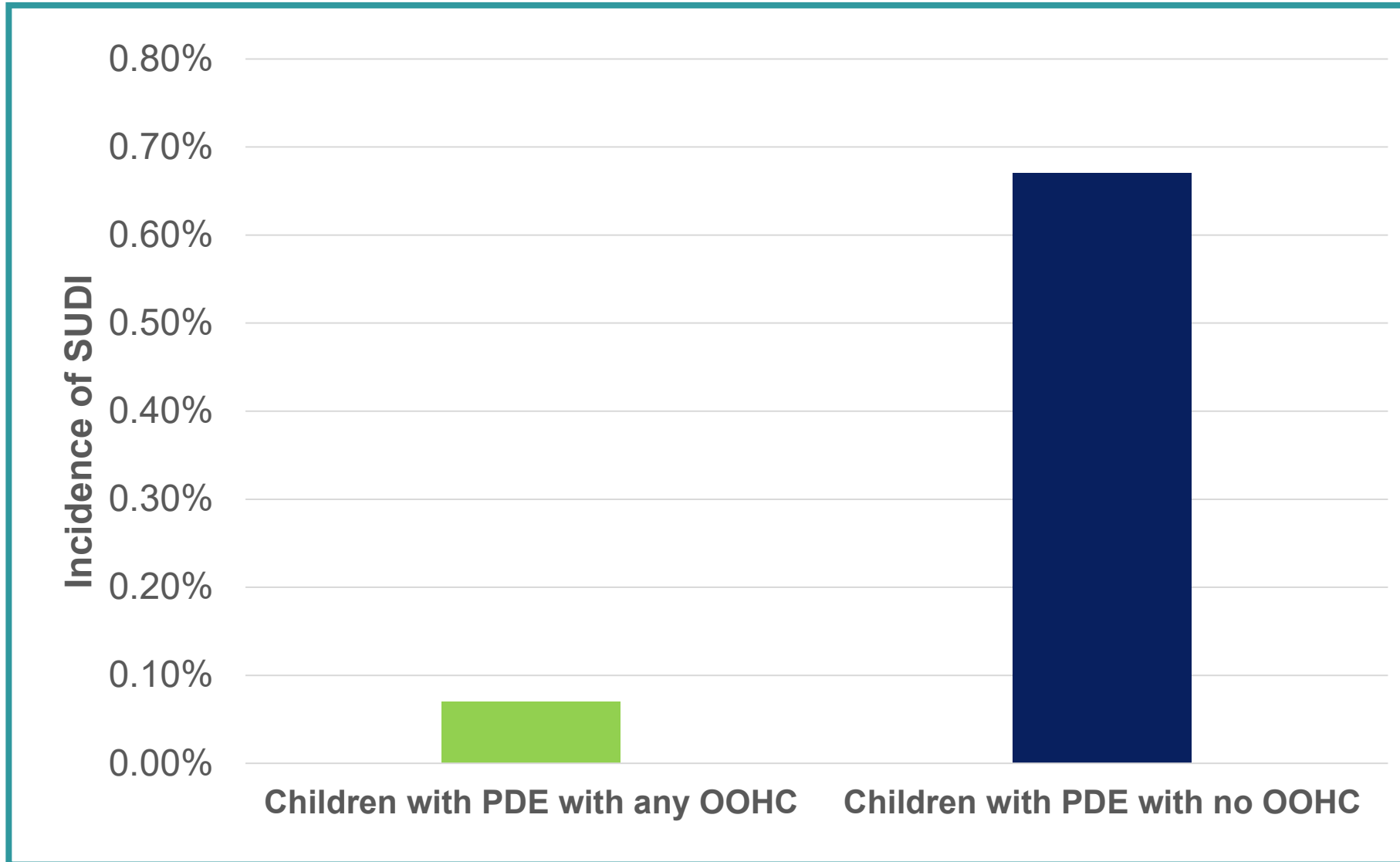
Relative/Kinship Care:
65% ↓ in mortality risk

OOHC ↓ death from external causes in PDE



No deaths from assault or self-harm for children with PDE in OOHC

OOHC ↓ death from SUDI in children with PDE



Analysis 2: OOHC ↓ risk of death for PDE but ↑ risk for NO PDE

Children with ANY PDE

(Children diagnosed with PDE [P96.1 or P04.4] in infancy **OR** children with prenatal drug exposure recorded in databases but not diagnosed in infancy)

- **72% ↓** in risk of mortality with OOHC* (HR 0.28, 0.20-0.40)**
- Foster Care: **48% ↓** (HR 0.52, 0.34-0.80)*
- Relative/Kinship Care: **88% ↓**
(HR 0.12, 0.06-0.24)**

Children with NO PDE

(Children with NO prenatal drug exposure recorded in databases)

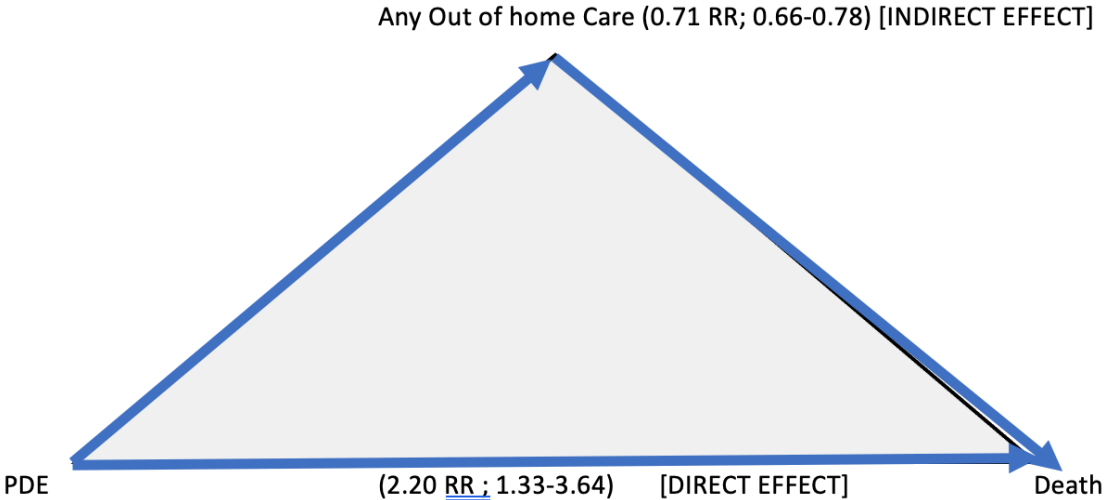
- Almost **5x ↑** in risk of mortality with OOHC (HR 4.97, 2.90-8.54)**
- Foster Care: **3x ↑** (HR 3.90, 1.95-7.80)**
- Relative/Kinship Care: **8x ↑**
(HR 8.46, 3.25-22.02)**



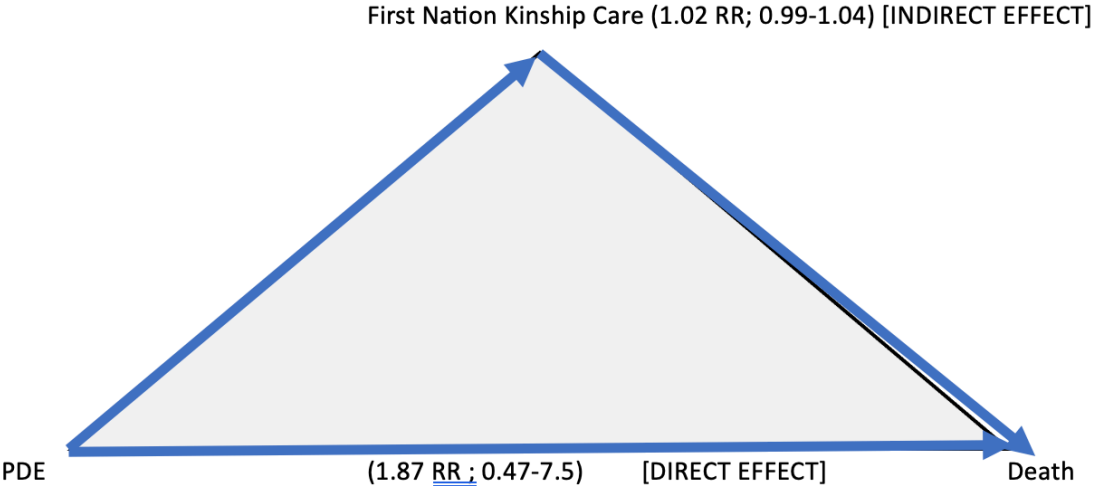
UNSW
SYDNEY

*P<0.05
**P<0.001

All First Nation's Children Risk of Death also Decreased with OOHC but Kinship Care almost **CANCELS** risk of death from PDE



Any OOHC

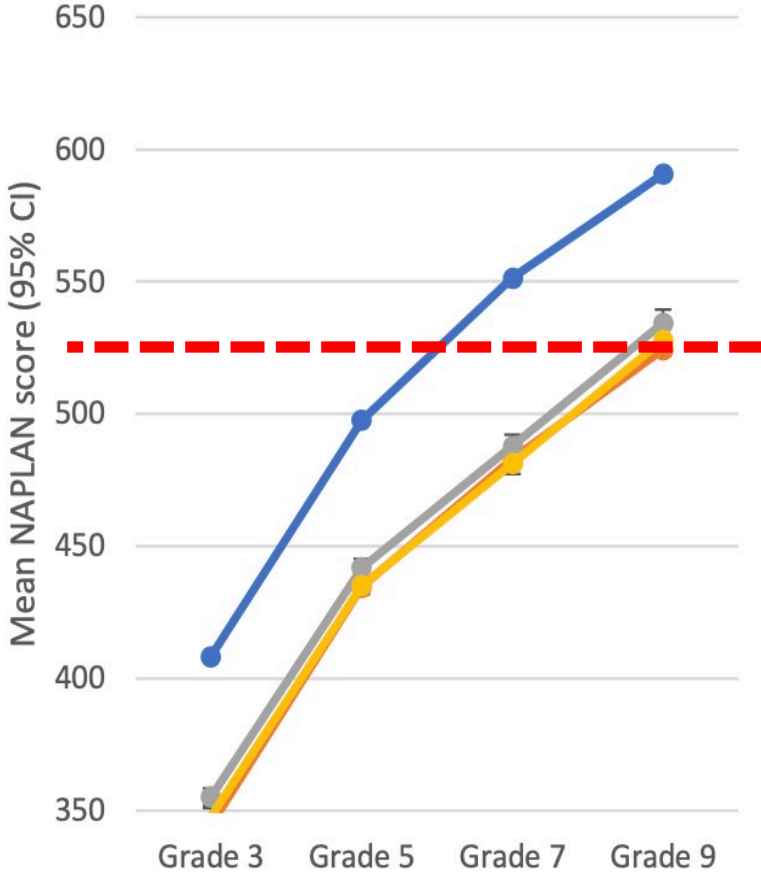


Kinship Care

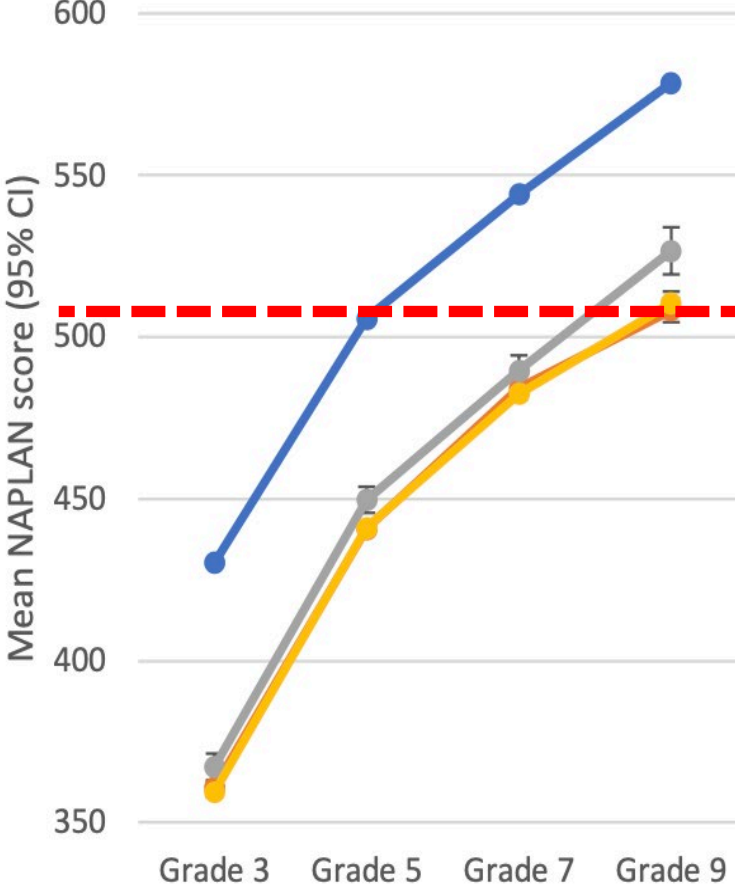
OOHC has minimal effect on school outcomes

- No PDE, no OOHC
- No PDE, OOHC
- PDE, No OOHC
- PDE, OOHC

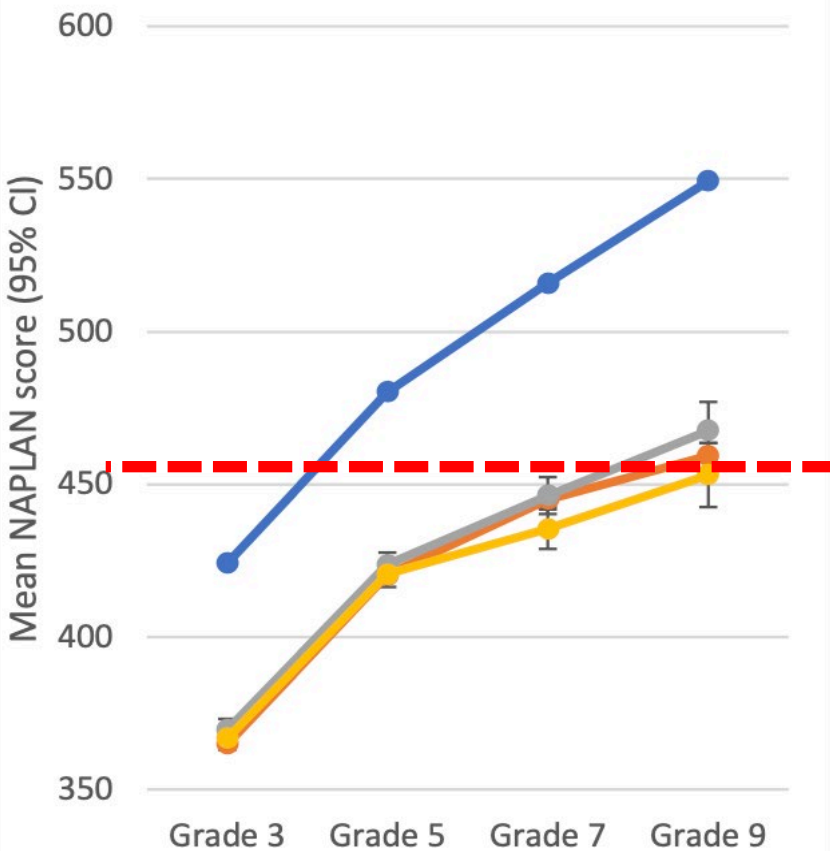
Numeracy



Reading



Writing



Conclusion

- Maternal drug use is a major ongoing problem
- Prenatal methamphetamine exposure is increasing and affected babies are hard to find and follow up
- We have almost NO LONG TERM INFORMATION about what happens to the babies
- Vigilance, support and **interdisciplinary communication and relationship including with lived experience** are crucial to
 - Ensure safety
 - Increase knowledge o improve outcomes

Thank you