Global Leadership Exchange

Presentation:

The impact of a pandemic on longitudinal research | The Infant Development, Environment And Lifestyle “IDEAL” Study

The impact of a pandemic on longitudinal research!

The Infant Development, Environment And Lifestyle "IDEAL" Study

IIMHL Presentation

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THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

MEDICAL AND HEALTH SCIENCES

IDEAL

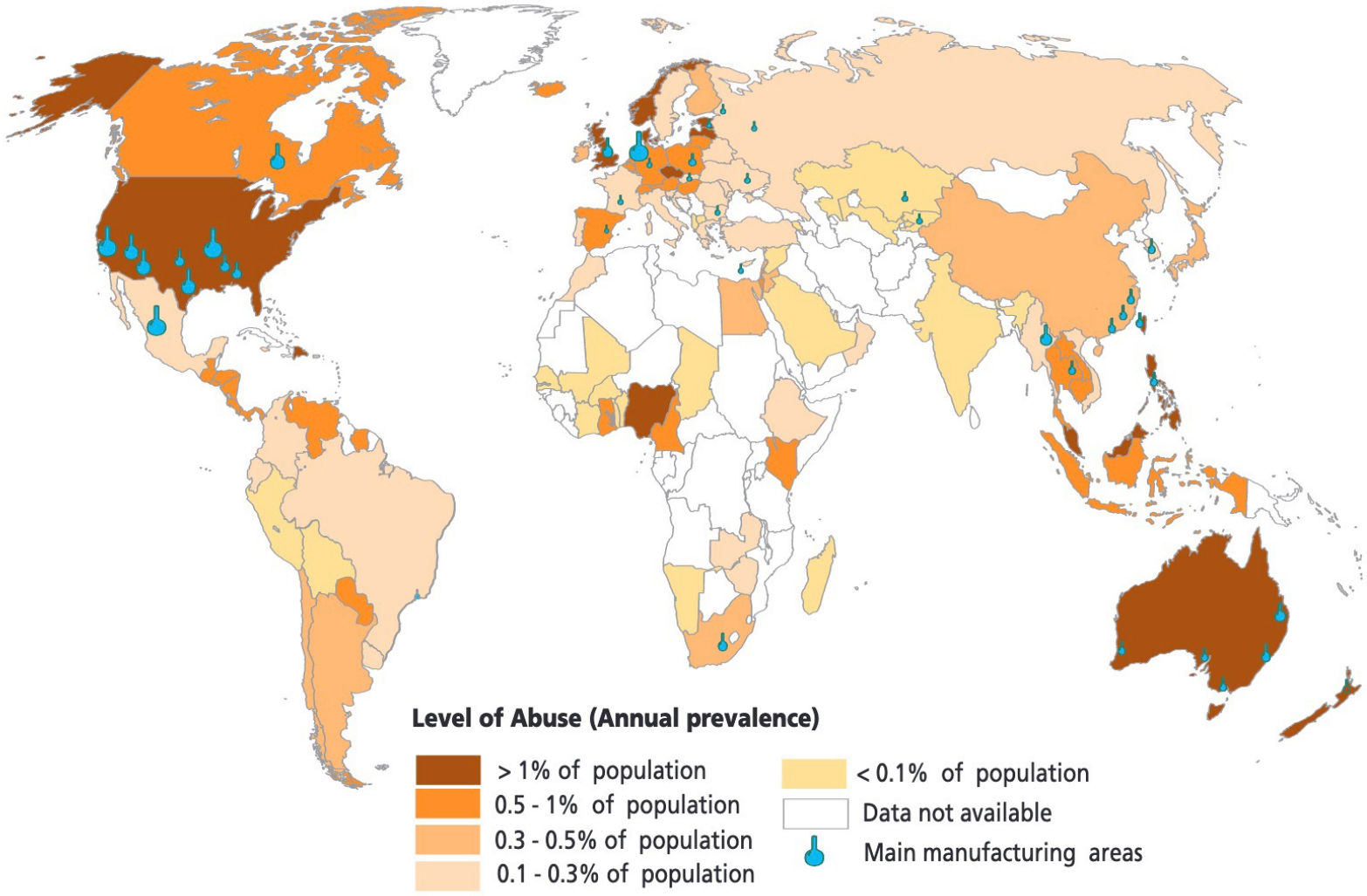
BROWN
Alpert Medical School

Methamphetamine

Street name “P” for Pure

- Powerful stimulant drug
- Odourless crystalline substance
- Colour changes with ingredients
- Smoked, snorted, injected
- Manufactured in man-made labs

Map 22: Use of amphetamines in 2004 (or latest year available)



Map 23: Ranking of amphetamine-type stimulants in order of prevalence in 2004 (or latest year available)

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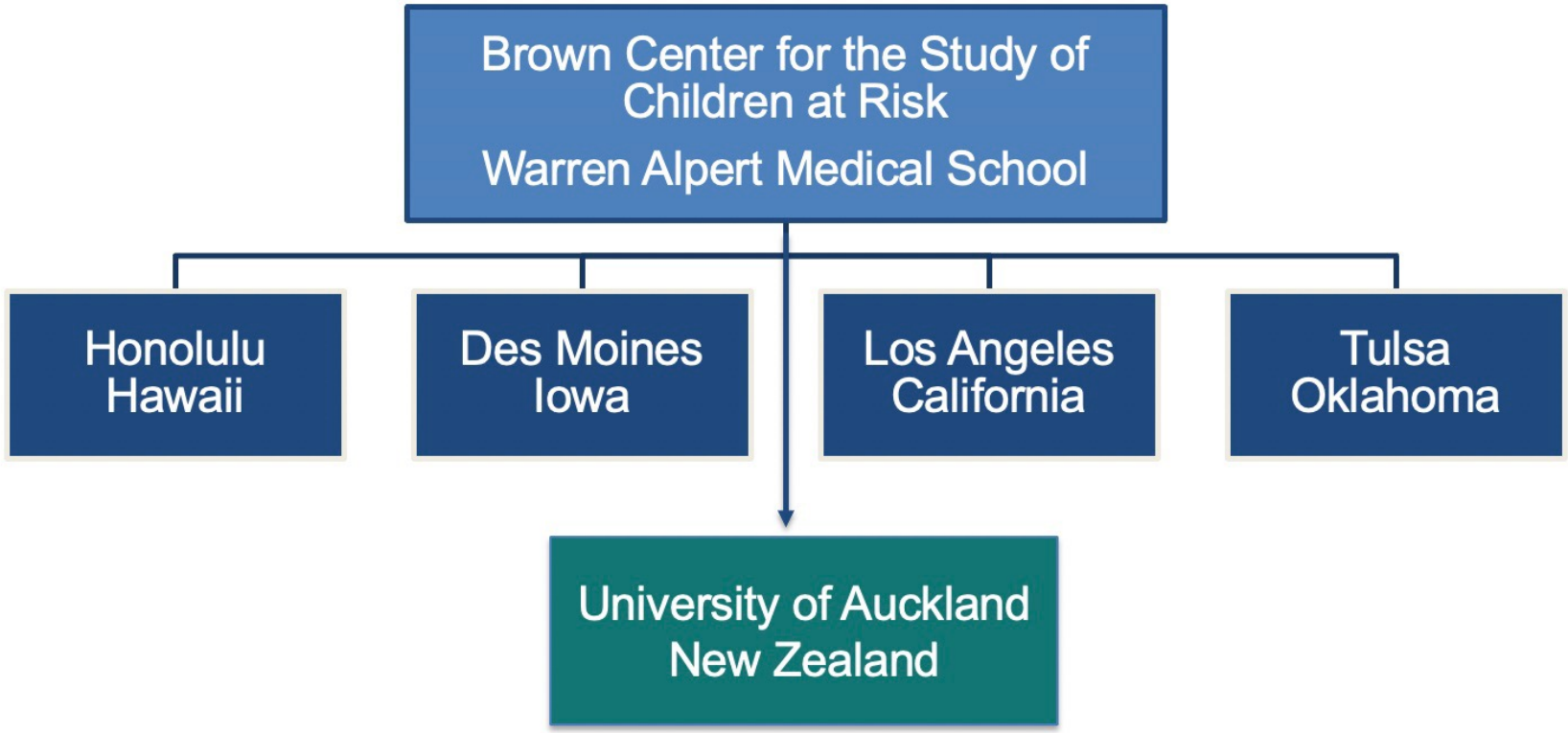
Infant Development, Environment And Lifestyle **"IDEAL"** Study



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US vs NZ IDEAL Study Opportunity to explore cross-cultural questions

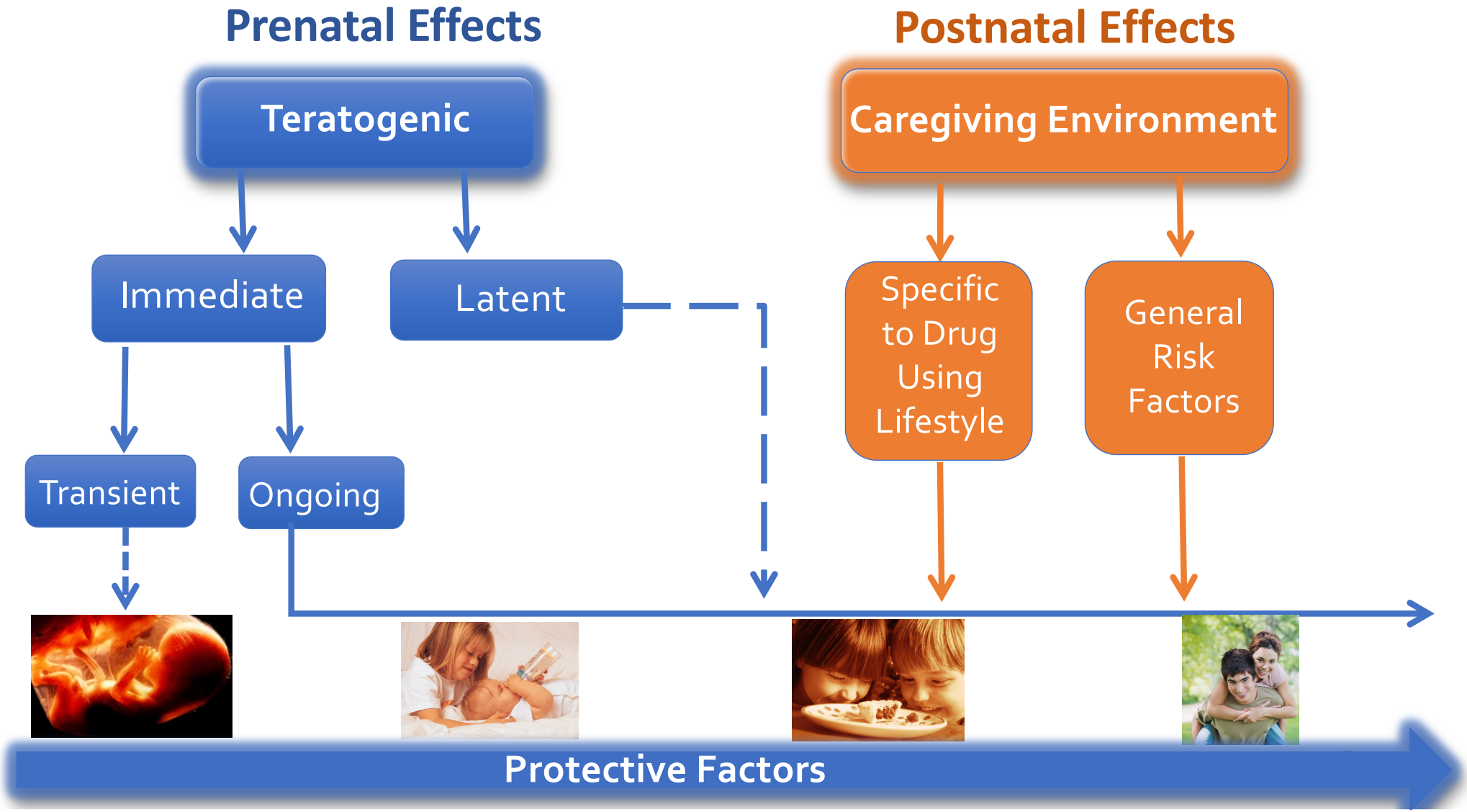
United States

- Child removal for prenatal drug use common
- Poor/restricted health care – insurance required
- Purity of drug variable
- Restricted access to benefits and housing
- Punitive approach towards mothers who use illicit drugs - imprisonment

New Zealand

- Child removal for prenatal drug use less common
- Health care during pregnancy available for everyone
- "P" Purity of meth
- Needs based benefit for single and drug dependent mothers
- "Harm Minimisation" approach to maternal drug use

Development of Children Born to Mothers who use Drugs During Pregnancy



Participants

Prenatal | Infancy | Childhood | Adolescence

Recruited….

Mothers and Babies who delivered at:

Waitemata DHB

- Waitakere Hospital
- North Shore Hospital

Auckland DHB

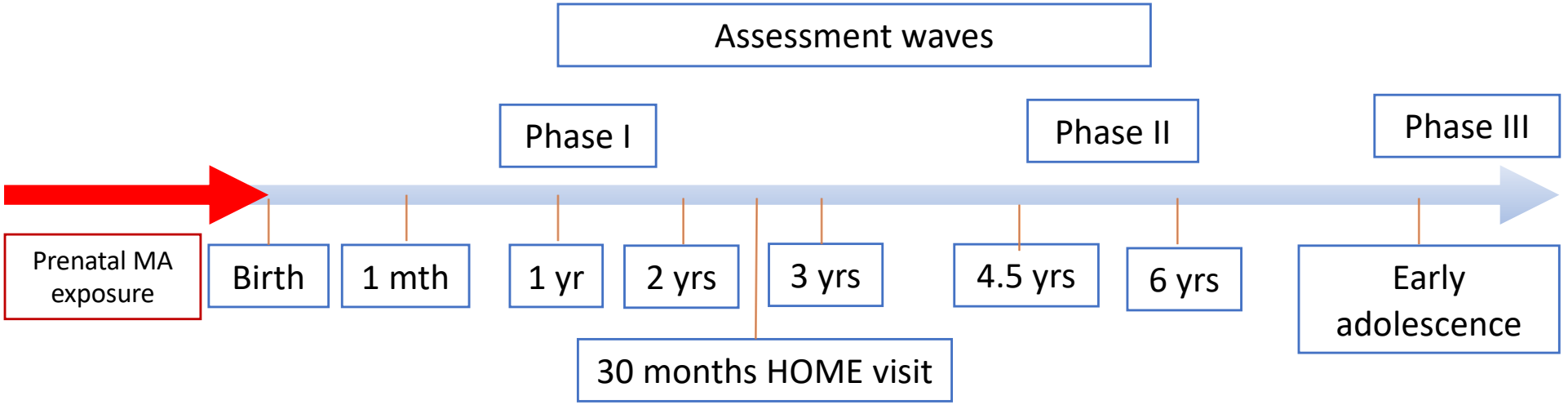
- National Women's Health

Groups (Meth-exposed & comparison) matched for ethnicity, maternal education, infant birth weight

Final sample included 107 MA Exposed and 110 Comparison Infants

IDEAL data collection

- Study retention has been maintained at >85% for each follow up visit



Developmental Follow-up

Birth, 1, 3, 9, 12, 24, 30, 36 months & 4.5, 5.5, **6.5**

Social-emotional

- Cognitive
- Motor
- Growth/Health
- Behaviour

Maternal and Environmental Data

Maternal Lifestyle Interview

- Neighborhood characteristics
- Domestic Violence
- Family Resources

Medical Chart Review

- Obstetric History – Terminations, Miscarriages
- Antenatal Care

Maternal Mental Illness

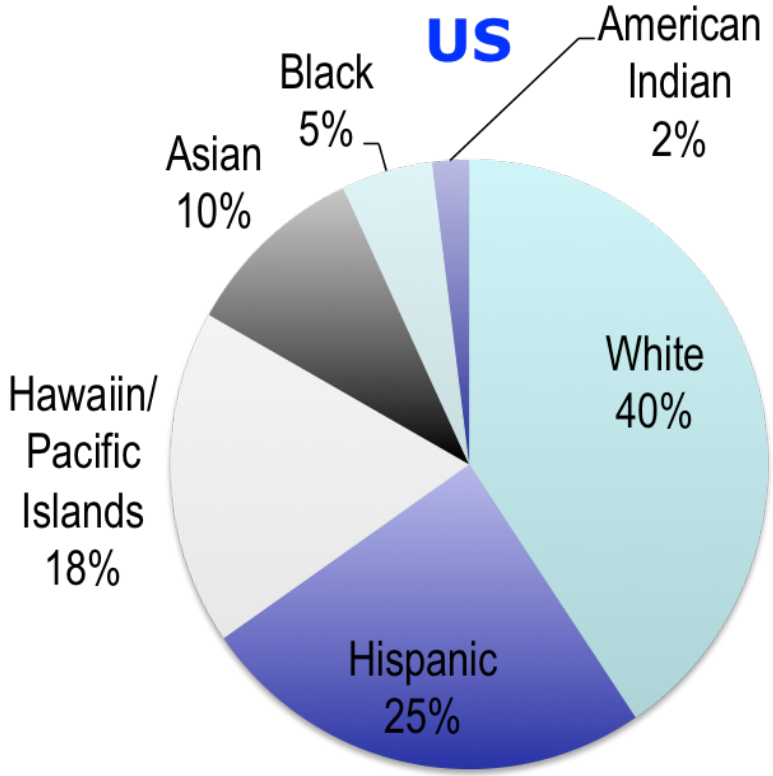
- Beck Depression Interview (BDI)
- Brief Symptom Inventory (BSI)

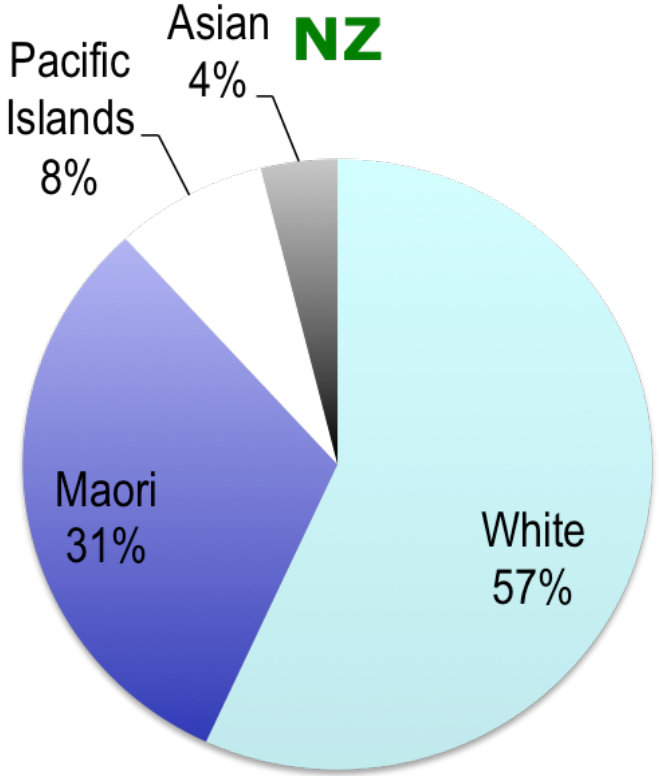
Drug Use and Related Harm

- Substance Use Inventory (SUI)
- Substance Abuse Subtle Screening Inventory-3 (SASSI-3)
- Addiction Severity Index (ASI)

Summary of Key Findings up until adolescence

Self-Identified Ethnicity METH Exposed





	US Meth	Comp	NZ Meth	Comp
Low SES <5 Hollings.	29%*	12%	46%*	18%
Income <$20,000	60%*	40%	33%*	18%
No Partner	52%*	34%	52%*	27%

Birth Outcomes

Nicu Network Neurobehavior Scale (NNNS)

- US Study found exposed infants were 3.5 times more likely to be born SGA–(Smith et al. 2006)
  - NZ babies bigger at birth than US babies (WHO) but weighed on average 168 gms less than comparison infants
- **Neurobehaviour** at Birth and 1 Month – exposed infants in both US and NZ
  - Under arousal, low tone, poorer quality of movement, increased stress
- **NZ only**
  - more asymmetric reflexes
  - Mode of 'P' use related to neurobehaviour - IV meth users poorer NNNS outcomes

LaGasse, Wouldes et al. (2011)
Rogers, J. (Masters Thesis, 2017)

Nap Study – 3 Months

Aim: to investigate whether Meth exposed infants have impaired arousal response

Compared 42 Meth exposed with 57 Comparison

No significant difference was found in arousal threshold

Concluded: Didn't support hypothesis that Meth exposed more at risk for SUDI

Galland, Mitchell, Thompson, Wouldes for the IDEAL Study Group (2012)

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Cognitive & Motor Development over first 3 years

- **US study found:**
  - Small differences between Meth and Comparison on cognitive outcomes over the first 3 years
  - Significant difference in one aspect of fine motor development "grasping" Smith et al.(2006)
- **NZ study found:**
  - No differences in cognitive outcomes in longitudinal analyses over first 3 years
  - Time trends for psychomotor development showed decreasing trends across the first three years.....

Wouldes, LaGasse et al. (2014)

Predictors of delayed motor development across first 3 years

- Peabody Development Motor Scale
  - Gross Motor -- **Prenatal MA exposure**
  - Fine Motor – **Male**
- Bayley-II
  - Mental Development – **Maori & Male**
  - Psychomotor Development – **Prenatal MA exposure** & Birth weight

Wouldes, LaGasse et al. (2014)

Maternal SUD and Mental Illness

- US and NZ Mothers who used METH 10 times more likely to meet criteria for a Substance Use Disorder (SUD)
  - US and NZ Mothers who used METH over 2.5 times more likely to meet criteria for a diagnosis of a Psychiatric Disorder (PD)
  - **NZ only mothers were 5.5 times more likely to meet criteria for both SUD and PD**

Wouldes, LaGasse et al. (2013)

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Wouldes, LaGasse et al. (2013)

What are we learning about the ongoing effects of prenatal exposure to meth in the context of the home environment of these children?

1. What the effects of Meth exposure on neurodevelopment & are Māori boys continuing to lag behind?
2. Given the high rates of alcohol use in women who use Meth, is Meth+alcohol associated with behaviour problems?
3. Given the high rates of maternal mental illness and adversity, is child EF at 4.5 associated with drug exposure or maternal adversity?

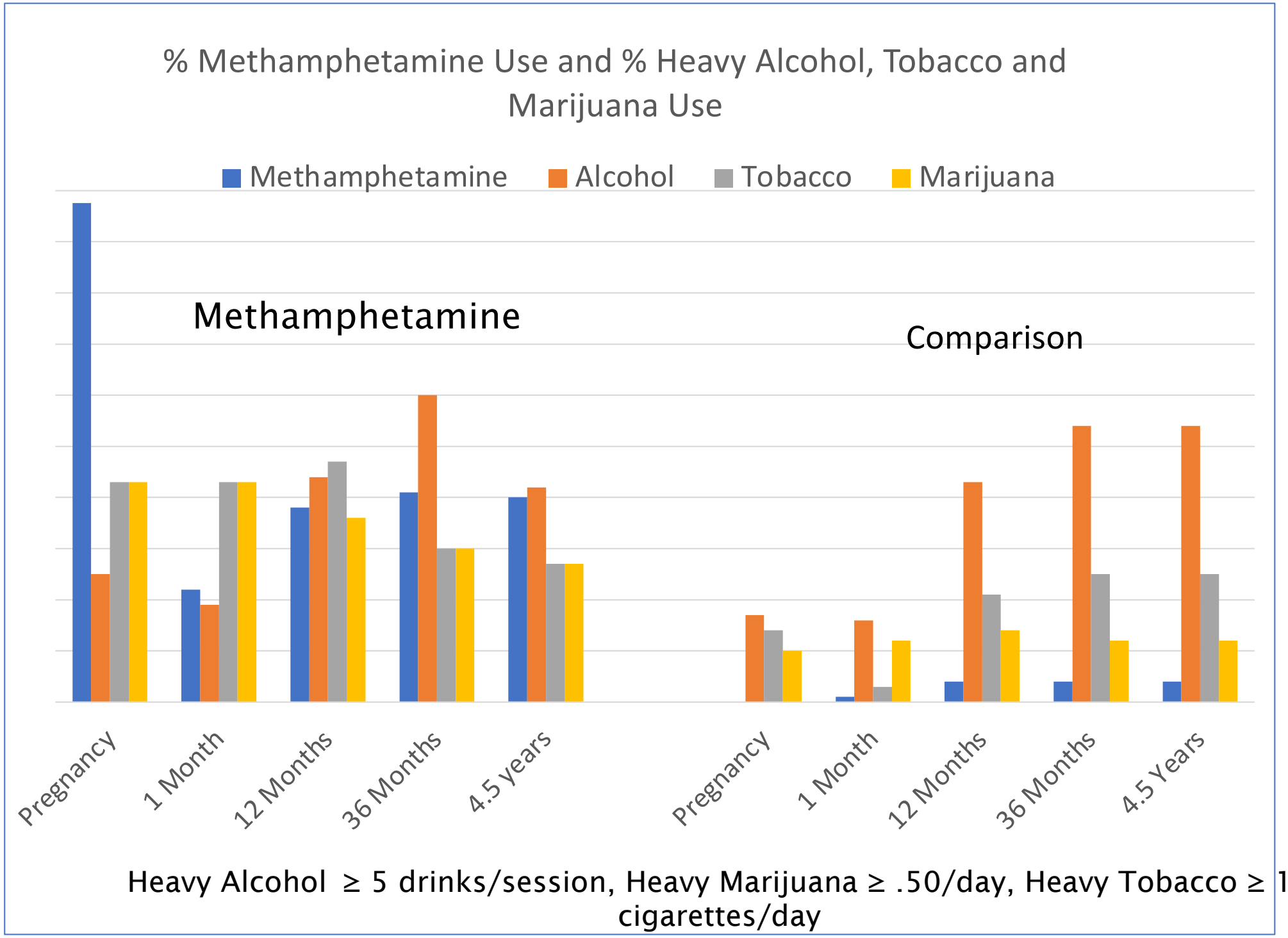
Outcomes in Middle Childhood

Measures at 4.5

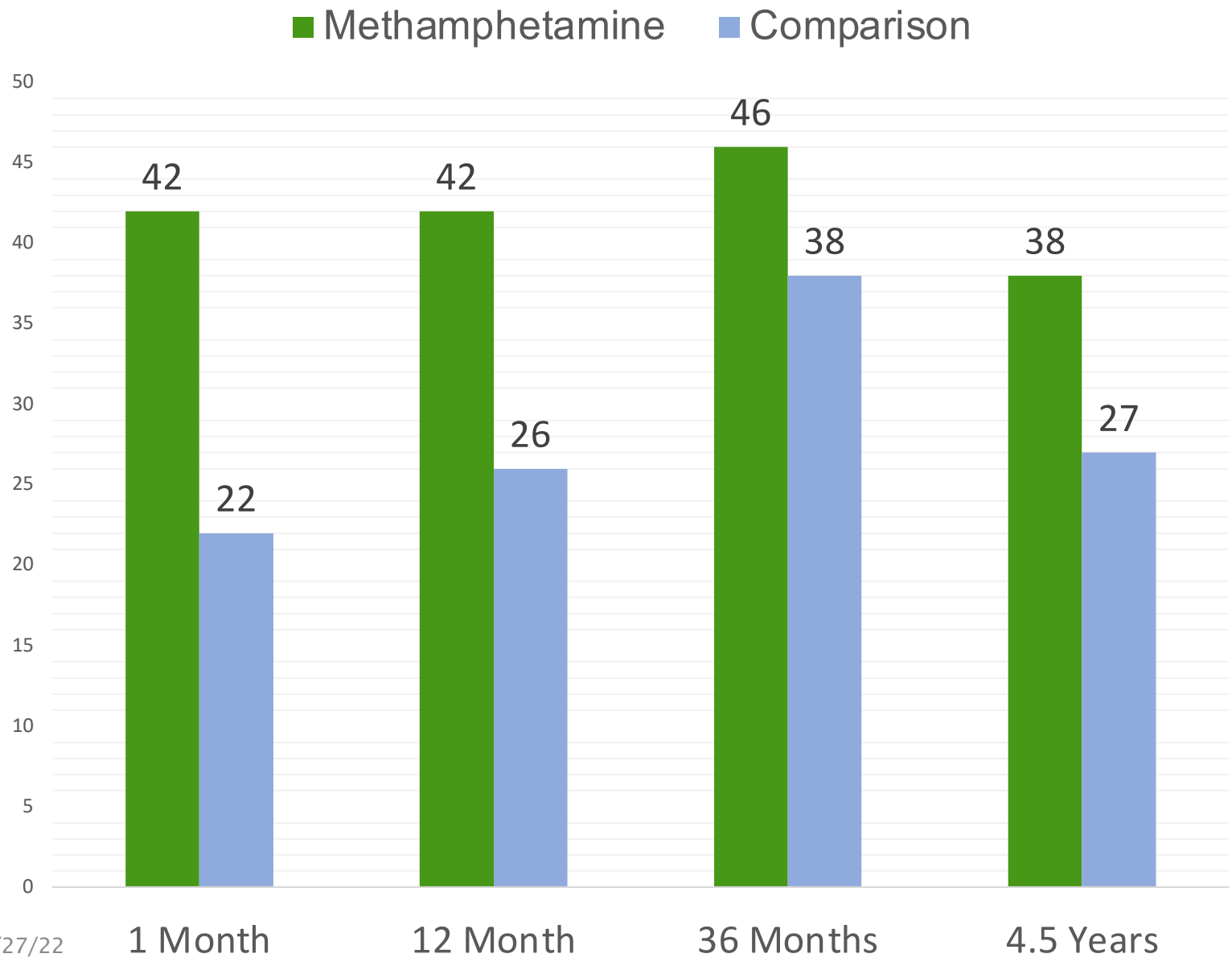
- Neurodevelopment – WPPSI-III, Peabody Motor
- Behaviour – SDQ
- Executive Function – Inhibition, Working Memory
    - Gift Delay
    - Day/Night
    - Bear Dragon
    - Parent Report – BRIEF-P

Measures at 6.5

- Cognitive
    - California Verbal Learning Test
    - Child Memory Scale


% Methamphetamine Use and % Heavy Alcohol, Tobacco and Marijuana Use
Methamphetamine
Alcohol
Tobacco
Marijuana
Methamphetamine
Comparison
Pregnancy
1 Month
12 Months
36 Months
4.5 years
Pregnancy
1 Month
12 Months
36 Months
4.5 Years
Heavy Alcohol ≥ 5 drinks/session, Heavy Marijuana ≥ .50/day, Heavy Tobacco ≥ 1
cigarettes/day

Percent Probability of a Psychiatric Diagnosis (BSI)



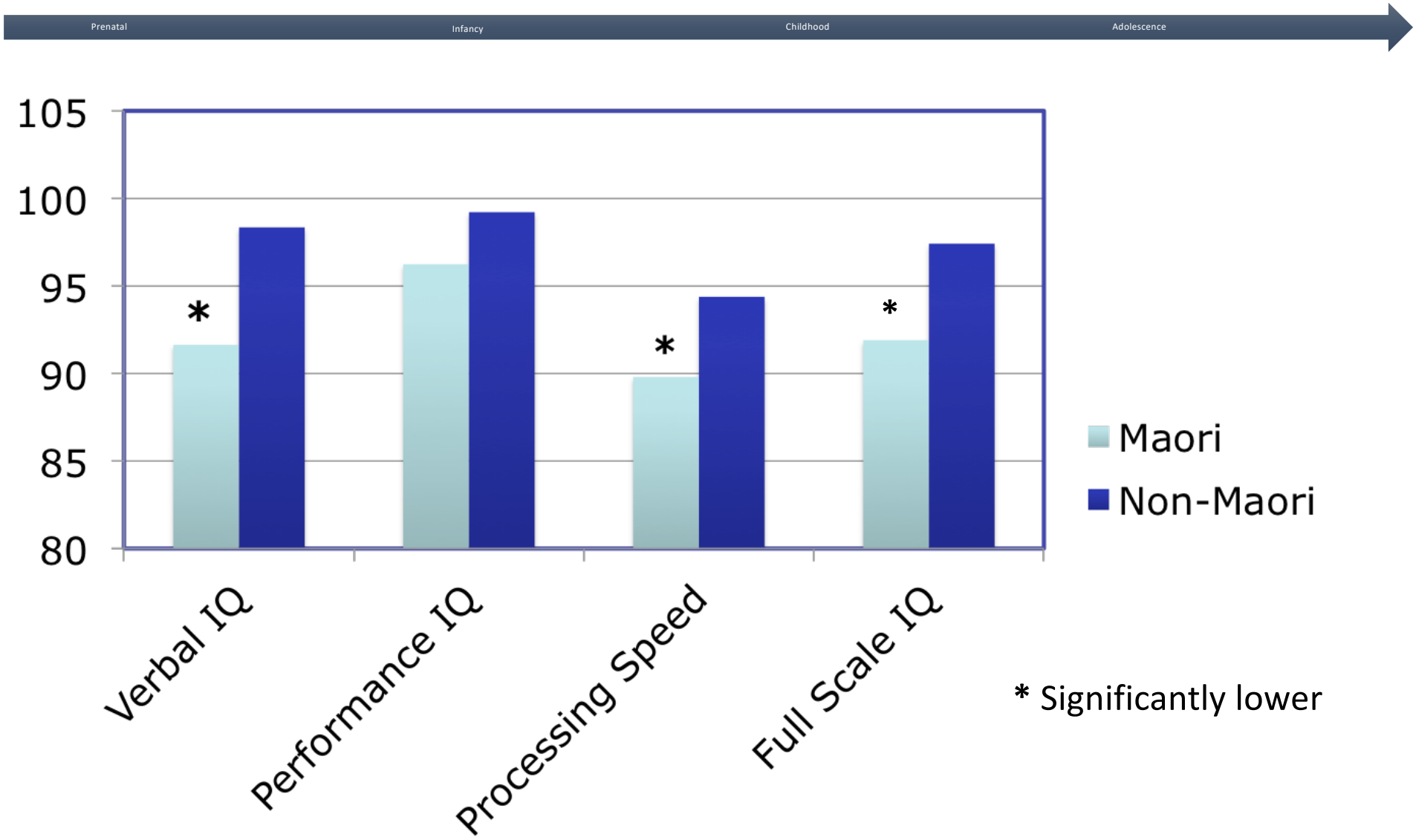
Is it prenatal exposure to Meth or maternal psychological distress that is associated with poorer outcomes for Meth exposed children?

Analysis of results of effects on executive function (EF) at age 4.5 suggest it may be maternal psychological distress. After controlling for prenatal Meth and other drug exposure, SES, and the HOME, maternal psychological distress was associated with:

- Maternal report of more problem behaviours (SDQ)
- Maternal report of poorer everyday executive function
- Objective observations on the Gift Wrap Delay Task of Inhibitory Behavior

McDonald (Rosso), Amy (PhD) *The role of maternal psychological distress on neurobehaviouraldisinhibition among pre-schoolers exposed prenatally to methamphetamine.*

Comparison of cognitive outcomes prior to school entry at age 4.5 between Maori and non-Maori (WPPSI-III)



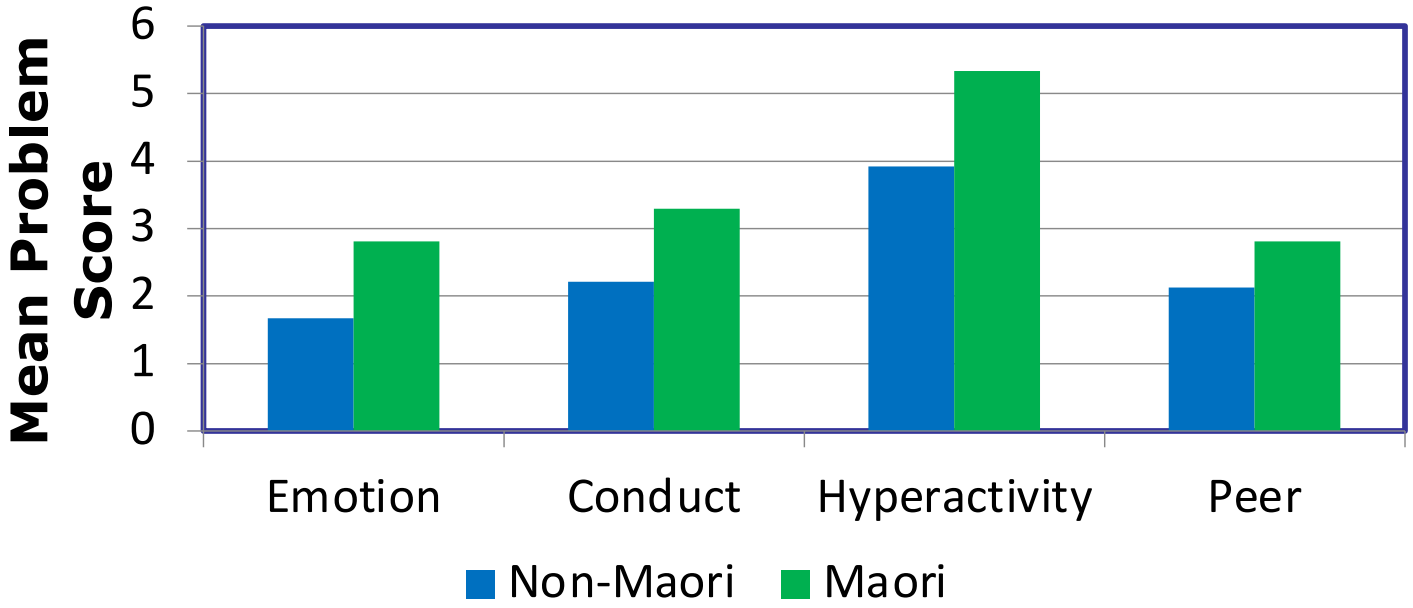
* Significantly lower

Wouldes, Rosso, Stevens ,Rogers, LaGasse, Lester (ISRCAP)

Preliminary analysis (Andi Crawford)

- General Linear models.
  - No effects for presence of other prenatal substance use.
  - Gender and ethnicity were also significant predictors.
  - When HOME added to the model
    - MA and ethnicity ceased to be significant predictors and effect size increased
    - HOME scores were the largest predictor.

Behaviour problem scores of children exposed prenatally to Meth+alcohol by ethnicity prior to school entry at age 4.5



Maternal report of more problem behaviour-Strengths & Difficulties Questionnaire

Exposure	Mean (SD)	Max.
Alcohol Only	15.8 (10.7)	45
Meth+Alcohol	23.00 (25.8)	115

Latent growth curve analysis plans

- Longitudinal analysis to investigate possible mediation effects of ongoing adversity on cognition and behaviour at age 6.5 years
  - Home environment
  - Maternal mental health
  - Ongoing substance use (illicit substances composites)
  - Income
  - Conflict in the home
  - Family support (protective factor)
- Interplay with maternal early adversity
  - Domestic violence & abuse history

Phase III - Adolescent follow-up

Phase III – adolescent follow-up

- Research questions:
- Funding – Cure Kids
- Grant applications – CANTAB Connect, Maurice & Phyllis Paykel Trust, Neurological Foundation
- Well Child Clinic set up

Phase III data collection

- Mother/caregiver interview
  - IDEAL lifestyle interview
  - Maternal mental health (Brief Symptom Inventory)
  - Substance Use Inventory
  - Family violence (Conflict Tactics Scale)
  - Family resources
  - General child health questionnaire
  - Child Behavior Checklist (CBCL; Achenbach)

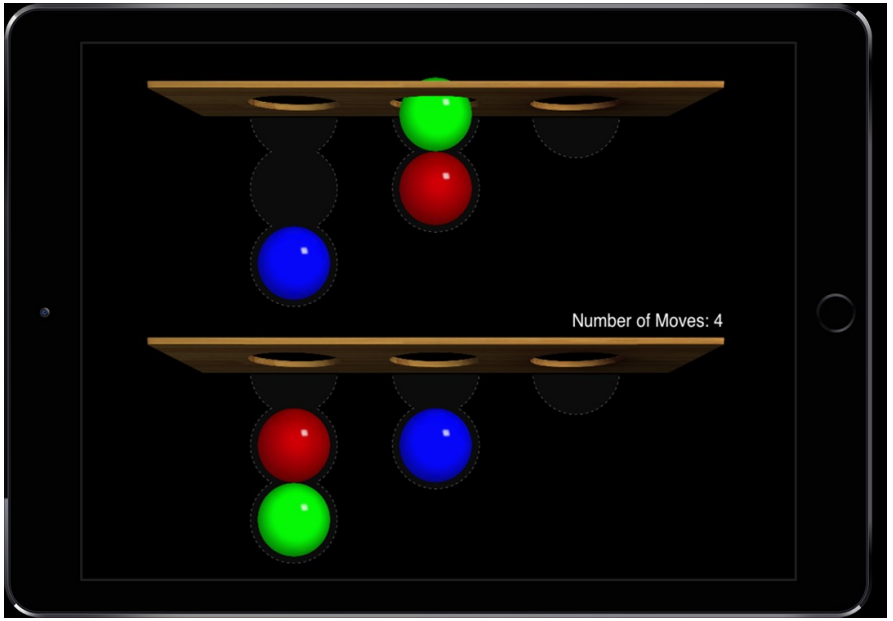
Child assessment & interview

- First time child interviewed
- Data entered directly into Redcap
- Cognitive testing on iPad
- Eye movement on specialist equipment

Domain	Measure
Substance use	Substances and Choices Scale (SACS; Werry Workforce Whāraurau)
Emotional & behavioural problems	Youth Self Report (Achenbach)
Exposure to violence	Modified 'Things I've Seen and Heard', additional questions re domestic violence
Life experiences	Negative Life Events Inventory (NIH, plus additions)
Wellbeing	Warwick- Edinburgh Mental Wellbeing Scale
Resilience	Compass-W Scale
Puberty	Tanner Scales plus menstruation questions (NICHD)

Cognitive assessment using CANTAB

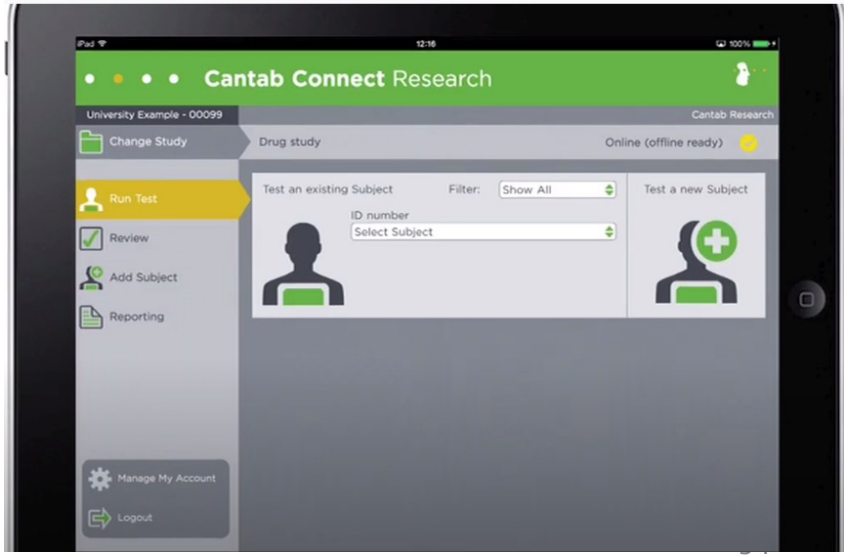
- Cambridge Neuropsychological Test Automated Battery
- Executive function
  - Spatial working memory
    - Strategy
    - Working memory errors
  - Stockings of Cambridge
    - Problem solving
  - Cambridge Gambling Task
    - Decision making
    - Risk taking & adjustment
    - Delay aversion



Cantab Connect cognitive assessment

Prenatal | Infancy | Childhood | Adolescence

- Memory
  - Verbal recognition memory
    - Free recall
    - Immediate recognition
    - Delayed recognition
  - Stop signal task
    - Response inhibition/impulse control
- Social cognition
  - Emotion bias task



Eye movement assessment

Prenatal | Infancy | Childhood | Adolescence

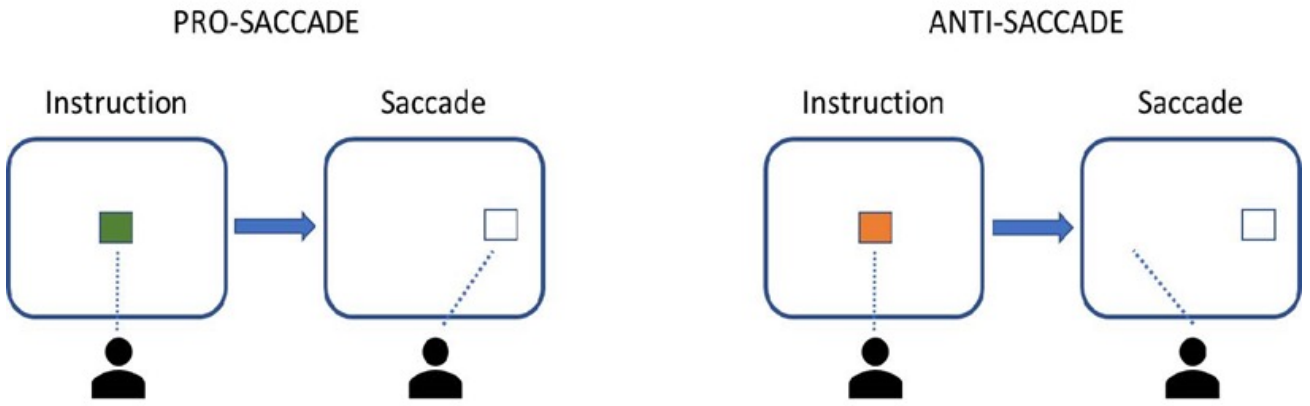
- **Background:** Eye movement assessment measures have been shown to be highly correlated with executive function (EF) and can potentially serve as a marker of prefrontal cortex structure and function.

- **Equipment**: VDU monitor and Tobii Eye Pro

Eye movement assessment

Prenatal | Infancy | Childhood | Adolescence

- **Task:** Trial type (pro- versus antisaccade) will be indicated by the colour of the fixation target present on the instruction screen.
- Children will try to make a saccade toward (pro-saccade) or away from (antisaccade) the target within 350 ms or 400 ms, respectively.



Outcomes: The accuracy (correct direction – towards or away from target), velocity and latency (time to initiating of eye movement).

THANKS TO OUR FUNDERS

National Institute of Drug Abuse (NIH)

Auckland Medical Research Foundation

NZ Child Health Research Foundation

Cure Kids

Neurological Foundation

The University of Auckland