Prenatal exposure to methamphetamine:

A tale of two cultures!

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IDEAL

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What is methamphetamine “P” and how does it differ from other recreational stimulants such as crack/cocaine?

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

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Meth Labs Toxic Environments

http://pugetsoundblogs.com

http://www.forensic-applications.com/meth/recognition.html

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Comparison of Cocaine vs Methamphetamine

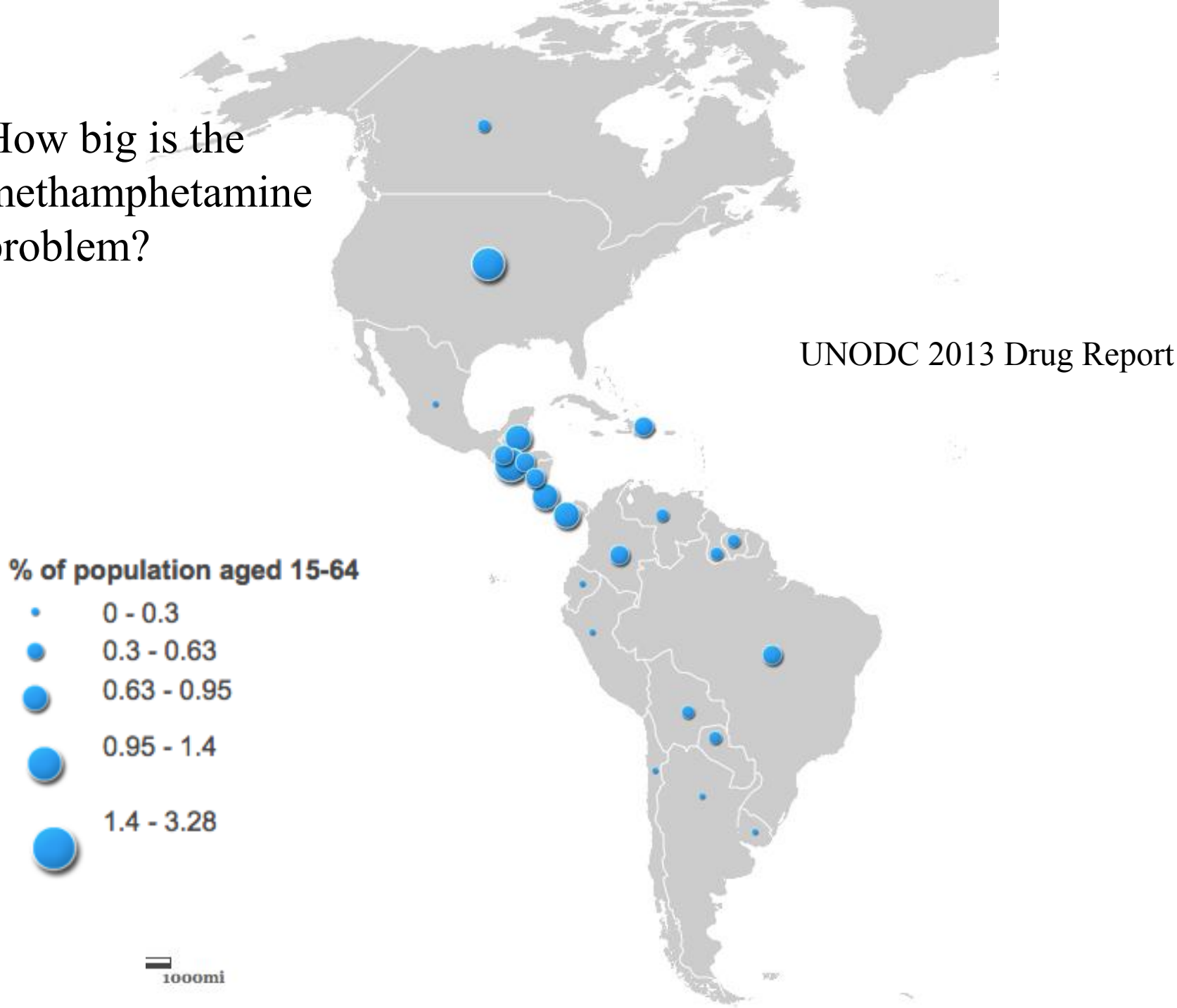
Cocaine

- Plant derived
- High lasts for 20-30 minutes
- 50% of Cocaine removed from body in 1 hour
- Cocaine has no neurotoxic effects on DA and Serotonin

Methamphetamine

- Man-made
- High lasts for 8-24 hours
- 50% of Meth removed from body in 12 hours
- Animal models show neurotoxic effects on DA and Serotonin

How big is the methamphetamine problem?



UNODC 2013 Drug Report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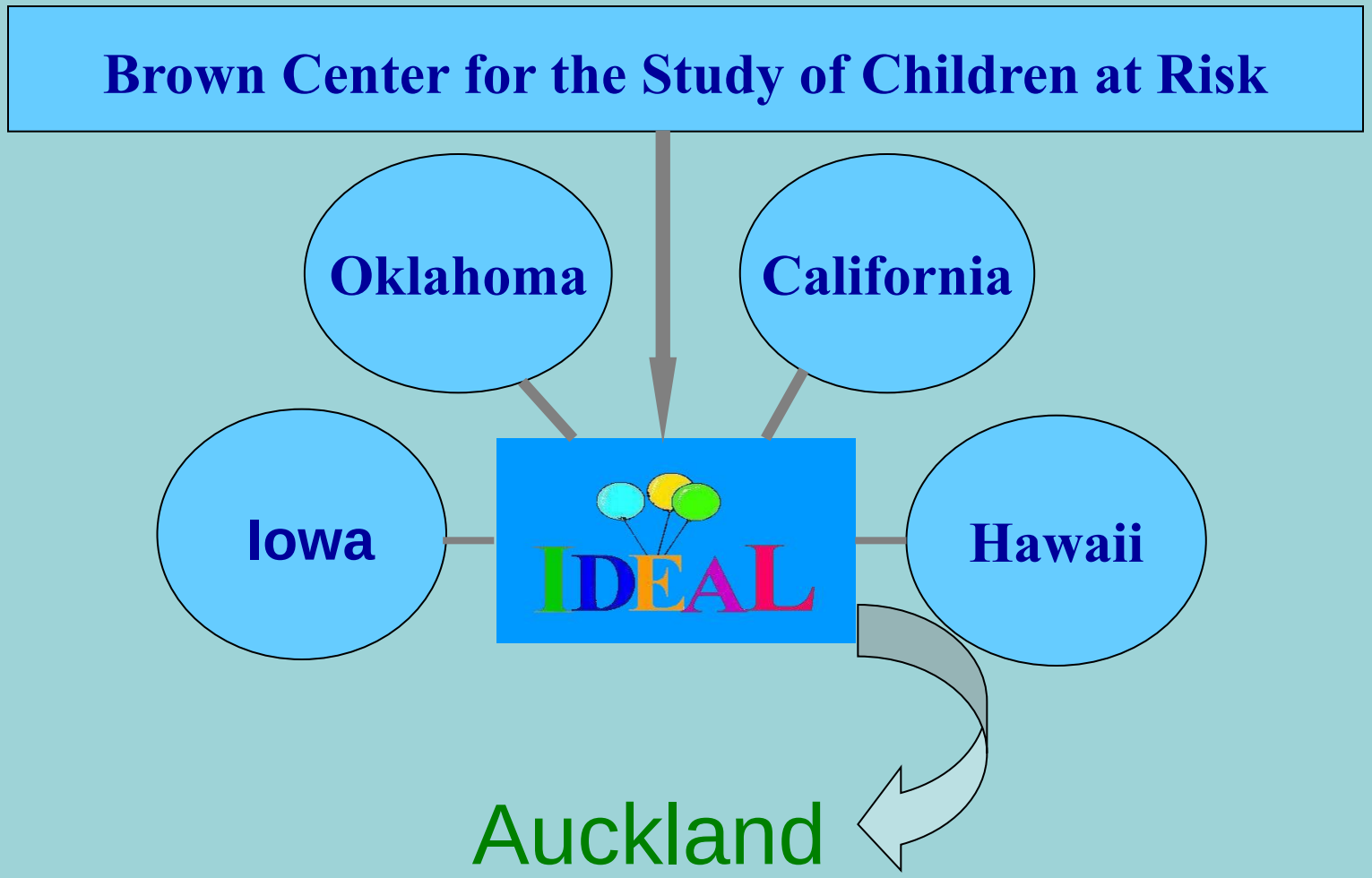
Infant Development, Environment And Lifestyle Study



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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 to drug using mothers - 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 reduction approach to drug dependence

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Auckland Participants

- Mothers and Babies who delivered at:
- Waitemata DHB
  - Waitakere Hospital
  - North Shore Hospital
- Auckland DHB
  - National Women's Health

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Inclusion/Exclusion Criteria

- Inclusion
  - 17 years or older
  - English speaking
  - Mother must self-report that she has used methamphetamine, any amphetamine including “speed” or “Ecstasy” or meconium assay confirms use
- Exclusion
  - Mother has been institutionalized for retardation or emotional disorders; was overtly psychotic or had a documented history of psychosis
  - Mother living outside of the Auckland area or planned to move in next 12 months

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Exclusion at Birth

- Mother and Newborn Child ineligible if…
  - Multiple births (twins)
  - Infant critically ill
  - Infant is born with a major life threatening congenital anomaly or documented chromosomal abnormality associated with mental or neurologic deficiency

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Developmental Follow-up

Birth, 1, 3, 9, 12, 24, 30, 36 months and 4.5, 5.5, 6.5 and 8 years?

- Social-emotional
- Cognitive
- Motor
- Growth/Health
- Behaviour
- Environment

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3 Months

Auditory evoked arousal during sleep

Galland, Mitchell, Thompson, Wouldes & NZ IDEAL Study Group (2013)

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Does antenatal care differ between US and NZ among women who use methamphetamine?

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Comparison of Adequate Prenatal Care

- Kessner Index
  - Prenatal visits
  - GA at first prenatal visit
  - Does not measure "quality" of care
- Data from Lifestyle Interview
  - Asked participants about referrals to CPS (CYFS)
  - Reviewed medical charts

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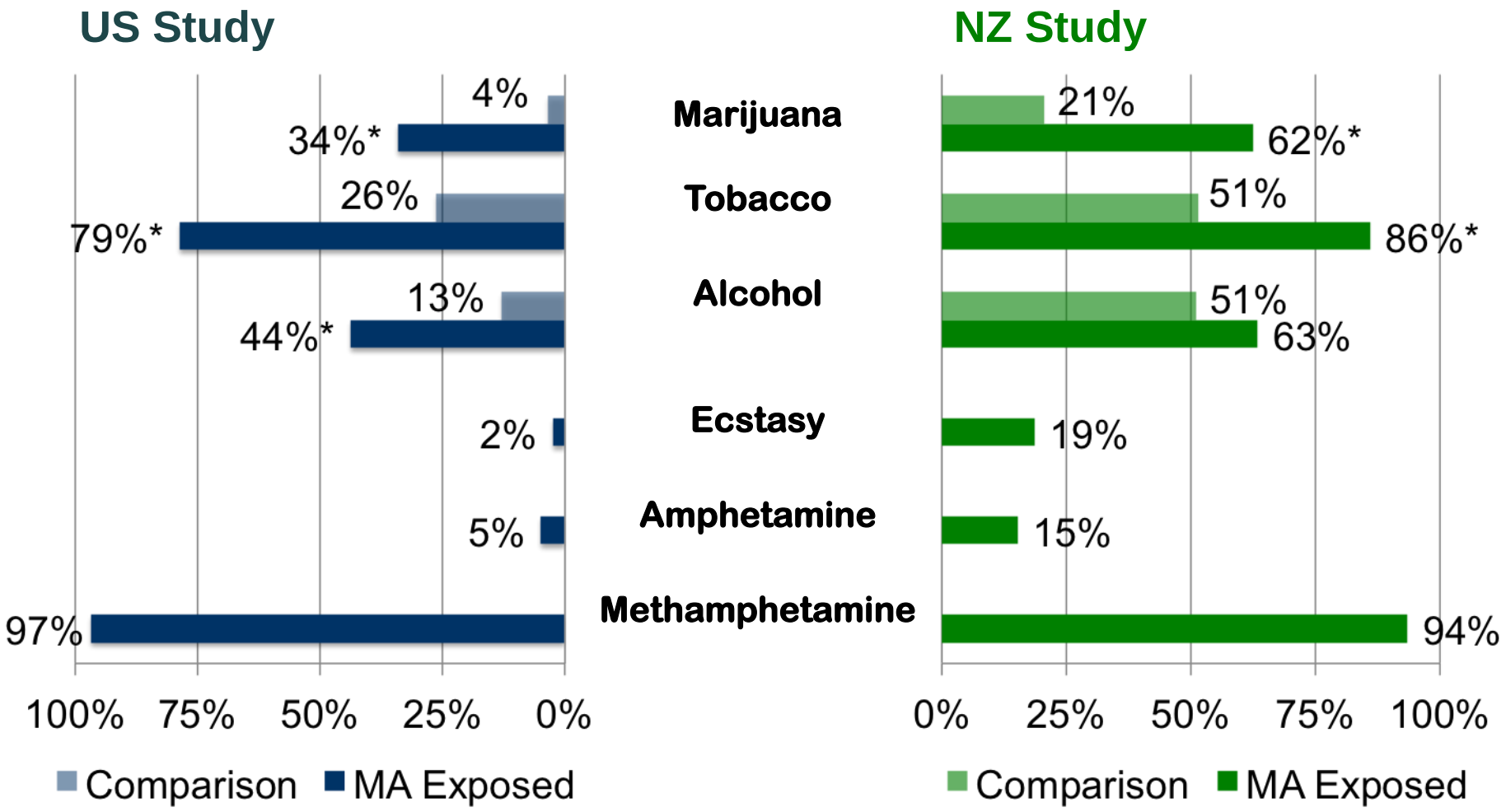
Prenatal Care Demographics

Social/Demographics	US-MA N = 182	US-Comp N=196	NZ-MA N = 107	NZ-Comp N = 112
Ethnicity % Minority	64%	61%	44%**	54%
SES – Hollingshead (mean)	24.9*	30.4	21.9***	29.6
No Partner	54%*	34%*	51%	26%
Education <high school grad US <5th form or comp NCEA	46%	40%	63%**	50%
Maternal Age	25.9	24.2	26.6	25.3

*Significant Difference between Groups within each country
** Significant Difference between US and NZ MA Groups

Percent of US and NZ Mothers who used Marijuana, Tobacco and Alcohol Prenatally (Substance Use Inventory).



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Prenatal Care

Prenatal Care	US-MA N = 182	US-Comp N = 196	NZ-MA N = 107	NZ-Comp N = 112
Mean Number of Visits	11.4	14.4*	15.8**	17.0
GA first visits (weeks)	14.8	9.5*	15.9*	13.2
Inadequate Prenatal Care (%)	23	5*	8***	4

*Significant Difference between MA & Comparison Groups
**Significant Difference between US & NZ MA Groups

Wu, LaGasse, Wouldes et al. (2013)

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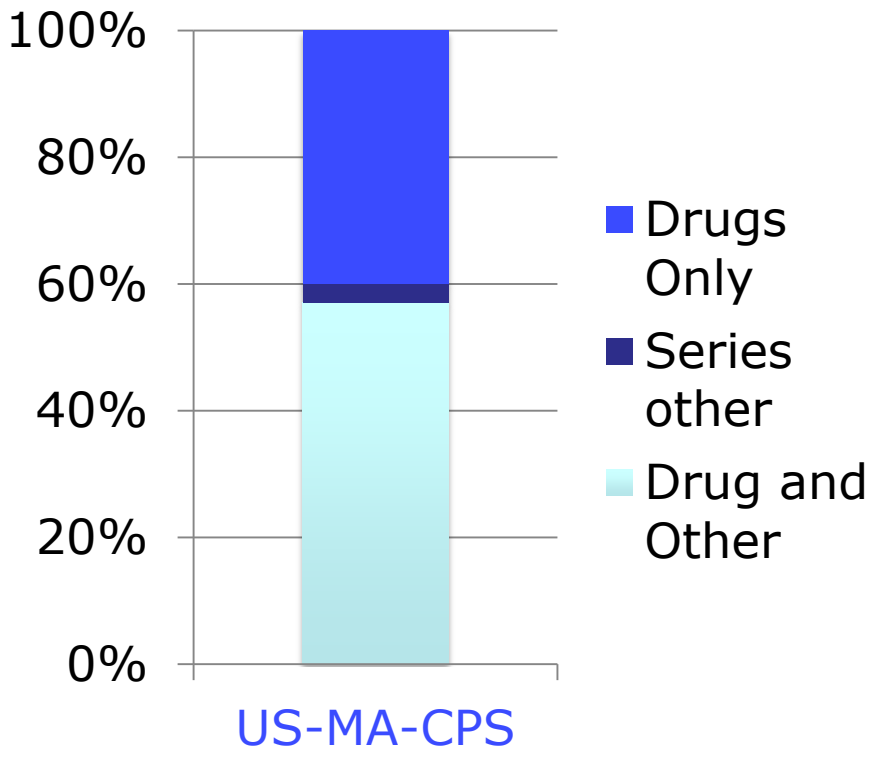
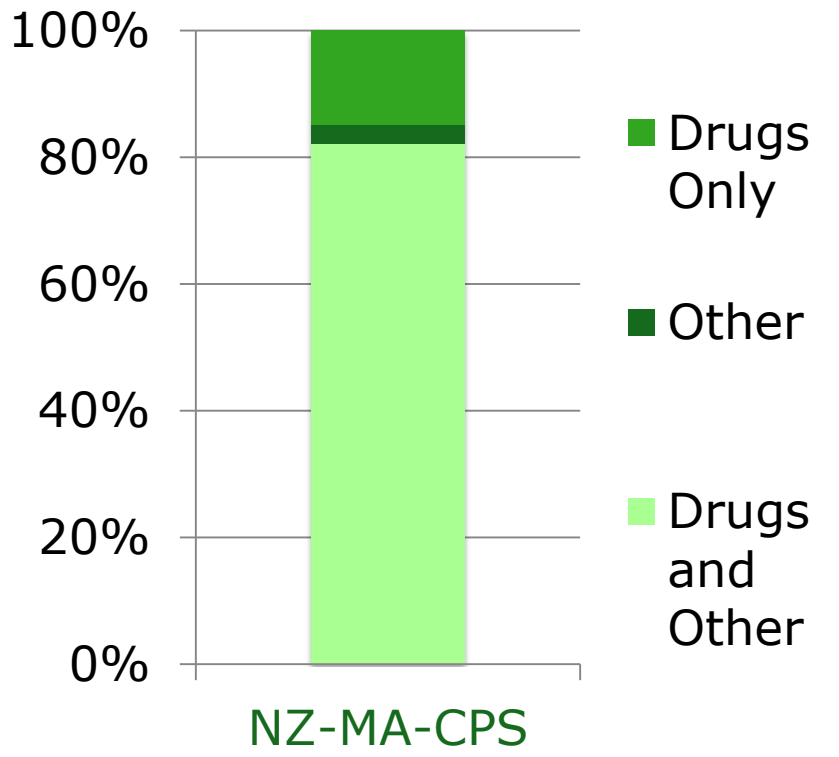
Reasons for Child Protection Referral





40% Drugs Only
3% Other
57% Drugs + Social/Other

15% Drugs Only
3% Other
83% Drugs + Social Other

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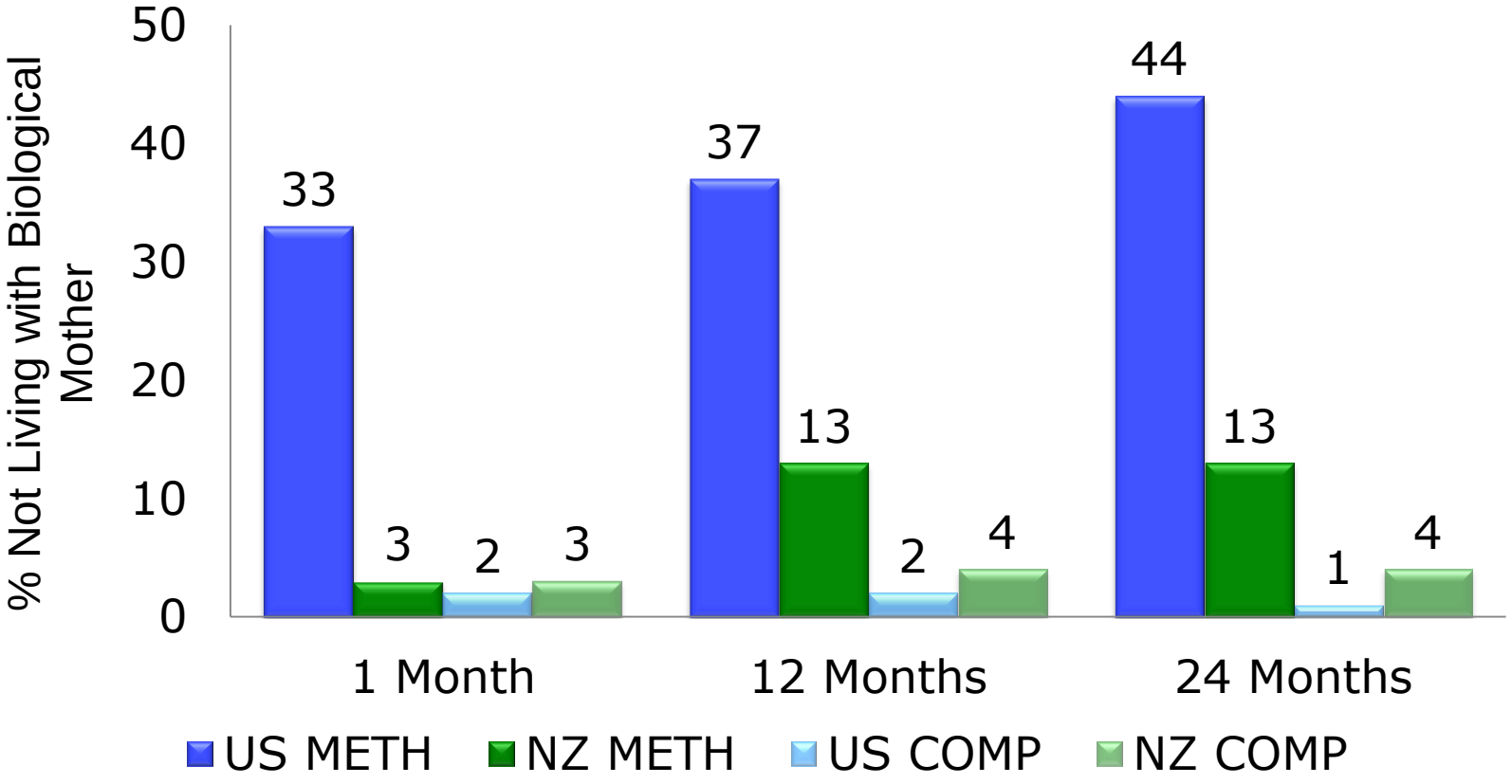
Not Living with Biological Mother



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How do the early environments of children born to mothers who have used methamphetamine during pregnancy in NZ compare to those in the US?

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Biological Mothers at 1 Month

- NZ Participants
  - 97 Methamphetamine Exposed Mothers
  - 110 Comparison Mothers matched Education & Ethnicity
- US Participants
  - 126 Methamphetamine Exposed Mothers
  - 193 Comparison Mothers

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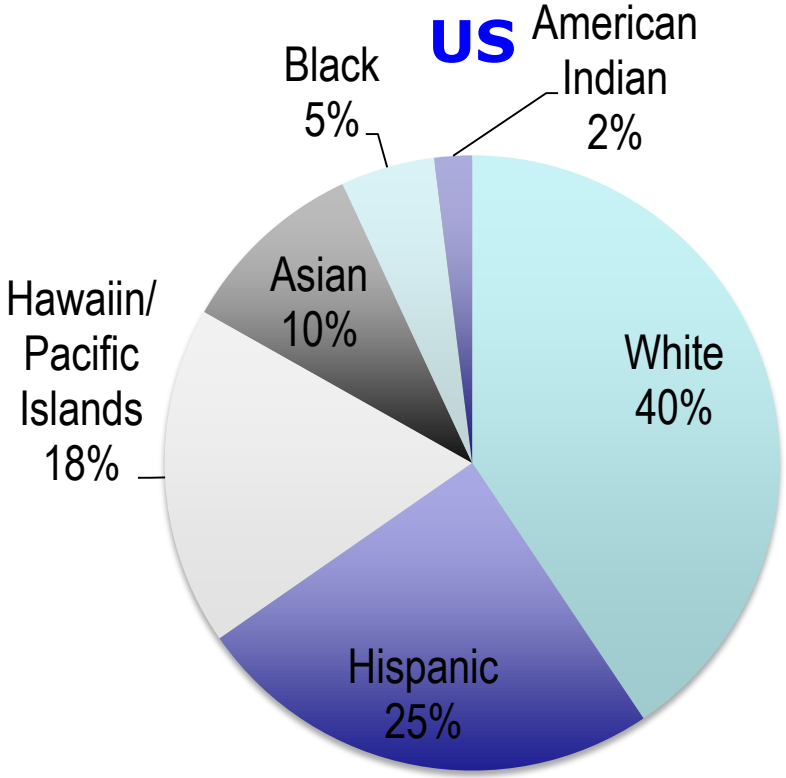
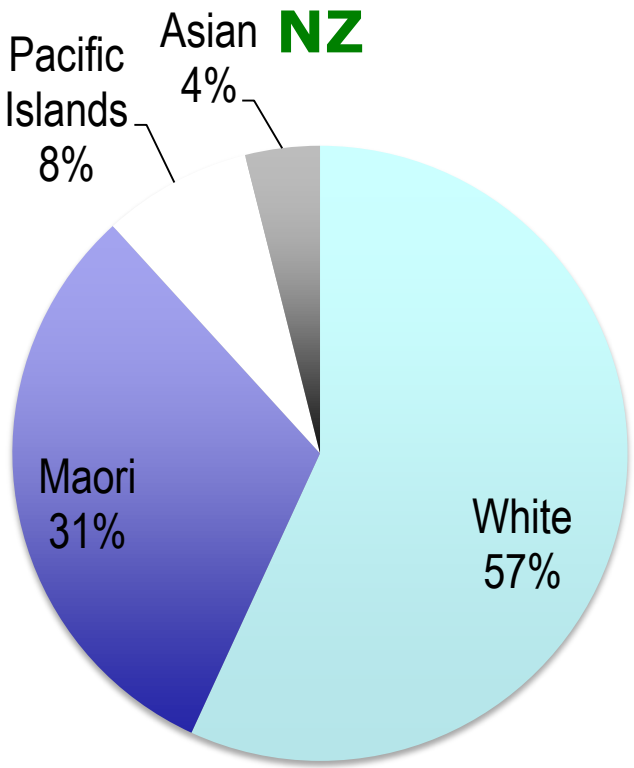
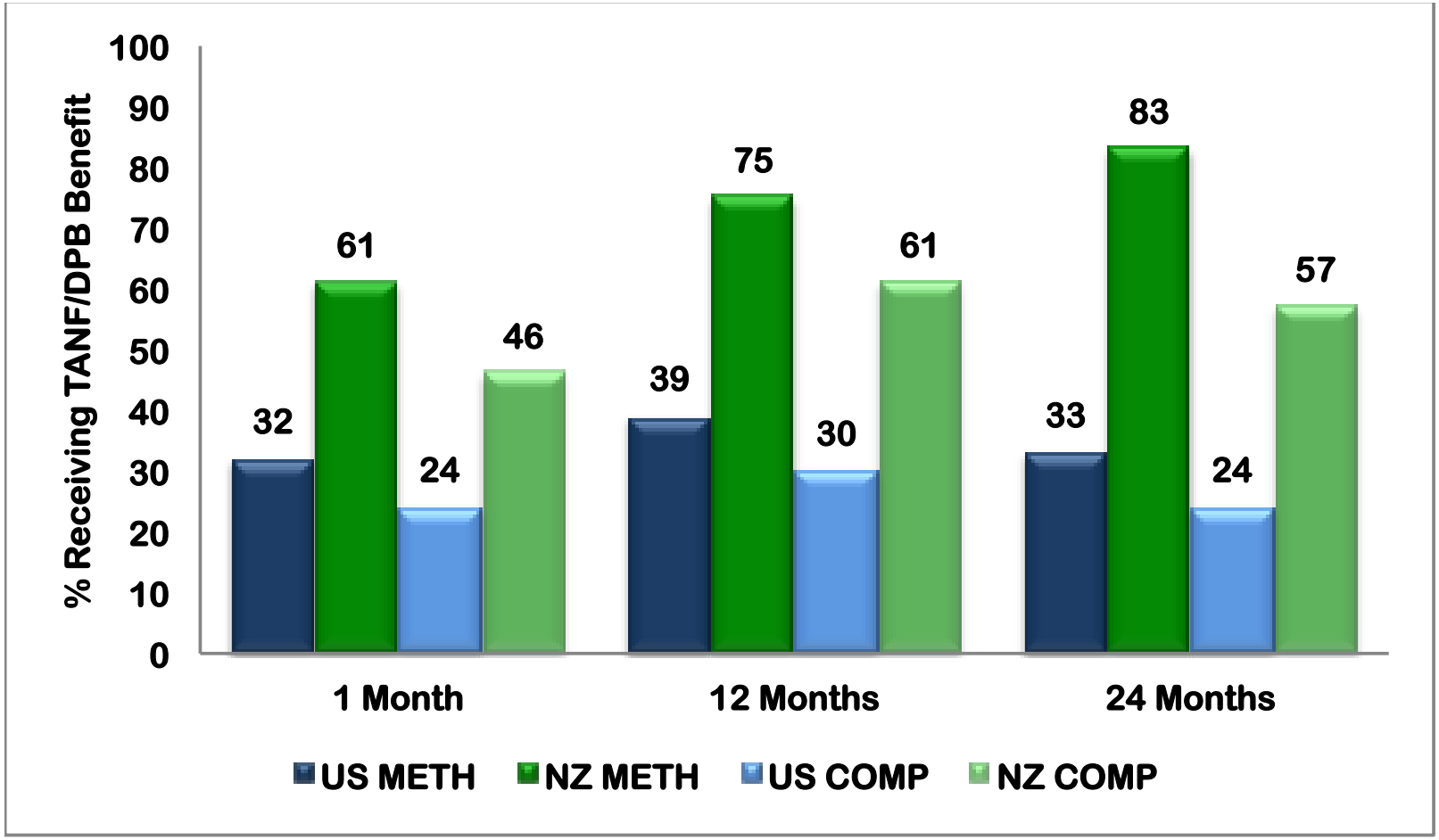
Self-Identified Ethnicity METH





Comparison of Biological Mothers Background

Maternal Characteristic	US METH N = 126	US COMP N = 193	NZ METH N = 93	NZ COMP N = 107
White/European	41%	40%	58%	47%
Maori	-	-	32%	36%
Hawaiin/Pacific Is	18%	17%	8%	13%
Asian	10%	14%	2%	4%
Black	5%	14%	-	-
American Indian	2%	2%	-	-
Education < high school	38%	38%	62%	50%
Mean Maternal Age	25.71	24.55	26.72	25.57
Low SES <5 Hollings.	**29%***	**12%**	**46%***	**18%**
Income <$20,000	**60%***	**40%**	**33%***	**18%**
No Partner	**52%***	**34%**	**52%***	**27%**



Comparison between US and NZ Mothers receiving Temporary Assistance for Needy Families (TANF) and NZ Domestic Purposes Benefit (DPB).

Maternal Risk Mental Illness

US Study

BSI Scale	MA	Comp
BSI Total	.59	.44*
Somatization	.43	.34
Obsessive Comp	.93	.78
Interper Sensitivity	.63	.54
Depression	.56	.37*
Anxiety	.43	.35
Hostility	.62	.48*
Phobic Anxiety	.36	.27
Paranoid	.83	.52*
Psychoticism	.51	.30*

NZ Study

BSI Scale	MA	Comp
BSI Total	.61	.34*
Somatization	.46	.30*
Obsessive Comp	.94	.69*
Interper Sensitivity	.71	.34*
Depression	.57	.25*
Anxiety	.41	.22*
Hostility	.65	.44*
Phobic Anxiety	.43	.21*
Paranoid	.82	.36*
Psychoticism	.48	.18*

*Significant Adjusted for Alcohol, Tobacco, Marijuana & SES

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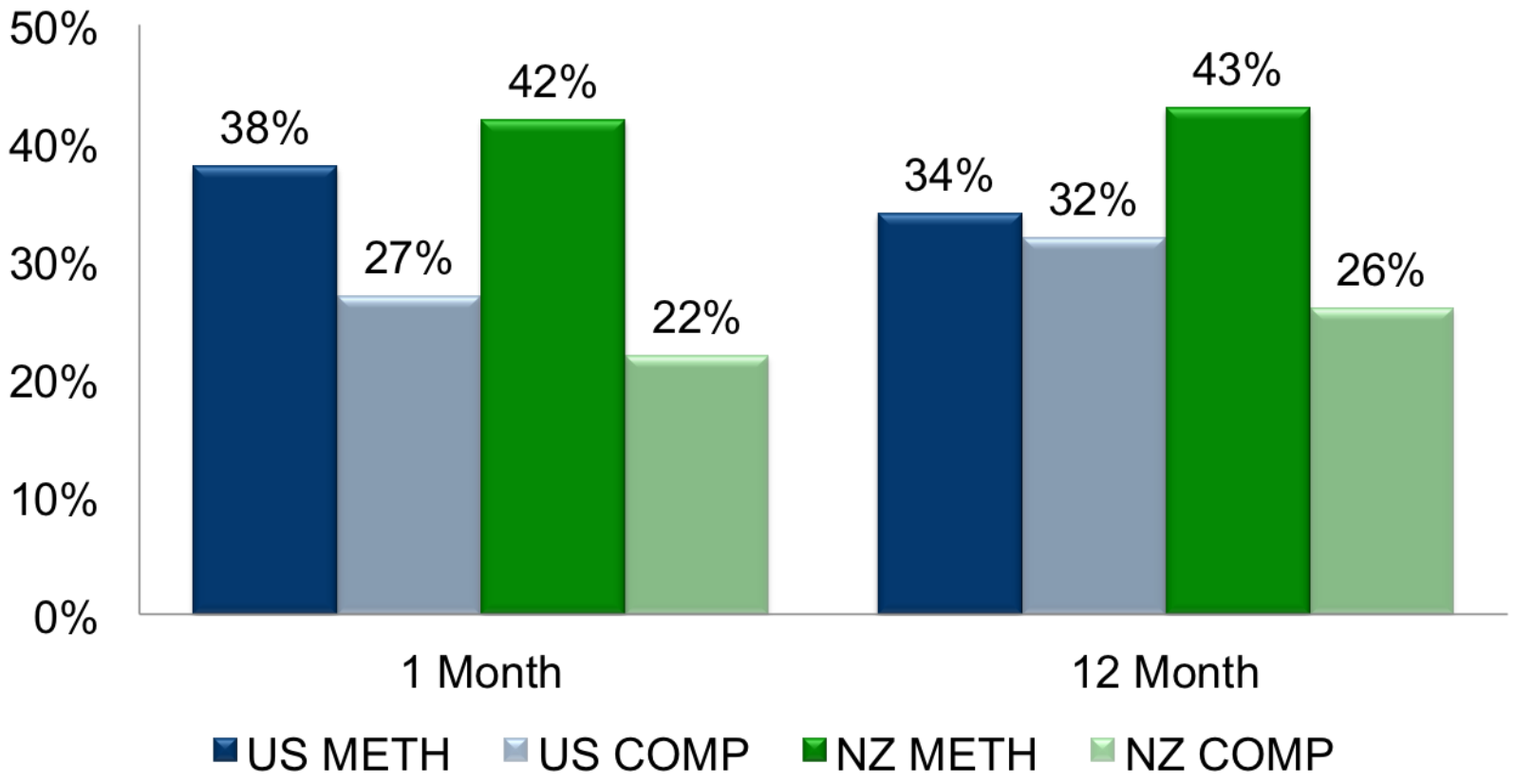
Positive Diagnosis Psychiatric Illness (BSI)



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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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How do birth outcomes of NZ and US children compare?

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Birth Outcomes

- 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)
- 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

LaGasse, Wouldes et al. (2011)

Nicu Network Neurobehavior Scale (NNNS)

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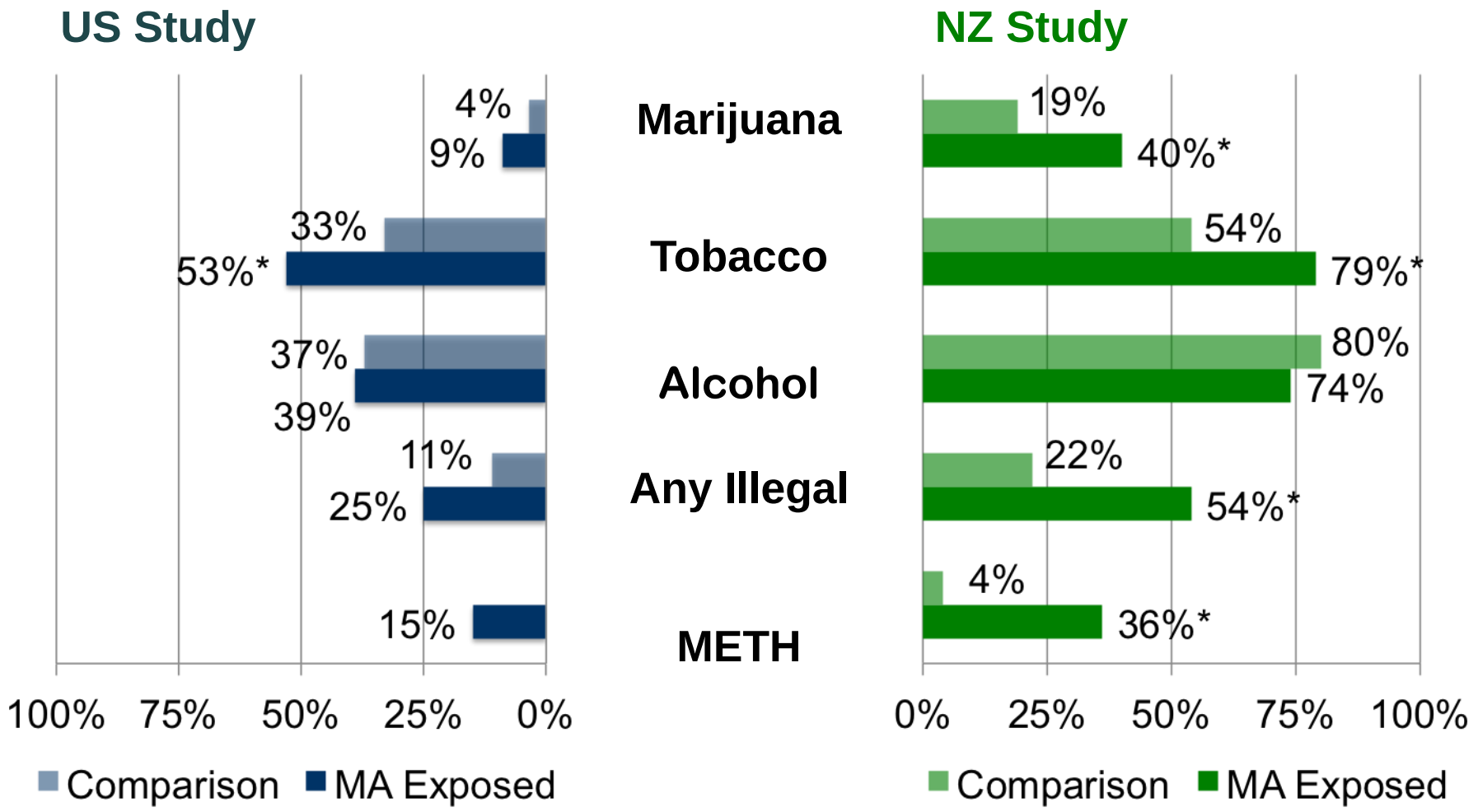
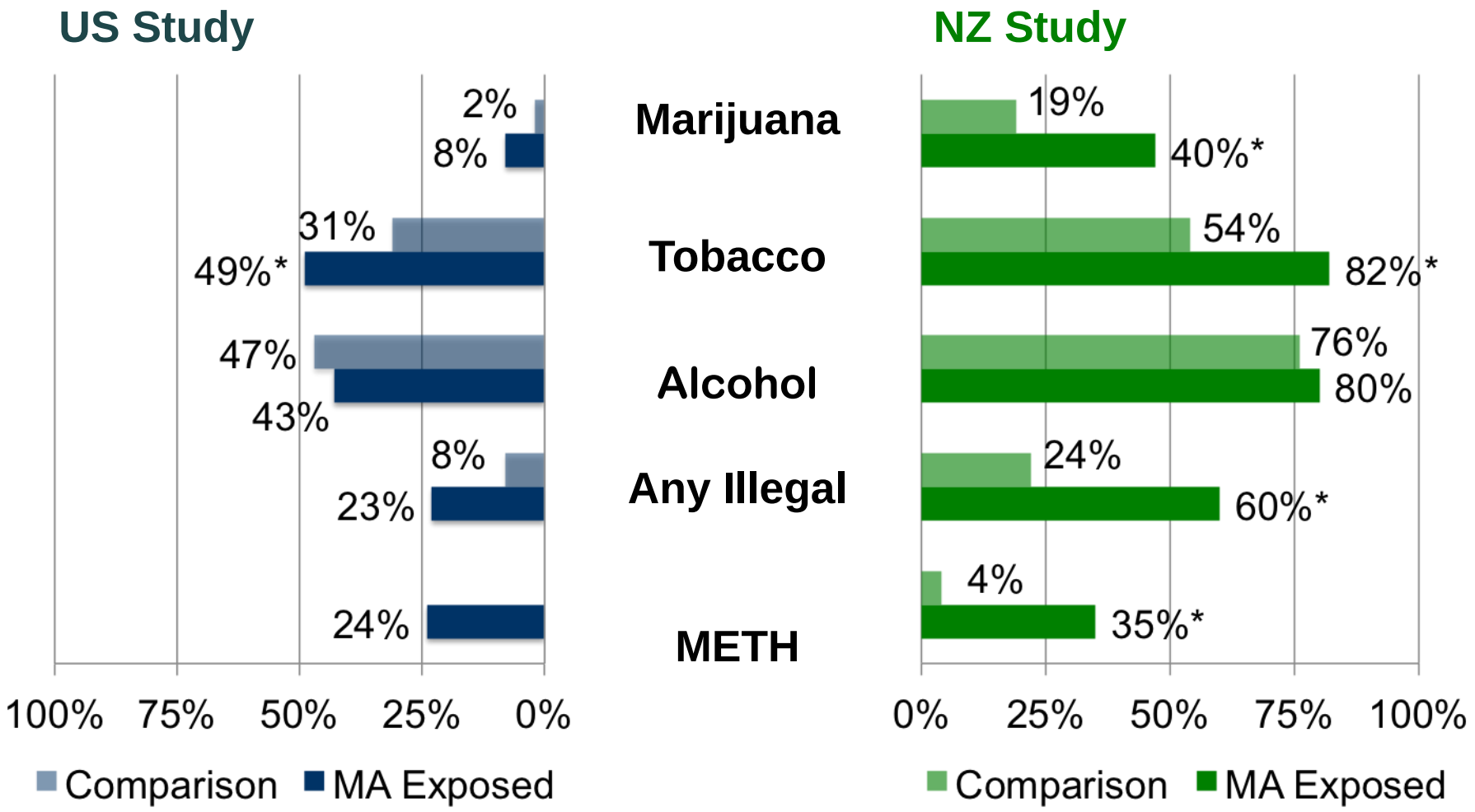
How do NZ and US children compare on cognitive and motor outcomes over the first three years?

Percent of US and NZ Mothers who used Marijuana, Tobacco and Alcohol at 12 Months (Substance Use Inventory).



Percent of US and NZ Mothers who used Marijuana, Tobacco and Alcohol at 24 Months (Substance Use Inventory).



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Cognitive & Motor Development over first 3 years

- US study found:
  - No differences between MA 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…..

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Predictors of delayed motor development

- 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)

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Clinical Implications

Some similarities and some differences across US and NZ cultures

Harm Reduction Approach in NZ may mean:

- Access to more adequate prenatal care--may improve birth outcomes
- May mean more children stay with biological mother

Treat mothers for both Substance Abuse and Mental Illness

- Similar rates of both in NZ and US
- NZ only MA exposed mothers 5.5 times more likely to have comorbid Substance Use Disorder and Psychiatric Disorder

More robust findings in NZ Study of MA exposure on early motor development than US

- More early interventions to treat children exposed to “P” and other drugs

Substance Abuse + Psychopathology + Toxic Environments = Poor outcomes for children

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