Sites

- ❑ Emory University School of Medicine, Atlanta, GA
- ❑ University of Calgary, Alberta
- ❑ University of Washington, Seattle, Washington
- ❑ Brock University, Ontario
- ❑ UBC, Vancouver, BC

Investigators

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and
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Rajesh Miranda, PhD
Amanda Mahnke, PhD
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FASD in Midlife: Overview of the Multisite Adult Health Study

*And Self-Reported Sleep Patterns

Claire D. Coles, PhD

PC2: Living With FASD Over Time: Sleep, Aging, and Unanswered Questions for Research and Daily Life

Seattle, April 18, 2026

Some important Questions

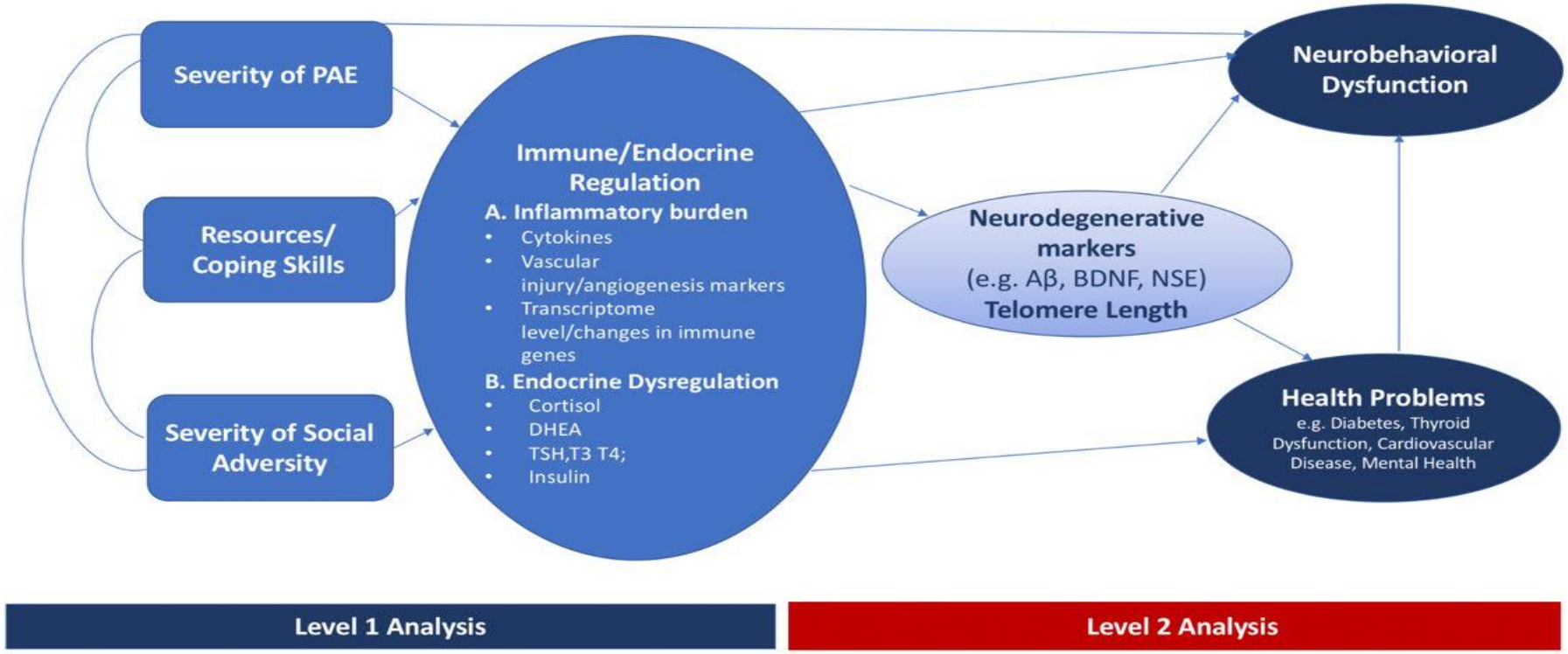
Why Do People participate in this Research?

- ❑ Participants with FASD in Atlanta, Seattle, and Calgary are volunteering to help understand the challenges to health and social adjustment that many experience.
- ❑ Also volunteering are unexposed community members of the same age as well as adults older than 65 who share the goal of improving access to care through early identification and prevention.

What is involved in participation?

- ❑ Informed Consent and allowing DEIDENTIFIED data to be shared.
- ❑ Providing answers to questionnaires about health and life style.
- ❑ In-person testing and computerized testing.
- ❑ Having a physical examination.
- ❑ Providing biological samples for analysis (saliva and blood).
- ❑ Having a 3-D picture taken.

Project Goals



- In Middle-Aged Adults with PAE, in comparison to SES and age-matched Controls and older healthy control contrast groups, evaluate the following:
  - *The role of **immune** and **endocrine dysregulation** in **physical** and **mental health** within the individual's social context (examining both negative and positive influences).*
  - *The impact of PAE as well as immune and endocrine status on **neurocognitive** performance and markers of early on-set functional deficits within the social context.*

Speakers and Topics: Workshop April 19, 2026, 10:30-12:00

- Claire D. Coles, *Prenatal alcohol exposure in middle age: The CIFASD Multisite Adult Health Study: **Overview** and **Neurodevelopmental** Outcomes*
- Julie A. Kable, *Altered **microvascular** morphology in adult individuals exposed to alcohol in utero and relationship to function and cognition*.
- Tamara Bodnar, ***Health**, **Resilience**, and **Well-Being** in Adults with FASD*
- Amanda Mahnke, ***Biomarkers** of aging **health** in adults with FASD*

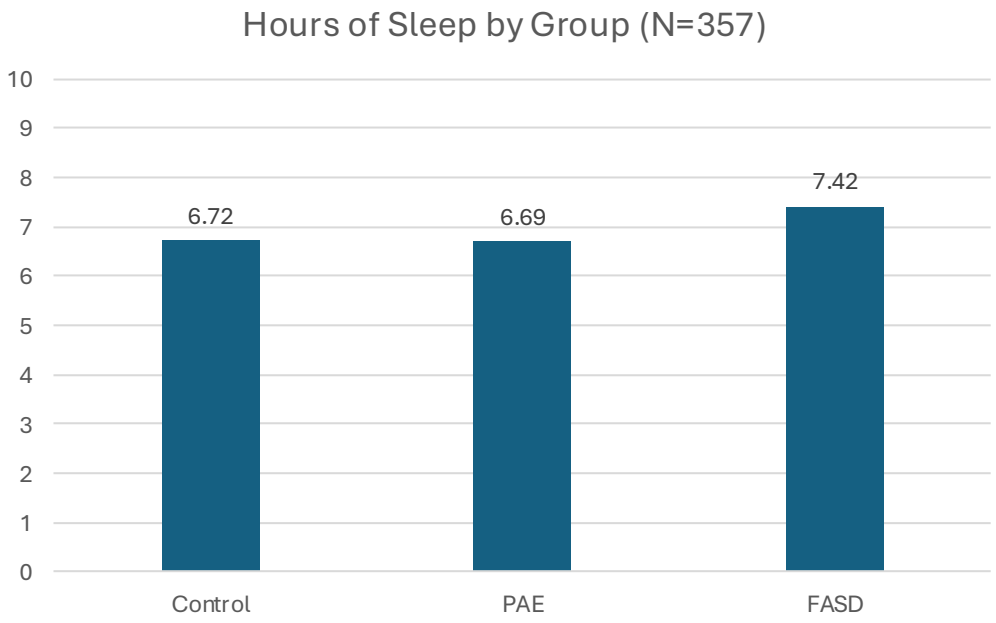
An Example of Information from the Adult Health Study- FASD and Sleep

- The Adult Health Questionnaire has several questions about sleep.
  - How many hours of sleep do you usually get?
  - In the last month, how many days have you felt you didn't get enough sleep?
  - In the last month, have you had any problems with sleep? Falling asleep, waking at night, or sleeping too much?
    - Checklist of sleep problems.
  - Do you snore?
  - Do you stop breathing during sleep? (Apnea)

The Self-Report Questionnaire also asks about:

- Have you been diagnosed with Depression? and, if “yes”
  - List of Depression symptoms including sleep disturbances.
- Have you been diagnosed with Anxiety?
- A list of questions about Adverse Childhood Experiences (ACEs)
- Weight
- Health Care Access
- Demographic Information

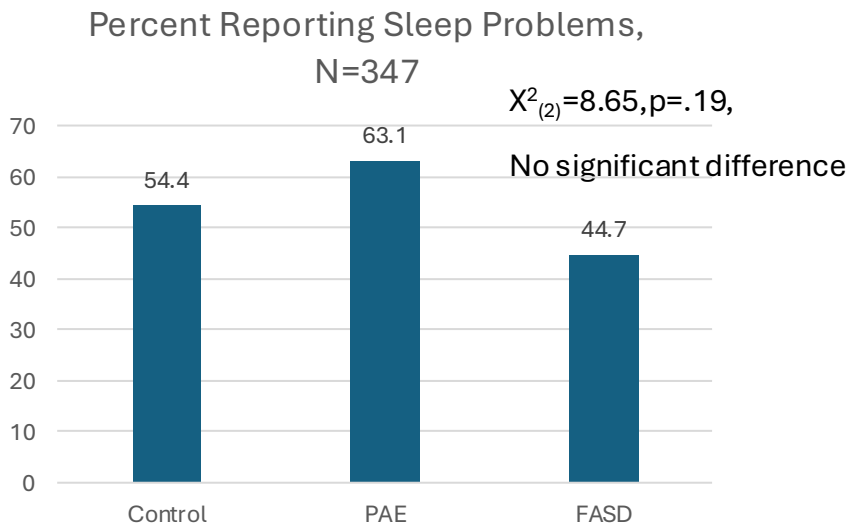
Some results comparing FASD, Alcohol Exposed (PAE)and Controls Matched for Age

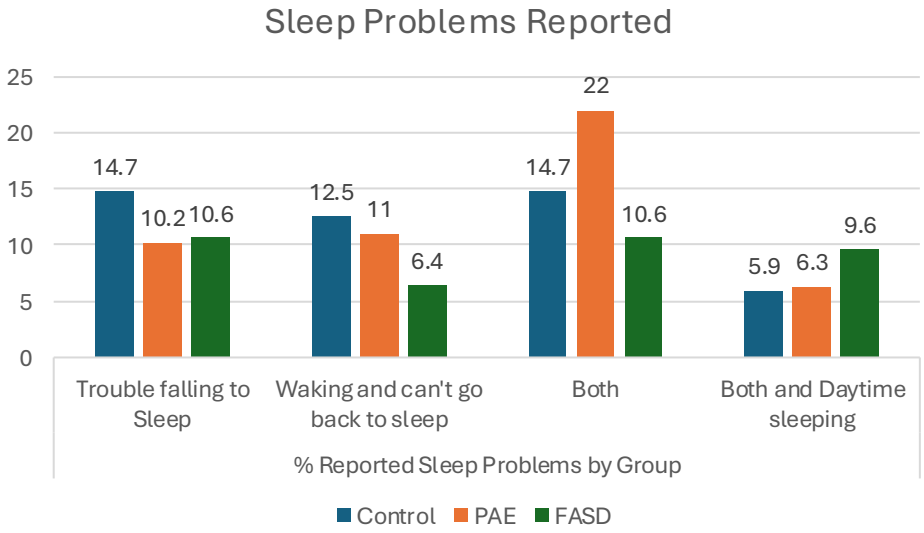


$F_{(2,340)}=5.62$, $p<.004$

FASD>Control & PAE

- Those with **FASD** report significantly <u>more</u> sleep time than other groups.
- <u>Both</u> PAE and Controls are sleeping about 6 ½ hours a night.
- So, basically, reports that the PAE group are not sleeping enough are correct, but, apparently, no one else is either in this community sample!
- Are there problems related to PAE?





Is anyone sleeping well?

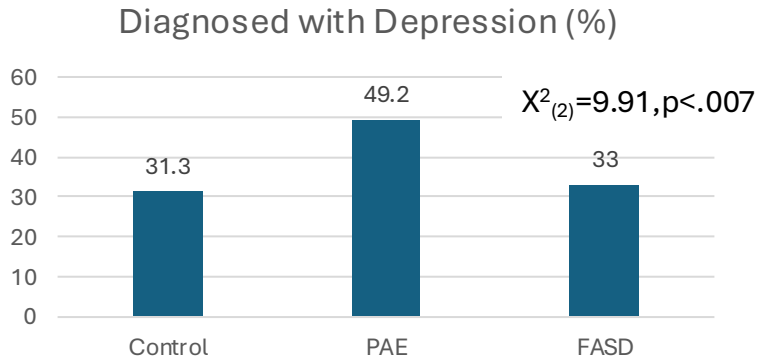
- More than 60% of the PAE group reported recent problems with sleep.
- More than 50% of the Controls did the same.

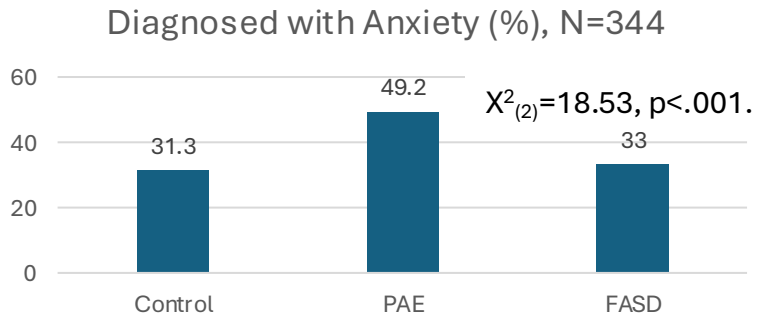
What is affecting Sleep in this group of people?

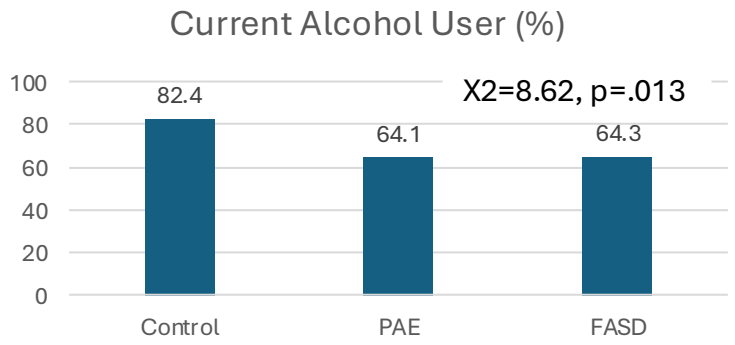
Things that can affect sleep-

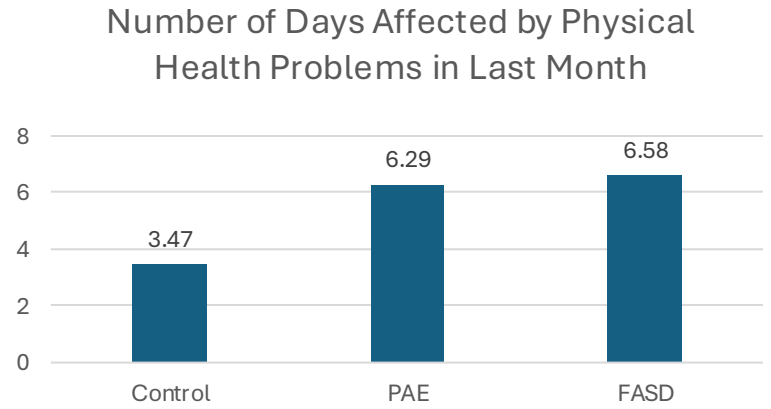
- *Depression*
- *Anxiety*
- *Life Style/Vocational hours*
- *Physical Health*
- *Age*
- *Hormonal Changes*
- *Drug/Alcohol Use*

Group Differences in Other Factors potentially related to sleep, N=357

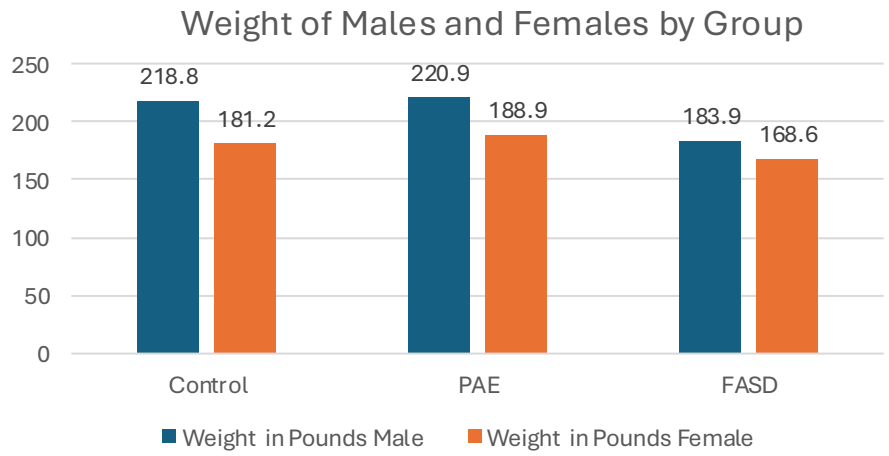








$F_{(2,353)}$=4.39, p=.013, Control<Both other Groups



Alcohol-Exposed Individuals (PAE) report more Depression, **Anxiety** and **Physical Health** problems but **less Alcohol Use** than controls.

Those with **FASD**, <u>do not differ from controls</u> on Depression and Anxiety but are <u>similar to PAE</u> on Physical Health Problems and Alcohol Use.

Males weighed **more** than females. **FASD** group weighted **less** than other groups.

How can we understand what leads to Sleep Disturbance in people responding to this Survey?

- We can do a PATH ANALYSIS. This is a statistical procedure that used MULTIPLE REGRESSION to look at the different factors involved in the self-report of Sleep Disturbance.
- It examines the relationship between two types of FACTORS.

➢**Exogenous Variables** (those not dependent on other variables but may be correlated). These were **Sex**, **PAE**, **Site**, and the participant's **Age** at the time of the visit.

➢**Endogenous Variables** (those impacted by other factors in the model). These were socioeconomic status (**SES**), adverse childhood experiences (**ACES**), **Depression** Symptoms, Sleep Related **Health (e.g., weight)**, Other Health Problems, and the outcome, **Sleep Disturbance**

Here is how we defined these Factors

SES- Derived from a demographic form and coded using Hollingshead Index
ACES-Series of questions whose responses were summed that indicated adverse events in an individual's lifespan
Depression Symptoms-Total Depression score self-reported from the Health Survey
Sleep Related Health-This is derived from a factor analysis (39.3% of variance) of health-related items from the Health Survey. Items loaded highly on this factor include

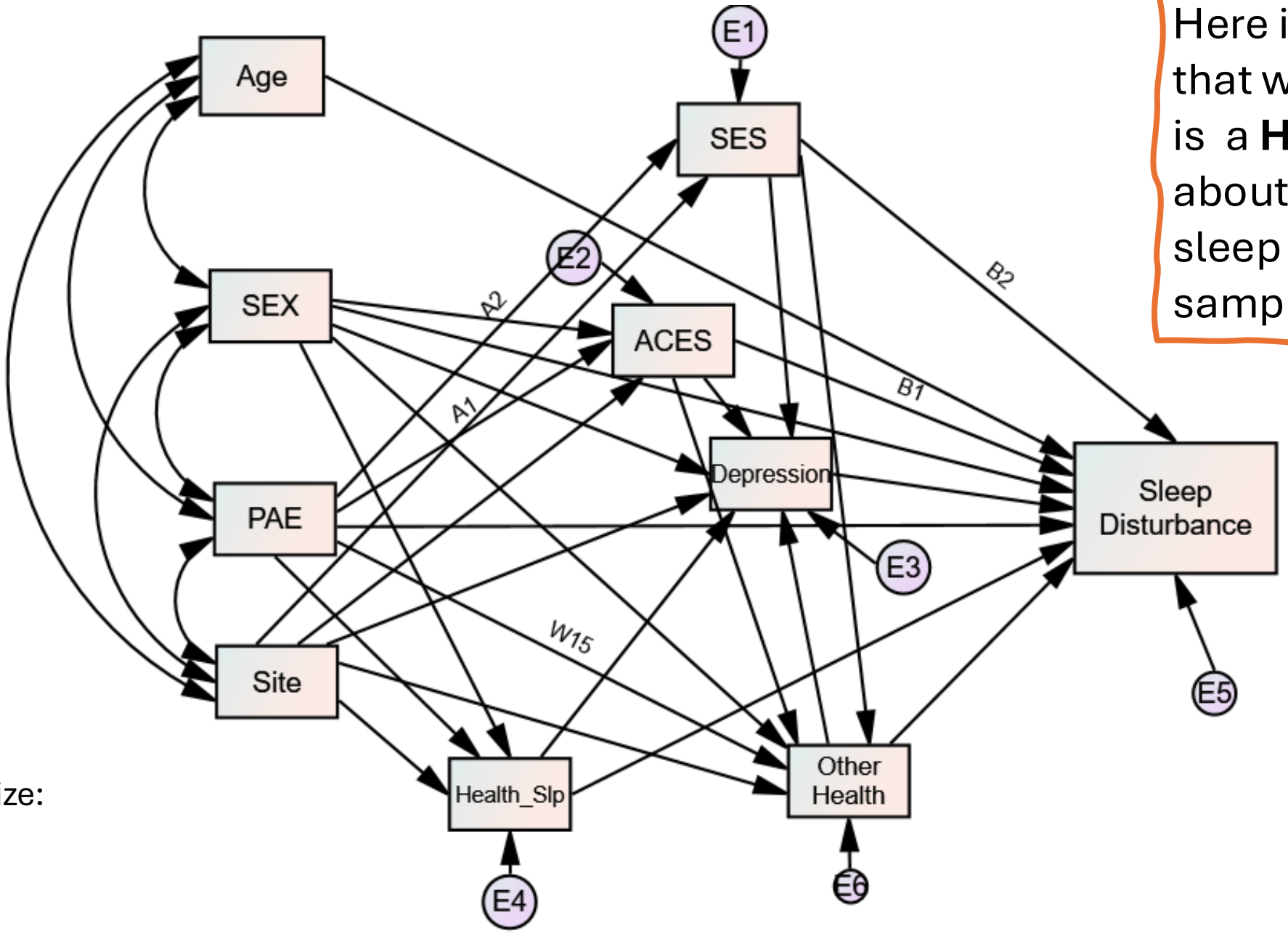
1. Weight in pounds
2. Stopping breathing while sleeping
3. Do you snore
4. Do you snore loudly

Other Health Problems-This is derived from a factor analysis (22.6% of variance) of health-related items from the survey Only one item loaded on this

1. Number of days affected by physical health

Sleep Disturbance-This is derived from a factor analysis of indicators of sleep problems (one factor generated accounting for **51.7%** of variance

1. Negatively related to total hours of sleep
2. Positively related to number of days sleep disturbed (2 items)
3. In the past months have you had sleep problems



Here is the Model that we tested. This is a **Hypothesis** about what affects sleep in this sample.

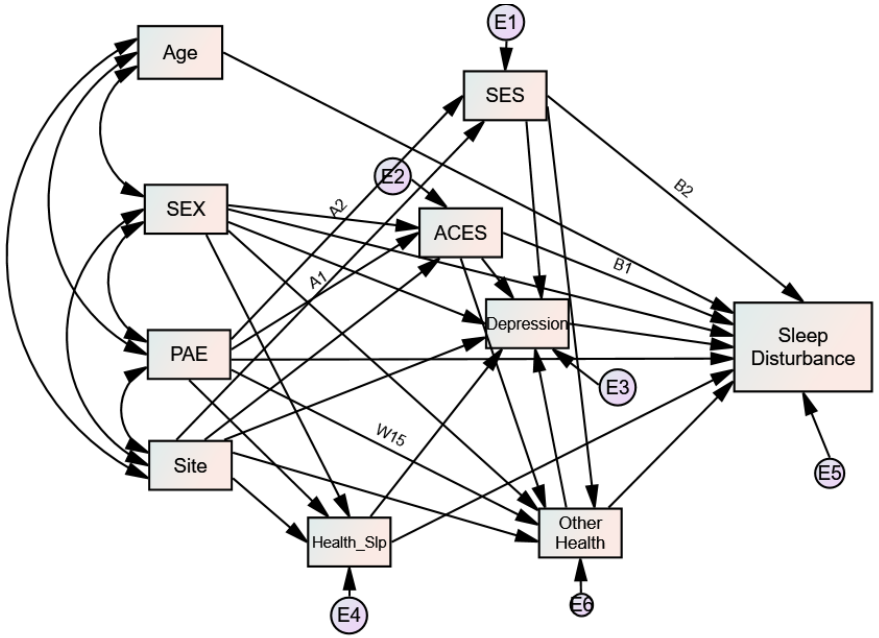
Sample size:
N=354

Model Results

- **Result (Default model Rejected):** Minimum was achieved; Chi-square (12, n=354) = 14.636, p < .262

- **Model Fit Indices:** CFI= .995, TLI = .982, RMSEA = .025)

- **Total Variance Accounted for in Sleep Disturbance**: 40.3% (p < .001)



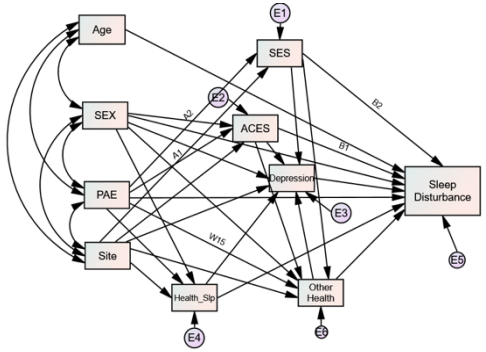
PAE Effect

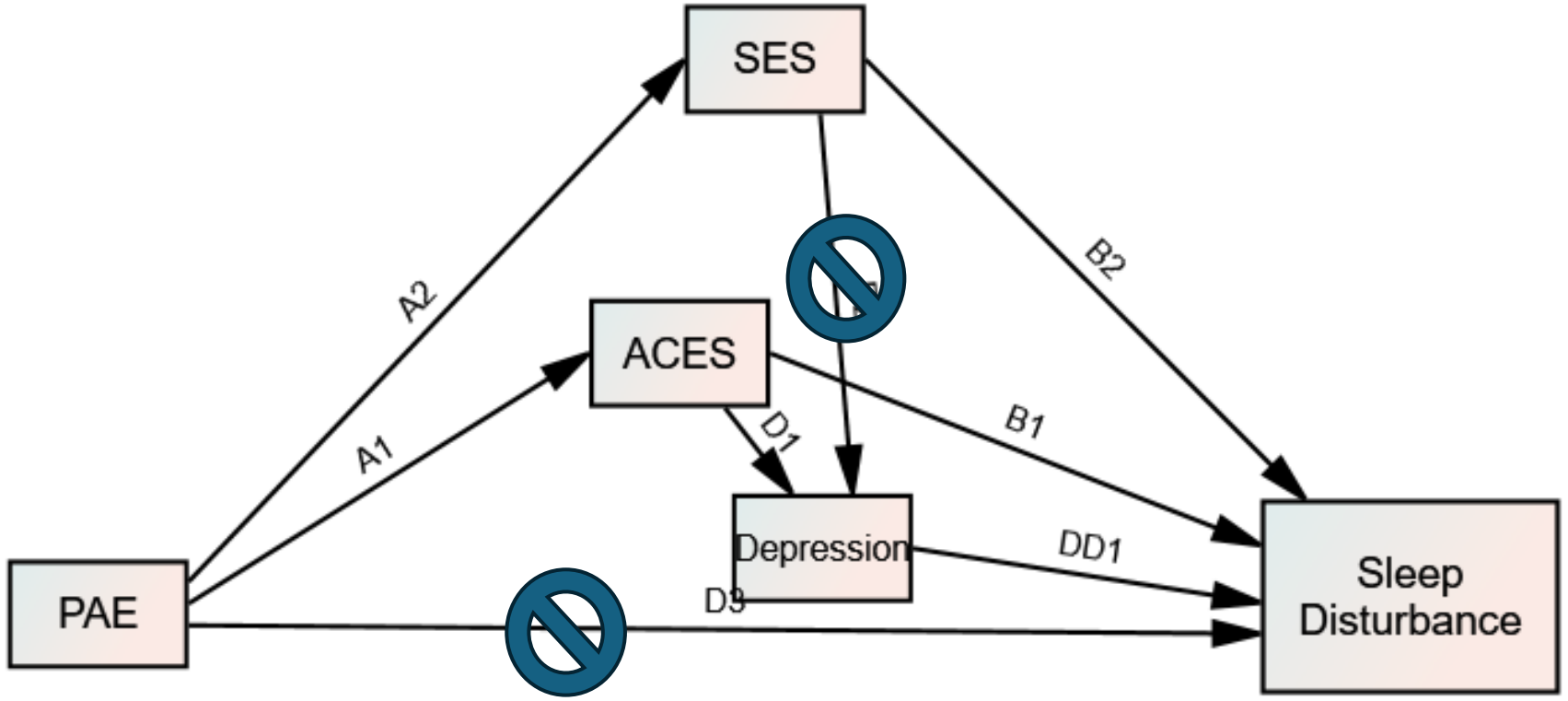
		90% Bias-Corrected Confidence Interval		
Parameter	**Estimate**	**Lower**	**Upper**	**P**
Total Effects	.026	-.046	.104	.511
Direct	-.059	-.131	.018	.221
Indirect	**.086**	**.028**	**.144**	**.013**

Indirect Paths of PAE

		90% Bias-Corrected Confidence Interval		
Parameter	**Estimate**	**Lower**	**Upper**	**P**
PAE via ACES	**.121**	**.065**	**.187**	**.001**
PAE via SES	**-.123**	**-.200**	**-.052**	**.004**
PAE via Sleep Related Health Problems	-.002	-.019	.007	.579
PAE via Other Health Problems	-.028	-.078	.002	.120
PAE via ACES impact on Depression	**.071**	**.045**	**.109**	**.001**
PAE via SES impact on Depression	.041	.006	.077	.058
PAE via Sleep Related Health on Depression	.001	-.003	.008	.582
PAE via Other Health Problems on Depression	-.009	-.032	.000	.103

Simplified Model of PAE Impact to Sleep Disturbance





Conclusions

- In this sample, Sleep Disturbances are common.
- Reports of Depression and ACEs are more frequent for those with prenatal alcohol exposure (PAE).
- Environmental factors (SES, ACEs) and mental health problems (Depression) contribute to the effect of PAE on Sleep Disturbance.
- In a larger sample, Health Problems might also reach significance.
- **Preventing** or **treating Sleep Disturbance** may be possible by addressing postnatal environmental factors and treating depression.

Analytical Plan

- **Path analysis** was carried out using SPSS 31.0 and IBM's SPSS AMOS 31 due to the multiple factors that contribute to sleep disruption. Each path analysis involved a series of multiple regression analyses to evaluate the direct and indirect (mediated) effects of PAE on the vascular outcome. In order to minimize the overall experiment-wise error, these equations are estimated simultaneously using structural equation modeling. Bootstrapping was done using 2000 samples of the data to obtain an estimate of bias-corrected results at a 90% confidence interval.
- **Exogenous Variables** (those not dependent on other variables but may be correlated) were Sex, PAE, Site, and Visit Age
- **Endogenous Variables** (those impacted by other factors in the model) were SES, ACES, Depression Symptoms, Sleep Related Health, Other Health Problems, and the outcome, Sleep Disturbance
- **An alpha level of .05** was used for rejecting the null hypothesis for specific relationships within each model.

Operational Definitions

SES- Derived from a demographic form and coded using Hollingshead Index
ACES-Series of questions whose responses were summed that indicated adverse events in an individual's lifespan
Depression Symptoms-Total score from X
Sleep Related Health-This is derived from a factor analysis (39.3% of variance) of health-related items from X. Items loaded highly on this factor include

1. Weight in pounds
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3. Do you snore
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