



Atopic Disease and Psycho-Social Stress

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Introduction

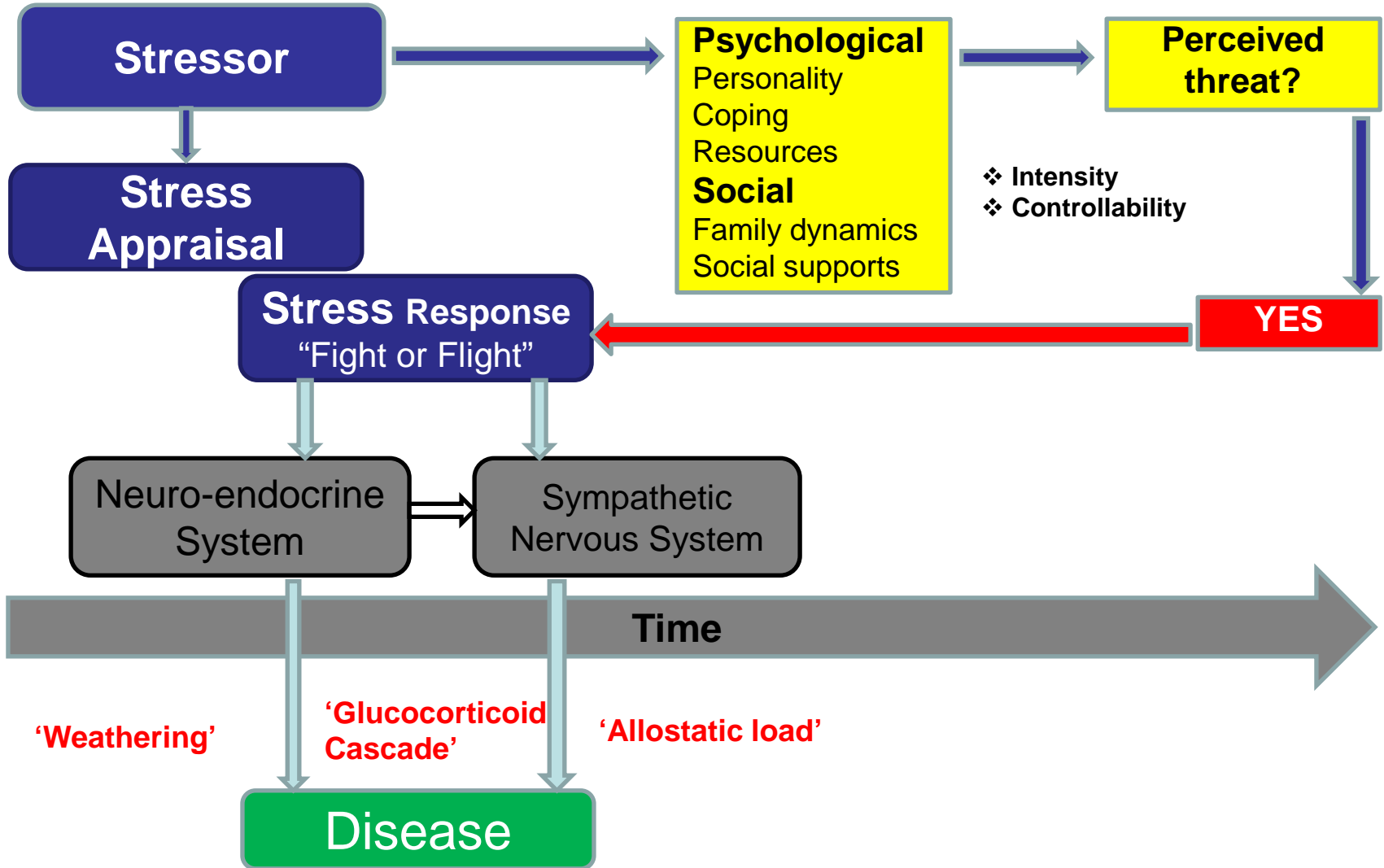
- Atopic conditions are a family of pathologies including:
 - Asthma
 - Eczema
 - Hay fever
 - Allergic rhinitis
 - Dermatitis
- Significant burden of disease in children (Mallol et al 2013)
- Atopic conditions cluster among individuals (Garcia-Aymerich et al 2015)
- Atopic disease is associated with an excessive reaction to allergens

Stress and its Consequences

- Stress: “A non-specific response of the body to any demand for change” (Selye 1936)
- Two systems of adaption:
 - hypothalamic-pituitary-adrenal (HPA) axis
 - sympathetic-adrenal-medulla (SAM) system
- Control the release of stress hormones:
 - glucocorticoids (cortisol)
 - catecholamines (adrenaline and noradrenaline)
 - and other hormones (prolactin, oxytocin)
- Evidence that prolonged prenatal stress associated HPA dysregulation in rats, abnormally high blood glucose levels of fewer glucocorticoid receptors in brain
- Evidence stress associated with initiation of atopic (Chiu et al 2012; Bandoli et al 2015)



How does adversity get under the skin?





The Growing Up in Ireland Study

- Infant Cohort:
 - Wave 1 (2008) 11,134 (Response rate: 69%)
 - Wave 2 (2011) 9,793
 - Wave 3 (2013) 9,001
- Sample frame: Child Benefit Register
- No clustering
- Interviews with both parents, and carers of 8+ hours a week
- Weights to adjust for sample error and attrition applied



Measures of Atopic Disease in GUI

C2. “Does <child> have any longstanding illness, condition or disability? By longstanding I mean anything that has troubled him/her over a period of time or that is likely to affect him/her over a period of time?”

Yes

No

- a. Asthma
- d. Eczema or any kind of skin allergy
- e. Any kind of respiratory allergy (including hayfever)

C5a. “In the past 12 months has child had any periods when there was wheezing with whistling on his/her chest when he/she breathed?”

Yes

No

C5b. “How many separate episodes/bouts of wheezing with whistling on his/her chest has child had in the past 12 months?”

_____ N



Other Possible Processes

- Exposure to toxins:
 - Eisner 2008; Baena-Cagnani 2009; Belanger & Triche 2008
 - Current Smoking: Never, Occasionally, <10, 10-15, 15+
- Breastfeeding as protective:
 - Bergman et al 2002; Sears et al 2002
 - Total breastfeeding (days)
- Early weaning as promoting
 - Fergusson & Horwood 1994; Zutavern et al 2004; Sariachvili et al 2010
 - Age at weaning (<4 months, 4, 5 and 6+ Months)
- The 'old friends' hypothesis
 - Okada et al 2010; Brooks et al 2013
 - Number of siblings (continuous)
 - Hours in centre based care per week
 - Farming household



Measuring Maternal Stress in Pregnancy

Maternal stress in Pregnancy:

S30a. At any time during the pregnancy did you feel under any stress?

A great deal	Some	Not much	None at all
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

S30b. Was that during:

	Yes	No
First Trimester [1 st , 2 nd or 3 rd month]	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Second Trimester [4th, 5th or 6th month]	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
Third Trimester [7th, 8th or 9th month]	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

S30c. Was this stress due to: (tick yes or not for each)

	Yes	No
(i) the pregnancy itself	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
(ii) other factor, such as bereavement, work related etc.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂



Control Variables

- Child sex
- Prenatal smoking: None, Low, Moderate, High
- Maternal age: continuous in years
- Household type: single parent; two parent, number of children
- Maternal education: lower 2nd, Upper 2nd, Post-School, 3rd Level, PG
- Household income: quintiles with missing category
- Gestation: <33wks, 33-36wks, 37-41wks, 42+ wks



Multi-level models: Random-Intercept model

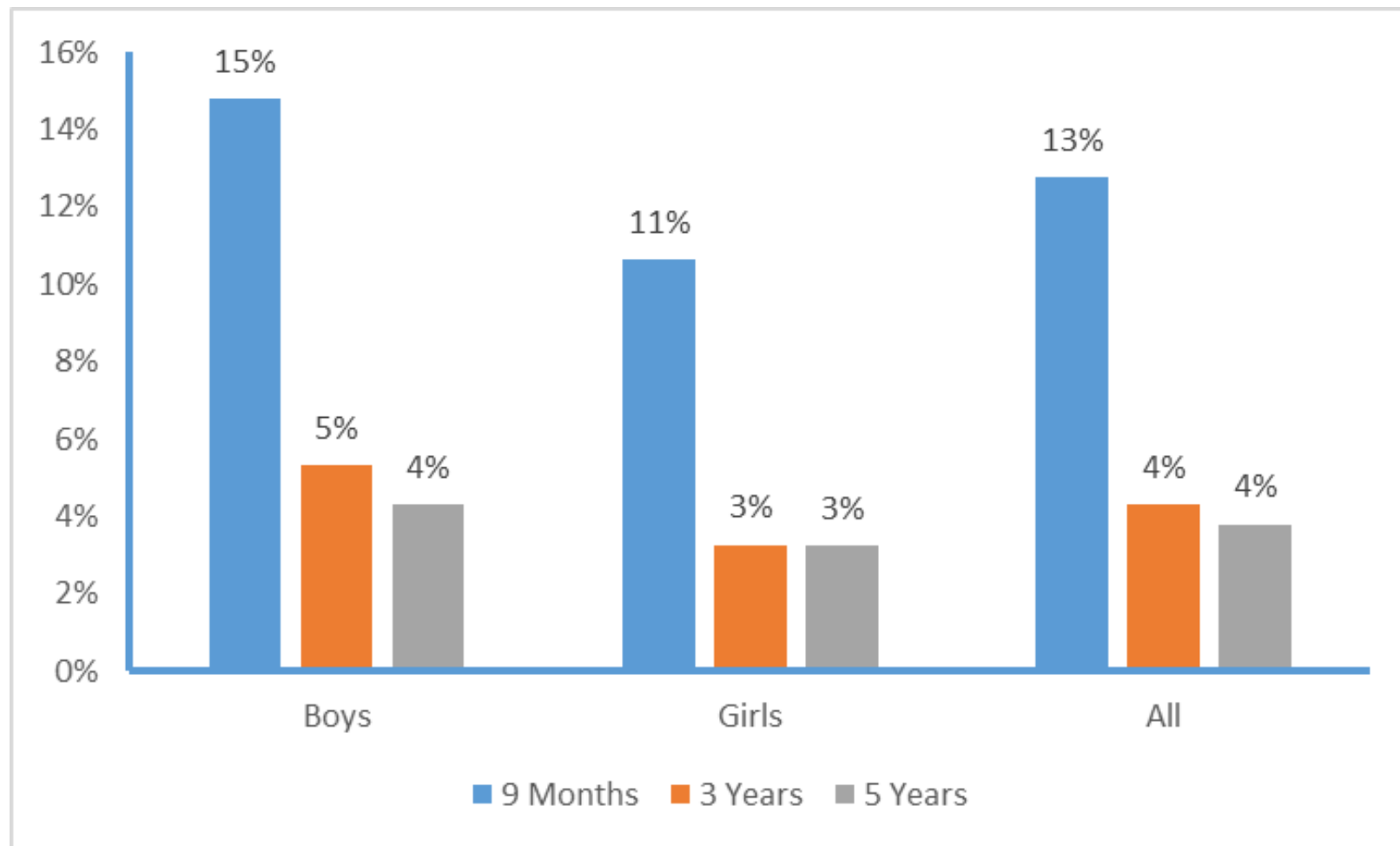
$$y_{ij} = a + \mathbf{u}_{0i} + X t_{ij} + S t_i + e_{ij}$$

y_{ij} = A topic for individual i at time t_{ij}

- **Different intercepts between individuals**
(\mathbf{u}_{0i})
- **The model estimates:**
 - Common (fixed) regression coefficients a , X and S
 - Individuals intercepts ($a + \mathbf{u}_{0i}$)

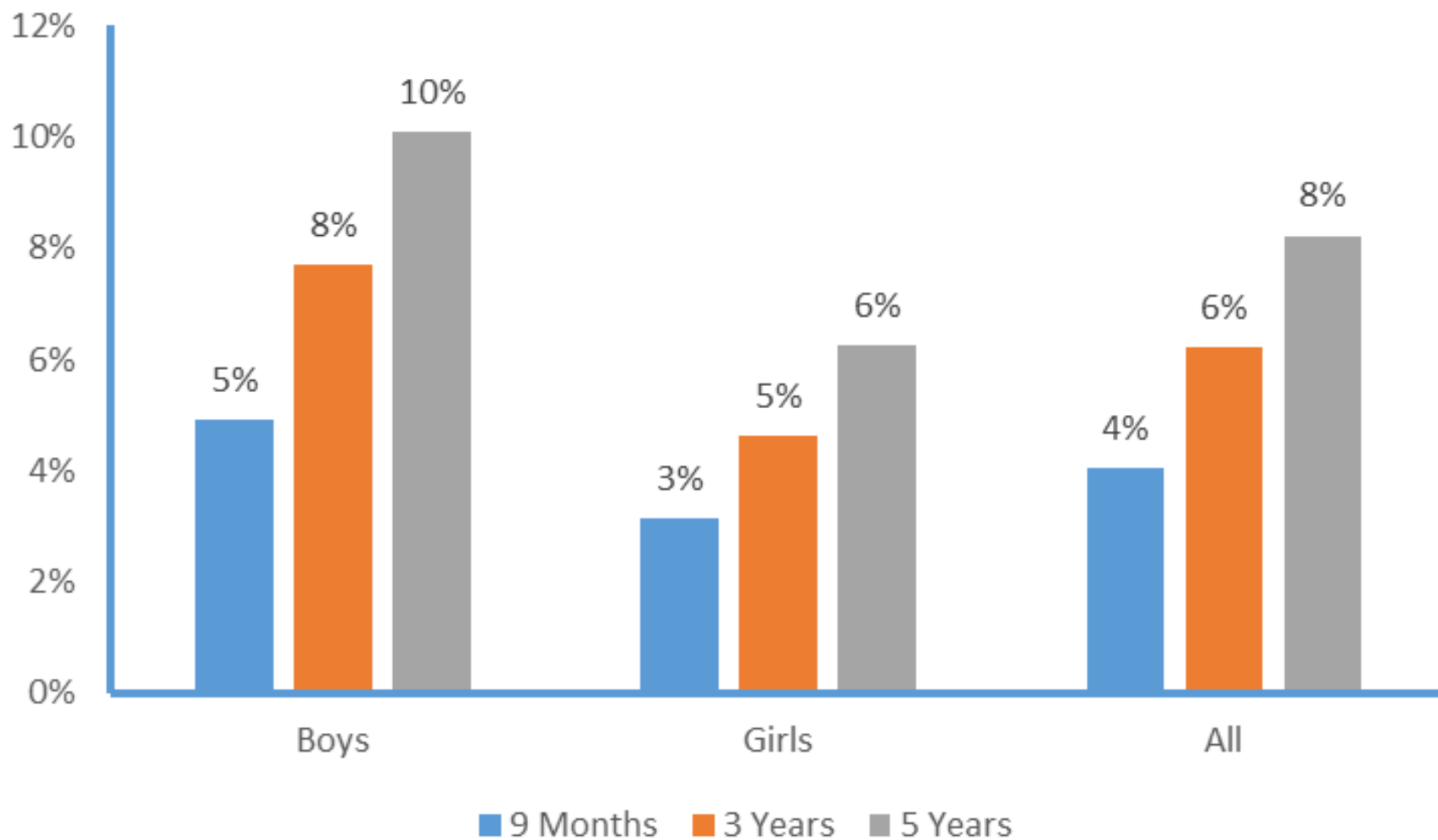


Reported Eczema by Age and Sex



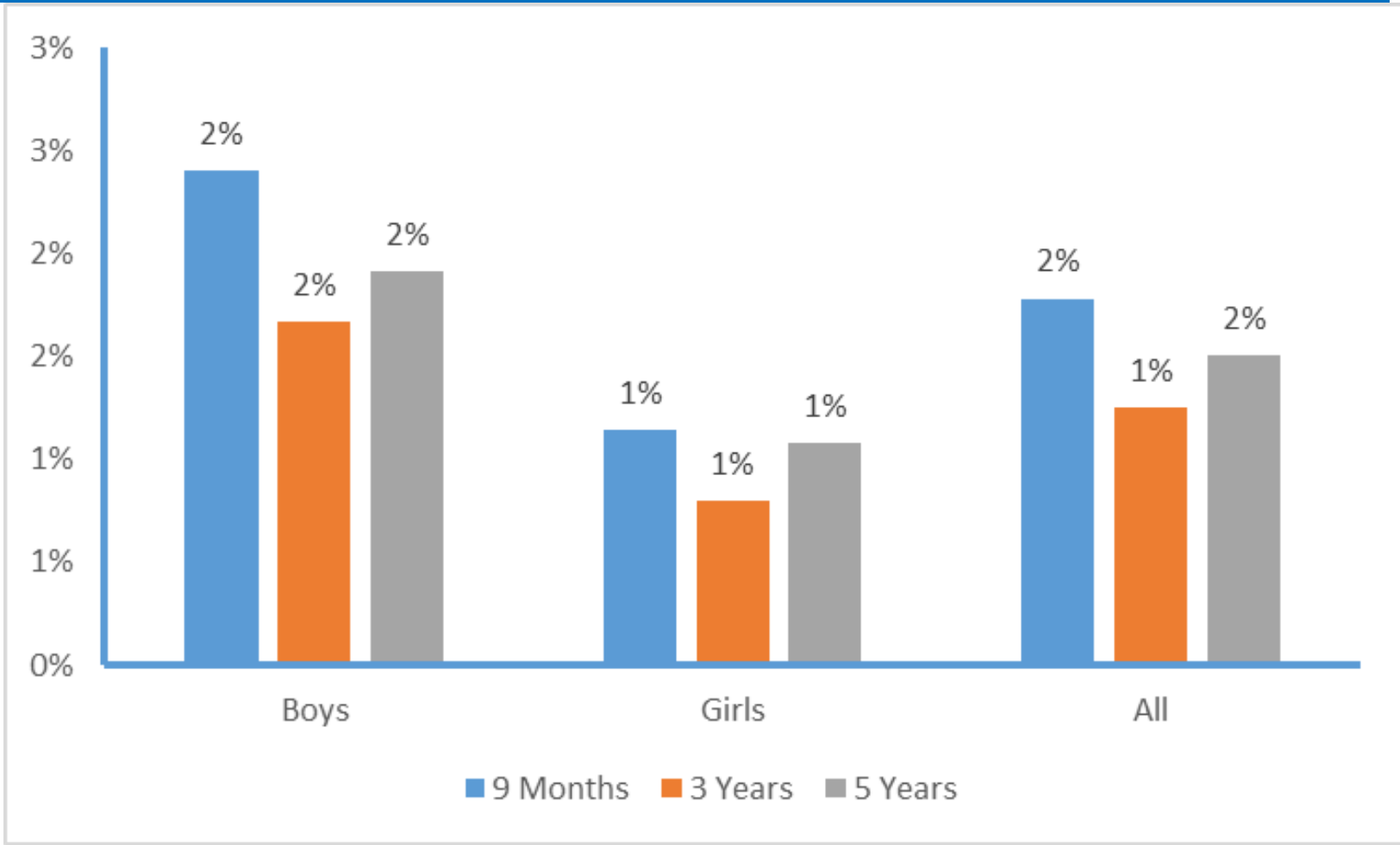


Reported Asthma by Age and Sex



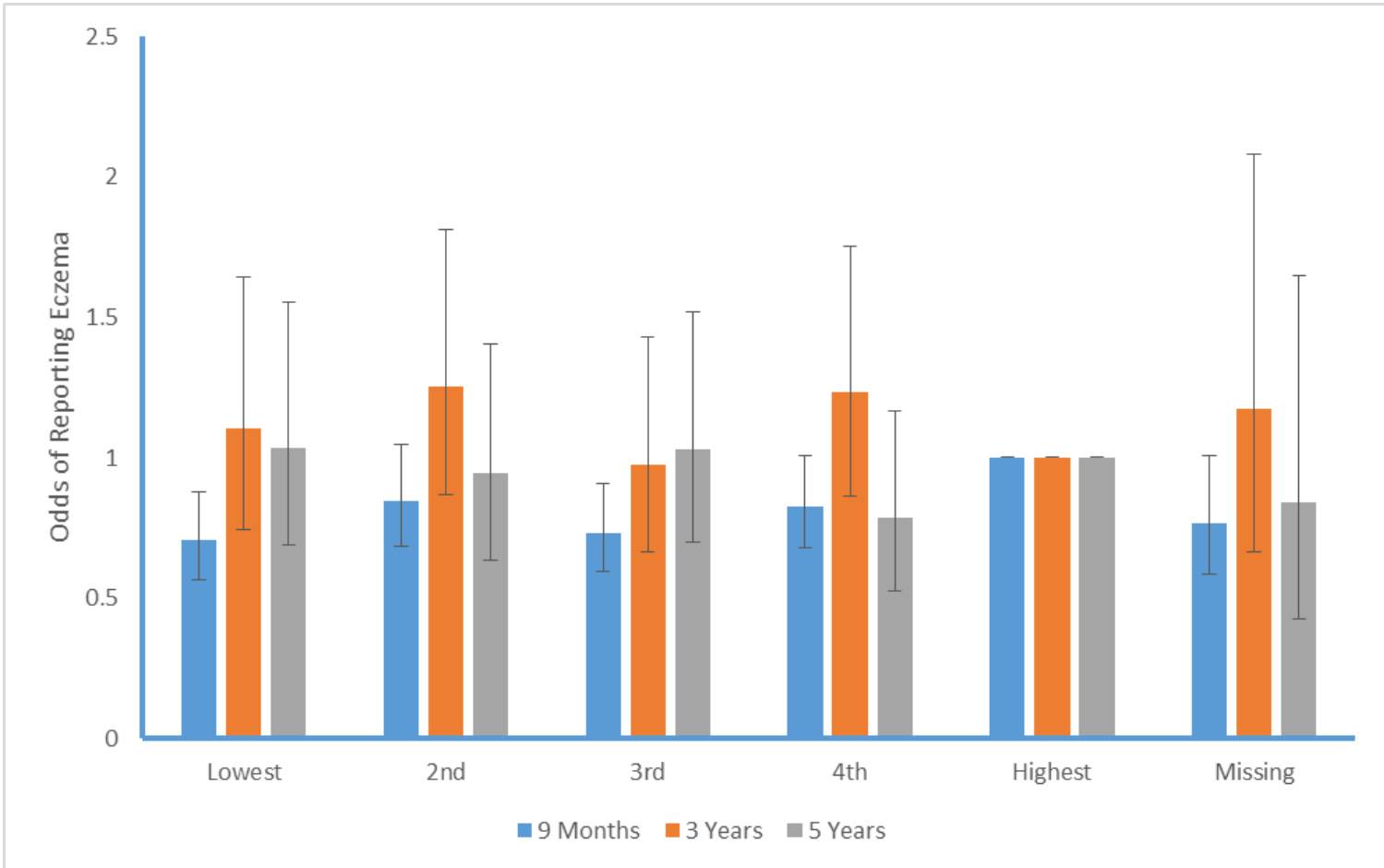


Reported Rhinitis by Age and Sex



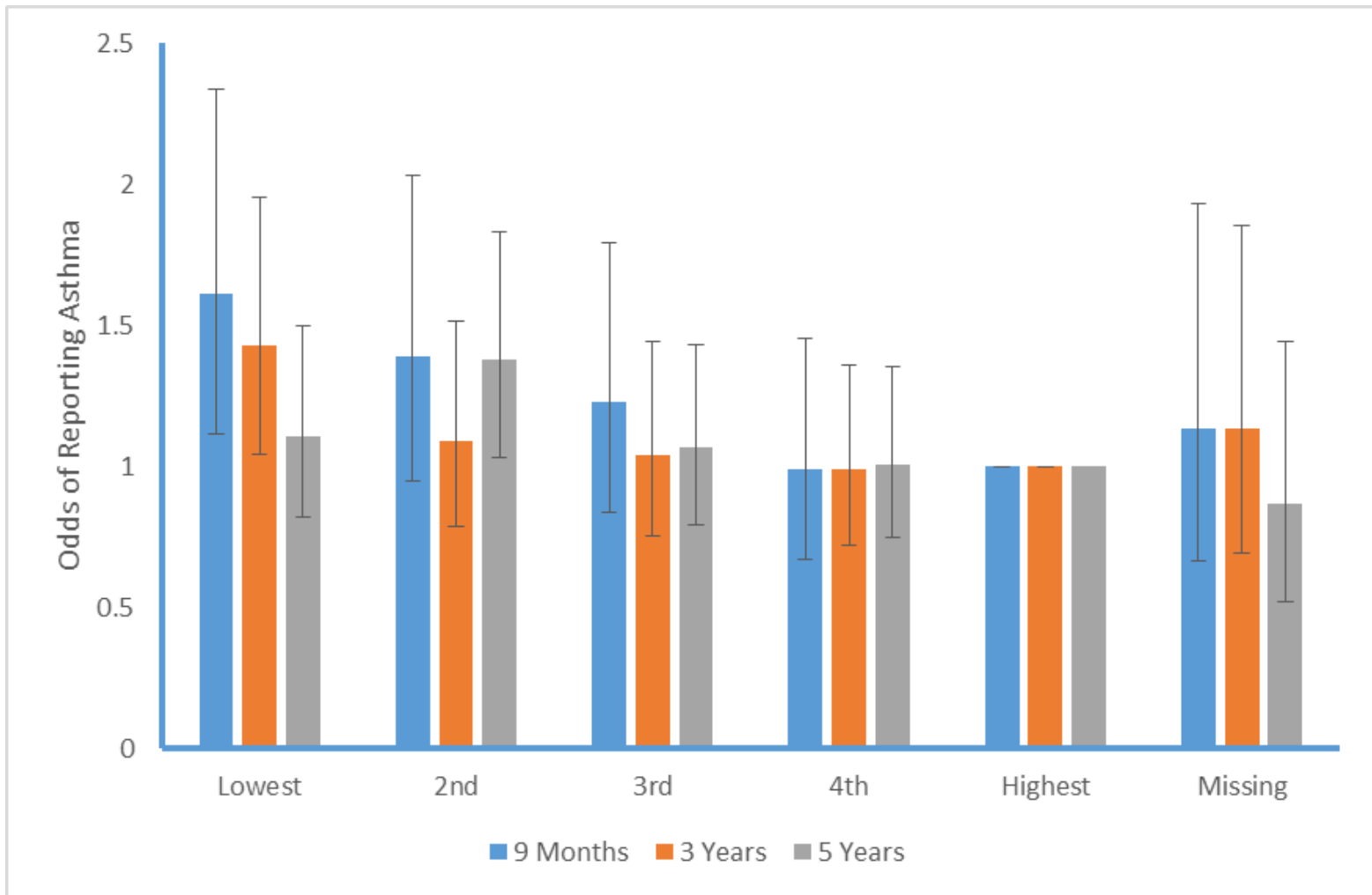


Odds of Reporting Eczema by Income Group

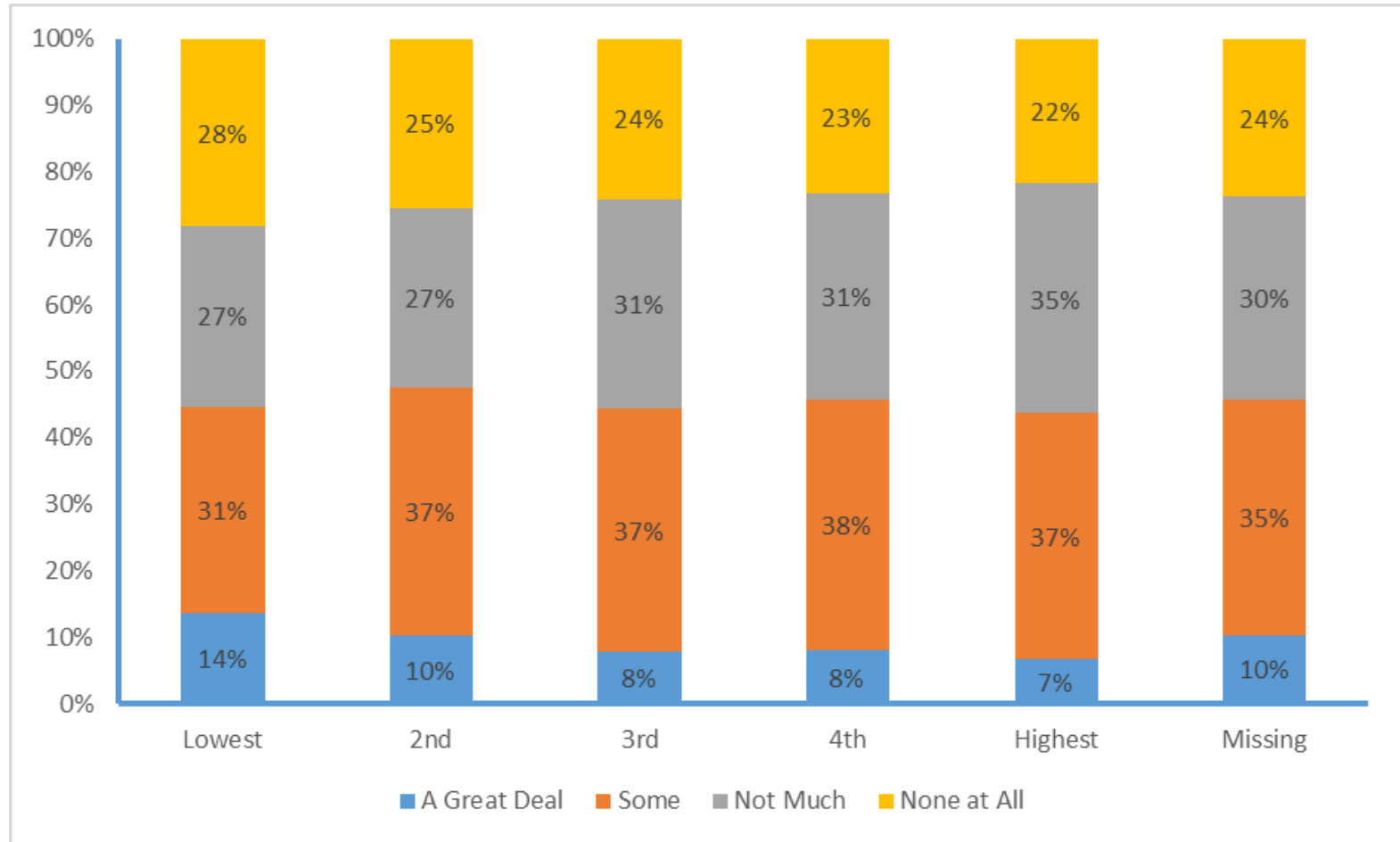




Odds of Reporting Asthma by Income Group

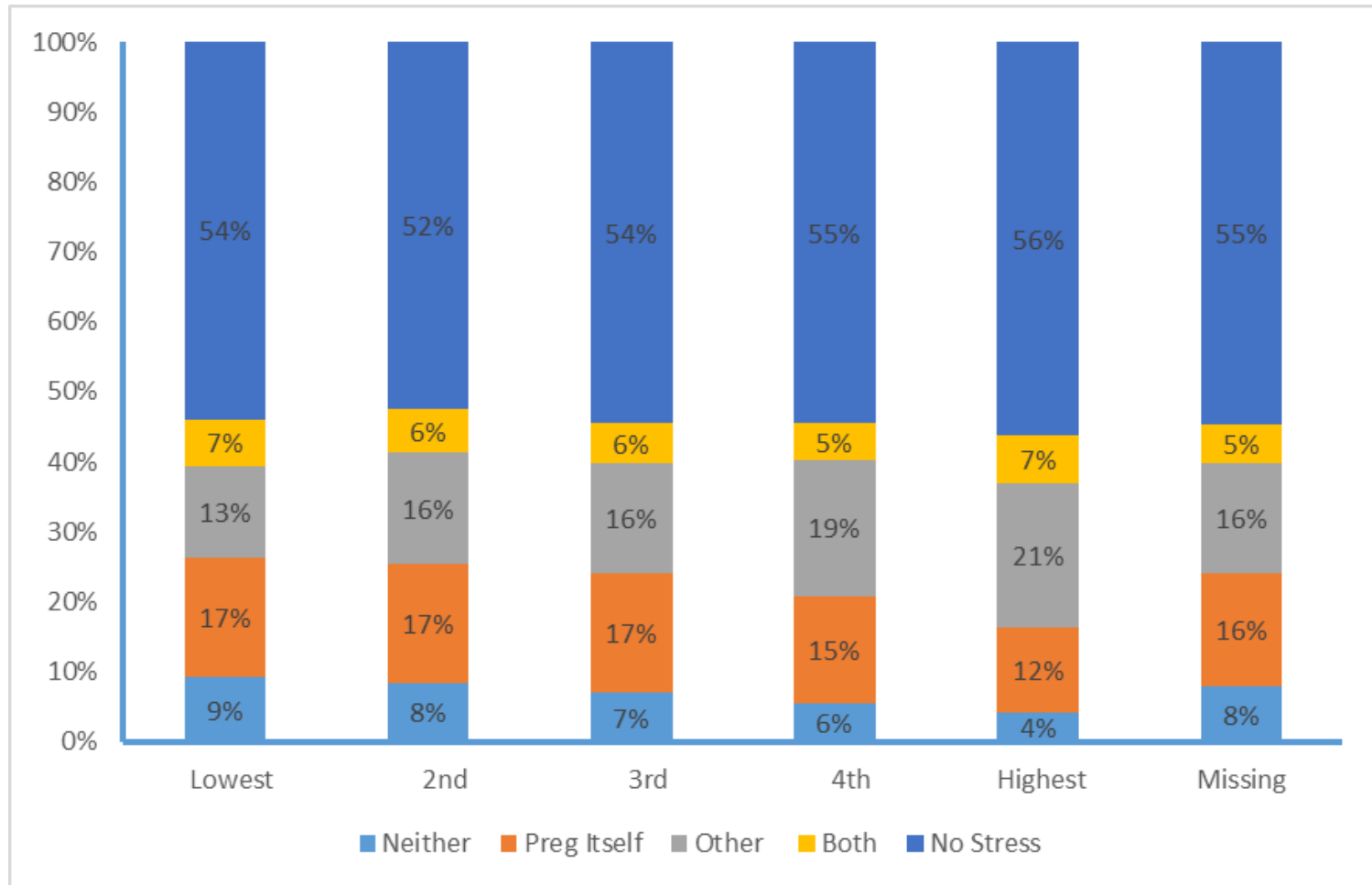


Stress in Pregnancy by Income



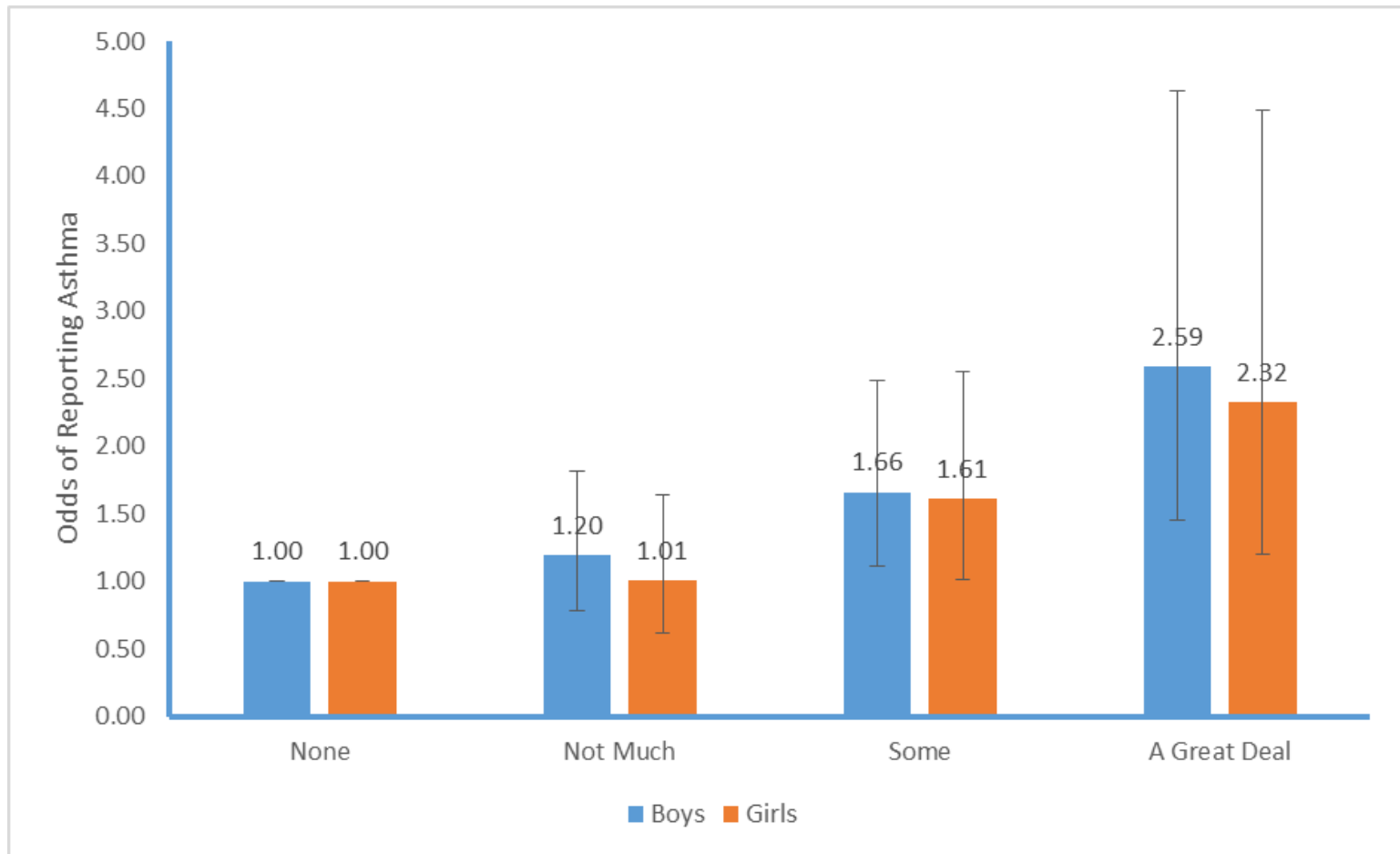


Reasons for Stress in Pregnancy by Income Group



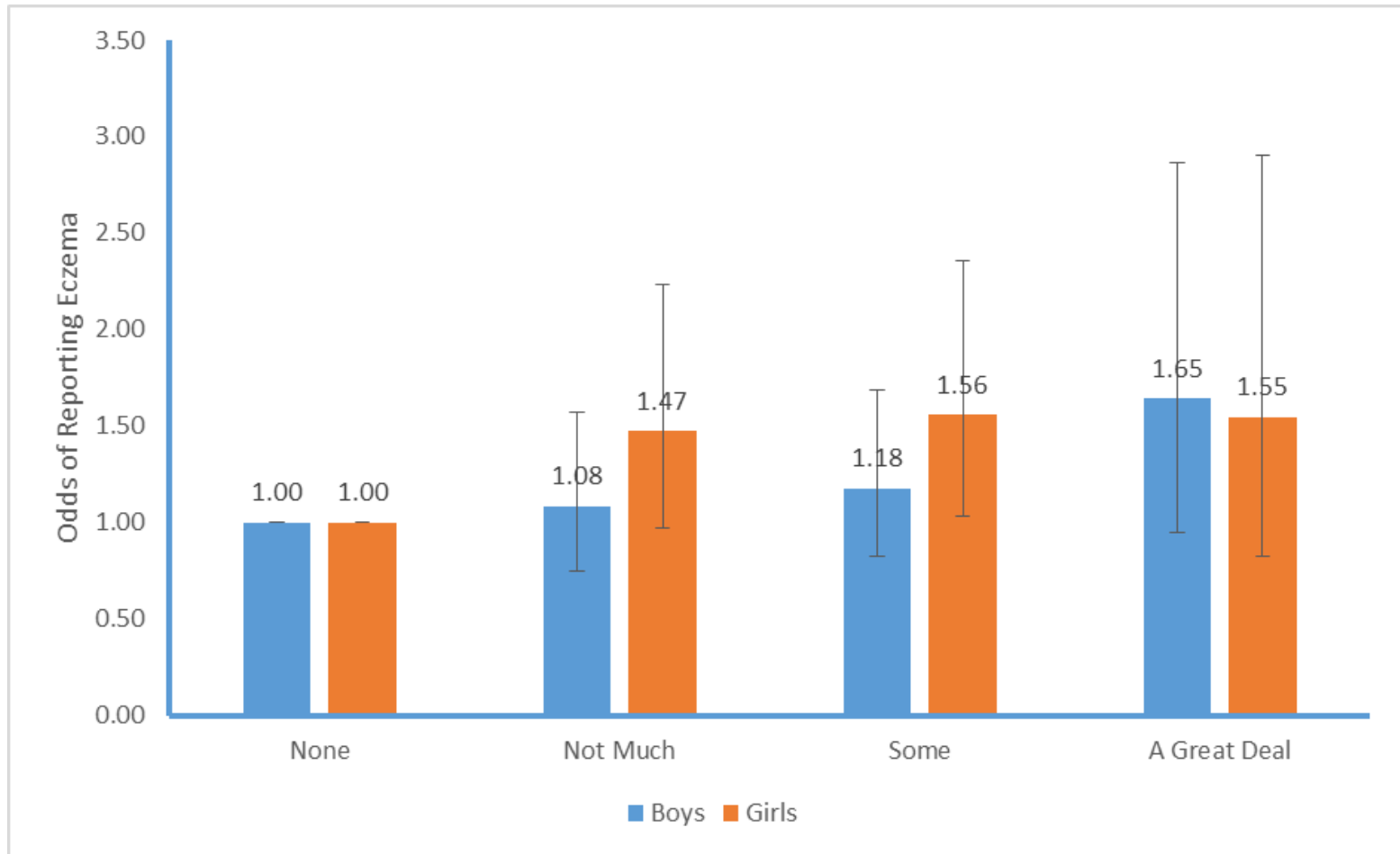


Fully Adjusted Model Asthma





Fully Adjusted Model Eczema





Discussion

- Psycho-Social processes may be an important contributor to individual differences in health and well-being
- Stress in pregnancy common (45%+)
- 1 in 6 experiencing stress develop atopic compared to 1 in 10 with no stress (at age 5)
 - Other factors clearly important
- No clear SES gradient in atopic by 5 years
- Is atopic indicative of generally raised inflammation?
- Implications for later health?