



# THE RELATIONSHIP BETWEEN CORTISOL AWAKENING RESPONSE AND DEPRESSION SEVERITY IN ADOLESCENT GIRLS

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## BACKGROUND

- During adolescence, girls are 2x more likely to experience depression than boys
- Some of the psycho-social factors that contribute to this phenomenon have been well documented, but the biological factors remain poorly understood
- Emerging evidence suggests that HPA axis reactivity may play a role in the manifestation of mood disorders
- This study aims to characterize HPA axis reactivity in adolescent girls and examine its relation to symptoms of depression

## METHODS



**Center for Epidemiological Studies- Depression Scale**  
The CES-DS is a 20 item self report survey that is validated for the assessment of depression in adolescents. In addition to providing an overall score, the scale also provides sub-scores for four symptom domains: somatic symptoms, depressed affect, reduced positive affect, and interpersonal difficulties.

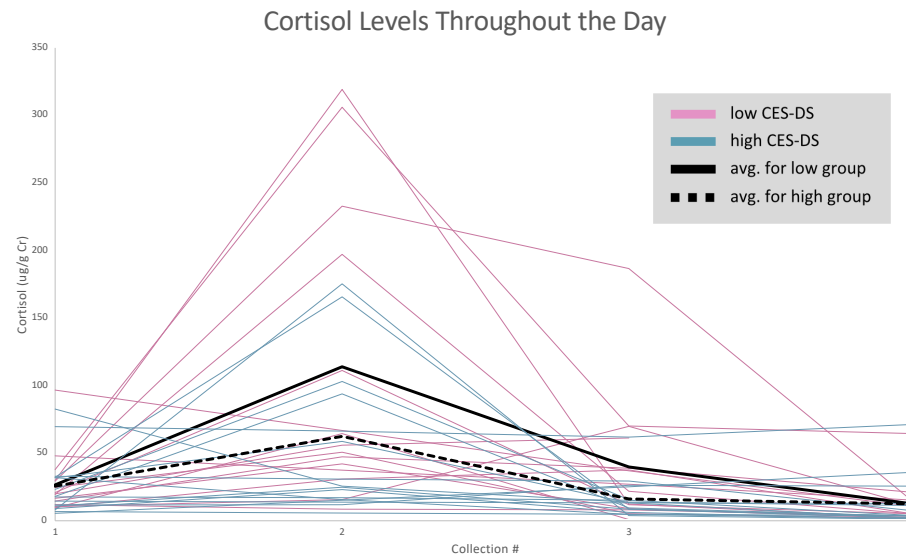


**Hormone Measurements**  
Each participant provided four dried urine samples throughout a single day. The first sample was collected upon waking, the second thirty minutes after waking, the third before dinner, and the fourth before bedtime. These samples were analyzed for cortisol concentration, the measure for HPA reactivity.



**Data Analysis**  
Area under the curve with respect to increase was calculated for each cortisol curve. A Spearman's correlation was run between AUC and total CES-DS score, as well as between AUC and each symptom domain sub-score.

The figure below depicts the cortisol awakening response in the participants of this study. A median split was used to categorize participants as having low or high CES-DS interpersonal scores. Low scoring participants are represented in PINK, while high scoring participants are represented in BLUE. The solid black line shows the average curve for the low scoring group, and the dashed black line shows the average curve for the high scoring group.



Cortisol AUC was significantly associated with interpersonal symptoms ( $r_s = -0.576$ ), as well as positive affect ( $r_s = -0.566$ ). **Blunted cortisol response predicted greater interpersonal issues and reduced positive affect.** Cortisol AUC was also significantly associated with overall CES-DS score ( $r_s = -0.390$ ). **Blunted cortisol response predicted greater depressive symptoms.**

## PARTICIPANTS

### DEMOGRAPHICS

White	73.8%
Black	14.3%
Asian	2.4%
Multiracial	9.5%
Hispanic or Latinx	7.1%

42 girls from the ages of 11 to 14 were recruited from the local community. The mean age was 13.48, SD = 0.79. All participants were within one year of menarche.

## DISCUSSION

There were stronger relationships between HPA axis reactivity and specific symptoms of depression, supportive of the idea that depression manifests uniquely in adolescent girls.

This research could inform the development of novel treatments for depression.

Future directions could examine the interaction between HPA axis reactivity and the psycho-social determinants of depression in adolescent girls.

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