Attention Deficit and Hyperactivity Disorder in Females in an Electronic Health Record System: Higher Polygenic Risk, Lower Diagnosis, Similar Comorbidity Structure

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Building Interdisciplinary Research Careers in Women's Health

BACKGROUND

- Attention Deficit/Hyperactivity Disorder (ADHD) is highly heritable.
- Male sex is associated with higher ADHD prevalence.
- Genetic risk variants, however, do not appear to differ based on biological sex.

METHODS

- Vanderbilt University Medical Center's electronic health record was used to identify patients with and without an ADHD diagnosis.
- A validated polygenic risk score (PRS) for ADHD was used to estimate individual risks in patients of genetically determined European Ancestry.
- Phecodes, aggregates of medical billing codes, identified shared and unique comorbidities based on ADHD PRS.

RESULTS

Total VUMC population

- 11,732 (1.5%) females and 20,402 (3.3%) males in the VUMC EHR have a diagnosis of ADHD.
- Figures 1 and 2 demonstrate the distribution of initial ADHD diagnosis based on record year and age, respectively.
- In general, females are older at first diagnosis (20.5 vs 14.3 years of age).

Figure 1. Density of ADHD diagnoses by year and EHR-reported sex.

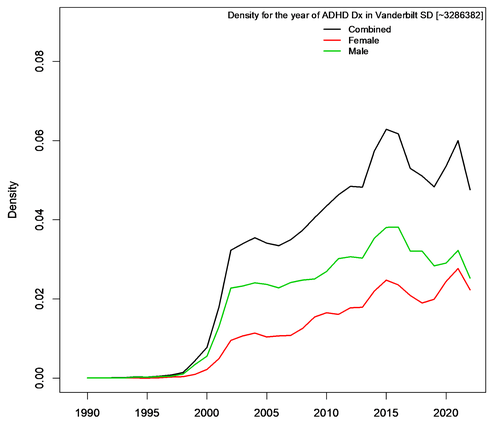
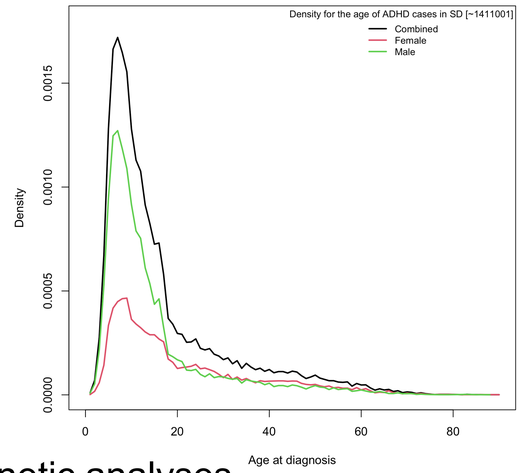


Figure 2. Density of ADHD diagnosis by age at diagnosis and EHR-reported sex.



VUMC population with genetics

- A subset of 1070 male ADHD cases and 887 female were included in the genetic analyses.
- ADHD PRS was a significant independent predictor of ADHD diagnosis (β=0.15, p=4.4 E-11) in the total population, however, prediction was less significant in males (p=0.03) than females (p=2.05 E-6).
- Females with ADHD had significantly higher PRSs (p=0.04).
- Figures 3 and 4 demonstrate the clinical phenome associated with the ADHD PRS.

Figure 3. Female sex specific PheWAS.

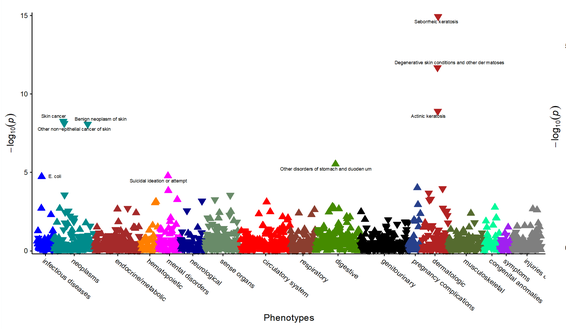
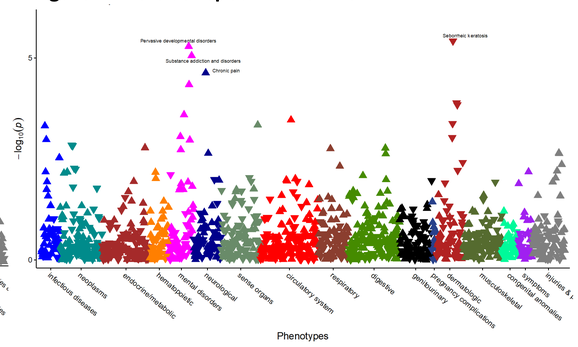


Figure 4. Male sex specific PheWAS.



CONCLUSIONS

- Female patients with ADHD appear to be older and the number of diagnoses have increased in recent years.
- Females also have higher genetic liability for the condition, despite lower rates of diagnosis in VUMC's EHR.
- The ADHD PRS did not demonstrate differential comorbidity structure based on sex.

This work is supported by grant 5K12AR084232-25.