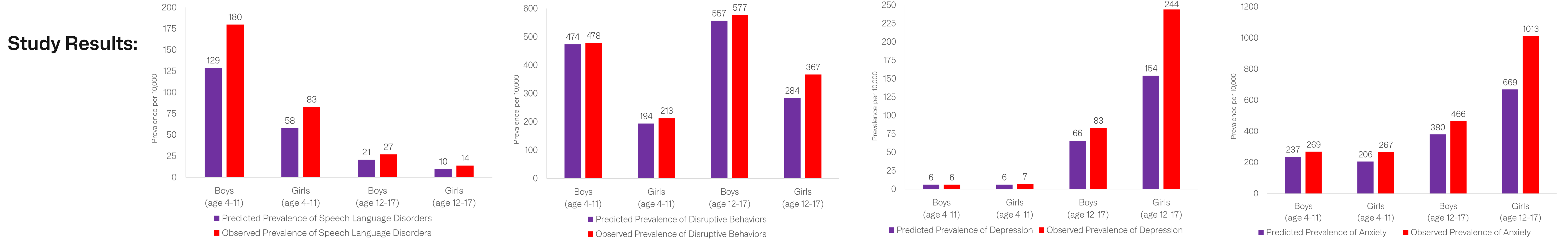


Study Summary

Study Question: Among privately insured children and adolescents, what is the average difference between the observed post-COVID prevalence and estimated post-COVID prevalence of mental and developmental outcomes had COVID-19-related policies and disruptions not occurred?

Study Design: Ecological interrupted time series used the Merative™ MarketScan® Commercial Claims and Encounters Database from 01/01/2017 to 12/31/2022



Conclusion: The observed prevalence of speech language disorders was higher than estimated in the post-COVID period for all children. The difference in the relative increase in the observed prevalence of disruptive behaviors, anxiety, and depression compared to the estimated prevalence suggests COVID era disruptions disproportionately impacted psychosocial outcomes for girls.

Background

- The COVID-19 pandemic had both (1) direct effects such as hospitalization and/or death of a caretaker and; (2) indirect effects such as school closures and economic instability on the psychosocial health of children and adolescents¹.
- Current evidence suggests children and adolescents experienced worsening mental health symptoms such as depression and anxiety during the COVID-19 pandemic^{1,2}.
- However, the prevalence of clinical diagnoses of mental, behavioral and neurodevelopmental outcomes from pre-pandemic to post-pandemic are less clear.

Objective

- To estimate the impact of COVID-19 policies and disruptions on the prevalence of mental, behavioral and neurodevelopmental disorders among children and adolescents with commercial insurance in the United States.

Methods

Data Sources

- Merative™ MarketScan® Commercial Database from January 1, 2017 through December 31, 2022
- The MarketScan administrative claims databases contain data on the full healthcare experience (inpatient, outpatient, and outpatient pharmacy) for individuals with employer sponsored commercial or Medicare insurance in the United States.

Study Design

- This ecological interrupted time series used the Merative™ MarketScan® Commercial Claims and Encounters Database from 01/01/2017 to 12/31/2022.
 - Pre- and post-COVID period were defined as 01/01/2017-03/31, 2020 (pre-COVID) and 04/01/2020-12/31/2020 (post-COVID).
 - Data were stratified into annual quarters.
 - Age at the end of each annual quarter was used to determine children (ages: 4-11) and adolescent (ages: 12-17) patients and stratified by sex.
- The prevalence of the following outcomes were determined using ICD-10-CM diagnoses: anxiety, depression, speech and language disorders, and disruptive behaviors (i.e. attention-deficit hyperactivity disorder (ADHD), conduct disorder, and oppositional defiant disorder).
 - For each annual quarter, the prevalence per 10,000 children and adolescents were reported by sex.
- Bayesian Structural Time Series Analysis model were used to estimate a counterfactual expected prevalence had the direct and indirect effects of COVID-19 not occurred based on pre-COVID prevalence, the average quarterly temperature in San Antonio, TX as an explanatory time series, and quarterly seasonality.
 - The average prevalence difference between the expected and observed prevalence with 95% Bayesian credible interval (CrI) were reported.

Figure 1. Prevalence of Mental, Behavioral, and Neurodevelopmental Disorders per 10,000 Children, 2017-2022

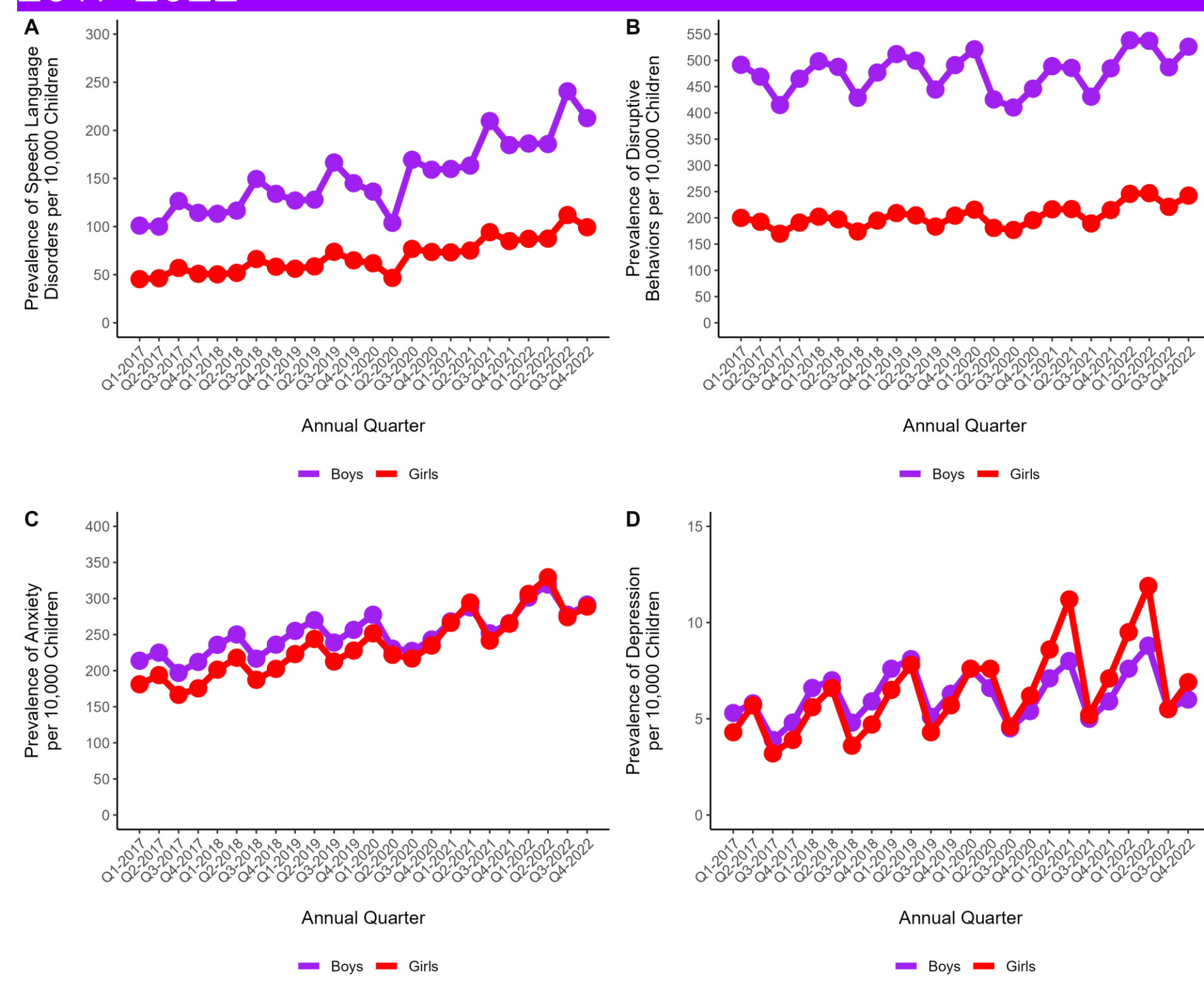
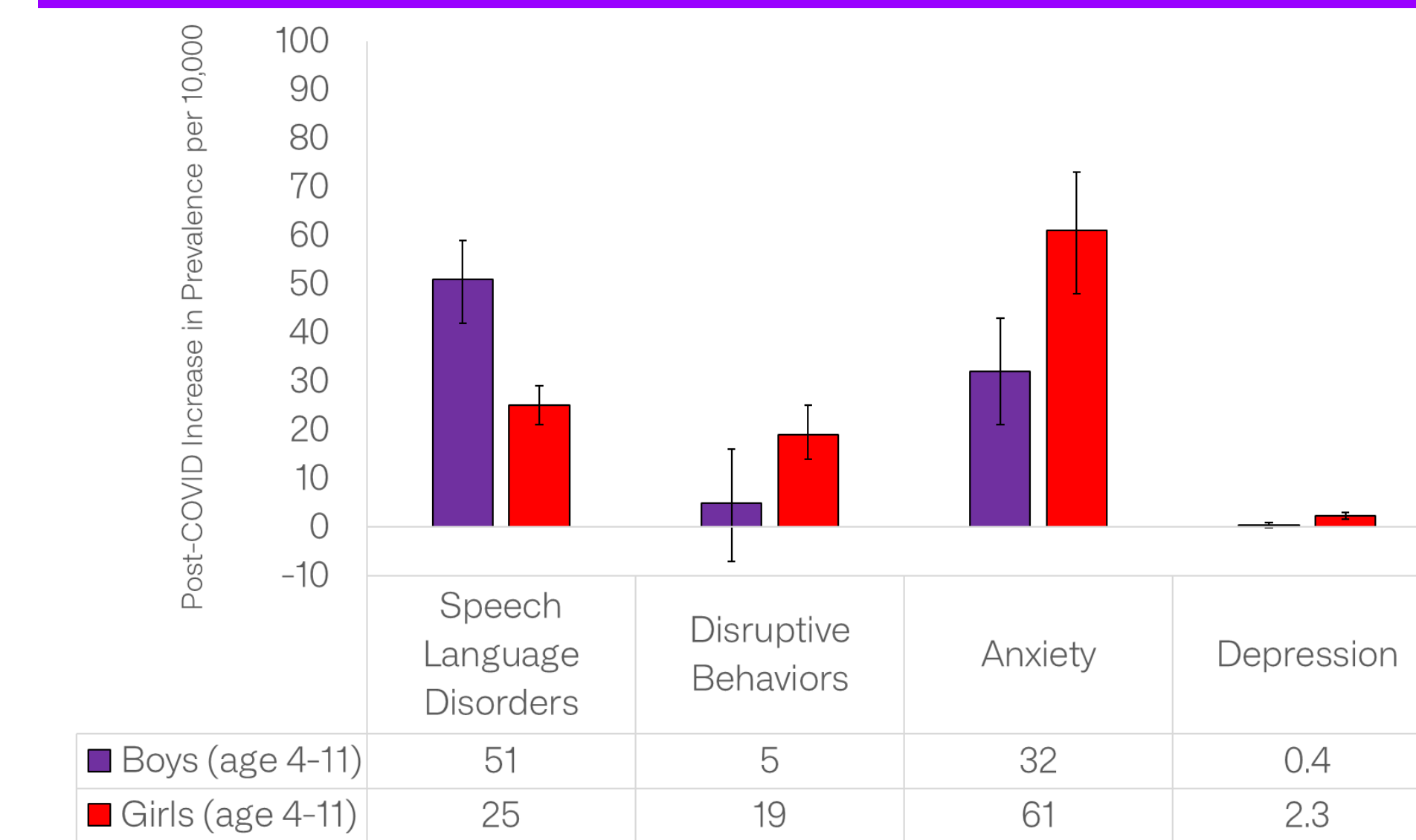


Figure 2. Average Post-COVID Increase in Prevalence of Mental, Behavioral, and Neurodevelopmental Disorders per 10,000 Children



Results

- From the 1st quarter of 2017 to the 4th quarter of 2022 the following prevalence trends were observed:
 - Speech and language disorders doubled for both male and female children (Figure 1A)
 - Disruptive behaviors were 20% higher for female children (Figure 1B) and 60% higher for adolescent females (Figure 2B)
 - Anxiety was 60% higher for female children (Figure 1C) 2-fold higher for adolescent females (Figure 2C)
 - Depression was 2-fold higher for both adolescent males and females (Figure 2D)
- Among children, the observed prevalence of the following outcomes were notably higher than estimated (Figure 3):
 - Speech and language Disorders
 - Boys [51 per 10,000 (95% CrI: 42-59)]
 - Girls [25 per 10,000 (95% CrI: 21-29)]
 - Disruptive Behaviors
 - Girls [19 per 10,000 (95% CrI: 14-25)]
 - Anxiety
 - Girls [61 per 10,000 (95%CrI: 48-73)]

Figure 3. Prevalence of Mental, Behavioral, and Neurodevelopmental Disorders per 10,000 Adolescents, 2017-2022

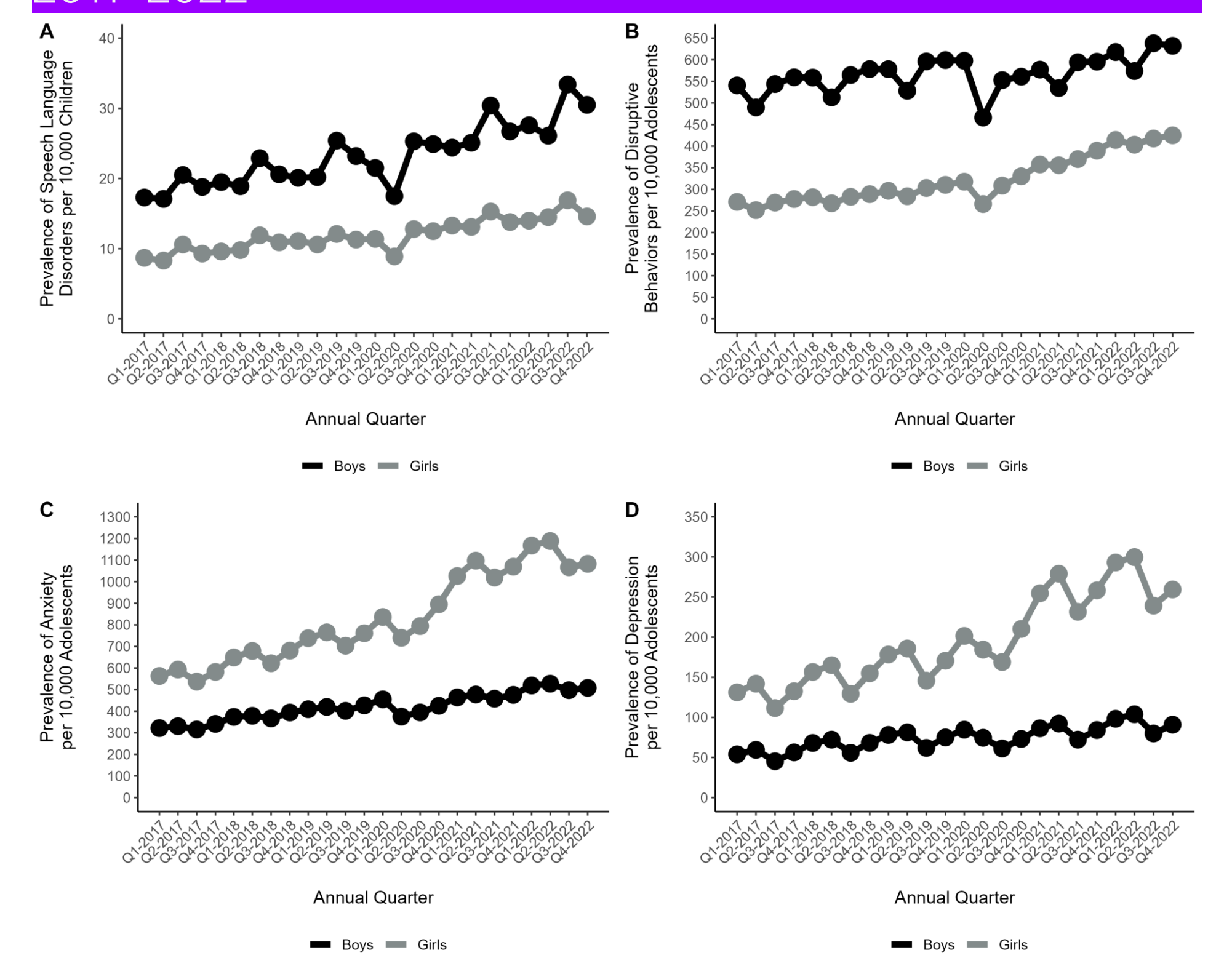
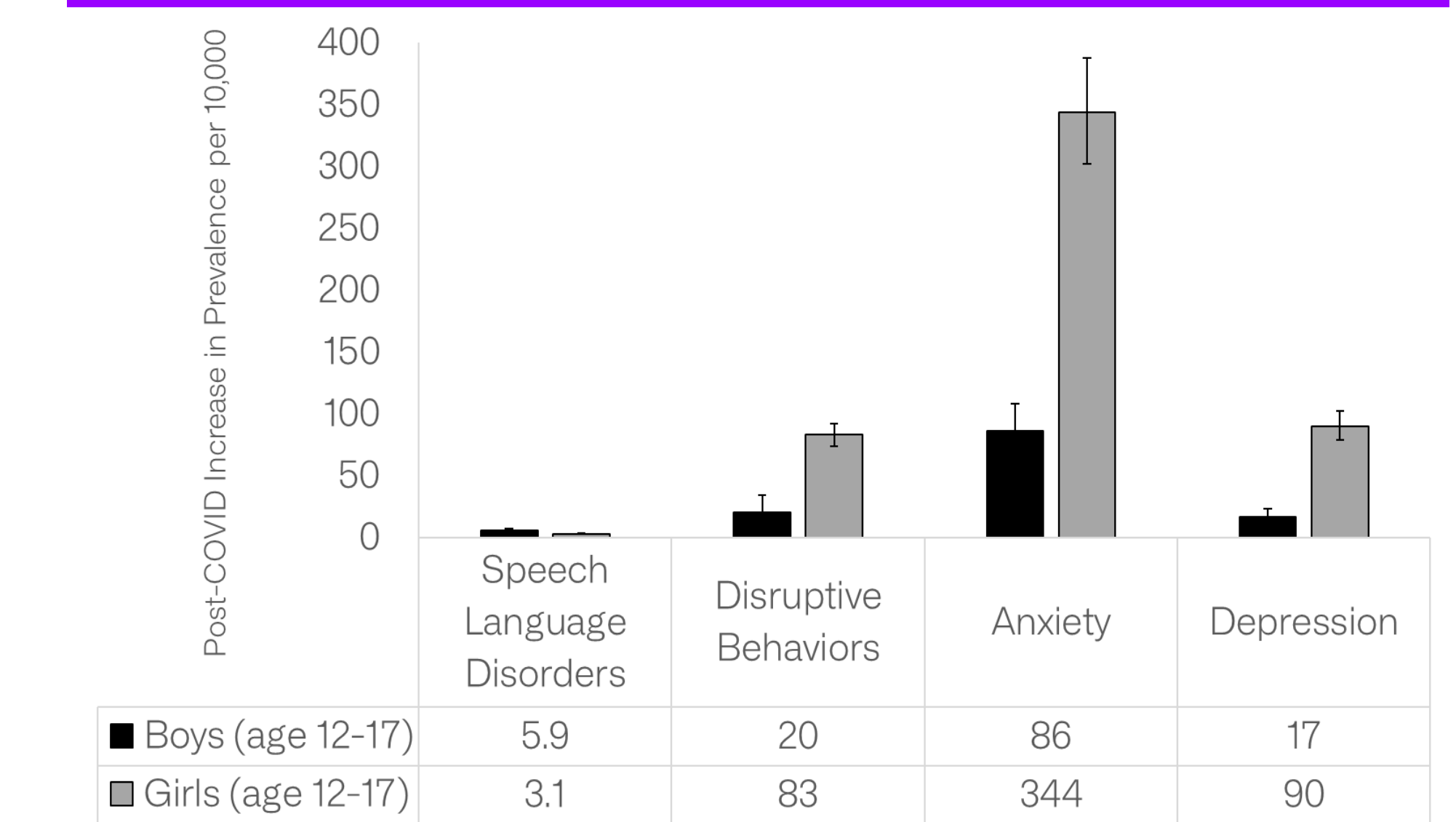


Figure 4. Average Post-COVID Increase in Prevalence of Mental, Behavioral, and Neurodevelopmental Disorders per 10,000 Adolescents



Results (cont'd)

- Among adolescents, the observed prevalence of the following outcomes were notably higher than estimated (Figure 4):
 - Disruptive Behaviors
 - Girls [83 per 10,000 (95% CrI: 74-92)]
 - Anxiety
 - Boys [86 per 10,000 (95% CrI: 65-108)]
 - Girls [344 per 10,000 (95% CrI: 302-388)]
 - Depression
 - Girls [90 per 10,000 (95%CrI: 79-102)]

Limitations

- This study was based on patients with commercial health coverage, and results may not be generalizable to patients with other types of insurance or without health insurance coverage.

Conclusions

- The higher than expected post-COVID prevalence in disruptive behaviors, anxiety, and depression was particularly striking for girls. Continued surveillance of these important mental health and developmental outcomes is warranted as the prevalence continues to increase.

References

1. Harrison L, Carducci B, Klein JD, Bhutta ZA. Indirect effects of COVID-19 on child and adolescent mental health: an overview of systematic reviews. *BMJ global health*. 2022;7(12).
 2. Panchal U, Salazar de Pablo G, Franco M, et al. The impact of COVID-19 lockdown on child and adolescent mental health: systematic review. *European child & adolescent psychiatry*. 2023;32(7):1151-1177.

Disclosure

Jud Janak, Ryan Ross, Brenna Brady, and Liisa Palmer, are employees of Merative. This study was funded by Merative.