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Internet searches for ADHD medications surged during the COVID-19 pandemic

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On January 2020, the World Health Organization (WHO) declared that Coronavirus Disease (COVID-19) had become a public health emergency of international concern (PHEIC) and was assessed as a pandemic in March 2020. For the next 2–3 years, Americans followed stay-at-home orders, and used virtual technologies, while struggling with pandemic-related stressors (1). This affected mental health (2). Attention-deficit hyperactivity disorder (ADHD) symptoms increased (3), resulting in an uptick in ADHD prescriptions (4). A shortage of Adderall was announced by the U.S. Food and Drug Administration (FDA) in October 2022. As actual prescription usage data were not available on the short time frame of the pandemic, we explored the potential of using internet searches as a proxy for real health behavior, with prevention of future shortages in mind. We used Google Trends (GT) data (5) to estimate public interest in ADHD medications during the pandemic.

GT represents analyses of Google search requests showing how popular a search term is over time. GT are normalized to make comparisons between terms: 1) each data point is divided by the total searches of the geography and time range, and 2) the result is then scaled on a range of 0–100 based on a topic's popularity compared with all topics. We find that searches for ADHD medications surged during the pandemic, and that there is a correlation between trending ADHD medication searches and real-life prescription usage.

To do this, we first performed cross-correlation analysis on GT data to identify trends spanning 20 years. Within each trend, we identified subtrends from the correlation matrix using k-medoids clustering (Supplemental Figure S1A–S1D). We label subtrends by the keyword that is most popular. We used the normalizing keyword "drugs" for comparisons with each keyword (Supplemental Tables S1F and S1G). We also performed seasonal trend analysis (Supplemental Figure S1E–S1H) for 187 disorders and 113 medication keywords. These analyses indicated increasing interest in ADHD medications.

We then noticed that ADHD disorder and medication searches surged after the onset of the COVID-19 pandemic (January 2020) (Figure 1A and B), correlating with known pandemic-associated increases in issued ADHD drug prescriptions (Chai *et al.*, 2024, *JAMA Psychiatry*) (4). As internet searches for prescription drugs may not reflect real-world prescription usage, we then compared GT ADHD drug searches with issued prescription drug rates (from the MEPS database). This showed significant correlation ($r = 0.876$, confidence interval [0.6926402–0.9531509], $p = 1.87 \times 10^{-6}$) leading up to the onset of the pandemic, as MEPS data are only available until 2021 (Figure 1C).

As GT data suggest that searches for ADHD medications correlate with prescription usage, we explored this idea further with other psychiatric drugs. We computed correlation coefficients between GT drug search data and issued prescription data (2004–2021), identifying that 47.8% of drugs have correlation greater than 0.5, and this correlation was generally greater for higher usage drugs ($r = 0.42$, Supplemental Figure S1I; Supplemental Table S1H).

Our findings match recently reported results showing that prescriptions for ADHD medications increased with the COVID-19 (4). We also found a short-term drop in GT searches for ADHD medications early in the pandemic, which matches findings from the same report (4). The long-term implications of increased public interest in and usage of ADHD medications in recent years is unclear—longitudinal data will determine whether this trend is sustained for years past the COVID-19 Public Health Emergency (PHE) which ended in May 2023.

This study has several limitations: 1)data were not representative of the general population, potentially excluding individuals with limited online literacy and internet access—other internet usage demographics could bias results as well; 2)though internet searches correlate with actual prescription use in the context of this study, this correlation may not hold for different health issues or for different times or places—a factor that could cause such a dissociation include media coverage of drugs; and 3) ADHD diagnoses and medication prescriptions moved heavily online during the pandemic, which may have increased their rates.

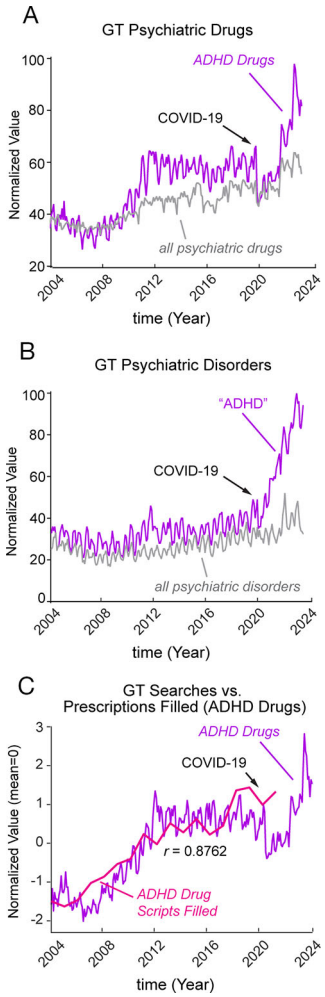

Figure 1. Public interest in ADHD medications surges during the COVID-19 pandemic. (A) GT search popularity for ADHD medications (purple) (key terms amphetamine+adderall, methylphenidate+ritalin, dextroamphetamine+dexedrine, lisdexamfetamine+vyvanse, dexmethylphenidate+focalin, atomoxetine+strattera, clonidine+kapvay, guanfacine+intuniv) compared with search terms for all psychiatric medications (gray). (B) GT search rates for "ADHD" compared with search rates for all psychiatric disorders. (C) GT ADHD drug searches (key terms amphetamine+adderall, dextroamphetamine+dexedrine, and lisdexamfetamine+vyvanse) compared with drug prescription issuance rates from the MEPS (key terms ADDERALL*, *AMPH*, VYVANSE*, *AMFET*, * indicate free characters), shows correlation $r = 0.8762$ (2004–2021).

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Going forward, public health departments and drug manufacturers may explore GT search data as a proxy for prescription usage during rapidly changing public health emergencies in which real prescription usage data are not yet available. For this approach to be effective on a wide range of health topics, additional studies will need to scale-up and refine the approach. A working relationship between public health departments, drug manufacturers, and industry partners who own the data, will be essential for making real-time predictions about the public's prescription usage. This partnership could detect the timing and geographical patterns of new drug interest changes, and perhaps even warn of fraudulent overprescribing.

In conclusion, GT may provide a potential method for public and private health officials to respond to rapidly changing public health situations, allowing pharmaceutical companies to accurately meet demands for prescription drug usage.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

SFG and KGJ designed, analyzed the data and wrote the manuscript. XX helped to oversee the project.

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