

Caffeine-Related ED Visits, Although Uncommon, Doubled for Middle School and High School Aged Children Since 2017

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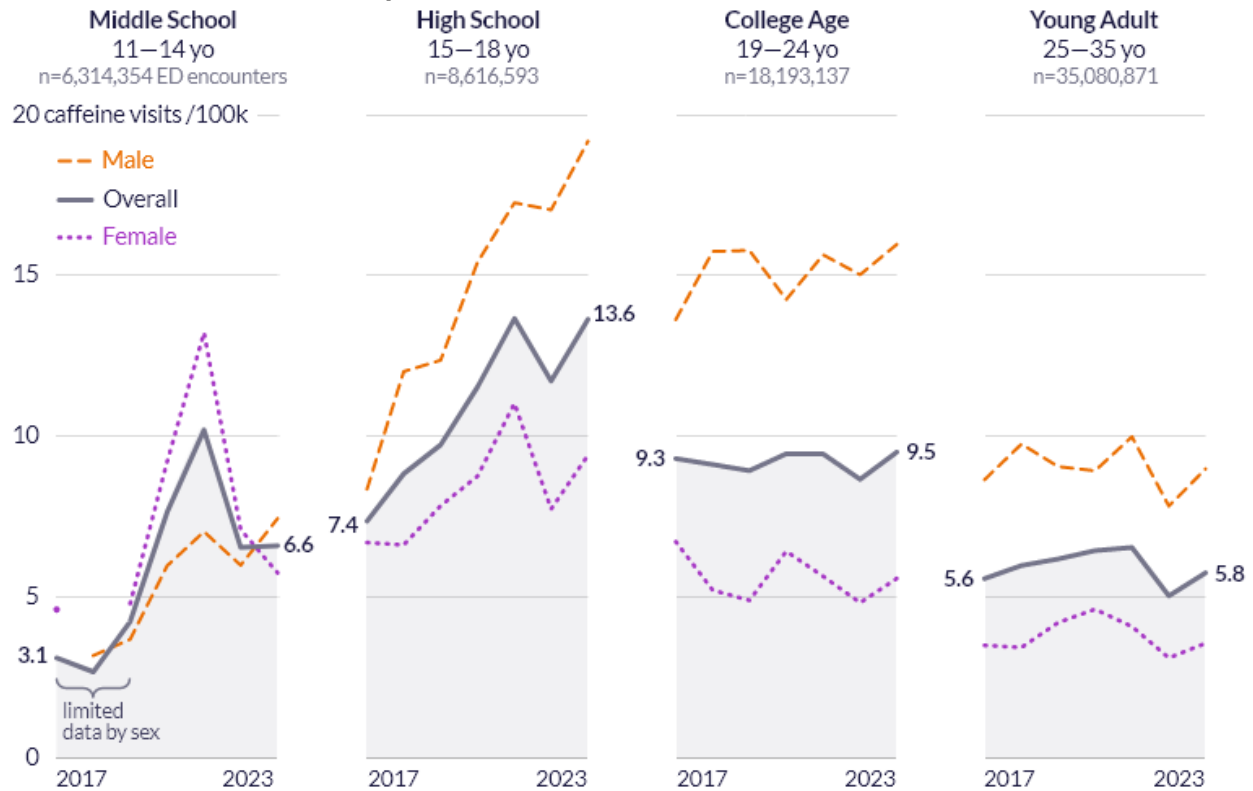
Key Findings:

- Between 2017 and 2023, the rate of emergency department (ED) visits related to caffeine overdose or adverse effects more than doubled for children aged 11 to 14, increasing from 3.1 to 6.6 per 100,000 visits. For those aged 15 to 18, the rate rose from 7.4 to 13.6 per 100,000 visits.
- Males tend to have higher rates of caffeine-related ED visits than females.

There have been reports of increased caffeine usage among teens despite experts warning about the harms of energy drinks for this population, such as heart palpitations, anxiety, and increased blood pressure.^{1,2} While rare, caffeine overdoses, or ingesting too much caffeine in a short period of time, can lead to severe arrhythmias, heart attacks, and even death.³ We studied 223 million ED visits for patients aged 11 to 35 between January 1, 2017, and December 31, 2023, to understand trends in caffeine-related visits.

We found that the rate of ED visits related to caffeine overdose or adverse effects more than doubled for middle school aged children, from 3.1 per 100,000 visits in 2017 to 6.5 per 100,000 visits in 2023. Similarly, the rate nearly doubled for high school aged children, from 7.5 per 100,000 visits to 13.7 per 100,000 visits. Additionally, in all but the youngest population, male patients had much higher rates of caffeine-related ED visits than female patients, sometimes triple the rate. This aligns with prior findings that males have an increased response to caffeine compared to females, which might result in more adverse reactions.⁴

Caffeine-Related ED Visits per 100,000 ED Visits



"Caffeine-Related ED Visits per 100,000 ED Visits," 2024. EpicResearch.org

Figure 1. Caffeine-related ED visits per 100,000 ED visits by patient sex and age.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 277 million patient records from 1,500 hospitals and more than 36,000 clinics from all 50 US states, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

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3. Murray A, Traylor J. Caffeine Toxicity. [Updated 2023 Jun 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. <https://www.ncbi.nlm.nih.gov/books/NBK532910/>. Accessed November 4, 2024.
4. Temple JL, Ziegler AM, Graczyk A, Bendlin A, Sion T, Vattana K. Cardiovascular responses to caffeine by gender and pubertal stage. Pediatrics. 2014;134(1):e112-e119. doi:10.1542/peds.2013-3962

Data Definitions

Term	Definition
Study period	1/1/2017 to 6/30/2024
Study population	ED encounters for those aged 11 to 35
Outcomes	Poisoning by caffeine, undetermined, sequelae: ICD-10-CM code T42.614S Poisoning by caffeine, undetermined, initial encounter: ICD-10-CM code T42.614A Poisoning by caffeine, undetermined, subsequent encounter: ICD-10-CM code T42.614D Poisoning by caffeine, accident, sequela: ICD-10-CM code T43.611S Poisoning by caffeine, accident, initial encounter: ICD-10-CM code T43.611A Poisoning by caffeine, accident, subsequent encounter: ICD-10-CM code T43.611D Poisoning by caffeine, intentional self-harm, initial encounter: ICD-10-CM code T43.612A Adverse effect of caffeine, sequelae: ICD-10-CM code T43.615S Adverse effect of caffeine, initial encounter: ICD-10-CM code T43.615A Adverse effect of caffeine, subsequent encounter: ICD-10-CM code T43.615D

Table 1: Caffeine-Related ED Visits per 100,000 ED Visits – Ages 11 – 18

	11-14							15-18						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
Male	-	3.2	3.7	6.0	7.0	6.0	7.4	8.4	12.1	12.4	15.5	17.3	17.1	19.2
Overall	3.1	2.7	4.2	7.6	10.2	6.5	6.6	7.4	8.9	9.8	11.5	13.6	11.7	13.6
Female	4.6	-	4.8	9.2	13.2	7.1	5.7	6.7	6.6	7.8	8.8	11.0	7.7	9.4

Table 1b: Caffeine-Related ED Visits per 100,000 ED Visits – Ages 19 to 35

	19-24							25-35						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
Male	13.7	15.8	15.8	14.3	15.7	15.1	16.0	8.7	9.8	9.1	8.9	10.0	7.8	9.0
Overall	9.3	9.1	9.0	9.5	9.5	8.7	9.5	5.6	6.0	6.2	6.5	6.6	5.1	5.8
Female	6.7	5.2	4.9	6.4	5.6	4.8	5.6	3.5	3.4	4.2	4.6	4.1	3.1	3.6