Emerging Stimulant Mortality Trends by Active Ingredient

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Stimulant Mortality is Rising in the US

From 2012 to 2018 in the US, poisonings involving psychostimulants with abuse potential† rose 30% per year[1]

†However, this includes drugs with a large range in toxicities, from methylphenidate to methamphetamine

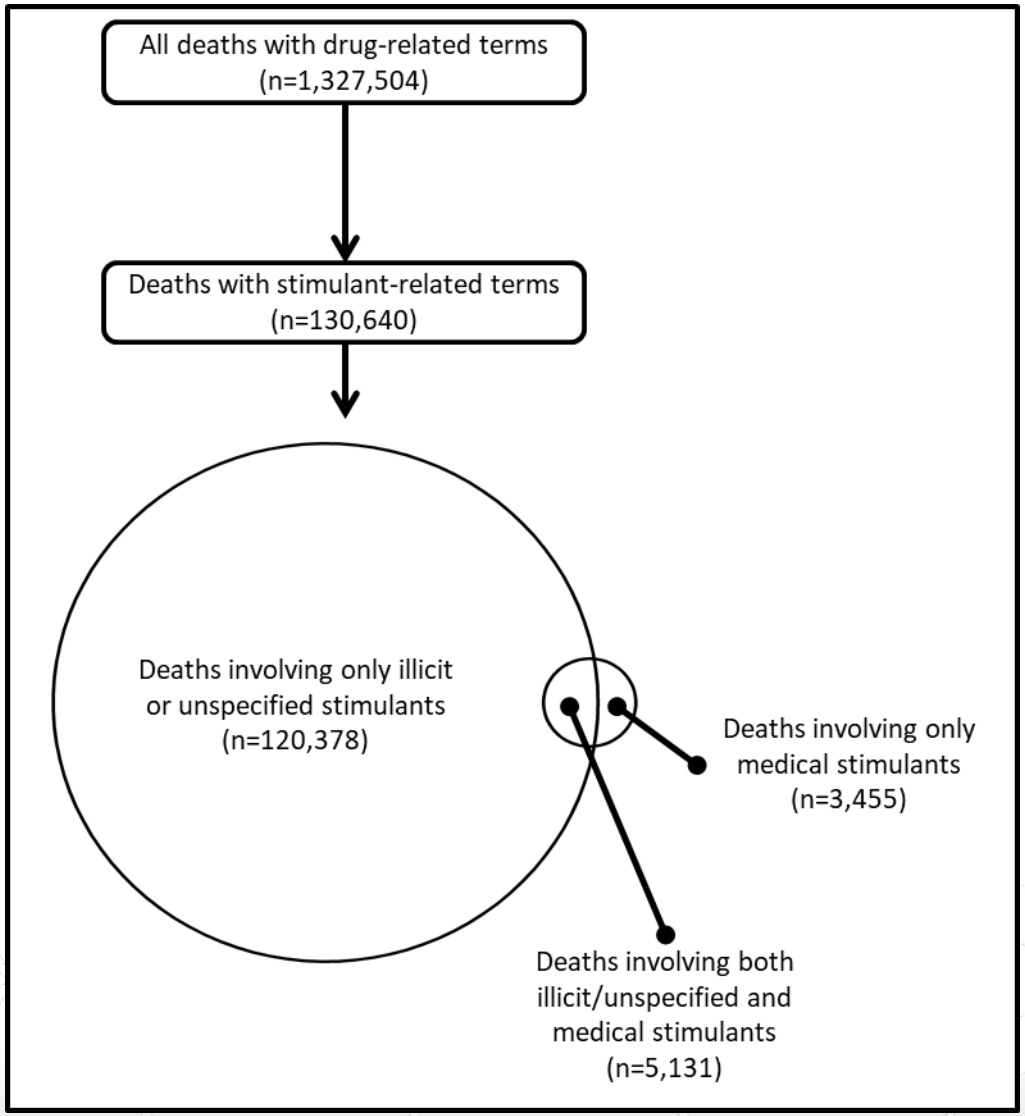
Study Goal: Identify which substances (medical and illicit) are contributing to the rise of psychostimulant mortality

[1]Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS Data Brief, no 356. Hyattsville, MD: National Center for Health Statistics. 2020.

Study Design & Methodology

- Death certificates list specific drugs contributing to the death
- Drug Mentions with Involvement database (CDC)
  - List of drug-related terms in Part I, II, and Box 43 of certificate
- Identified all drug mentions for stimulant substances
  - Cocaine, methamphetamine, 3,4-methylenedioxymethamphetamine (MDMA), pseudoephedrine, amphetamine, methylphenidate, generic terms, other terms
  - Decedents can be in multiple groups
- Setting: All decedents in 50 states + DC; 2010-2017
- Poisson regression used to calculate age-adjusted annual rate ratios

Total Deaths: 2010-2017



Substance Mentioned	Deaths
All Stimulant Related	130,640
Medical Stimulant† Related	8,586
Cocaine	77,045
Methamphetamine	49,648
Amphetamine	8,245
MDMA	817
Pseudoephedrine	615
Methylphenidate	295

†Any death involving one of: amphetamine, methylphenidate, atomoxetine, modafinil, dextroamphetamine, lisdexamphetamine

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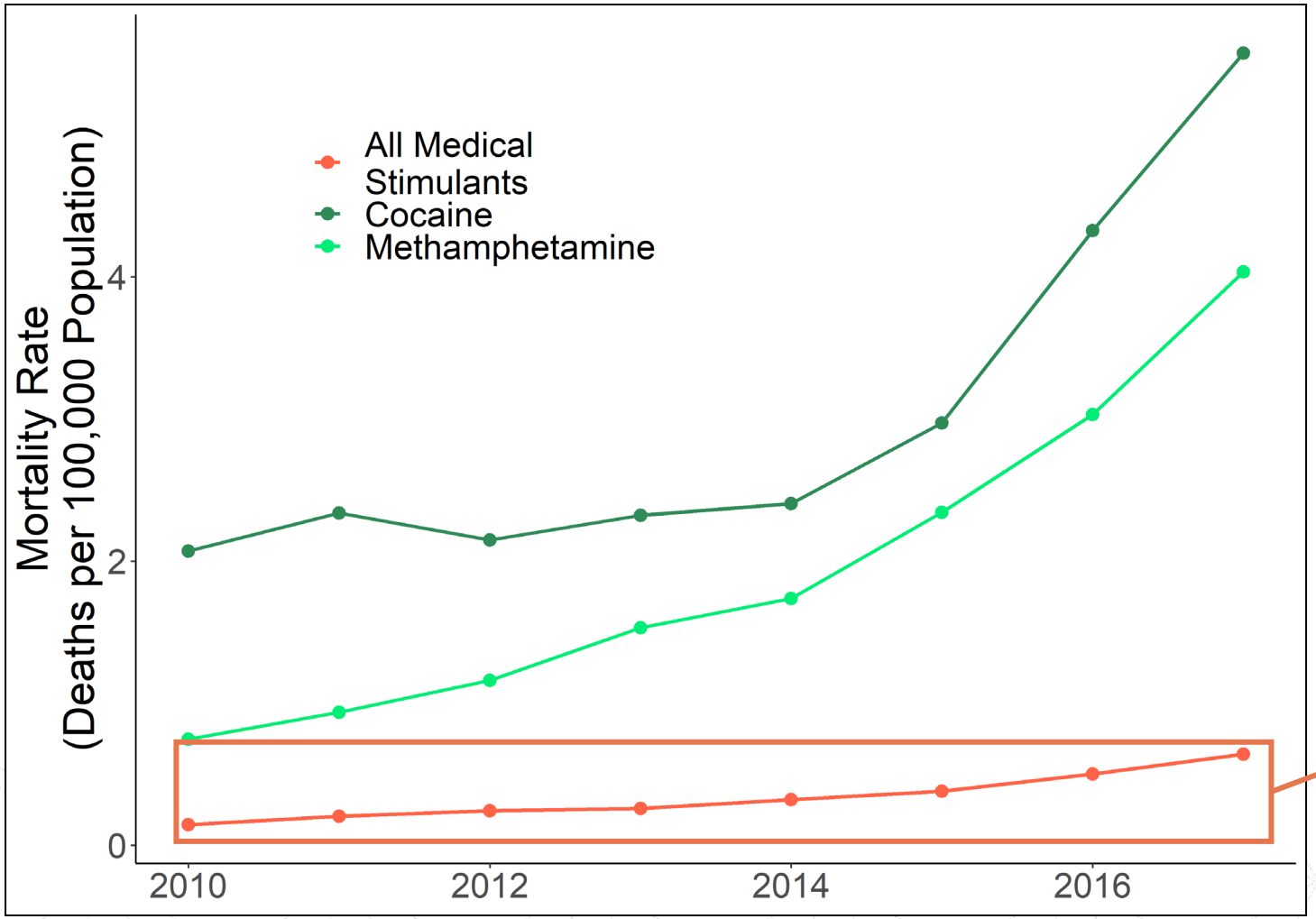
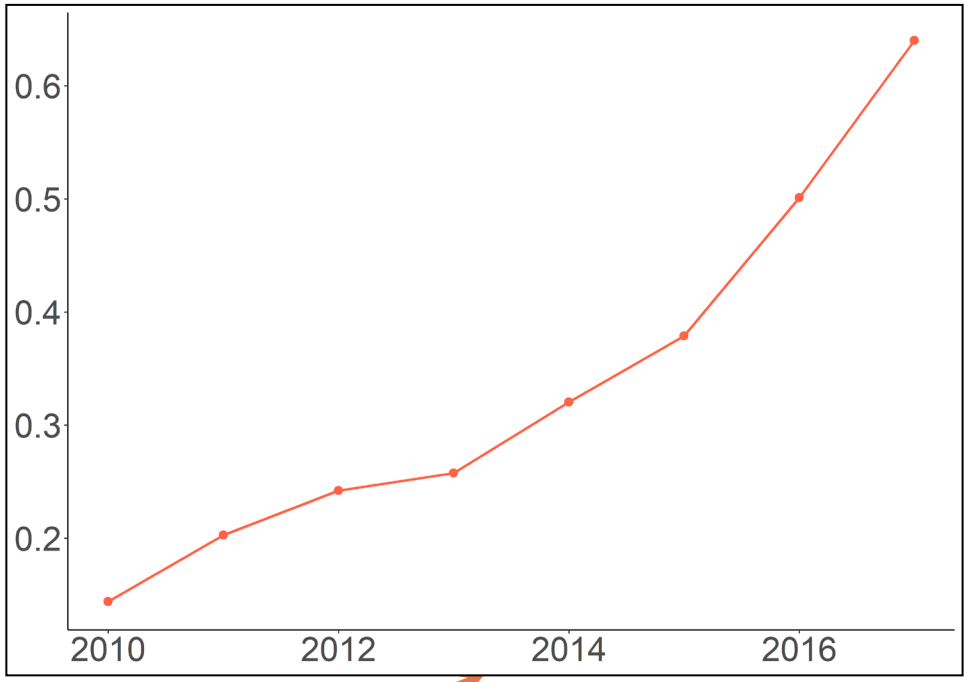
Increasing Mortality over Time





Mortality related to medical stimulants is rising rapidly alongside illicit substances like cocaine and methamphetamine.

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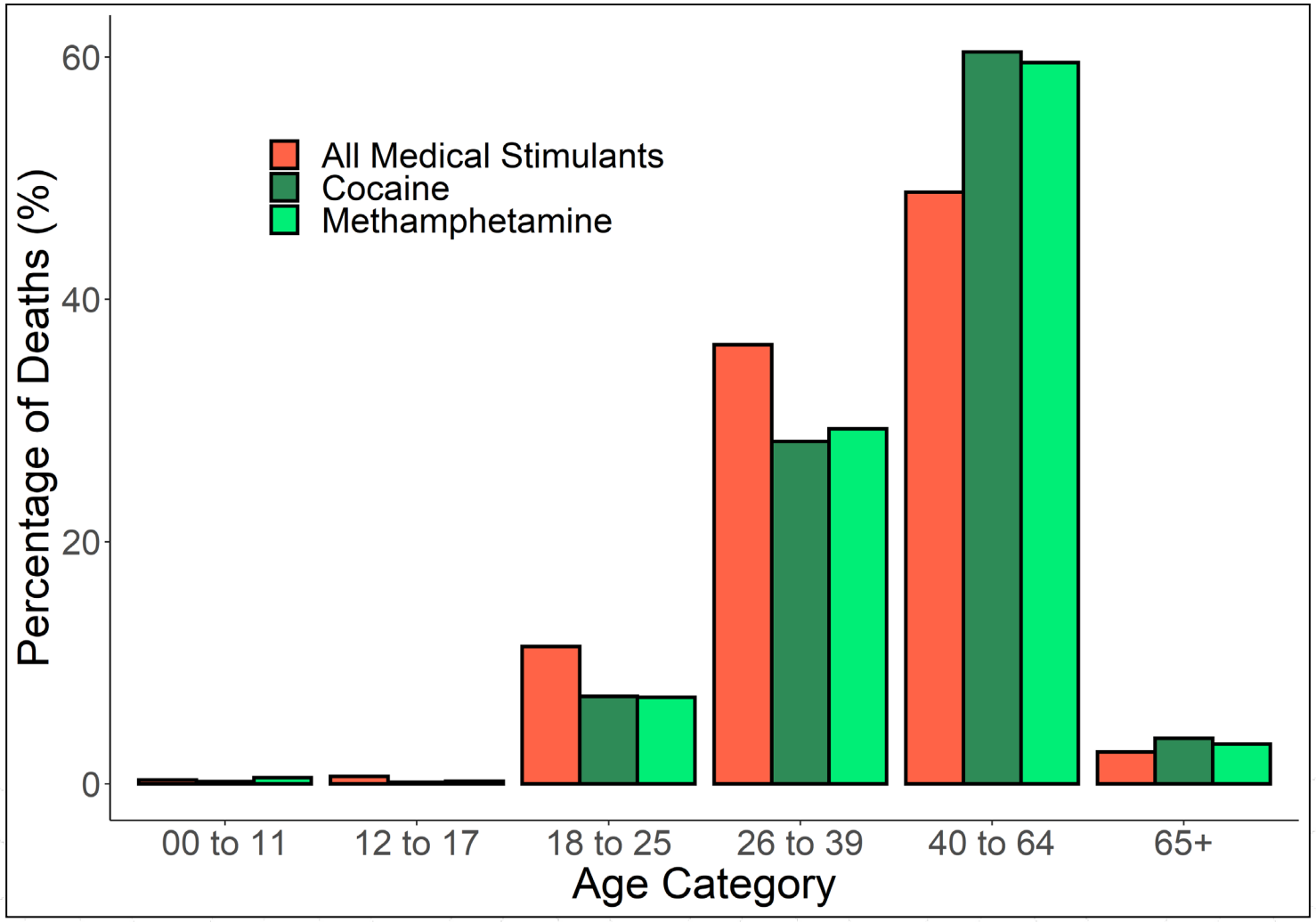
Modelled Annual Increase in Rates

Substance Mentioned	2010 Deaths	2017 Deaths	Annual Rate Ratio† (95% CI)	P-value
All Stimulant Related	9,022	31,515	1.20 (1.19, 1.20)	<0.001
Medical Stimulant Related	445	2,081	1.22 (1.21, 1.24)	<0.001
Cocaine	6,405	18,127	1.16 (1.16, 1.17)	<0.001
Methamphetamine	2,309	13,116	1.27 (1.27, 1.28)	<0.001
Amphetamine	411	2,023	1.23 (1.22, 1.24)	<0.001
MDMA	87	223	1.22 (1.18, 1.26)	<0.001
Pseudoephedrine	49	126	1.15 (1.11, 1.19)	<0.001
Methylphenidate	29	47	1.07 (1.02, 1.13)	0.008

†Age- and state-population adjusted year-over-year increase in rate

Annual Rate Ratio of 1.20 corresponds to a doubling in rate approximately every 4 years

Age Profile of Decedents



Higher percentage of deaths among 18 to 39 year old decedents for medical stimulants than for decedents related to cocaine or methamphetamine

Sex and Race Profile of Decedents

Decedent Sex	Medical Stimulants, N (%)	Any Illicit Stimulant, N (%)
Female	3,138 (36.5%)	34,833 (27.8%)
Male	5,448 (63.5%)	90,676 (72.2%)

- Higher proportion of female decedents of medical stimulants than illicit stimulants
- Higher proportion of white decedents (and lower proportion of black decedents) of medical stimulants than illicit stimulants

Decedent Race†	Medical Stimulants, N (%)	Any Illicit Stimulant, N (%)
Asian or Pacific Islander	168 (2.0%)	2,402 (1.9%)
Black	362 (4.2%)	27,051 (21.6%)
Native American or Alaskan Native	154 (1.8%)	2,145 (1.7%)
White	7,902 (92.0%)	93,911 (74.8%)

†NCHS/Census Bridged Race

Strengths and Limitations

- Strengths
  - All deaths in the 50 states & DC
  - Not limited by ICD-10 code classification
- Limitations
  - Changing medical examiner/coroner practice over time and jurisdiction
  - Concomitant drugs (e.g., opioids) not analyzed

Conclusions

- Rise in overall stimulant mortality attributable to many different stimulant drugs
- Disparities observed between medical and illicit mortality
- Drug overdose epidemic extends beyond just opioids
- Ensure drug testing is comprehensive of medical stimulants
  - Particular need to ensure methamphetamine is differentiated from amphetamine, MDMA

Thank you!

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