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Risky driving behaviours among stimulant drug users: the role of aggression

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Conflicts of interest and disclosures

Conflicts of Interest:

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The views and opinions expressed in this article are those of the authors and should not be construed to represent the views of any of the sponsoring organizations or agencies or the US government.

Introduction

Amphetamines comprise a large class of CNS-acting substances

~30% drivers involved in road trauma

Acute intoxication: ↑ Lane drifting, erratic driving, speeding, weaving, high-speed collisions



Introduction

Simulant use can acutely increase aggression

- In rodents

Long term use in humans associated with increased violence when acutely intoxicated

Increased impulsivity and antisocial personality traits among users

Potentially shared pharmacological aetiology?



NESARC overview

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)

Cross-sectional, nationally representative sample of the civilian non-institutionalised population of the United States aged 18 years and older

- Age, gender distribution, region and ethnicity

Complex multistage probability sampling methodology

- Primary sampling units
- Secondary sampling units
- Tertiary sampling units



NESARC waves

First wave fielded 2001–2002

The second wave completed 2004–2005

- Re-interviewed same sample of respondents (81% retention)

The third wave completed 2012–2013

- 36,309 respondents (60.1% response rate).
 - Limited access data



NESARC questionnaires

Face-to-face, computerised semi-structured interviews in household settings

NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-IV and AUDADIS-V)

Diagnostic Statistical Manual of Mental Disorders (DSM-IV and DSM-V)

Biological sampling (NESARC-III)

Section 1 - BACKGROUND INFORMATION		
Statement A →	These first few questions are about your background.	N1STA
1a.	How old are you as of today? _____ Age	NAGE
CHECK ITEM 1.0	Does AGE = D OR R? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No - SKIP to 1c	NICK10
1b.	Interviewer: Enter best guess as to respondent's age. _____ Age	NIQ1B
c.	What is your date of birth? Please give me the month, day and year. Example: 01-20-1983 12-01-1963	NIQ1CM NIQ1CD NIQ1CY <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Month Day Year
d.	Ask if not apparent. If D or R record from observation. What is your sex?	1 <input type="checkbox"/> Male 2 <input type="checkbox"/> Female NSEX
e.	Are you of Hispanic or Latino origin?	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No NIQ1E
	(SHOW FLASHCARD 1)	
f.	On Card 1 is a list of racial categories. Please select 1 or more categories to describe your race. Mark (X) all that apply. NIQ1F	1 <input type="checkbox"/> White NIQ1F1 2 <input type="checkbox"/> Black or African American NIQ1F2 3 <input type="checkbox"/> Asian NIQ1F3 4 <input type="checkbox"/> Native Hawaiian or Other Pacific Islander NIQ1F4 5 <input type="checkbox"/> American Indian or Alaska Native NIQ1F5
	(SHOW FLASHCARD 2)	
2a.	Which country on the card best describes the heritage or ancestry (for example, Ireland or Italy) you identify with the most even though you may have been born in the United States? Please just tell me the number on the card. If you are not entirely certain, please give me your best guess. (Don't accept U.S. as response.)	<input type="text"/> <input type="text"/> <input type="text"/> Code NIQ2A
b.	Were you born in the United States?	1 <input type="checkbox"/> Yes - SKIP to 2e 2 <input type="checkbox"/> No NIQ2B
c.	(SHOW FLASHCARD 2) In what country were you born?	<input type="text"/> <input type="text"/> <input type="text"/> Code NIQ2C
d.	How many years have you lived in the United States? (Code 1 if less than 1 year.)	_____ Year(s) NIQ2D

Methodology

Substance use

- Frequency, amount, type of stimulant used
- DSM-V Stimulant use disorder

Driving Behaviour

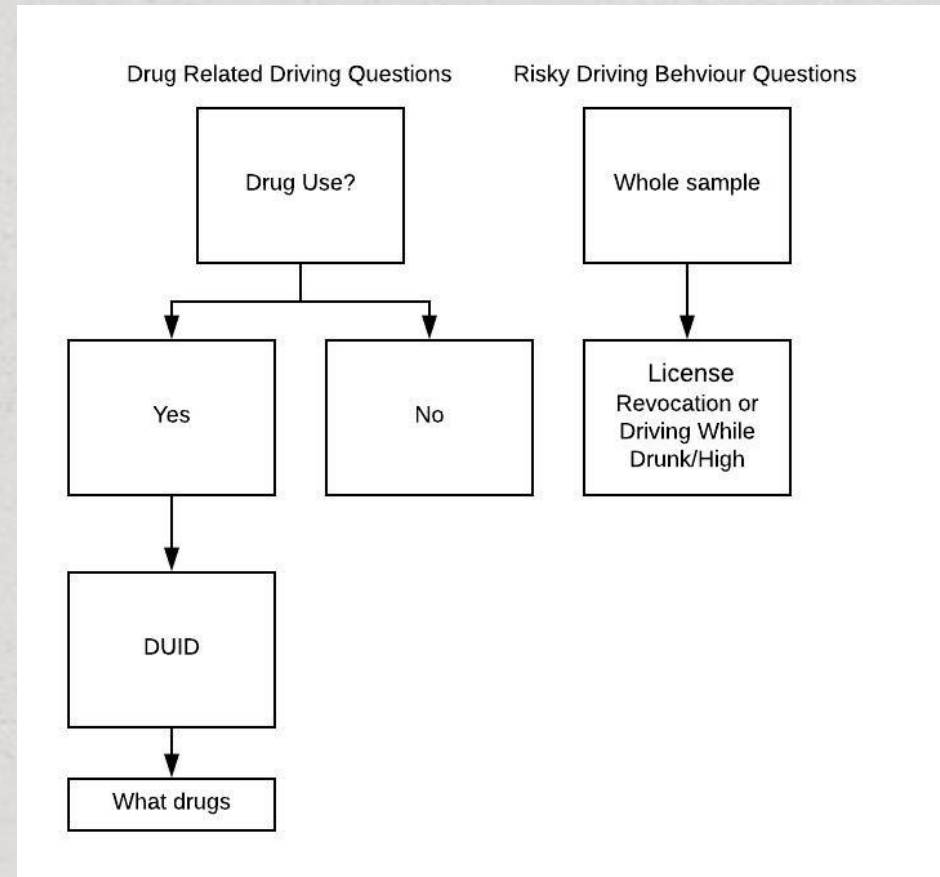
- DUID-specific
- Whole group

Aggression

- General (Cronbach's $\alpha = 0.96$)
 - 7 items
- History (aggression before age 15years)

Demographic/Psychiatric/other substance use

Driving Behaviour Decision Flowchart



Statistical approach

Complex Samples design using Taylor series linearization to adjust standard errors of estimates

1. Weighted means and percentages for continuous and categorical outcomes
2. Cross-tabulations (Chi-square χ^2 or Fishers Exact) for drug use, characteristic, driving and aggression data
3. Separate binary logistic regression analyses

Results: Characteristics

In total, **2,714 (8.3%)** respondents indicated lifetime ongoing use of stimulant drugs

As many as **112 (0.3%)** met criteria for Past Year DSM-5 Stimulant use disorder

High proportion of daily/weekly stimulant use among users (34.8%)

White, male, well-educated and married/cohabitating

High comorbidity with psychiatric illness, excessive alcohol use

Results: Stimulant use and driving outcomes

License ongoing stimulant drug users

- ~60% admitted any DUID in previous year
- 1/3 had licence revoked
- ~40% met criteria for general aggression, 25% history of aggression

Past Year DSM-V Stimulant use disorder

- ~80% admitted any DUID in previous year
- Over half had licence revoked
- >50% met criteria for general aggression, 45% history of aggression

Results: Stimulant-specific DUID

1. ONGOING STIMULANT DRUG USERS

	% (SE)	95%CI	p value
Stimulants only	11.4 (2.2)	7.7 - 16.5	<0.0001
Stimulants combined with any drug	22.2 (2.6)	17.4 - 27.8	0.017

2. PAST YEAR DSM-V STIMULANT USE DISORDER

	% (SE)	95%CI	p value
Stimulants only	33.0 (6.2)	21.9 - 46.3	<0.0001
Stimulants combined with any drug	50.1 (6.2)	38.0 - 62.2	<0.0001

Values are given % estimate. Bold font represents statistically significant results (p < .05).

*Data are weighted by NESARC-calculated AUDADIS full-sample weight, clustering for county and stratification using the stratum variable, adjusting standard errors. In all cases complex-sampling procedures was used.



Results: Driving behaviour and aggression

1.

GENERAL AGGRESSION			
	% (SE)	95%CI	p value
Driving under the influence of drugs (DUID)	53.7 (1.3)	51.2-56.3	<0.0001
Speeding/using machinery or driving while drunk/high	37.0 (0.8)	35.3-38.6	<0.0001
Licence revocation	31.1 (0.8)	29.5-32.8	<0.0001

2.

HISTORY OF AGGRESSION			
	% (SE)	95%CI	p value
Driving under the influence of drugs (DUID)	53.8 (1.4)	51.0-56.6	<0.0001
Speeding/using machinery or driving while drunk/high	39.0 (1.0)	36.9-38.8	<0.0001
Licence revocation	32.3 (1.0)	30.3-34.4	<0.0001

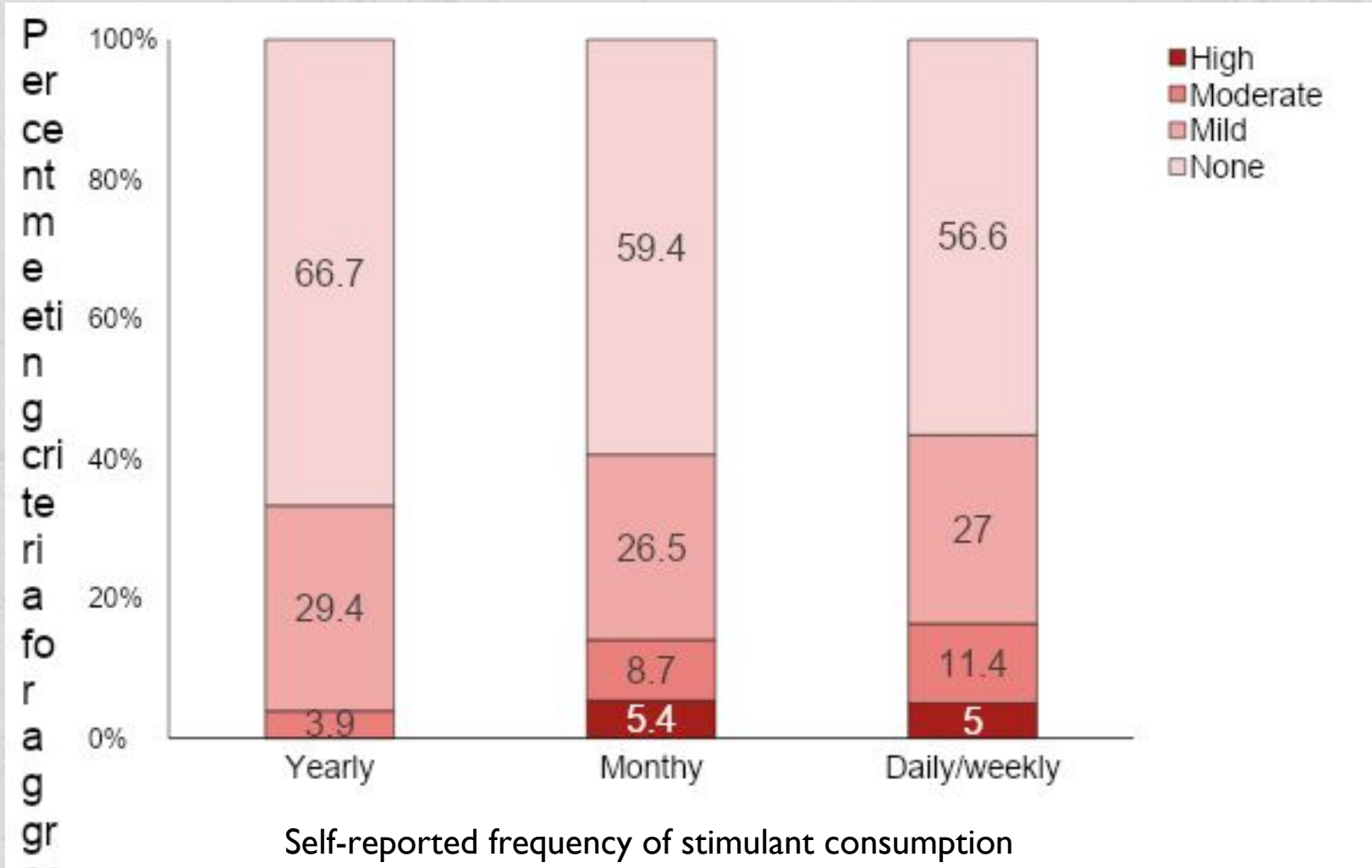
Values are given % estimate. Bold font represents statistically significant results (p < .05).

*Data are weighted by NESARC-calculated AUDADIS full-sample weight, clustering for county and stratification using the stratum variable, adjusting standard errors. In all cases complex-sampling procedures was used.



Results: Drug use frequency and aggression

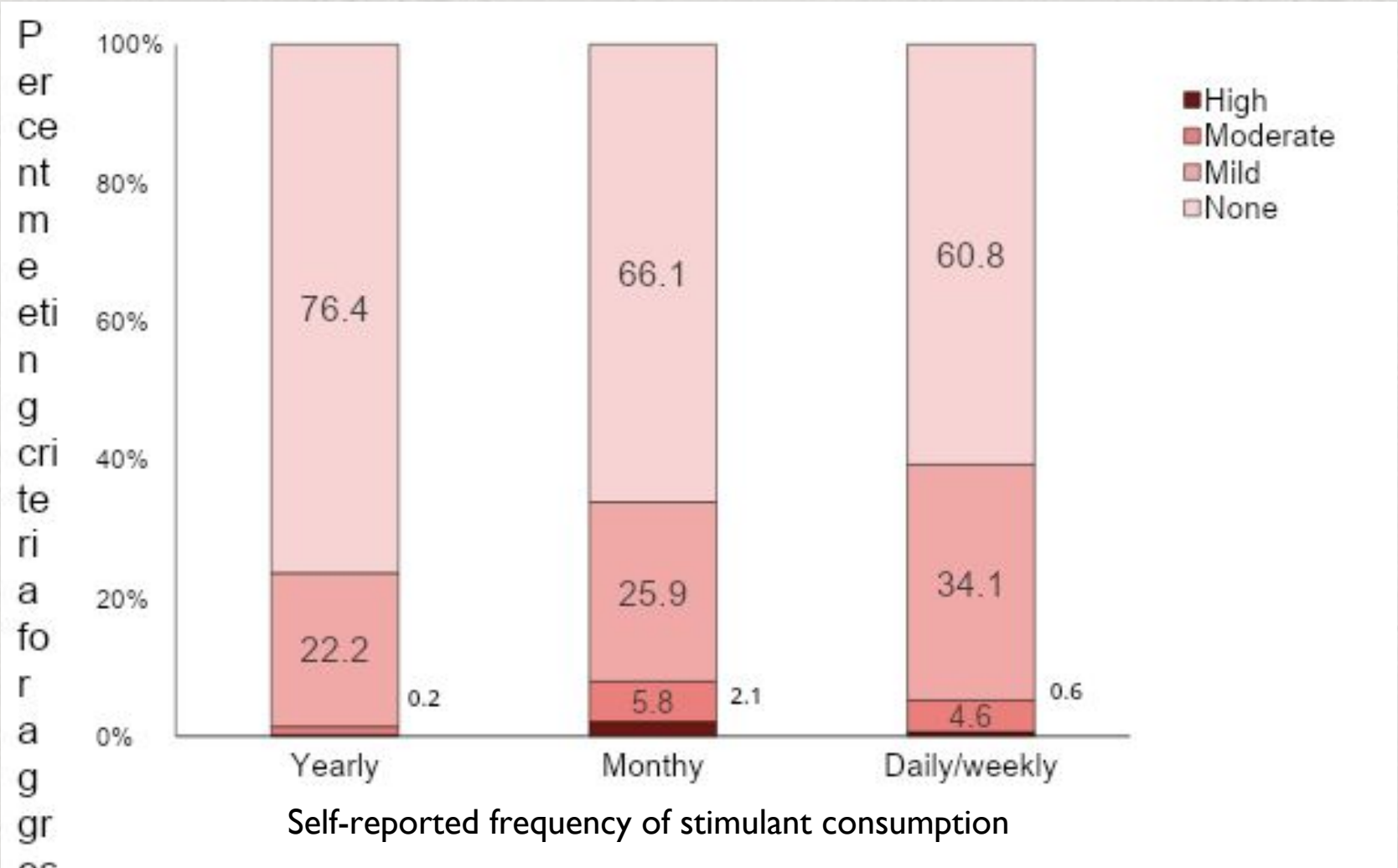
GENERAL AGGRESSION



A greater number of participants who indicated **monthly** or **daily** use of stimulant drugs were classified as having moderate-high levels of general aggression

Results: Drug use frequency and aggression

HISTORY OF AGGRESSION



Among those with a history of aggression, there was a greater prevalence of those using stimulants **monthly** or **daily**

Results: Multivariable models

LIFETIME STIMULANT USE										
	Unadjusted			Aggression-adjusted			Fully Adjusted [^]			P-value
	OR	95% CI of the OR		OR	95% CI of the OR		OR	95% CI of the OR		
		Lower	Upper		Lower	Upper		Lower	Upper	
DUID	4.01	3.55	4.53	3.00	2.63	3.41	3.00	2.64	3.42	<0.0001
Speeding/driving while drunk or high	6.84	6.17	7.58	3.38	3.00	3.80	3.39	3.01	3.82	<0.0001
Licence revocation	4.02	3.58	4.50	2.14	1.86	2.47	2.16	1.87	2.49	<0.0001

Adjusted for characteristics, and independent of aggression;

1. Lifetime stimulant users reported increased likelihood of driving or speeding under the influence of drugs.
2. They are more likely to have had their licence revoked

[^] Adjusted for age, gender, education, marital status, urbanicity, ethnicity, alcohol use, smoking status, DSM-5 Primary Major Depressive Disorder, DSM-5 Panic Disorder, DSM-5 Bipolar Disorder, General aggression and History of aggression (omitted from table).

Results: Multivariable models

PAST-YEAR DSM-V STIMULANT USE DISORDER										
	Unadjusted			Aggression-adjusted			Fully Adjusted [^]			P-value
	OR	95% CI of the OR		OR	95% CI of the OR		OR	95% CI of the OR		
		Lower	Upper		Lower	Upper		Lower	Upper	
DUID	7.56	4.30	13.31	5.48	2.94	10.18	5.48	2.94	10.18	<0.0001
Speeding/driving while drunk or high	9.43	6.01	14.81	3.98	2.31	6.85	3.87	2.23	6.70	<0.0001
Licence revocation	2.87	1.65	5.00	-	-	-	-	-	-	0.079*

Adjusted for characteristics and independent of aggression;

1. Those with DSM-V Stimulant use disorder have increased likelihood of driving or speeding under the influence of drugs.

[^] Adjusted for age, gender, education, marital status, urbanicity, ethnicity, alcohol use, smoking status, DSM-5 Primary Major Depressive Disorder, DSM-5 Panic Disorder, DSM-5 Bipolar Disorder, General aggression and History of aggression (omitted from table).

* fully explained by excessive alcohol consumption

Discussion and future directions

Stimulant users and those with a DSM-V stimulant use disorder report a high incidence of all examined risky driving practices and separately meet criteria for heightened aggression

- Steeped relationship between stimulant use and aggression

Propensity to engage in risky driving behaviours is not attributed to aggression

Harm minimisations policy should encompass antecedents and future potential outcomes of road trauma risks in this drug user group