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Trends in self-reported stimulant and depressant non-fatal overdose among people who regularly use ecstasy and related stimulants in Darwin, Northern Territory.

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Key Findings

- The percentage of Northern Territory (NT) EDRS participants reporting past-year non-fatal overdose has fluctuated since 2013, ranging between 20% and 39%.
- The percentage of NT participants reporting a past-year non-fatal stimulant overdose has declined since 2017 (33% to 15% in 2020).
- The percentage of NT participants reporting a past-year non-fatal depressant overdose has declined since 2018 (32% to 18% in 2020).
- Both stimulant and depressant overdoses most commonly occurred in the context of simultaneous substance use.
- Participants who reported a past-year stimulant overdose were more likely to be younger, female and have recently accessed services for alcohol/drug reasons than those who did not report any past-year overdose.
- Participants who reported a past-year depressant overdose were more likely to be currently studying a tertiary qualification than those who did not report any-past year overdose.

Background

In Australia, 77% of those aged 14 years and older reported past year use of alcohol in 2019, while 4.2%, 3.0% and 1.3% reported past year use of cocaine, ecstasy and methamphetamine, respectively (1). While producing differing effects, use of alcohol and illicit stimulants both have the potential to cause acute negative effects, including fatal and non-fatal overdose. Indeed, preliminary estimates suggest that there were 1137, 478 and 86 drug-induced deaths involving opioids, amphetamines and cocaine among Australians in 2019 (2). Furthermore, alcohol caused 492 accidental deaths (accidental poisoning, falls and transport accidents) among Australians in 2017 (3).

Overdose caused by depressants, including opioids and alcohol, can be characterised by symptoms such as depressed respiration and loss of consciousness (4, 5). In contrast, stimulant toxicity may be characterised by symptoms including arrhythmia, severe tachycardia, increased body temperature, tremors, severe anxiety, agitation or panic, chest pain, seizure, nausea and vomiting (6, 7). Non-fatal overdose can lead to a range of longer-term harms (8), and is a major risk factor for subsequent fatal overdose (9). However, both fatal and non-fatal overdose are preventable. By better understanding the prevalence and characteristics of overdose, we can appropriately tailor strategies to reduce overdose risk.

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Background continued.

Much of the existing literature on overdose among people who use drugs has focused on opioid overdose among people who inject drugs (10). However, the prevalence of overdose, and the profile of people who experience them, is likely to differ substantially across different subgroups of people who use drugs. Moreover, the majority of the existing literature on non-fatal overdose in Australia is based on data from large capital cities of Australia (e.g., (11)). As Darwin is considered a regional area in Australia, trends in drug use and overdose may not reflect those seen in major cities (12). These data are important to inform harm reduction and service needs in Darwin.

Accordingly, this bulletin aimed to describe the following among a sample of people in Darwin who regularly use ecstasy and/or other illicit stimulants. Specifically, it aimed to examine:

1. Trends in the percent reporting past-year non-fatal overdose from 2013-2020, disaggregated by whether overdose(s) involved stimulant and/or depressant drugs;

2. Substances used prior to last stimulant and depressant overdose among those reporting past-year overdose(s), and medical assistance provided in response to the last event; and

3. Sociodemographic, drug use, health, and service utilisation characteristics of those who reported a past-year stimulant overdose and those who reported a past-year depressant overdose (versus those who did not report any overdose).

Methods

The Ecstasy and Related Drug Reporting System (EDRS) is a national, annual cross-sectional survey of people who use ecstasy and/or other illicit stimulants that began in 2003. Approximately 100 people are recruited from each capital city of Australia. People are eligible for the study if they are 18 years or older (17 years or older prior to 2020), have used ecstasy or other illicit stimulants at least monthly in the past six months, and have resided in the capital city for at least 10 of the past 12 months. Participants provide informed consent prior to the interview, which takes approximately one-hour to complete, and are reimbursed $40 for their time. In 2020, due to COVID-19 related restrictions, interviews moved from face-to-face to phone/videoconference and participants were reimbursed via bank transfer or electronic gift voucher rather than cash.

In 2020, 100 participants were interviewed in Darwin, Northern Territory (see our published methods for sample size 2003-2020 and further detail of methods). Due to the particularly small samples recruited in Darwin in 2010-2012, time series in this bulletin begin in 2013.

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Methods continued.

Questions regarding non-fatal overdose have changed over the interviewing period, and this should be taken in account when examining trends in overdose over time (e.g., Figure 1). In the 2020 interview, participants were asked about their past-year experience of:

- Alcohol overdose: the experience of symptoms (e.g., reduced level of consciousness, and collapsing) where the participant felt professional assistance would have been helpful.
- Stimulant overdose: the experience of symptoms (e.g., nausea, vomiting, chest pain, tremors, increased boy temperature, increased heart rate, seizure, extreme paranoia, extreme anxiety, extreme agitation, panic, hallucinations, excited delirium) that are outside the participant's normal drug experience or where the participant felt professional assistance would have been helpful.
- Other drug (i.e., not alcohol, not a stimulant) overdose: the experience of symptoms outside the participant's normal drug experience or where the participant felt professional assistance would have been helpful.

For the purposes of this bulletin, 'depressant overdose' has been computed from alcohol and any depressant drugs under 'other' overdose (i.e., GHB, opioids, benzodiazepines and kava). 'Any overdose' has been computed from overdoses attributed to any drug, so may be greater than the sum of stimulant and depressant overdoses.

Descriptive analyses were used to summarise trends in past-year non-fatal overdose (stimulant, depressant, and any) among the sample (aim 1), and to examine drug/s involved at the time of last stimulant and depressant overdose and treatment access (CPR or naloxone administered, ambulance attendance, emergency department presentation or GP attendance; aim 2). To address the final aim, sociodemographic, drug use and health characteristics were compared between participants who reported a past-year stimulant overdose or a past-year depressant overdose, versus those who did not report any overdose, using multinomial logistic regression. These characteristics were chosen a priori and included two validated scales. The Kessler Psychological Distress Scale (K10) was used to identify possible mental health issues, with a cut-off score of ≥22 used to indicate high or very high psychological distress (13). The Alcohol Use Disorders Identification Test (AUDIT) was used to identify potentially risky consumption of alcohol (score ≥8; (14)). Magnitude of association is presented as a relative risk ratio (RRR) and 95% confidence interval (CI), with the significance level set at $p<0.05$. To increase statistical power of these hypothesis tests, participants from the 2019 and 2020 studies were pooled (n=200). Further years were not added due to changes in overdose questions that began in 2019. Participants who reported participating in both 2019 and 2020 were excluded (n=21). Participants who did not respond to overdose questions (n=2) and those who reported both a past-year stimulant overdose and a past-year depressant overdose were excluded (n=13), resulting in a final sample size of 164.

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Results

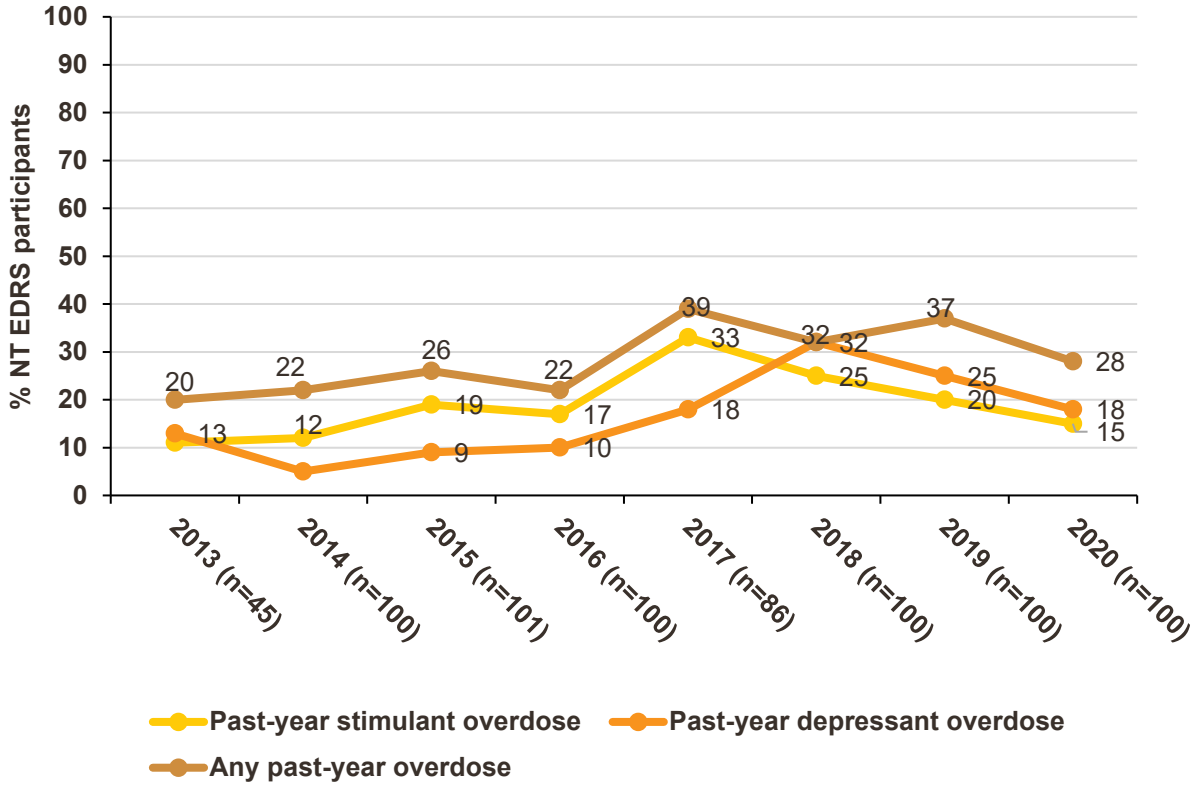
Trend in self-reported past-year non-fatal overdose, 2013-2020

Among the NT EDRS sample, the percentage of participants reporting any past-year overdose has fluctuated over time, ranging between 20% and 39% (**Figure 1**).

Stimulant overdose: Self-reported past-year stimulant overdose increased from 2013 (13%) to 2017 (33%), before decreasing in each of the subsequent years (15% in 2020).

Depressant overdose: Self-reported past-year depressant overdose has followed a similar pattern; the percent of participants increased from 2014 (n≤5) to 2018 (32%), before decreasing in each of the subsequent years (18% in 2020).

Figure 1. Past-year non-fatal stimulant, depressant and any drug overdose, NT EDRS sample, 2013-2020



Note. data labels removed where n≤5.

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Results continued

Substance/s involved at time of last overdose and treatment access, 2020

Stimulant overdose: In the 2020 sample, the most common drug cited as consumed prior to last stimulant overdose was MDMA/ecstasy (80% of those reporting a stimulant overdose), followed by crystal methamphetamine (n≤5). Almost all (93%) reported polydrug use on the last occasion of overdose (73% and 33% reported concurrent alcohol and cannabis use, respectively). Most participants (80%) did not receive treatment on their last occasion of stimulant overdose.

Depressant overdose: The most common drug cited was alcohol (89% of those reporting a depressant overdose). Most (69%) reported polydrug use on the last occasion of overdose, with cannabis the most common drug used concurrently (n≤5). The majority did not receive treatment on their last occasion of depressant overdose (94%).

Few (n≤5) participants reported both a depressant and stimulant overdose in 2020.

Sociodemographic, drug use, health and service access characteristics of self-reported past-year non-fatal overdose, 2019-2020

Stimulant overdose: Participants who reported a past-year stimulant overdose were less likely to be male (RRR: 0.23, 95% CI: 0.08-0.68) and aged 25 years or older (RRR: 0.0.16, 95% CI: 0.04-0.57; **Table 1**) than those who reported no overdose. There was no statistically significant difference in drug use and health characteristics between the two groups, but those who reported a past-year stimulant overdose were more likely to have accessed a service for alcohol or drug-related reasons during the past 6 months (RRR: 4.00, 95% CI: 1.43-11.22).

Depressant overdose: Participants who reported a past-year depressant overdose were more likely to currently studying a tertiary qualification (compared to not studying and no completion of any tertiary qualification) than those who did not report any overdose (RRR: 5.55, 95% CI: 1.31-23.55). There were no other statistically significant differences in characteristics (**Table 1**).

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Table 1. Sociodemographic, drug use, health and service use characteristics of those who reported a past-year stimulant overdose or past-year depressant overdose versus those who did not report any overdose, NT EDRS sample, 2019-2020.

	Whole sample (N=164)	No past-year overdose (N=119)	Past-year stimulant overdose (N=20)			Past-year depressant overdose (N=25)		
	% (n)	% (n)	% (n)	RRR (95% CI)	*p*	% (n)	RRR (95% CI)	*p*
Sociodemographic characteristics								
Gender identity								
Female	47 (77)	41 (49)	75 (15)	Reference		52 (13)	Reference	
Male	53 (87)	59 (70)	-	**0.23 (0.08-0.68)**	**0.008**	48 (12)	0.65 (0.29-1.62)	0.333
Age								
<25 years	54 (88)	47 (56)	85 (17)	Reference		60 (15)	Reference	
≥25 years	46 (75)	53 (62)	-	**0.16 (0.04-0.57)**	**0.005**	40 (10)	0.60 (0.25-1.45)	0.257
Tertiary education								
None	29 (48)	31 (37)	35 (7)	Reference		-	Reference	
Current student	13 (21)	8 (10)	-	2.64 (0.69-10.13)	0.156	24 (6)	**5.55 (1.31-23.55)**	**0.020**
Completed qualification	58 (95)	61 (72)	40 (8)	0.59 (0.20-1.75)	0.338	60 (15)	1.93 (0.60-6.22)	0.273
Employment status								
Unemployed	29 (48)	29 (34)	-	Reference		36 (9)	Reference	
Employed	71 (115)	71 (84)	75 (15)	1.21 (0.41-3.60)	0.726	64 (16)	0.72 (0.29-1.79)	0.478
Drug use characteristics								
Weekly+ MDMA use								
No	68 (112)	71 (85)	60 (12)	Reference		60 (15)	Reference	
Yes	32 (52)	29 (34)	40 (8)	1.67 (0.63-4.44)	0.306	40 (10)	1.67 (0.68-4.07)	0.263
Weekly+ alcohol use								
No	21 (35)	21 (25)	-	Reference		64 (16)	Reference	
Yes	79 (129)	79 (94)	80 (16)	1.06 (0.33-3.47)	0.918	36 (9)	0.84 (0.30-2.33)	0.741
Binge drug use past 6 months								
No	64 (104)	66 (78)	50 (10)	Reference		64 (16)	Reference	
Yes	36 (59)	34 (40)	50 (10)	1.95 (0.75-5.07)	0.171	36 (9)	1.10 (0.45-2.70)	0.841
Used any NPS past 6 months								
No	85 (136)	85 (100)	84 (16)	Reference		87 (20)	Reference	
Yes	15 (24)	15 (18)	-	1.04 (0.28-3.94)	0.952	-	0.83 (0.22-3.10)	0.786
Health and substance dependence								
K10 ≥ 22								
No	71 (117)	72 (86)	65 (13)	Reference		72 (18)	Reference	
Yes	29 (47)	28 (33)	35 (7)	1.40 (0.51-3.82)	0.508	28 (7)	1.01 (0.39-2.65)	0.978
AUDIT ≥ 8								
No	15 (24)	17 (20)	-	Reference		-	Reference	
Yes	85 (139)	83 (99)	90 (18)	1.82 (0.39-8.46)	0.176	92 (22)	2.22 (0.48-10.21)	0.305
Harm reduction and help-seeking behaviour								
Accessed service for alcohol/drug related reasons past 6 months								
No	82 (134)	86 (102)	60 (12)	Reference		80 (20)	Reference	
Yes	18 (30)	14 (17)	40 (8)	**4.00 (1.43-11.22)**	**0.008**	-	1.50 (0.50-4.53)	0.476
Past year drug checking								
No	85 (140)	87 (103)	90 (18)	Reference		76 (19)	Reference	
Yes	15 (24)	13 (16)	-	0.72 (0.15-3.38)	0.672	24 (6)	2.03 (1.71-4.53)	0.189

Notes: Due to differences in survey items regarding overdose, only 2019 and 2020 participants were included for analysis. Participants who reported that they were not a first-time participant were excluded (n=21), as were those who reported both a past-year stimulant and past-year depressant overdose (n=13) and those who didn't respond to overdose questions (n=2). - exact number suppressed, n≤5. Education was coded hierarchically, so participants who reported both current enrolment in a tertiary course and completion of a tertiary course were assigned to the qualification completed category.. Employment status refers to any current employment (i.e., fulltime, part-time, casual or self-employed). Binge drug use refers to 48 hours or more of continuous drug use without sleep. 'NPS' or new psychoactive substance use refers to use of substances that mimic the effects of traditional illicit drugs e.g., 2C substances, synthetic cannabinoids, mephedrone. Past year drug checking refers to the participant or someone else testing the purity/contents of the participant's drugs in Australia.

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Discussion

In this sample of people who regularly use ecstasy and related drugs in Darwin, the annual per cent of participants reporting a past-year stimulant overdose has decreased since 2017, with the per cent reporting a past-year depressant overdose also decreasing since 2018. Among the 2020 sample, a similar percent reported a past-year stimulant overdose and a past-year depressant overdose. The majority of participants who had experienced a past-year overdose reported that their last overdose occurred in the context of simultaneous drug use, and that they did not receive treatment as a result of the overdose.

Our finding that overdoses usually occur in the context of simultaneous substance use aligns with previous research (15, 16). Simultaneous substance use is associated with elevated risk of adverse acute events, as well as longer-term risk of psychiatric and physical health issues (17). A study of people who reported recent drug use found that those who planned to spread out their doses during simultaneous substance use sessions were less likely to report adverse events, such as loss of conscious and aggression (18). Thus, harm reduction messaging to people who use drugs is important in reducing risk. Further, it was concerning that so few participants received treatment at the time of last overdose, and suggests targeted harm reduction messaging around how to recognise the symptoms of, and respond to overdose, may be warranted.

It is important to preface discussion of differences between participants reporting a past-year overdose and those reporting no overdose with an acknowledgement of the small sample size, which may mean our analyses were insufficiently powered to detect true differences in certain characteristics. Participants who reported a past-year depressant overdose were more likely to be currently studying a tertiary qualification than those who reported no overdose. Alcohol-related harm is relatively common among university students, and may be a consequence of a number of factors, including stress, identity exploration or social pressure (19). This finding suggests that tailoring interventions to engage university or TAFE students may be successful in reducing non-fatal depressant overdose.

The younger age of participants reporting a stimulant overdose supports previous research into non-fatal overdose (20), and suggests that inexperience may contribute to harm (21). Peer-led interventions have been successful in engaging younger people at nightclubs and festivals (22), and may have longer-term benefits in decreasing drug involvement (23). Our finding that females were more likely report a stimulant overdose also aligns with evidence of differing pharmacodynamics of MDMA by sex, with females more likely to experience acute physical and psychological effects (24-26). Thus, it is important that any education-based intervention emphasises the differing responses to MDMA by sex.

While we cannot disentangle the temporal nature of the association between past 6-month service access for alcohol/drug-related issues and past-year stimulant overdose, this is an important finding. This association may indicate these participants have sought help after an overdose. However, there is also the possibility that these participants have continued to experience adverse events despite seeking assistance.

Discussion continued

An important caveat to the description of trends in percent reporting past-year overdose over time is the differences in survey questions relating to overdose over the years of interviewing. We cannot rule out that these changes have contributed to observed trends. Care should also be taken when making inferences about differences in characteristics by past-year overdose status. Data for some factors investigated were particularly sparse (evident by wide confidence intervals), and this precluded use of adjusted multinomial logistic regression. Lastly, our data rely on self-report and may be subject to recall bias. However, previous research has found behaviours reported by people who use drugs to be sufficiently reliable and valid (27).

Conclusion

Stimulant and depressant overdose were relatively common amongst our sample of people who use ecstasy and/or other illicit stimulants, with the majority of those reporting these events using multiple substances on the occasion of last overdose, and few receiving medical assistance. Harm reduction messaging around risks of polydrug use is warranted. Our findings suggest that for depressant overdose such messaging may be best targeted at university students, while for stimulant overdose it may be best targeted towards young women.

Participating Researchers and Research Centres

- Antonia Karlsson, Julia Uporova, Daisy Gibbs, Rosie Swanton, Olivia Price, Roanna Chan, Professor Louisa Degenhardt, Professor Michael Farrell and Dr Amy Peacock, National Drug and Alcohol Research Centre, University of New South Wales, New South Wales;
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- Tanya Wilson and Associate Professor Raimondo Bruno, School of Psychology, University of Tasmania, Tasmania;
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