NDARC
DRUG TRENDS
National Drug & Alcohol Research Centre

ECSTASY AND RELATED DRUGS REPORTING SYSTEM
DRUG TRENDS BULLETIN
JULY 2016

The Difference is Research

Stimulant and depressant overdose among a sample regular psychostimulant users in Australia, 2007-2015

Authors: Rachel Sutherland, Gavin Entwistle and Courtney Breen
National Drug and Alcohol Research Centre, The University of New South Wales

Medicine | National Drug and Alcohol Research Centre

KEY FINDINGS

Stimulant Overdose

- Lifetime and past year stimulant overdose fluctuated across 2007-2010, before stabilising from 2011 onwards.
- The majority of participants attributed their last overdose to ecstasy; much smaller proportions nominated methamphetamine as the main drug involved in their last overdose.
- Among those who had overdosed in the past year, only a minority received medical assistance. The majority of the sample reported that they had not received any treatment or had been monitored by friends.

Depressant Overdose

- Lifetime and past year depressant overdose remained relatively stable across 2007-2015.
- The majority of participants attributed their last overdose to alcohol, and this remained consistent across all years.
- Among those who had overdosed in the past year, only a minority received medical assistance. The majority reported that they had not received any treatment or had been monitored by friends.

INTRODUCTION

Drug-related overdoses are often reported using mortality rates and drug-related hospitalisations. In Australia and New Zealand, statistics on drug-related overdose estimate a mortality rate of 101.5 people per million, second only to North America (164.5 deaths per million; UNODC, 2011). Opioids were ranked as the primary cause of death followed by tranquilisers and sedatives, and amphetamine-type stimulants (UNDOC, 2014). The majority of opioid overdose deaths in Australia are accidental. The most recent data report the rate of accidental overdose deaths due to opioids in Australia as 44.7 per million among persons aged 15 to 54 years. Among all ages the rate of accidental opioid deaths in 2012 was 28.1 per million persons (30.5 in 2011) (Roxburgh & Breen, 2016a). In regards to drug-related hospitalisations, data from the National Hospital Morbidity Database shows that in 2013/14, 459 people per million were admitted to hospital principally for opioids, 341 per million for amphetamines, 109 per million for cannabis and 34 per million for cocaine (Roxburgh & Breen, 2016b).

These estimates show that overdose is a significant issue in Australia, although they do not represent all overdoses. Mortality rates, by definition, fail to capture overdoses that do not result in death. Estimating mortality rates that are directly attributable to overdose is difficult due to variations in the quality and quantity of data, and likely underestimates the total disease burden (Degenhardt et al., 2003). Similarly, drug-related hospitalisations only capture incidents where drugs were determined to be the 'principal' reason for the hospital stay; that is, they do not account for hospitalisations in which drugs may have been a 'secondary' reason for admittance, and are thus an underestimate of the total number of drug-related hospital admissions (Roxburgh & Burns, 2016b). In addition, they do not account for the number of overdoses that occur without hospitalisation.

Furthermore, it has been argued that current overdose definitions are relatively unclear, and that by focusing on the limited clinical definition of overdose we may be underestimating the harm associated with illicit drug use (Fitzgerald, Hamilton, & Dietze, 2000). Through inadequately defining and thus not fully understanding drug users' experiences of drug overdose we may be

ISSN 1835-8233

Funded by the Australian Government under the Substance Misuse Prevention and Service Improvement Grants Fund

missing significant opportunities to intervene in what is a significant medical and social problem. Self-report data is thus an important accompaniment to mortality rates and drug-related hospitalisations, allowing us to obtain a more comprehensive understanding of the drug user's experience of overdose.

While there has been a considerable amount of research looking at self-reported experiences of overdose, much of the research in this area has focused on opioid users and/or people who inject drugs (PWID). For example, it has been shown that up to 68% of PWID have experienced a non-fatal overdose (Bazazi et al., 2015; Best, 2000; Bonar & Bohnert, 2016; Darke, Ross, & Hall, 1996; Kerr, Dietze, Kelly, & Jolley, 2009; McGregor, Darke, Ali, & Christie, 1998; Powis et al., 1999; Sergeev, Karpets, Sarang, & Tikhonov, 2003; Strang, Best, Man, Noble, & Gossop, 2000), with the majority of overdoses occurring in the presence of someone else (McGregor et al., 1998; Powis et al., 1999). Overdose is clearly a significant issue among these populations, however comparatively little is known about overdose experiences among 'recreational' illicit drug users. Indeed, few studies have examined overdose among regular ecstasy or 'recreational' drug users, despite the fact they have been shown to have risky patterns of drug use (Sindicich, Stafford & Breen, 2016) and despite the fact that MDMA can have serious toxic effects (Green, Cross, & Goodwin, 1995; Turillazzi, Riezzo, Neri, Bello, & Fineschi, 2010). This paper aims to fill this research gap by examining stimulant and depressant overdose among a sample of regular psychostimulant users (RPU) in Australia. More specifically, this paper will:

1. Examine self-reported rates of lifetime and past year stimulant and depressant overdose among a sample of RPU in Australia, from 2007-2015.
2. Determine which drugs were involved in past year overdoses, from 2007-2015.
3. Examine the proportion of RPU who received medical assistance during their last overdose, from 2011-2015.

METHODS

Study design

This paper uses data from the 2007-2015 Ecstasy and related Drugs Reporting System (EDRS) (for full protocol details, see Sindicich, Stafford & Breen, 2016). The EDRS is a national monitoring study aimed at detecting emerging trends in illicit drug markets and has been conducted annually in all Australian jurisdictions since 2003.

Participants and procedure

Participants are recruited through street-press advertisements, drug information websites, social media, flyers placed at university campuses, and through word of mouth. Eligibility criteria were; at least monthly use of ecstasy or psychostimulants in the preceding six months, 16 years of age or older, and residence in the capital city of their state for twelve months prior to interview. Face-to-face one-hour structured interviews were conducted by trained interviewers at a negotiated time and location. All information was confidential and de-identified. Participants were reimbursed $40 for their time.

Measures relevant to the current study

From 2007 onwards, questions about drug overdose were asked separately for stimulants (e.g. ecstasy, methamphetamines, cocaine, LSD) and depressants (e.g. alcohol, GHB, benzodiazepines, opioids). Overdose was defined as a range of symptoms that are outside a person's normal drug experience, or where professional assistance would have been helpful. Participants were asked how many times they had ever overdosed and how long ago they last overdosed. Participants who reported a drug overdose in the twelve months prior to interview were asked about the main drug they attributed their most recent overdose to, and if there were other drugs involved; from 2011 onwards they were also asked if they had received any immediate treatment.

Analysis

Means were presented for continuous data where skewness <+-1 and kurtosis <+-3. Data regarding rates of overdose, main drug involved and treatment were obtained using descriptive statistics. All analyses were conducted using IBM SPSS Statistics for Windows release 22.0 (IBM Corporation, 2013).

RESULTS

Demographics

From 2007-2015, 6,294 participants were recruited and interviewed for the EDRS. More specifically, in 2007 there were 741 participants; in 2008 there were 678 participants; in 2009 there were 752 participants; in 2010 there were 693 participants; in 2011 there were 574 participants; in 2012 there were 607 participants; in 2013 there were 686 participants; in 2014 there were 800 participants; and in 2015 there were 763 participants.

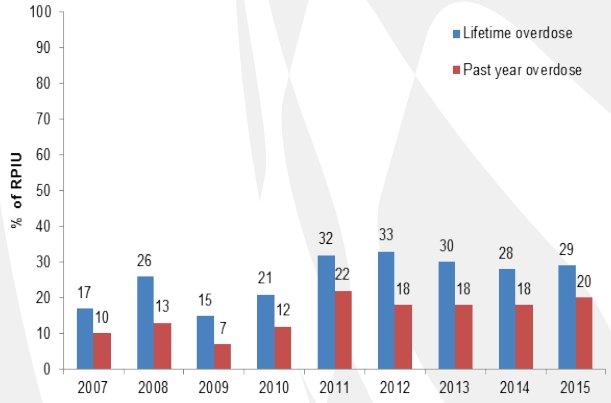
Demographic characteristics have remained relatively stable over this period. In 2015, 62% of the sample were male with a mean age of 23 years (SD 6.9), 46% were tertiary qualified, 72% were employed in some capacity and 33% were students. Poly drug use was common,

with participants reporting that they had used a mean of five drug classes (range: 1-14) in the six months preceding interview. More detailed demographics of the sample have been reported elsewhere (Sindicich, Stafford & Breen, 2016).

Stimulant Overdose

Rates of lifetime and past year stimulant overdose are presented in Figure 1. There was considerable fluctuation in overdose rates across 2007-2010, with the proportion of participants who had ever overdosed on a stimulant drug ranging from 15-26%, and the proportion who had overdosed in the past year ranging from 7-13%. However, overdose rates have remained relatively stable from 2011 onwards, with approximately one-third (28-33%) of the sample reporting lifetime stimulant overdose and approximately one-fifth (18-22%) reporting overdose in the past year.

Figure 1: Proportion of participants reporting stimulant overdose, 2007-2015

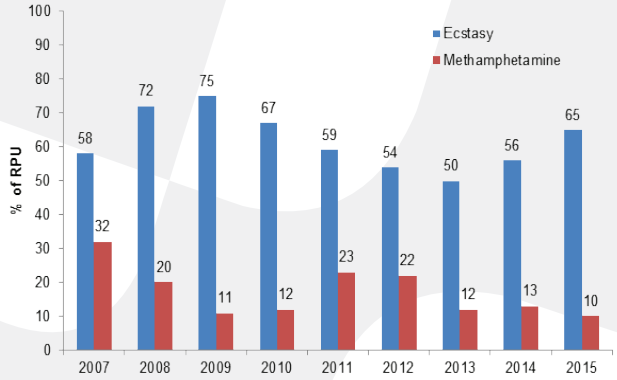


Source: EDRS participant interviews

If participants had experienced a stimulant overdose in the previous twelve months, they were asked about the 'main drug' that they attributed their most recent overdose to and if there were other drugs involved. As can be seen in Figure 2, most participants attributed their most recent overdose to ecstasy, although this has fluctuated over time. More specifically, from 2009-2013 there was a steady decline in the proportion of participants that nominated ecstasy as the main drug involved in their most recent stimulant overdose (75% in 2009 vs. 50% in 2013). However, more recently this trend seems to have reversed, with an upward trend being observed from 2013-2015 (50% in 2013 vs. 65% in 2015).

There has also been considerable variation in the proportion of participants who attributed their most recent overdose to methamphetamine, ranging from 32% in 2007 to 10% in 2015. Among those who had experienced a stimulant overdose in the past year, the majority reported that there was more than one drug involved during their most recent overdose (see Figure 3).

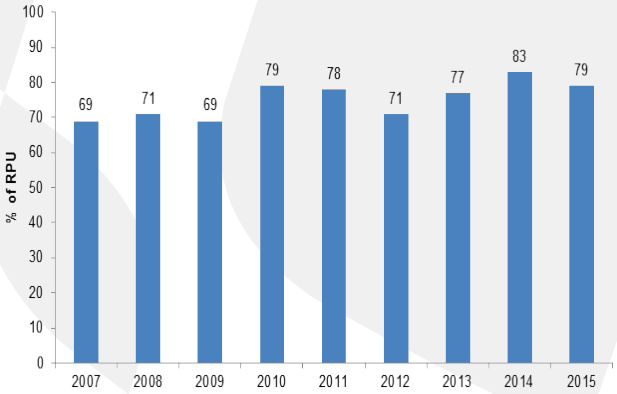
Figure 2: The proportion of participants who attributed ecstasy or methamphetamine as the primary drug involved in their last stimulant overdose*, 2007-2015



Source: EDRS participant interviews

*Among those who had overdosed in the preceding 12 months

Figure 3: The proportion of participants who reported that other drugs were involved in their last stimulant overdose*, 2007-2015

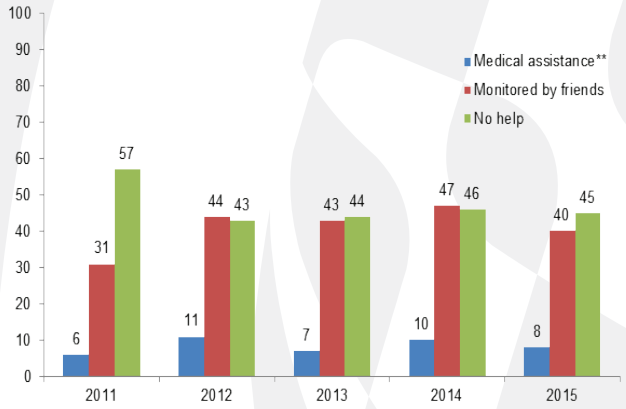


Source: EDRS participant interviews

*Among those who had overdosed in the preceding 12 months

If participants had experienced a stimulant overdose in the previous twelve months, they were also asked what, if any, immediate treatment they had received. As can be seen in Figure 4, only a small proportion of RPU (6-11%) reported that they had received any medical assistance for their last overdose. With the exception of 2011, almost equal proportions of the sample reported that they had been monitored by friends or had not received any treatment.

Figure 4: The proportion of participants who received medical assistance at the time of their last stimulant overdose*, 2011-2015



Source: EDRS participant interviews

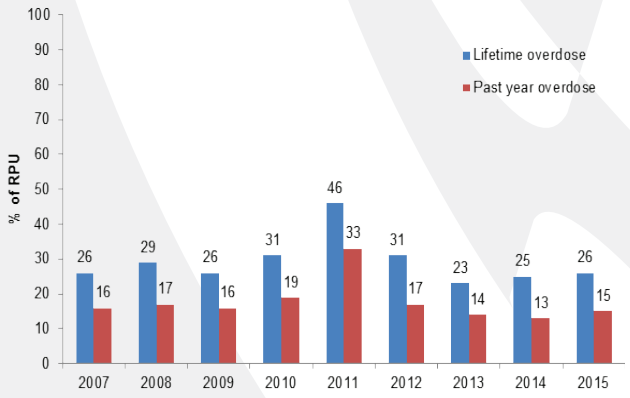
*Among those who had overdosed in the past 12 months

** Includes ambulance attendance, hospital emergency department, GP, drug health service, received oxygen, received CPR

Depressant Overdose

Rates of lifetime and past year depressant overdose are presented in Figure 5. With the exception of 2011, it can be seen that rates of overdose have remained relatively stable across 2007-2015. More specifically, in 2007 one-quarter (26%) of the sample reported that they had ever experienced a depressant overdose (vs. 26% in 2015) and 16% reported that they had overdosed on a depressant drug in the twelve months preceding interview (vs. 15% in 2015).

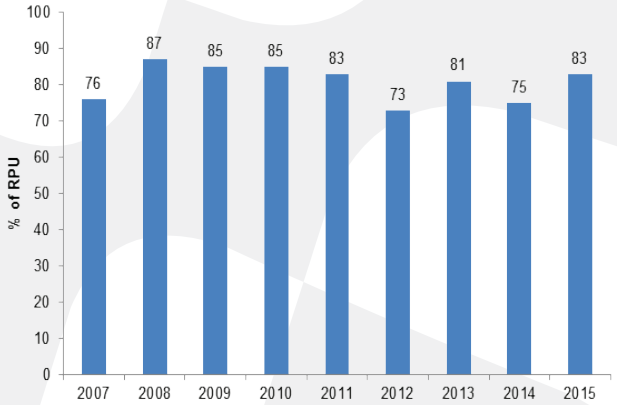
Figure 5: Proportion of participants reporting depressant overdose, 2007-2015



Source: EDRS participant interviews

If participants had experienced a depressant overdose in the previous twelve months, they were asked about the 'main drug' that they attributed their most recent overdose to, and if there were other drugs involved. As can be seen in Figure 6, alcohol was consistently the main drug that participants attributed their most recent depressant overdose to, although there was some fluctuation over the years (76% in 2007 vs. 83% in 2015). Among those who had experienced a depressant overdose in the past year, about half (46-57%) reported that there was more than one drug involved during their most recent overdose (see Figure 7).

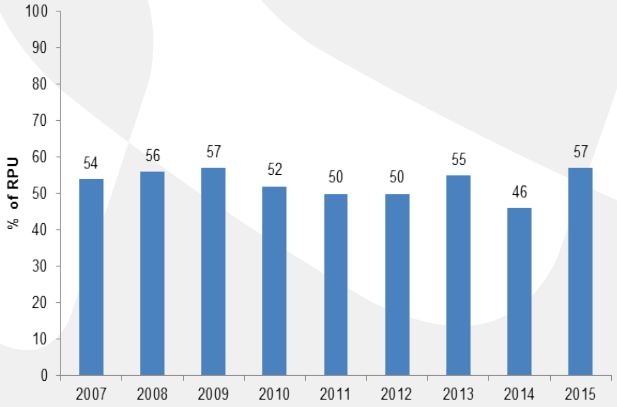
Figure 6: The proportion of participants who attributed alcohol as the primary drug involved in their last depressant overdose*, 2007-2015



Source: EDRS participant interviews

*Among those who had overdosed in the preceding 12 months

Figure 7: The proportion of participants who reported that other drugs were involved in their last depressant overdose*, 2007-2015

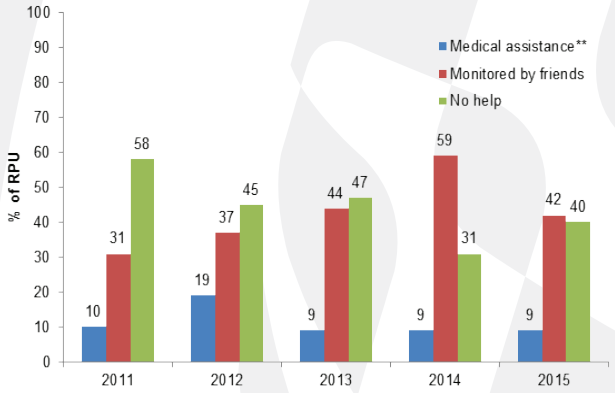


Source: EDRS participant interviews

*Among those who had overdosed in the preceding 12 months

If participants had experienced a depressant overdose in the previous twelve months, they were also asked what, if any, immediate treatment they had received. As can be seen in Figure 8, only a small proportion of RPU reported that they had received any medical assistance for their last overdose. Across all years, the majority of the sample reported that they had been monitored by friends or had not received any treatment.

Figure 8: The proportion of participants who received medical assistance at the time of their last depressant overdose*, 2011-2015



Source: EDRS participant interviews

*Among those who had overdosed in the past 12 months

** Includes ambulance attendance, hospital emergency department, GP, drug health service, received oxygen, received Narcan, received CPR

DISCUSSION

Overdose is a significant cause of mortality and morbidity for drug users, both in Australia and globally. Much of the research in this area has largely focused on opioid users and/or PWID, with comparatively little attention given to 'recreational' illicit drug users. Our findings suggest that overdose experiences are relatively common among RPU. More specifically, although self-reported stimulant overdose fluctuated across 2007-2010, from 2011 onwards approximately one in three RPU (28-33%) had ever experienced a stimulant overdose and one in five (18-22%) had experienced a stimulant overdose in the twelve months preceding interview. Ecstasy was the main drug involved in these overdoses, which is not surprising given that this was largely a sample of regular ecstasy users. Self-reported depressant overdose remained largely stable across 2007-2015, with alcohol being the dominant drug that participants attributed their most recent overdose to. Concurrent drug use was common in both stimulant and depressant overdoses, suggesting that poly-drug use played an important role in these overdoses.

The findings of this study also highlight the fact that mortality rates and drug-related hospitalisations do not represent all overdoses. Among participants who had experienced either a stimulant or depressant overdose in the preceding twelve months, only a minority reported that they had received medical assistance at the time of their most recent overdose. That is, the majority of overdoses reported by our samples of RPU would not have been captured by the aforementioned data sources. Self-reported rates of overdose are thus an important accompaniment to these estimates, providing additional data on drug related harms.

Inversely, the vast majority of participants reported that they had not received any medical assistance at the time of their last overdose. This is consistent with previous studies showing that although a high proportion of overdoses are witnessed, medical help is often not sought or is sought too late (Strang et al., 2007). This is of great concern and it is important that we investigate the reasons for this further. Existing research shows that there are a number of reasons why individuals do not call for ambulance assistance at overdose situations, including fear of police attendance (Lankenau et al., 2013; Sergeev et al., 2003; Tobin, Davey, & Latkin, 2005) and the belief that they could 'handle it themselves' (Bohnert, Tracy, & Galea, 2012). It has also been shown that factors like gender and the number of bystanders present can play an important role, and that individuals who have experienced an overdose themselves are less likely to call for emergency medical services when witnessing an overdose (Tobin et al., 2005). However, as has already been noted, the majority of these studies use samples of opioid users and/or PWID, and it is important to determine whether these findings are transferrable to other groups of drug users.

Lastly, and perhaps most importantly, our findings show that peers play an important role in the management of overdoses. Substantial proportions of our sample reported being 'monitored by friends', which is similar to previous studies showing that most non-fatal overdoses are witnessed by a peer (McGregor et al., 1998; Powis et al., 1999). Indeed, peers are well-recognised as key targets for witness intervention efforts. However, to-date, most peer-based interventions have been directed towards opiate users and/or PWID (e.g. naloxone training and distribution programs). Evaluations of such programs have shown that once trained in the recognition and management of overdoses, users report significant improvements in their awareness, knowledge and confidence, and were more likely to appropriately intervene in high risk situations (Gaston, Best, Manning, & Day, 2009). At present, it appears that our sample of RPU represent a missed opportunity in terms of overdose management, and we would recommend a targeted campaign aimed at educating regular psychostimulant users regarding overdose awareness and appropriate responses to overdose (i.e. risk factors for overdose, signs of an overdose, actions to take in the event of an overdose).

LIMITATIONS

There is no clear definition of overdose in the literature. The definition of overdose used by the EDRS is the experience of a number of symptoms outside a person's normal drug experience or where profession assistance would have been helpful. This definition

is subjective and because the EDRS focuses on a largely experimental group of psychostimulant users it is expected that individuals would often experience symptoms outside their normal drug experience. Secondly, the EDRS sample is not representative of all RPU in Australia, which means that our findings are not generalizable to all RPU in Australia. Rather, it is a sentinel sample which allows for the early identification of trends in illicit drug markets. Finally, our analysis is reliant upon self-report data from participants which may be subject to bias. Although evidence points to sufficient validity and reliability of self-report in studies assessing illicit drug use (Darke, 1998), it is possible that some participants will not report an overdose when they have in fact experienced one or report an overdose when they have not had one.

REFERENCES

Bazazi, A. R., Zelenev, A., Fu, J. J., Yee, I., Kamarulzaman, A., & Altice, F. L. (2015). High prevalence of non-fatal overdose among people who inject drugs in Malaysia: Correlates of overdose and implications for overdose prevention from a cross-sectional study. *International Journal of Drug Policy, 26*(7), 675-681. doi:10.1016/j.drugpo.2014.11.010

Best, L.-H. M. M. G. A. N. J. S. D. (2000). Drug users' experiences of witnessing overdoses: what do they know and what do they need to know? *Drug and Alcohol Review, 19*(4), 407-412. doi:10.1080/0959523002004894

Bohnert, A. S. B., Tracy, M., & Galea, S. (2012). Characteristics of drug users who witness many overdoses: Implications for overdose prevention. Drug and Alcohol Dependence, 120(1–3),168-173.doi:http://dx.doi.org/10.1016/j.drugalcdep.2011.07.018

Bonar, E. E., & Bohnert, A. S. B. (2016). Perceived Severity of and Susceptibility to Overdose Among Injection Drug Users: Relationships With Overdose History. *Substance Use and Misuse*, 1-5. doi:10.3109/10826084.2016.1168447

Darke, S. (1998). Self-report among injecting drug users: A review. *Drug and Alcohol Dependence, 51*(3), 253-263. doi:http://dx.doi.org/10.1016/S0376-8716(98)00028-3

Darke, S., Ross, J., & Hall, W. (1996). Overdose among heroin users in Sydney, Australia: I. Prevalence and correlates of non-fatal overdose. *Addiction, 91*(3), 405-411. doi:10.1046/j.1360-0443.1996.9134059.x

Degenhardt, L., Hall, W., M Lynskey, M., & M Warner-Smith, M. (2004). Chapter 13: Illicit drug use, in M Ezzati, AD Lopez, A Rodgers, CJL Murray (Eds.), *Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors* (2nd edn.), World Health Organization, Geneva

Fitzgerald, J., Hamilton, M., & Dietze, P. (2000). Walking Overdoses: A Re-Appraisal of Non-Fatal Illicit Drug Overdose. *Addiction Research, 8*(4), 327-352. doi:10.3109/16066350009009519

Gaston, R. L., Best, D., Manning, V., & Day, E. (2009). Can we prevent drug related deaths by training opioid users to recognise and manage overdoses? *Harm Reduction Journal, 6*(1), 1-8. doi:10.1186/1477-7517-6-26

Green, A. R., Cross, A. J., & Goodwin, G. M. (1995). Review of the pharmacology and clinical pharmacology of 3,4-methylenedioxymethamphetamine (MDMA or "Ecstasy"). *Psychopharmacology, 119*(3), 247-260. doi:10.1007/bf02246288

IBM Corporation. (2013). IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corporation.

Kerr, D., Dietze, P., Kelly, A.-M., & Jolley, D. (2009). Improved response by peers after witnessed heroin overdose in Melbourne. *Drug and Alcohol Review, 28*(3), 327-330. doi:10.1111/j.1465-3362.2009.00029.x

Lankenau, S. E., Wagner, K. D., Silva, K., Kecojevic, A., Iverson, E., McNeely, M., & Kral, A. H. (2013). Injection Drug Users Trained by Overdose Prevention Programs: Responses to Witnessed Overdoses. *Journal of Community Health, 38*(1), 133-141. doi:10.1007/s10900-012-9591-7

McGregor, C., Darke, S., Ali, R., & Christie, P. (1998). Experience of non-fatal overdose among heroin users in Adelaide, Australia: circumstances and risk perceptions. *Addiction, 93*(5), 701-711. doi:10.1046/j.1360-0443.1998.9357016.x

Powis, B., Strang, J., Griffiths, P., Taylor, C., Williamson, S., Fountain, J., & Gossop, M. (1999). Self-reported overdose among injecting drug users in London: extent and nature of the problem. *Addiction, 94*(4), 471-478. doi:10.1046/j.1360-0443.1999.9444712.x

Roxburgh, A., & Breen, C. (2016a). *Accidental drug-induced deaths due to opioids in Australia, 2012*. Sydney: National Drug and Alcohol Research Centre, UNSW Australia, available at: https://dlnstorage.blob.core.windows.net/drt101/1744/ndarc-bulletin-opioid-deaths-2012.pdf [accessed 29 June 2016]

Roxburgh, A., & Breen, C. (2016b). *Drug-related hospital stays in Australia, 1993-2014*. Sydney: National Drug and Alcohol Research Centre, UNSW Australia, available at: https://dlnstorage.blob.core.windows.net/drt101/1738/1993-2014-nidip-drug-trends-hospital-bulletin-final.pdf [accessed 29 June 2016]

Sergeev, B., Karpets, A., Sarang, A., & Tikhonov, M. (2003). Prevalence and circumstances of opiate overdose among injection drug users in the Russian federation. *Journal of Urban Health, 80*(2), 212-219. doi:10.1093/jurban/jtg024

Sindicich, N., Stafford, J., & Breen, C. (2016). Australian Trends in Ecstasy and related Drug Markets 2015. Findings from the Ecstasy and Related Drugs Reporting System (EDRS). Australian Drug Trends Series No. 154. Sydney, National Drug and Alcohol Research Centre, UNSW Australia.

Strang, J., Best, D., Man, L.-H., Noble, A., & Gossop, M. (2000). Peer-initiated overdose resuscitation: fellow drug users could be mobilised to implement resuscitation. *International Journal of Drug Policy, 11*(6), 437-445. doi:http://dx.doi.org/10.1016/S0955-3959(00)00070-0

Strang, J., Kelleher, M., Best, D., Mayet, S., Manning, V., Semmler, C., Offor, L., Titherington, E., Santana, L., & Best, D. (2007*). The Naloxone programme: investigation of the wider use of Naloxone in the prevention of overdose deaths in pre-hospital care*, National Treatment Agency for Substance Misuse.

Tobin, K. E., Davey, M. A., & Latkin, C. A. (2005). Calling emergency medical services during drug overdose: an examination of individual, social and setting correlates. *Addiction, 100*(3), 397-404. doi:10.1111/j.1360-0443.2005.00975.x

Turillazzi, E., Riezzo, I., Neri, M., Bello, S., & Fineschi, V. (2010). MDMA Toxicity and Pathological Consequences: A Review About Experimental Data and Autopsy Findings. *Current Pharmaceutical Biotechnology, 11*(5), 500-509.

UN Office on Drugs and Crime (UNODC). (2011). *World Drug Report 2011*, available at: https://www.unodc.org/documents/data-and-analysis/WDR2011/World_Drug_Report_2011_ebook.pdf [accessed 29 June 2016]

UN Office on Drugs and Crime (UNODC). (2014). *World Drug Report 2014*, available at: https://www.unodc.org/documents/data-and-analysis/WDR2014/World_Drug_Report_2014_web.pdf [accessed 29 June 2016]

SUGGESTED CITATION

Sutherland, R., Entwistle, G. & Breen, C. (2016). Stimulant and depressant overdose among a sample regular psychostimulant users in Australia, 2007-2015. Ecstasy and Related Drug Trends Bulletin, July 2016. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.