



A Snapshot of Substance Use: Licit and Illicit Drug Use 'Yesterday' among People Who Inject Drugs in Australia (2006-2015).

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KEY FINDINGS

- Past research has shown that exact recall methods, including the 'Yesterday' method (i.e., reporting on substance use the day prior to interview), minimise under-reporting.
- This measurement technique can also reveal whether particular drug forms are more dominant, and allow assessment of same-day use of substances whose interactive effect may be associated with greater risk of harm.
- The aims of this study were to explore changes in use of the following substances 'yesterday' in the IDRS 2006-2015 study: i) specific licit and illicit substances, ii) opioid and methamphetamine forms, and iii) opioid and other depressant use.
- Results revealed general stability over time in the proportion reporting use of cannabis, opioids, alcohol, and cocaine, with the former two being the primary substances consumed.
- This stability was also evident in regards to the relative prevalence of particular opioid forms (i.e., opioid substitution treatment, pharmaceutical opioids and heroin).
- Prevalence of methamphetamine use followed a U-shaped curve over the 2006-2010 period; further analysis revealed that increases in use were predominantly driven by same-day use of opioids and methamphetamine. Greater dominance of crystal use over other lower-purity methamphetamines forms in recent studies relative to other indicators may indicate the necessity for targeted harm reduction strategies.
- Further, around two-fifths of the sample each year reported using opioids with other depressants (i.e., alcohol and benzodiazepines), despite general consensus as to the risk of overdose with concomitant use, and general advice to clinicians and consumers to this effect.
- These findings emphasise the need for healthcare professionals and harm reduction services to educate PWID regarding high-risk consumption practices.

BACKGROUND

Monitoring changes in substance use in Australia and globally over time is critical to address existing and emerging social, health, and economic problems related to substance abuse (1). However, measurement can be challenging given that use within a population can fluctuate due to various factors (e.g., availability, price, and purity), and identification as a 'drug user' is often stigmatised. Consequently, integration of data from various sources (e.g., general population surveys, longitudinal studies, key informant data, analysis of routine records, and statistics) repeatedly over time is necessary to ensure accurate identification of changes in substance use and associated behaviours within the general population (1).

Cross-sectional repeated surveys with subpopulations, such as people who inject drugs (PWID), is an important component of such monitoring as they generally target those at greatest risk of harm. Such research typically involves retrospective self-report of substance use and related behaviours (e.g., route of administration, purchase price, and associated harms including overdose, injection-related injuries, and blood-borne virus) within a certain timeframe. Typical methods for assessing patterns of substance use include: i) quantity/frequency or graduated frequency estimation: reports of 'average' consumption or average frequency of ingesting a certain quantity within a reference period, or ii) exact recall: reports of specific occasions of use (2). Frequency estimation is limited in that participants are often summarising behaviour which may be variable over a given period (e.g., past six months) and they may use heuristics to aid responding. Exact recall provides a more accurate and detailed account of use within the given period (a caveat being that use within the reference period may be atypical) (3).

Both methods can be subject to recall bias, with declines in accuracy according to length of the reference period. However, one type of exact recall method, the 'Yesterday' method (i.e., exact recall of consumption yesterday), has been shown to minimise recall issues and under-reporting

bias relative to other methods (4-6). Indeed, this measure has been recommended for use, alongside those which capture longer-term outcomes and individual variation in consumption, particularly amongst samples with heavier patterns of substance use (7, 8).

A particular strength of the 'Yesterday' method in substance research is that it can capture same-day concurrent substance use (i.e., use of more than one drug on the same day) (9, 10). Same-day concurrent substance use can increase risk of adverse events, and the interactive pharmacological effects of certain substances can enhance their abuse liability. For example, concomitant use of opioids with other depressants, such as benzodiazepines and alcohol, may have a synergistic central nervous system (CNS) effect, increased sedation and greater motor impairment and heightening the risk of falls, injuries and overdose (11, 12).

As such, the aim of this study was to explore substance use 'yesterday' in a cross-sectional repeated survey of PWID. The Illicit Drug Reporting System (IDRS) is a monitoring system which includes an annual survey of PWID in state and territory capital cities in Australia. Primary substances used by this sample include opioids (i.e., heroin, pharmaceutical opioids, and opioid substitution treatment) and methamphetamine (i.e., speed, base, and crystal/ice forms). Thus, data from 2006 to 2015 interviews were extracted to explore changes in use of the following 'yesterday':

- Specific licit (e.g., alcohol) and illicit substances (e.g., methamphetamine, heroin)
- Opioids and methamphetamine (including differentiation by form); and
- Opioid and other depressants (i.e., benzodiazepine and alcohol).

METHOD

Participants and Procedure

The Illicit Drug Reporting System (IDRS) is an annual study designed to monitor emerging trends in the illicit drug market in Australia. Detailed information on the methodology of the survey and characteristics of PWID who participated in the IDRS survey between 2006 and 2015 can be found in the national and state reports available on the NDARC website: <http://www.drugtrends.org.au/>.

Participants are recruited using a variety of methods, including advertisements distributed through Needle and Syringe Program (NSP) outlets, pharmacies and health services, as well as via snowball methods

(recruitment of friends and associates through word of mouth). In order to satisfy eligibility criteria, participants had to: 1) be aged 17 years or older, 2) self-report injecting drugs at least monthly in the six months preceding the interview, and 3) self-report residing for at least the 12 months prior in the capital city in which the interview was conducted. Interviews were conducted face-to-face at locations convenient to the participant, such as health services and NSP outlets. Written informed consent was obtained prior to interview, and participation was voluntary and confidential.

Key Measures

Participants were asked to report all licit (including prescribed and non-prescribed medicines) and illicit substances that they had consumed yesterday (i.e., the day prior to interview). Substances assessed included: alcohol, cannabis, heroin, cocaine, benzodiazepines, antidepressants, pharmaceutical opioids (i.e., morphine, oxycodone, fentanyl, tramadol, and codeine products), opioid substitution treatment (OST; i.e., methadone, buprenorphine, and buprenorphine-naloxone), and methamphetamine (i.e., base, speed, and ice/crystal). Use of any opioid was identified by reporting of pharmaceutical opioid, OST and/or heroin use.

Analyses

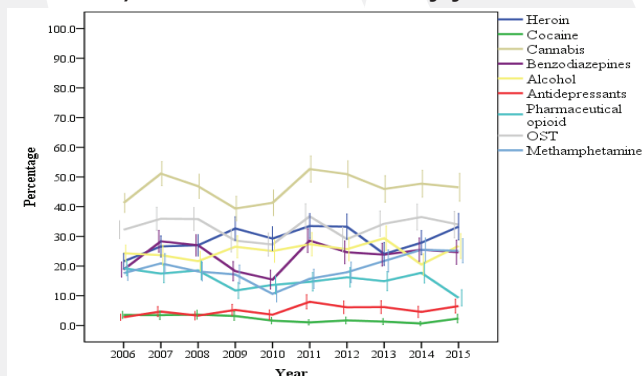
SPSS Statistics Version 22 (IBM, Somers, NY) was used to calculate descriptive statistics, including percentages and 95% confidence intervals for categorical outcomes. Participants with missing data for the 'yesterday' item were excluded, however participants who did not report any drug use 'yesterday' were retained in the sample. Participants in the 2007-2015 interviews who reported completing the IDRS in previous year(s) were excluded from the sample to ensure independence of observations at each time point (13); sensitivity analyses including these participants are presented in Supplementary Materials. Sample sizes for each year were thus: 2006: n=911; 2007: n=579; 2008: n=578; 2009: n=537; 2010: n=499; 2011: n=490; 2012: n=481; 2013: n=484; 2014: n=493; 2015: n=463. It should be noted that data presented here do not represent all substances consumed yesterday: those substances not consistently assessed from 2006-2015 (i.e., tobacco, anti-psychotics) or coded as 'other drug' are not presented.

RESULTS

Use of Specific Licit and Illicit Substances 'Yesterday'

Figure 1 shows that the most commonly consumed substance 'yesterday' from 2006 to 2007 was cannabis, followed by OST and heroin. Approximately half of the sample reported cannabis use 'yesterday' each year, with the exception of a decline in 2006 (41%), and then again in 2009 (39%) and 2010 (41%). In regards to opioid use: i) OST use has remained relatively stable (27% to 37%); ii) heroin use has remained relatively stable (27% to 34%), with the exception of declines in 2006 (22%) and 2013 (24%); and iii) pharmaceutical opioid use has remained relatively stable, with the exception of a decline from 2014 (18%) to 2015 (9%). In contrast, methamphetamine use has declined (21% in 2007 to 11% in 2010), and then increased again, with one-quarter of the sample reporting use in 2014 (26%) and 2015 (25%). A similar pattern was evident for benzodiazepine use, from 28% in 2007 to 15% in 2010, stabilising at around one-quarter of the sample reporting use from 2011 onwards. Stable rates of use have been evident for alcohol (21% to 29%), with low reporting of anti-depressant (3% to 8%) and cocaine (0.6% to 4%) use.

Figure 1. Percentage of participants reporting use of each substance 'yesterday' (i.e., day prior to interview) in the IDRS interview by year.



Source: IDRS participant interviews

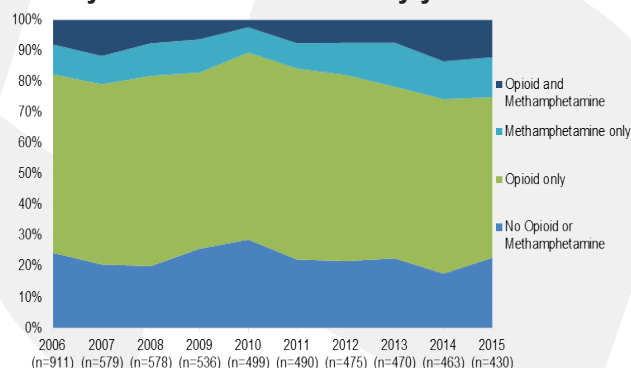
Note that these data exclude those participants in the 2007-2015 interviews who reported participating in the IDRS in a previous year (n=5,515). Error bars represent 95% confidence intervals.

Use of Opioids and Methamphetamine 'Yesterday'

Concurrent use of opioids and methamphetamine

From 2006 to 2015, between 18% and 29% of the sample did not report use of opioids and/or methamphetamine on the day prior to interview (Figure 2). Indeed, the majority of the sample report use of opioids only (i.e., excluding methamphetamine), although this number declined from 2011 (62%) to 2015 (52%). There was a U-shape trend for use of any methamphetamine, with greater rates of use in 2007 (21%) and 2014/2015 (25% and 25%), although these were trends were predominantly driven by same-day concurrent opioid and methamphetamine use. Specifically, 12% reported using opioids and methamphetamine yesterday in 2007, 2% in 2010, and then 12% again by 2014 and 2015.

Figure 2. Percentage of participants reporting use of opioids (heroin, pharmaceutical opioids, and opioid substitution treatment) and methamphetamine yesterday in the IDRS interview by year.



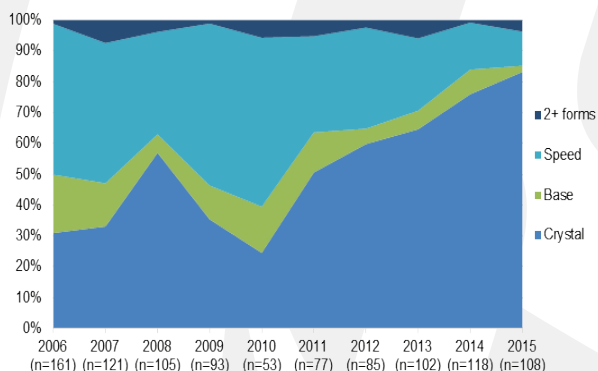
Source: IDRS participant interviews

Note that these data exclude those participants in the 2007-2015 interviews who reported participating in the IDRS in a previous year (n=5,987).

Methamphetamine forms

Breakdown of use by form amongst those who reported methamphetamine use 'yesterday' (Figure 3) showed use of base declined from 2006 (19%) to 2008 (6%), repeating this pattern again from 2010 (15%) to 2015 (2%). Speed and crystal/ice were the primary forms used, although their relative dominance has shifted several times. In 2007, speed (46%) was more commonly used by methamphetamine consumers yesterday than crystal (33%). This reversed briefly in 2008 (57% and 33% for crystal and speed, respectively), and then a similar trend was observed in 2009 and 2010. Since 2011 though, the ratio of crystal to speed consumers has been increasing: 51% and 31% of methamphetamine consumers used crystal and speed, respectively in 2011, whereas in 2015 it was 83% and 11%, respectively.

Figure 3. Percentage of participants by year who report methamphetamine use yesterday according to form used.



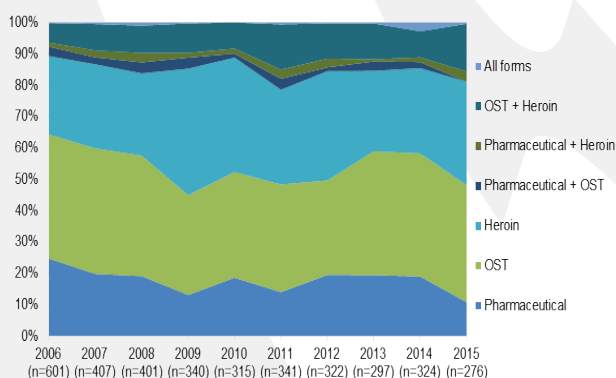
Source: IDRS participant interviews

Note that these data exclude those participants in the 2007-2015 interviews who reported participating in the IDRS in a previous year (n=1,023).

Opioid forms

Analyses restricted to those who used any opioid yesterday shows use of pharmaceutical opioids only declined from 2006 (25%) to 2009 (13%), repeating this pattern again from 2014 (19%) to 2015 (11%). Use of OST only yesterday amongst those who report any opioid use has remained relatively stable between 32% and 40%, as has use of heroin only (7% to 14%). Between one-tenth and one-fifth of the sample each year have reported using two or more opioid forms yesterday, with the greater part of this comprising concurrent OST and heroin use. Indeed, there have been small surges in use of this combination, with 14% and 15% of opioid consumers reporting such use yesterday in 2011 and 2015 (Figure 4).

Figure 4. Percentage of participants by year who report opioid use yesterday according to form used*.



Source: IDRS participant interviews

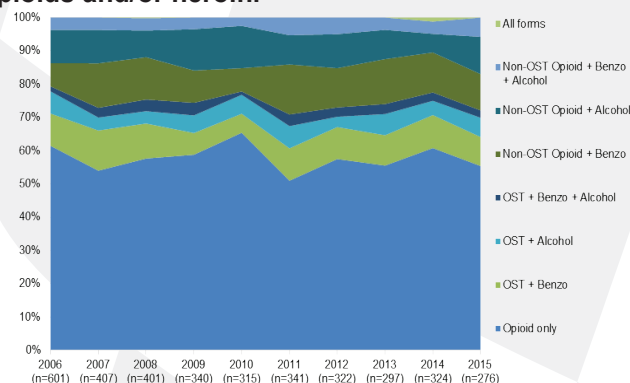
*Breakdown is by whether participants reported using pharmaceutical opioids only; OST only; heroin only; pharmaceutical opioids and OST; pharmaceutical opioids and heroin; OST and heroin; or pharmaceutical opioids, OST and heroin, yesterday.

Note that these data exclude those participants in the 2007-2015 interviews who reported participating in the IDRS in a previous year (n=3,624).

Use of Opioids and other Depressants 'Yesterday'

Analyses of same-day concurrent use of opioids and depressants were restricted to participants who had consumed opioids only, with differentiation of concurrent use with OST versus non-OST opioids (i.e., pharmaceutical opioids and heroin) given evidence of reduced mortality risk with long-term methadone maintenance dosing (14). Around two-fifths of the sample reported using an opioid with benzodiazepines and/or alcohol yesterday, and this proportion was relatively consistent over the years (35% to 49%). The majority of this comprised use of non-OST opioids and benzodiazepines (around one-tenth; 11% in 2015), non-OST opioids and alcohol (around one-tenth each year; 11% in 2015), and OST and benzodiazepines (around one-tenth each year; 9% in 2015). Small numbers reported same-day use of opioids with both benzodiazepines and alcohol.

Figure 5. Percentage of participants by year who report opioid use yesterday according to concomitant benzodiazepine/alcohol use. Non-OST opioid use comprised use of pharmaceutical opioids and/or heroin.



Note that these data exclude those participants in the 2007-2015 interviews who reported participating in the IDRS in a previous year (n=3,624).

CONCLUSIONS AND IMPLICATIONS

The 'Yesterday' method represents a unique method of capturing rates of substance use at a single point in time and in a manner than minimises under-reporting (8)&. The primary substances consumed 'yesterday' by PWID who participated in the IDRS from 2006 to 2015 comprised cannabis, OST, and heroin, in line with findings from this project when using a longer reference period (i.e., any use of the substance in the preceding six months) (15). Rate of use of each substance amongst the sample remained relatively stable, with the exception of temporary declines in benzodiazepine use, and recent declines in pharmaceutical opioid use.

Past descriptions of the sample as predominantly opioid-using (15) were reinforced when comparing use of any opioid versus any methamphetamine, although there were recent increases in methamphetamine use, predominantly driven by a greater number reporting same-day concurrent opioid and methamphetamine use (similar to findings in 2007). This U-shaped trend for any methamphetamine use reflects findings when using the longer reference period of use in the 'past six months' (15). The present findings are distinct relative to using the longer timeframe in regards to use of the different methamphetamine forms. Data on past six month substance use in the 2015 IDRS study revealed that 67% of the total sample had used crystal, and 25% had used speed (noting that participants may report use of one or both forms) (15). In contrast, data on substance use yesterday in the 2015 IDRS study showed that 85% of methamphetamine consumers had used crystal methamphetamine only, while 11% had used speed only. The 'Yesterday' method has been shown to minimise under-reporting bias relative to other methods (4-6). Thus, this finding of greater prevalence of use of the higher purity methamphetamine form, relative to the lower purity speed form, is concerning given greater risk of harms associated with use of the crystalline form (16).

Use of the 'Yesterday' method also revealed general stability within the sample in regards to the use of different opioid forms (OST, pharmaceutical opioids, and heroin over time). However, a substantial proportion of the sample (up to one-third) at each time point reported same-day use of opioids with benzodiazepines/ alcohol yesterday. Further, the number who reported engaging in this behaviour was relatively consistent each year. This is despite the fact that the risk of harm (e.g., falls, injuries, and overdose) associated with sedation effects of concomitant depressant use have been long acknowledged (17), and prescribing guidelines for clinicians and medicine information for patients advise against such use. A number of these individuals consumed OST with benzodiazepines/ alcohol (17% in 2015), arguably a less risky practice given evidence of reduced mortality risk with long-term stable methadone maintenance dosing (14). However, the regularity of OST use could not be ascertained, and the majority of remaining individuals were consuming non-OST medicines (i.e., pharmaceutical opioids and/or heroin) with benzodiazepines/alcohol (28% in 2015). Data were not collected on whether medicines were prescribed or not, nor whether participants regularly engaged in same-day concurrent use. Despite this, these findings speak to the importance of explicit assessment of concomitant sedative use when prescribing and monitoring treatment, and of

ensuring that harm reduction services (e.g., needle and syringe programs) educate broadly on the harms of concomitant depressant use.

Overall, these findings demonstrate the value of using the 'Yesterday' method to minimise under-reporting of substance use alongside individual-level measures of longer-term consumption practices. Whilst it should be noted that the IDRS survey comprises a sentinel sample which may not be generalisable to all PWID in Australia, and has inherent those biases associated with self-report data, the current study highlights notable trends over time in substance use. Specifically, this study revealed a greater dominance of the higher-purity methamphetamine form, crystal, amongst consumers than originally reported, and stable high rates of same-day depressant use; both practices which are associated with greater harm. The fact that these patterns of same-day use continue to remain high over a decade, despite unequivocal evidence that they are problematic combinations if given clinically (and actively discouraged in clinical guidelines) and high risk combinations if used illicitly, is an important reminder for prescribers and harm reduction services to reinvigorate efforts to educate against this practice.

ACKNOWLEDGEMENTS

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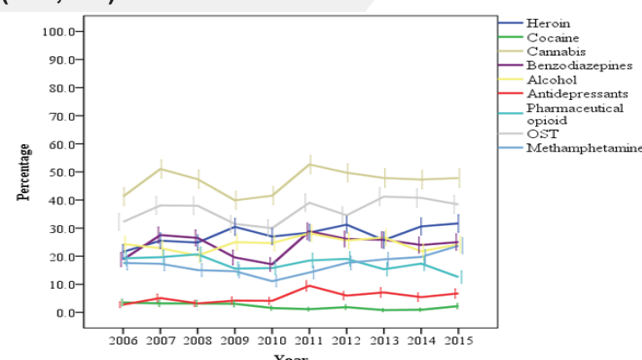
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SUGGESTED CITATION

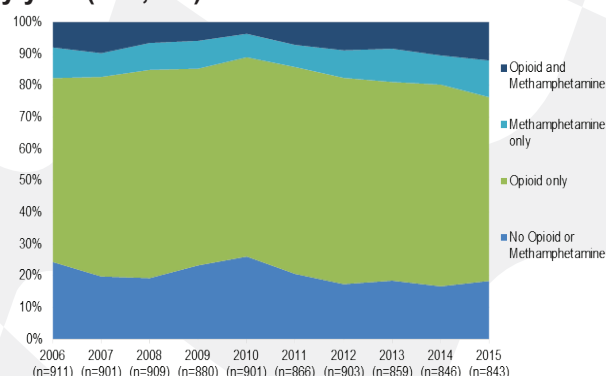
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Supplementary Figure 1. Percentage of participants reporting use of each substance 'yesterday' (i.e., day prior to interview) in the IDRS interview by year (n=8,954).



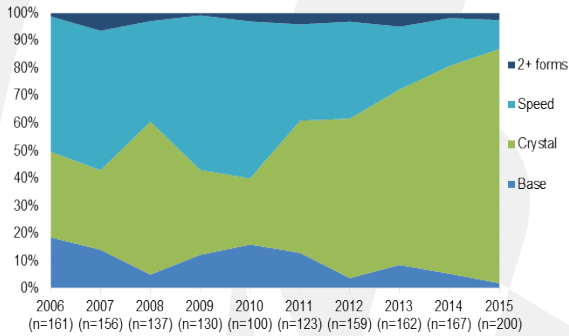
Source: IDRS participant interviews
 Note: Error bars represent 95% confidence intervals.

Supplementary Figure 2. Percentage of participants reporting use of opioids (heroin, pharmaceutical opioids and opioid substitution treatment) and methamphetamine yesterday in the IDRS interview by year (n=8,819).



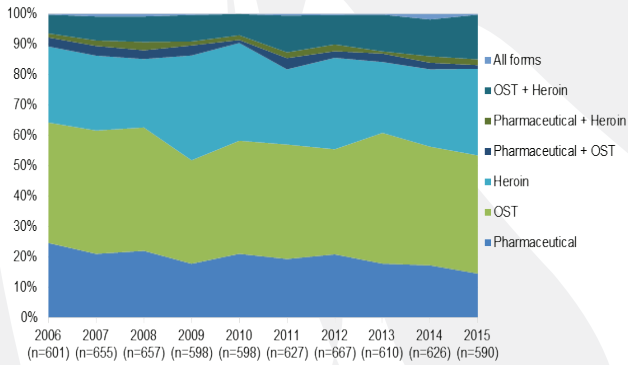
Source: IDRS participant interviews

Supplementary Figure 3. Percentage of participants by year who report methamphetamine use yesterday according to form used (n=1,495).



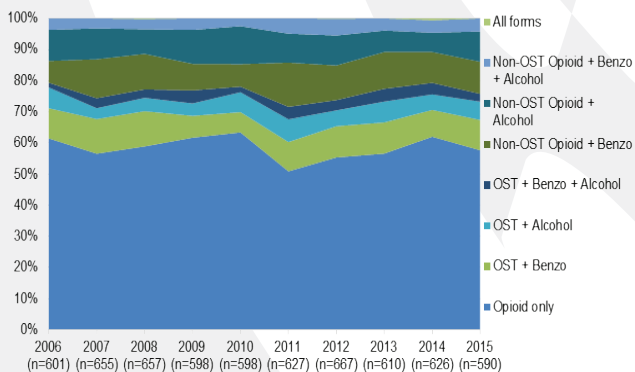
Source: IDRS Participant interviews

Supplementary Figure 4. Percentage of participants by year who report opioid use yesterday according to form used (n=6,229).



Source: IDRS Participant interviews

Supplementary Figure 5. Percentage of participants by year who report opioid use yesterday according to concomitant benzodiazepine/alcohol use (n=6,229).



Source: IDRS Participant interviews