



Simultaneous use of alcohol with methamphetamine but not ecstasy linked with aggression among young adult stimulant users



Ellen M. Leslie^{a,b,*}, Andrew Smirnov^b, Adrian Cherney^a, Helene Wells^{c,d}, Margot Legosz^d, Robert Kemp^e, Jake M. Najman^{a,b}

^a School of Social Science, The University of Queensland, St Lucia, QLD 4072, Australia

^b Queensland Alcohol and Drug Research and Education Centre, School of Public Health, The University of Queensland, Herston Rd, Herston, QLD 4006, Australia

^c Griffith Youth Forensic Service, School of Criminology & Criminal Justice, Griffith University, Mt Gravatt, QLD 4122, Australia

^d Crime and Misconduct Commission, North Tower Green Square, St Pauls Terrace, Fortitude Valley, QLD 4006, Australia

^e Queensland Health, Butterfield St, Herston, QLD 4006, Australia

HIGHLIGHTS

- Alcohol consumption is a ubiquitous feature of amphetamine-type stimulant use.
- Risky simultaneous alcohol and methamphetamine use is linked with aggression.
- No association found between simultaneous use of alcohol and ecstasy and aggression.
- Policy challenges of alcohol and amphetamine-type stimulant use are interlinked.

ARTICLE INFO

Article history:

Received 11 August 2016

Received in revised form 27 January 2017

Accepted 30 January 2017

Available online 2 February 2017

Keywords:

Ecstasy

Methamphetamine

Amphetamine-type stimulants

Alcohol

Aggression

Young adult

ABSTRACT

Introduction: Illicit stimulants are often combined with alcohol in nightlife entertainment districts, an environment where aggressive behaviour commonly occurs. While alcohol and methamphetamine use are each associated with aggressive behaviour, relatively little is known about the impact of the combined use of alcohol and amphetamine-type stimulants (i.e., ecstasy [MDMA] and methamphetamine) on aggression.

Method: Analysis of longitudinal data from a population-based sample of Australian young adult amphetamine-type stimulant users ($n = 248$) to examine: (a) prevalence and timing of simultaneous alcohol and amphetamine-type stimulant use and (b) predictors of ecstasy- and methamphetamine-related aggression and hostility. Prediction models of ecstasy- and methamphetamine-related aggression and hostility were developed using multivariate logistic regression.

Results: Simultaneous alcohol consumption and amphetamine-type stimulant use was prevalent, with drinking generally occurring before consuming amphetamine-type stimulants and while 'high'. Methamphetamine-related aggression and hostility was significantly associated with recurrent risky simultaneous methamphetamine and alcohol use (Adjusted Odds Ratio [AOR] 2.74, 95% CI 1.09–6.89), a high frequency and increasing use methamphetamine trajectory (AOR 7.23, 95% CI 1.27–41.03), and high trait aggression (AOR 5.78, 95% CI 2.53–13.20). In contrast, only trait aggression (moderate: AOR 3.01, 95% CI 1.55–5.84; high: AOR 5.02, 95% CI 2.38–10.61) was associated with ecstasy-related aggression and hostility.

Conclusions: These findings indicate a link between risky patterns of simultaneous alcohol and methamphetamine use and methamphetamine-related aggression and hostility, independent of separate use of alcohol, methamphetamine and cannabis, trait aggression, psychosis, and gender. The policy challenges of amphetamine-type stimulant and alcohol use require a targeted, multidisciplinary approach.

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1. Introduction

Violence among young adults often occurs in and around licensed venues in nightlife entertainment districts (NEDs) (Graham & Homel, 2008; Schnitzer et al., 2010). These settings are inextricably linked with both drinking and illicit substance use, including use of

* Corresponding author at: Queensland Alcohol and Drug Research and Education Centre, School of Public Health, Public Health Building, The University of Queensland, Herston Rd, Herston, QLD 4006, Australia.

E-mail address: e.leslie1@uq.edu.au (E.M. Leslie).

amphetamine-type stimulants (ATS; i.e., ecstasy [MDMA] and methamphetamine). Illicit stimulants, such as ATS, are often combined with alcohol in NEDs in the context of a 'big night out' (Pennay et al., 2015). In a study of Canadian rave attendees, 45.2% of ecstasy users and 39.3% of amphetamine users had combined alcohol with ecstasy and amphetamines, respectively (Barrett, Gross, Garand, & Pihl, 2005). While alcohol and methamphetamine use are each associated with aggression under certain circumstances (Beck & Heinz, 2013; Darke, Torok, Kaye, Ross, & McKetin, 2010; Ernst, Weiss, Enright-Smith, Hilton, & Byrd, 2008; Exum, 2006; Foran & O'Leary, 2008), relatively little is known about the impact of their combined use on aggression.

1.1. Simultaneous amphetamine-type stimulant and alcohol use

The use of other substances, particularly alcohol and cannabis, is common among ATS users (Darke, Kaye, & Torok, 2012; Herbeck et al., 2013; Scott, Roxburgh, Bruno, Matthews, & Burns, 2012). Substances may be combined for various reasons, including to produce pleasurable effects, to extend, enhance, or intensify effects, and to mitigate negative effects (Hunt, Evans, Moloney, & Bailey, 2009). Specifically, combined alcohol and ATS use may produce longer-lasting euphoria than separate use (Hernández-López et al., 2002) and may mitigate some unwanted ATS use effects (e.g., anxiety, agitation, and restlessness) (Fisk, Murphy, Montgomery, & Hadjiefthyvoulou, 2011). ATS use may also facilitate high-volume alcohol consumption, as ATS-intoxicated individuals are potentially able to consume alcohol without experiencing its usual sedative effects (Hernández-López et al., 2002). A recent study observed that ecstasy users who consumed illicit stimulants on a night out drank excessively, consuming a median of 20 standard drinks (McKetin, Chalmers, Sunderland, & Bright, 2014a). While a growing body of research suggests alcohol and drug combinations may result in greater harms than their separate use (Fisk et al., 2011; Hedden et al., 2010; Midanik, Tam, & Weisner, 2007), little is known about potential consequences of simultaneous ATS and alcohol use (Kirkpatrick, Gunderson, Levin, Foltin, & Hart, 2012).

1.2. Drinking, amphetamine-type stimulant use, and aggression

Numerous studies have separately examined the relationship between either alcohol or methamphetamine use and aggression. Both substances affect cognitive functioning, increasing the likelihood that environmental stimuli will be perceived as threatening (Attwood & Munafo, 2014; Homer et al., 2008; Payer et al., 2008), and each affects impulsivity regulation and responses to perceived threats (Clements & Schumacher, 2010; Heinz, Beck, Meyer-Lindenberg, Sterzer, & Heinz, 2011; Kim et al., 2011; Panenka et al., 2013; Scott et al., 2007). A recent Australian study suggests alcohol consumption may account for part of the association between methamphetamine use and violence (McKetin et al., 2014b), raising the possibility that alcohol and methamphetamine may interact to produce a profile of aggressive behaviour that differs from those arising from separate use. This aligns with research examining combined alcohol and cocaine use, which indicates that co-use may have synergistic effects on aggression (Macdonald, Erickson, Wells, Hathaway, & Pakula, 2008; Zhao et al., 2015). However, the relationship between combined alcohol and methamphetamine use and aggression has not been examined.

In contrast, evidence is mixed regarding ecstasy use and aggression. While there is evidence of subacute effects, with ecstasy linked with increased aggression 3–4 days post-consumption (Curran, Rees, Hoare, Hoshi, & Bond, 2004; Hoshi, Pratt, Mehta, Bond, & Curran, 2006), this association may be confounded by sleep factors (e.g., hours and quality of sleep) (Pirone & Morgan, 2010; Scott, Hides, Allen, & Lubman, 2013). Further, there is little evidence supporting an association between ecstasy use and long-term increases in aggression (Hoshi et al., 2007).

1.3. Current study

This study adds to the scarce research examining the relationship between simultaneous alcohol and ATS use and aggression, using a population-based sample of Australian young adult ATS users to address the following questions:

1. How prevalent is simultaneous alcohol and ATS use among young adult ATS users?
2. Are patterns of simultaneous alcohol and ATS use associated with ATS-attributed aggression and hostility, adjusting for ATS use trajectories, cannabis use, alcohol use, trait aggression, psychosis, and gender?

2. Methods

2.1. Participants

The Natural History Study of Drug Use (NHSU) is a prospective study of a population-based sample of young adult ATS users in South-East Queensland, Australia, which commenced in 2009. A one-page drug use screening questionnaire was mailed to 12,079 young adults (aged 19–23 years) randomly selected from the Brisbane and Gold Coast electoral roll (response rate: 49.9%). Using these screening data, a sampling frame was developed from which an ATS-user group (used ecstasy or methamphetamine ≥ 3 times within the last 12 months; $n = 352$) was recruited. This method is described in detail elsewhere (Smirnov, Kemp, Wells, Legosz, & Najman, 2014). All participants provided informed consent and the study protocol was approved by the University of Queensland's Behavioural and Social Sciences Ethical Review Committee (approval number: 2007-001-367).

Data are drawn from the baseline face-to-face interview ($n = 352$), 6-month online survey ($n = 335$), 12-month face-to-face interview ($n = 315$), 30-month online survey ($n = 319$), and 4.5-year face-to-face interview ($n = 274$; 77.8% of baseline sample). In the current study, 104 cases (29.5%) were excluded due to missing data, including 92 participants who did not complete follow-up waves and 12 participants who were missing relevant data, resulting in the present sample ($n = 248$).

Excluded participants were more likely, compared with the present sample, to be male (59.6% cf. 45.6%; $\chi^2 = 5.79$, $p < 0.05$) but did not differ significantly by age ($t = 1.12$, ns), baseline employment ($\chi^2 = 0.23$, ns), last month ecstasy (43.0% cf. 46.8%, $\chi^2 = 0.41$, ns) or methamphetamine use (12.0% cf. 14.6%, $\chi^2 = 0.40$, ns) at baseline, or mean total lifetime consumption of ecstasy pills at baseline (180.1 pills cf. 194.3 pills; $z = -0.98$, ns). They were less likely to have consumed alcohol in the last month at baseline (92.0% cf. 98.0%; $\chi^2 = 7.10$, $p < 0.01$), but among those who had consumed alcohol, there was no difference in the mean number of standard drinks (defined as any portion containing 10 g of alcohol (National Health and Medical Research Council, 2009)) consumed (8.80 cf. 7.71 standard drinks; $z = -1.04$, ns).

2.2. Measures

2.2.1. Aggression and hostility during ecstasy and methamphetamine use (outcome)

As part of a set of questions assessing subjective effects, participants reported whether they experienced feelings of aggression or hostility from using (a) ecstasy and (b) methamphetamine at three waves – baseline (timeframe: ever), 12 months (timeframe: last 12 months), and 4.5 years (timeframe: last 12 months). Dichotomous variables were created for ecstasy- and methamphetamine-related aggression and hostility (experienced feelings of aggression or hostility at any wave vs. never experienced).

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