

# Young adults' recreational social environment as a predictor of ecstasy use initiation: findings of a population-based prospective study

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## ABSTRACT

**Aims** To examine prospectively the contribution of the recreational social environment to ecstasy initiation. **Design** Population-based retrospective/prospective cohort study. **Setting** Data from screening an Australian young adult population to obtain samples of users and non-users of ecstasy. **Participants** A sample of 204 ecstasy-naïve participants aged 19–23 years was obtained, and a 6-month follow-up identified those who initiated ecstasy use. **Measurements** We assessed a range of predictors of ecstasy initiation, including elements of participants' social environment, such as ecstasy-using social contacts and involvement in recreational settings. **Findings** More than 40% of ecstasy-naïve young adults reported ever receiving ecstasy offers. Ecstasy initiation after 6 months was predicted independently by having, at recruitment, many ecstasy-using social contacts [adjusted relative risk (ARR) 3.15, 95% confidence interval (CI): 1.57, 6.34], attending electronic/dance music events (ARR 6.97, 95% CI: 1.99, 24.37), receiving an ecstasy offer (ARR 4.02, 95% CI: 1.23, 13.10), early cannabis use (ARR 4.04, 95% CI: 1.78, 9.17) and psychological distress (ARR 5.34, 95% CI: 2.31, 12.33). Adjusted population-attributable fractions were highest for ecstasy-using social contacts (17.7%) and event attendance (15.1%). **Conclusions** In Australia, ecstasy initiation in early adulthood is associated predominantly with social environmental factors, including ecstasy-using social contacts and attendance at dance music events, and is associated less commonly with psychological distress and early cannabis use, respectively. A combination of universal and targeted education programmes may be appropriate for reducing rates of ecstasy initiation and associated harms.

**Keywords** Drug offers, drug use initiation, ecstasy (MDMA), epidemiology, social contacts, social environment.

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## INTRODUCTION

During the last two decades there have been significant increases in the prevalence of ecstasy (3,4-methylenedioxymethamphetamine; MDMA) use within young adult populations [1–3]. The available global data indicate that the 12-month prevalence of ecstasy use is higher in Australia than any other country [1,3]. However, there is limited understanding of why ecstasy use is so common among young adults. Few studies evaluate possible predictors of initiation to ecstasy use,

and little attention has been paid to relevant processes of socialization [4–6].

### Social environment

Given the high prevalence of ecstasy use in some young adult populations, it is plausible that ecstasy initiation could occur through peer and cultural influences independently of risk factors such as delinquency and psychological problems [7,8]. Given young adults' propensity for social contact and the nexus between ecstasy use and

some recreational activities, the social environment of this age group warrants special attention with regard to understanding ecstasy initiation [9,10]. However, previous models of ecstasy initiation have not examined the extent of social contact with ecstasy-using peers and engagement with recreational social settings [11]. Ecstasy use has long been associated with settings involving electronic dance music, but has also been documented within other recreational settings including live music venues [9,12].

### Individual risk factors and culture

Drug use initiation is commonly associated with risk factors such as psychological distress, aggression, delinquency, previous drug use and low educational attainment [13–15]. From a risk perspective, such factors make young people more susceptible to drug-related social influence and/or contribute to changes in their social environment which expose them to drug use. However, some drug use initiation may involve an interactive process among friends, rather than passive acceptance of opportunity by susceptible individuals. One study of ecstasy users found that ecstasy initiation occurred through reciprocal social influence within groups of established friends [4]. This finding raises questions of whether social groupings of ecstasy users are necessarily predicated on shared 'deviant' characteristics. It is also suggestive of a degree of social interaction between users and non-users. This is consistent with evidence that young adult drug users can have a considerable breadth and quality of social interaction, thus facilitating the diffusion of relevant cultural norms. The receptiveness of young adults to ecstasy-related culture is also explicable in the developmental context of early adulthood, with regard to the predisposition for new information and experiences.

### Ecstasy offers and ecstasy use

Social interaction among young adults can also provide opportunities to use ecstasy. These opportunities may contribute independently to the diffusion of ecstasy use [16,17]. Previous research suggests that a lack of opportunity to use ecstasy is associated with persistent abstinence among young adults [18]. However, there is no research concerning the extent to which ecstasy-naive young adults are offered ecstasy or whether such exposure contributes to decisions to try ecstasy. Despite the high global prevalence of ecstasy use, data concerning life-time exposure are limited [19,20].

The Natural History Study of Drug Use (NHSDU) addresses the lack of knowledge concerning initiation to ecstasy use in early adulthood, and in particular the role of the social recreational environment in initiation. We

examine levels of exposure to relevant factors, including ecstasy-using social contacts and offers of ecstasy, among a group of ecstasy-naive young adults. We then prospectively investigate social environmental predictors of ecstasy initiation after 6 months, adjusting for key risk factors such as early drug use, delinquency, psychological distress and aggressive behaviour. Given the high prevalence of ecstasy use among young adults, we expect that social environmental factors will contribute to ecstasy use initiation to a greater extent than individual risk factors or previous drug use.

## METHODS

### Participants

The NHSDU is a population-based retrospective/prospective longitudinal study of a young adult cohort comprising amphetamine-type stimulant (ATS; i.e. ecstasy and methamphetamine) users and a comparison group (CG) of non-users. We used a novel application of population screening to develop a sampling frame and thereby recruit probability samples. A one-page questionnaire examining life-time drug use was mailed to 19–23-year-olds selected randomly from electoral roll data for Brisbane and the Gold Coast (Queensland, Australia). In Australia it is compulsory for citizens aged  $\geq 18$  years to be enrolled to vote. In June 2008 an estimated 82% of eligible 18–25-year-olds were enrolled [21]. The study was described as examining the health of young adults and did not highlight ATS use as a study focus. The screening response rate was 49.9% ( $n = 12\ 079$ ).

The present study focuses exclusively on our sample of CG participants. Of the young adults we screened, 77.7% ( $n = 6027$ ) had never used ecstasy or methamphetamine. From this group of ATS-naive respondents, 320 were selected randomly for participation in the CG. The number selected was limited by study resource constraints, but adequate for simple comparisons. Of this group, 63.8% ( $n = 320$ ) consented to participate. This was similar to the participation rate for the ATS-using group (67.4%), which suggests that participation did not vary considerably according to the target behaviour. With regard to age-related rates of ecstasy initiation, this group of 19–23-year-olds could be considered as being at moderate risk for commencing ecstasy use. While the average age of initiation in Australia is around 22 years, approximately 25% commence by 19 years and 50% by 21 years [22].

Participants were interviewed face-to-face at baseline (at ages 19–23 years) and surveyed via the internet at 6 months. At the 6-month follow-up, none of the ATS-using group in the broader study recanted ecstasy use, which suggests that variation between data collection

modes regarding ecstasy use disclosure may have been minimal. The internet survey was completed by 97.6% ( $n = 204$ ) of CG participants. Consequently, we had complete data for 199 CG participants.

## Measures

### *Ecstasy offers*

Previous studies define drug opportunity as any situation in which the respondent perceived that they could have used drugs if they wished [22,23]. This definition may include instances where no drug offer is forthcoming or where drug use opportunity is entirely the result of drug-seeking behaviour [23]. Questions which, instead, examine exposure to drug offers might assess the transmission of drug use behaviour more accurately than measures of ambient opportunity. We used retrospective questions at the baseline interview to assess life-time drug offers (e.g. 'has anyone *ever* offered you ecstasy, regardless of whether you accepted or declined this offer?').

### *Social contacts*

At baseline participants were asked how many ecstasy users they knew by name or face. Knowing more than 10 ecstasy users comprised the upper quartile for CG participants, and was designated as having a large set of ecstasy-using social contacts.

### *Recreational settings*

We asked participants about social recreational venues they visited during the previous 12 months. Questions were asked at the 6-month follow-up but addressed a time-period comparable to baseline measures, given the 12-month time-frame. For each variable we adopted a cut-off for venue attendance of more than once in last 12 months (reference category  $\leq$  once) to designate recurrent involvement. To distinguish between cultural settings, we examined attendance at music festivals or electronic/dance music events compared with attendance at live music venues. Music festivals and electronic/dance music events were combined in a single category on the basis of assumed cultural similarity, which is reflected in participants' attendance patterns. Australian music festivals targeting young adults tend to include an electronic/dance music element and both types of events have a pageant character, which is generally absent from other live music performances [24].

### *Psychological distress and aggressive behaviour*

Psychological distress was evaluated at baseline using the Hospital Anxiety Depression Scale (HADS). The total

scale provides a valid and reliable screen for psychological distress, with a Cronbach's alpha of 0.88–0.89 [25,26]. The HADS is appropriate for identifying psychological distress in illicit drug users because it does not refer to somatic symptoms [27]. A cut-off of 16 indicates high levels of distress [28]. Aggression was measured using the aggressive behaviour subscale of the Achenbach Young Adult Self-Report Scale (YASR) [29]. The YASR is an age-appropriate measure with demonstrated validity. It has a Cronbach's alpha of 0.84 averaged across each of the syndromes, and a Cronbach's alpha of 0.81 has been found for the aggressive behaviour syndrome [30,31]. Because co-occurring mental health problems can manifest differently for male and female drug users, we also examined the interaction terms for (i) sex and psychological distress and (ii) sex and aggression as predictors of initiation.

### *Delinquency and social outcomes*

We assessed delinquency, educational attainment and social disengagement at baseline. Retrospective self-reports of school expulsion/exclusion and leaving home early (age  $<18$  years) were used as proxies of adolescent delinquency [32,33]. Non-completion of senior high school (year 12) indicated low educational attainment. A measure of income was used as a short-term indicator of socio-economic status. This comprised three levels (high, intermediate and low), with high and low income represented by lower and upper quartiles, respectively.

## Data analysis

Due to the relatively small sample, Poisson regression was used to examine relevant univariable and multivariable associations. Because Poisson regression applied to binomial data may overestimate error variance, we used a robust error variance procedure (i.e. sandwich estimation) [34]. Within the multivariable analysis, a cumulative set of prediction models examined the extent to which ecstasy use initiation is predicted by social environment after controlling for other categories of variables. Population-attributable fractions (PAFs) were calculated for factors associated positively with ecstasy initiation using the average attributable fraction approach, whereby factors are 'removed' from the model in every possible sequence, and results averaged over all obtained fractions. This method has provided plausible adjusted estimates of PAFs [35,36]. Data were analysed using Stata Special Edition version 11.0.

## RESULTS

### **Ecstasy initiation**

At the commencement of the study none of the CG participants had ever used ecstasy. By the time of the

**Table 1** Study group characteristics and univariable associations with use of ecstasy by 6-month follow-up, reporting relative risk (RR) with 95% confidence intervals.

	Percentage used ecstasy (n)		RR (95% CI)
	With characteristic	Without characteristic	
<b>Social environment</b>			
Know >10 ecstasy users	35.3 (34)	8.5 (165)	4.16 (2.11, 8.20)***
Attended dance event (last 12 months) <sup>a</sup>	27.3 (33)	10.2 (166)	2.66 (1.30, 5.46)**
Attended live music venue (last 12 months)	13.2 (114)	13.1 (85)	1.02 (0.49, 2.10)
<b>Drug use opportunity</b>			
Ever offered ecstasy	24.4 (90)	3.7 (109)	6.66 (2.38, 18.67)***
<b>Early drug use</b>			
Used alcohol aged <14 years	28.0 (25)	10.9 (174)	2.56 (1.20, 5.48)*
Used tobacco aged <14 years	31.6 (19)	11.1 (180)	2.84 (1.30, 6.21)**
Used cannabis aged <15 years	54.6 (11)	10.6 (188)	5.13 (2.59, 10.14)***
<b>Individual factors</b>			
School suspension (ever)	27.3 (22)	11.3 (177)	2.41 (1.09, 5.37)*
Left home aged <18 years	23.8 (21)	11.8 (178)	2.02 (0.85, 4.80)
Low educational attainment <sup>b</sup>	25.0 (44)	9.7 (155)	2.58 (1.28, 5.22)**
<b>Income level<sup>c</sup></b>			
Middle	12.0 (100)	22.5 (49)	0.53 (0.25, 1.13)
Low	6.0 (50)	22.5 (49)	0.27 (0.08, 0.90)*
Psychological distress <sup>d</sup>	31.6 (19)	11.1 (180)	2.54 (1.15, 5.63)*
Aggressive behaviour <sup>e</sup>	15.0 (80)	11.8 (119)	2.84 (1.30, 6.21)**
Sex (male) × psychological distress <sup>f</sup>	14.3 (7)	13.0 (192)	1.10 (0.17, 7.02)
Sex (male) × aggressive behaviour <sup>g</sup>	50.0 (8)	11.5 (191)	4.34 (1.95, 9.65)***
Sex (male)	15.0 (80)	11.8 (119)	1.28 (0.62, 2.62)
Age ≥21 years	16.2 (105)	9.6 (94)	1.69 (0.79, 3.62)

<sup>a</sup>Includes attendance at dance or electronic music events more than once in last 12 months; <sup>b</sup>did not complete senior high school successfully (year 12); <sup>c</sup>high, middle and low levels of income based on distribution of data. High income is the reference category; <sup>d</sup>measured using the Hospital Anxiety Depression Scale; <sup>e</sup>measured using aggressive behaviour subscale of Young Adult Self Report; <sup>f</sup>interaction of sex and psychological distress. Base number 'with characteristic' refers to males with psychological distress; <sup>g</sup>interaction of sex and aggressive behaviour. Base number 'with characteristic' refers to males with aggression trait. CI = confidence interval; RR = relative risk. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

6-month follow-up, 13.1% ( $n = 199$ ) or 26 of these young adults reported having used ecstasy.

### Univariable associations

Table 1 presents the univariable associations for all considered predictors of ecstasy use initiation. Recent attendance at live music venues and leaving home before the age of 18 years were non-significant, as were gender and age. All other variables from the social environment and individual domains were associated significantly with ecstasy initiation. Lower income levels were associated negatively with initiation. All early drug use variables (alcohol, tobacco and cannabis) were associated positively with initiation.

#### Model 1

Social environment predictors are considered in multivariable model 1 (Table 2). Having a large number of ecstasy-using social contacts (defined as knowing >10 ecstasy users) and attendance at electronic/dance music

events each predicted ecstasy use initiation independently. Attending live music venues was not a significant predictor.

#### Model 2

In model 2, we add the ecstasy offer variable to the predictors from model 1 (Table 2). All variables in this model predicted ecstasy initiation significantly. However, attending live music venues was associated negatively with ecstasy initiation, whereas having a large number of ecstasy-using social contacts, attending electronic/dance music events and ever being offered ecstasy were associated positively.

#### Model 3

In model 3, we add the early drug use variables to variables from model 2 (Table 2). Of the early drug use variables, only early cannabis use (<15 years of age) predicted ecstasy initiation significantly. All other variables were associated significantly with ecstasy initiation.

**Table 2** Prediction model for initiation of ecstasy use in early adulthood ( $n = 199$ ).

	Adjusted RR (95% CI) <sup>a</sup>				Population-attributable fraction (model 4) <sup>j</sup>
	Model 1 (social environment)	Model 2 (including drug offer exposure)	Model 3 (including early drug use)	Model 4 (including individual factors)	
Know >10 ecstasy users	4.65 (2.37, 9.12)***	2.60 (1.37, 4.92)**	2.94 (1.49, 5.82)**	3.15 (1.57, 6.34)**	17.66
Attended dance event <sup>b</sup>	3.62 (1.57, 8.35)**	2.94 (1.37, 6.31)**	3.66 (1.71, 7.80)**	6.97 (1.99, 24.37)**	15.08
Attended live music <sup>c</sup>	0.49 (0.21, 1.12)	0.38 (0.18, 0.83)*	0.30 (0.13, 0.67)**	0.25 (0.09, 0.67)**	
Ever offered ecstasy		5.02 (1.62, 15.55)**	4.46 (1.43, 13.96)*	4.02 (1.23, 13.10)*	30.42
Used alcohol aged <14 years			1.29 (0.61, 2.73)	1.15 (0.51, 2.58)	
Used tobacco aged <14 years			1.16 (0.52, 2.58)	0.76 (0.34, 1.70)	
Used cannabis aged <15 years			4.25 (1.71, 10.61)**	4.04 (1.78, 9.17)**	10.19
School suspension (ever)				1.38 (0.70, 2.70)	
Left home aged <18 years				2.15 (1.10, 4.20)*	5.46
Low educational attainment <sup>d</sup>				1.83 (0.79, 4.21)	
Income level <sup>e</sup>					
Middle				1.15 (0.51, 2.56)	
Low				0.68 (0.21, 2.16)	
Psychological distress <sup>f</sup>				5.34 (2.31, 12.33)***	10.22
Aggressive behaviour <sup>g</sup>				0.72 (0.30, 1.76)	
Sex × psychological distress <sup>h</sup>				0.12 (0.02, 0.59)**	
Sex × aggressive behaviour <sup>i</sup>				3.05 (0.68, 13.64)	
Sex (male)				1.31 (0.63, 2.73)	
Age ≥21 years				2.06 (0.86, 4.93)	

<sup>a</sup>Multivariable relative risk, adjusted for all other variables in model; <sup>b</sup>attendance at music festival or dance/electronic music events > once in last 12 months; <sup>c</sup>attendance at venue (e.g. pub, bar, stadium) to see live music performance > once in last 12 months; <sup>d</sup>did not complete senior high school successfully (year 12); <sup>e</sup>high, middle and low levels of income based on distribution of data. High income is the reference category; <sup>f</sup>measured using the Hospital Anxiety Depression Scale; <sup>g</sup>measured using aggressive behaviour subscale of Young Adult Self Report; <sup>h</sup>interaction of sex and psychological distress; <sup>i</sup>interaction of sex and aggressive behaviour; <sup>j</sup>population-attributable fraction calculated using average attributable fraction method. CI = confidence interval; RR = relative risk. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

Inclusion of the early drug use variables did not diminish the magnitude of the association for the social environment and drug offer variables.

#### Model 4

Model 4 is the final model in this cumulative set of prediction models (Table 2). We add individual factors to variables from model 3. Having a large number of ecstasy-using social contacts and attendance at electronic/dance events predicted ecstasy initiation independently. The magnitude of the effect for these variables was maintained following adjustment for psychological distress and other risk factors. Early cannabis use was also an independent predictor of initiation. Psychological distress and leaving home early (age <18 years) were the only individual risk factors that were independent predictors. The results for the interaction of psychological distress and sex were also significant, and suggest that females but not males experiencing distress have an

increased likelihood of using ecstasy. However, this difference should be treated with caution due to the small numbers involved. The final model explained an estimated 32% of the variance in ecstasy initiation, based on McFadden's pseudo  $R^2$ .

#### PAF

The PAF was calculated for each significant factor, to assess the likely proportion of ecstasy use initiation caused independently by each (Table 2). The greatest PAF pertained to having ever been offered ecstasy, followed by having a large number of ecstasy-using social contacts and attending electronic/dance music events.

#### DISCUSSION

More than one in 10 of our population sample of ecstasy-naive young adults initiated ecstasy use within a 12-month time-frame. This finding is credible in the

context of the high prevalence of ecstasy offers that we observed. Factors pertaining to young adults' recreational social environment predicted ecstasy initiation independently of risk factors typically associated with exposure to drug-related social influence, such as delinquency, aggressive behaviour and psychological distress. Psychological distress comprised another distinct risk factor for ecstasy initiation and, consistent with previous research, early cannabis use also contributed [37,38]. The separate and distinct effects of social environmental factors, early cannabis use and psychological distress are suggestive of different pathways to ecstasy initiation. However, the risk of initiation attributable to social environmental factors appears to be greater than that attributable to psychological distress or cannabis use.

### Social environment and drug offers

Having a large number (>10) of ecstasy-using social contacts and being involved in electronic/dance music events were associated robustly with an increased likelihood of ecstasy initiation. In contrast, attendance at live music venues was associated with a reduced likelihood of initiation. This suggests that, despite the population-level diffusion of ecstasy use in Australia, there is a continued nexus between ecstasy use and specific cultural forms. Those who attend live music performances but not the other types of events might have less exposure to ecstasy use or less affinity with associated cultural forms, and therefore less interest in trying ecstasy.

Given that engagement with ecstasy-using social contacts and electronic/dance music events preceded first ecstasy use, these types of social involvement cannot have arisen as a consequence of ecstasy use. Instead, they are likely to have contributed to ecstasy initiation, which is suggestive of some process of social influence.

The independent contribution of ecstasy-using social contacts departs from previous studies which characterize young people's affiliation with drug users as an aspect of delinquency, social deviance and underlying psychological problems [39]. Ecstasy initiation was not associated independently with school suspension/expulsion, low educational attainment, income or aggressive behaviour. However, ecstasy initiation was associated positively with leaving home early (age <18 years), which could be because these young people had different sources of social influence compared to their peers. Furthermore, the relationship between social environment and initiation appeared to apply in particular to psychologically healthy young adults; none of the young adults with psychological distress attended electronic/dance music events. Thus, engagement with relevant recreational settings and networks might be greater for young adults with comparatively high levels of social functioning and

psychological wellbeing. Moreover, the findings concerning social contact are consistent with evidence suggesting that young adult drug users may have a reasonable breadth and quality of friendships compared to non-users [40].

The characteristics of this group of ecstasy initiators also provide additional support for the proposition that ecstasy use is increasingly normative among recent young adult cohorts [41–44]. Although we did not measure drug use attitudes, the high prevalence of offers we found among ecstasy-naive young adults would probably be untenable without a considerable level of community acceptance of ecstasy use. Similarly, cannabis-related social norms of US birth cohorts are strongly predictive of adolescent cannabis use [41,45].

Our study is novel for its inclusion of ecstasy offers in the model of ecstasy initiation. Being offered ecstasy predicted initiation independently of other factors, including early cannabis use. By examining ecstasy offers we could assess whether the contribution of social environmental factors could be explained simply in terms of facilitating access to ecstasy. We found the provision of ecstasy offers explained a proportion but not all of the relationship between the recreational environment and ecstasy initiation. Other aspects of social engagement, such as observing or talking about ecstasy use, might encourage initiation [4,46,47]. Social contact might also be a proxy for shared values and interests [48]. The connection between young adults' culture and ecstasy use highlights the importance of considering social norms in the development of policy responses.

### Psychological distress

Psychological distress, evaluated by symptoms of anxiety and depression, predicted ecstasy initiation independently. This finding is consistent with earlier prospective research [49,50]. Moreover, our study is the first to consider psychological distress independently of social environmental factors and early drug use. Our findings are suggestive of a direct pathway from distressing symptoms to ecstasy initiation, rather than an indirect pathway involving processes such as social deviance and drug sensitization. Our testing of the interaction between sex and psychological distress tentatively suggests that the link between distress and ecstasy use may apply to females more than males.

### Population-level implications

With regard to population-attributable risk, having ecstasy-using social contacts, attending electronic/dance music events and being offered ecstasy together account for more than 60% of the estimated cases of ecstasy initiation. This reflects the significant exposure of young

adults to these factors. For ecstasy-naive young adults who attend electronic/dance music events, location-based harm reduction programmes can support decisions not to use. However, credible universal prevention programmes are required to reach all young adults at risk of being offered. Young adults are likely to perceive ecstasy use as relatively safe on the information available to them [18]. Given the minimal nature of normative constraints upon young adults' uptake of ecstasy use, the capacity of prevention programmes to safeguard public health might be increased by also focusing on risk reduction rather than solely on preventing use [51, 52]. Behaviour such as high-dose ecstasy use could be a tenable and measurable target [53].

While pertaining to a smaller subpopulation of young adults, the independent and direct contribution of psychological distress is notable, and adds to previous findings. Education programmes and health services for young people should take account of anxiety and depression as possible motives for trying ecstasy. Early interventions for preventing or delaying cannabis use may also provide a small reduction in young adults' rates of ecstasy initiation.

### Strengths and limitations

The NHSDU is a population-based study. Consequently, it is well placed to provide estimates of drug use initiation and levels of community exposure to different risk factors. It also used a clearly defined measure of ecstasy use opportunity.

There are some study limitations. First, personality traits not considered in the present study, such as sensation-seeking, could create a propensity not only to use ecstasy but also to engage in relevant social settings. Future prospective research should consider such factors. Furthermore, caution should be exercised in generalizing findings to other populations, especially given that contextual factors (e.g. social norms) may differ in lower-prevalence settings.

Although the screening response rate was reasonable compared to those attained routinely from mail-out surveys and other surveys of drug use [54–56], bias may have resulted from non-response. None the less, our drug use estimates are similar to other Australian population estimates [22]. In addition, our interview data concerning ecstasy offers and early drug use are retrospective and subject to recall bias, although participants were recruited close to the age at which ecstasy offers were first received (median of 3 years between first offer and baseline interview). The moderate sample size also means that there was low power to detect small differences. Finally, because we relied upon self-report, in some instances what participants believed to be ecstasy may have contained no MDMA.

### CONCLUSION

Our findings indicate that there are multiple predictors associated with ecstasy use initiation among young Australian adults. The most common predictors include extensive social engagement with ecstasy users and involvement in recreational settings where ecstasy is used. The robustness of these predictive factors is explicable in terms of the prevalence of ecstasy use among young adults and the social acceptance of ecstasy compared to other drug use. A substantial proportion of the ecstasy-naive young adult population has some social involvement with ecstasy users. Early cannabis use and distressing symptoms of anxiety and depression comprise less common risk factors. With regard to psychological distress, our findings are suggestive of a direct link between such symptoms and ecstasy initiation, thus elucidating the findings of previous research. Given the different characteristics of these predictive factors, a combination of strategies is required, focused on reducing rates of initiation and also reducing the harms for young adults who try ecstasy.

### Declaration of interests

None.

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