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Short Communication

# Is there any evidence of changes in patterns of concurrent drug use among young Australians 18–29 years between 2007 and 2010?

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## HIGHLIGHTS

- We focused on drug use profiles in a large nationally representative survey (2010).
- There were four clusters of concurrent drug use among young adults (18–29 years).
- Of those who used any drug, about half concurrently used 2 or more drugs (past year).
- There was a little meaningful change in drug clusters from 2007.

## ARTICLE INFO

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## ABSTRACT

*Background:* A significant minority of Australians engage in concurrent drug use (using more than one drug in a given period). We examined clusters and correlates of concurrent drug use using the latest available nationally representative survey data on Australian young adults.
*Sample:* 3836 participants aged 18–29 years (mean age 24 years) from the 2010 National Drug Strategy Household Survey (NDSHS).
*Method:* Clusters were distilled using latent class analysis of past year use of alcohol, tobacco, cannabis, cocaine, hallucinogens, ecstasy, ketamine, GHB, inhalants, steroids, barbiturates, meth/amphetamines, heroin, methadone/buprenorphine, other opiates, painkillers and tranquillisers/sleeping pills.
*Results:* Concurrent drug use in this sample was best described using a 4-class solution. The majority (87.5%) of young adults predominantly used alcohol only (50.9%) or alcohol and tobacco (36.6%). 10.2% reported using alcohol, tobacco, marijuana, and ecstasy, and 2.3% reported using an extensive range of drugs.
*Conclusion:* Most drug use clusters were robust in their profile and stable in their prevalence, indicating little meaningful change at the population level from 2007. The targeting of alcohol and tobacco use remains a priority, but openness to experiencing diverse drug-related effects remains a significant concern for 12.5% of young people in this age group.



## 1. Introduction

Concurrent use (here defined as the use of more than one drug in a specified period, typically 1–12 months) is highly prevalent in young adulthood (Carter et al., 2013; Chiauzzi, DasMahapatra, & Black, 2013; Chung, Kim, Hipwell, & Stepp, 2013; Moss, Chen, & Yi, 2013; Font-Mayolas et al., 2013; Reyes, Perez, Colon, Dowell, & Cumsille, 2013; White et al., 2013). When drugs are combined, there are risks of cumulative and synergistic effects on brain function (Connor, Gullo, White, & Kelly, 2014; Licata & Renshaw, 2010) and mental health problems (Quek et al., 2013; Smith, Farrell, Bunting, Houston, & Shevlin, 2011; White et al., 2013). In an analysis of the 2007 national survey data (AIHW, 2008), we examined the extent to which a nationally representative sample of young adults aged 18–29 years used different combinations of alcohol, tobacco, and other drugs. We established five clusters of substance use: the majority of young adults predominantly used alcohol only (52.3%), or alcohol and tobacco (34.2%). The other classes were cannabis, ecstasy, and licit drug use (9.4%), cannabis, amphetamine derivative, and licit drug use (2.8%), and sedative and alcohol use (1.3%).

In this paper we replicated this analysis for the 2010 national survey data (AIHW, 2011) to assess the robustness of drug use clusters, and whether there had been changes from 2007 to 2010 in patterns and correlates of concurrent drug use. As in our analysis of the 2007 data

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and related research (Carter et al., 2013; Chung et al., 2013; Smith et al., 2011), we examined the use of one or more substances in the previous year. The use of this time frame means that proximity of the use of different substances is closer than studies that use lifetime prevalence data on polydrug use (Agrawal, Lynskey, Madden, Bucholz, & Heath, 2007; Connor et al., 2014; Lynskey et al., 2006; White et al., 2013), and cell sizes for clusters are sufficiently large to permit analysis of predictors of cluster membership.

## 2. Material and methods

### 2.1. Sample

The sample consisted of 3836 participants in the 2010 National Drug Strategy Household Survey (AIHW, 2011) who were aged 18–29 years (42.3% male; mean age = 23.97; SD = 3.49). Of these, 335 (8.7%) were excluded due to non-response on any of the drug-related items and 26 were excluded because they reported completing the questionnaire in the presence of another person where the honesty of their answers may have been affected. These exclusion criteria were the same as those applied to 2007 NDSHS data.

### 2.2. Measures

The measures were identical to those applied in our prior study of 2007 data (Quek et al., 2013). Concurrent drug use was based on >1 drug used in the past year [alcohol/tobacco/marijuana/ecstasy/tranquillisers or sleeping pills/cocaine/hallucinogens/meth or amphetamine/pain-killers or analgesics, for non-medical purposes in the last 12 months]. Responses for each drug were coded as 0 "no" and 1 "yes". For the purposes of examining similarities across and within clusters, a range of potential covariates were measured. Covariates included in the analysis were: sex, couple relationship status (0 "not partnered" and 1 "partnered"), high school completion (0 "completed", 1 "not completed"), income levels (0 "$41,600 or above", 1 "$13,000–41,599", 2 "$12,999 or below", 3 "prefer not to say/don't know"), language spoken at home (0 "English", 1 "non-English"), regionality (1 "major cities", 2 "inner regional", 3 "outer regional/remote/very remote") (ABS, 2009), and depressive symptoms measured by the Kessler 10 scale (Kessler et al., 2003).

### 2.3. Survey procedure

Participants were from all Australian states and territories, and were randomly selected using a stratified design based on statistical local area (AIHW, 2011). Access to the survey data was approved by the Australian Social Science Data Archive and by the University of Queensland Human Research Ethics Committee.

### 2.4. Analysis

As per our analysis of the 2007 data, Latent Class Analysis (LCA) was used to analyse drug use. The number of classes was determined using: Bayesian Information Criteria (BIC) (Schwarz, 1978), Sample Size Adjusted Bayesian Information Criterion (SSABIC) (Sclove, 1987), and the Akaike Information Criterion (AIC) (Akaike, 1974), with lower values for each indicating optimal balance of model parsimony and model fit. The Lo–Mendell–Rubin adjusted likelihood ratio test (Lo, Mendell, & Rubin, 2001) was used to compare the fit of a model with *k* classes to a model with *k-1* classes. Entropy and average posterior probabilities were used to evaluate the classification quality. The number of significant bivariate residuals was used to access the validity of the local independence assumption of LCA. Once the optimal number of classes was determined, covariates were added to the model to examine their associations with latent classes. All analyses were performed with Mplus 6.01 (Muthén & Muthén, 2011).

## 3. Results

A six-class solution attained the lowest value of AIC, a four-class solution attained the lowest value of BIC and a five-class solution attained the lowest value of SSABIC. Results from the LMR-LRT suggested that a four-class solution fitted the data significantly better than the three-class solution and not significantly worse than a five-class solution. Simulation suggested that the performances of SSABIC and LMR-LRT were better than other criteria in model selection (Nylund, Asparouhov, & Muthén, 2007; Yang, 2006). However, since these two statistics pointed to two different solutions, both were examined on the basis of interpretability and usefulness of the classification (Muthén & Muthén, 2000). In the four-class solution, an extended range concurrent drug using class was identified. This group was further broken down into two sub-classes in the five class solution each with a very small prevalence estimates, namely, a class with very high probabilities of using all the drugs, and a class with a very high probability of using all alcohol, tobacco, marijuana and pain killers, and a moderate probability of using tranquillisers. A comparison of the participants in these two classes indicated that they had very similar demographic profiles. The four-class solution was chosen as the optimal solution as it yielded classifications that were clearly distinct and interpretable, and had adequate class sizes with high average posterior probabilities. Average posterior probabilities were over 0.80 for all classes.

Each of the four classes was described below using the probabilities of drug use in the past 12 months (see Fig. 1). Nomenclature for each class was based on the type and range of substances with posterior probabilities greater than 0.65. Class 1 ("Alcohol only"): participants in this cluster (50.9%) were predominantly alcohol users (0.78 probability of alcohol use), with a small probability (0.07) of tobacco use and nearly zero probabilities of other drug use. Class 2 ("Alcohol and tobacco"): participants in this class (36.6%) reported nearly universal alcohol use (0.99), high probability of tobacco use (0.69), moderate probability of marijuana use (0.32) and negligible probabilities of other drug use (below 0.05). Class 3 ("Marijuana, ecstasy and other licit drug use"): participants in this cluster (10.2%) reported nearly universal alcohol use (0.99), high probability of tobacco, marijuana and ecstasy use (above 0.67), moderate probability of cocaine, hallucinogen and amphetamine use (0.32–0.37) and low probabilities of other drug use. Class 4 ("Extended concurrent drug use"): participants in this cluster (2.3%) reported universal alcohol use (1.00), high probability of tobacco, marijuana, ecstasy, tranquilliser/sleeping pill, cocaine, amphetamine and pain killer/analgesic use (above 0.63), and moderate probabilities of hallucinogens (0.47). Relative to the "Alcohol only" class, the following findings were significant covariates that predicted membership in the multiple concurrent drug using classes (see Table 1): being male (Class 2, $p < .05$, Class 3, $p < .001$, respectively), not completing high school (all classes, $p < .05$), not having a partner (all classes, $p < .05$), low income level (Class 3, $p < .001$), depressive symptoms ($p < .001$), and coming from an English speaking home ($p < .001$). Regionality was unrelated to cluster membership.

## 4. Discussion

The overall objective of this study was to examine drug use clusters, their prevalence and correlates using the latest available (2010) nationally representative survey data. A four cluster solution was the most robust and interpretable and the key risk markers of cluster membership were being male and not completing high school. Coming from a non-English speaking home and having a partner were protective markers. There were close parallels between the 2007 and the 2010 clusters — both the present study and our earlier study identified an alcohol only cluster, an alcohol and tobacco cluster, and a marijuana, ecstacy and other licit drug use cluster. Our earlier study found evidence of a distinct cluster alcohol and sedatives/tranquillisers. In the present study this cluster was not replicated. Instead, posterior probabilities