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The association between psychosis and problematical drug use among Australian adults: findings from the National Survey of Mental Health and Well-Being

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ABSTRACT

Background. The present paper aimed to: (*a*) provide Australian estimates of the population-level association between psychotic 'caseness' and substance use; (*b*) examine liability to problematical substance use according to 'caseness' via the conditional prevalence (prevalence among users); and (*c*) examine associations between problematical substance use and the number of psychotic symptoms using ordinal logistic regression.

Method. Data were from the National Survey of Mental Health and Well-Being (NSMHWB), a stratified multi-stage probability sample of Australian adults, using a subset of persons under the age of 50 years ($N = 6722$). A screener assessed the presence of characteristic psychotic symptoms. Associations between 'case' status and DSM-IV alcohol, cannabis and other drug use disorders were examined. Ordinal logistic regressions predicting psychosis scores were carried out, including demographic, mental health and drug use variables.

Results. Ninety-nine persons (1·2%) screened positively for psychosis. Regular tobacco, alcohol and cannabis use were much more common among persons screening positively, as were alcohol, cannabis and other drug use disorders. Among alcohol and cannabis users, psychosis 'cases' were much more likely to be dependent. Ordinal logistic regressions revealed that regular tobacco use, cannabis and alcohol dependence, and opiate abuse were predictors of psychosis scores.

Conclusions. The mental health risks of problematical substance use need to be disseminated to persons at risk of, or suffering from, psychotic illness, and to heavy substance users. Work is needed to develop effective treatment approaches for problematical substance use among persons with psychosis.

INTRODUCTION

Psychotic disorders, such as schizophrenia and schizoaffective disorders, have a lower prevalence than other forms of mental illness such as depression or anxiety (Keith *et al.* 1991), yet they impose a considerable public health burden because of their impact on sufferers and their families. Such disorders often run a chronic or recurrent course, cause considerable disability to the individual, and adversely affect the family and the community (Keith *et al.* 1991). The economic cost of schizophrenia has been estimated to be a substantial proportion of that attributable to myocardial infarction (Hall *et al.* 1985).

Clinical research on persons with psychoses has revealed high rates of substance use, and of more concern, high rates of tobacco use (Masterson & O'Shea, 1984; Goff, Henderson & Amico, 1992; Glassman, 1993) and problematical use (abuse or dependence) of alcohol (Drake *et al.* 1989; Drake & Wallach, 1989;

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Dixon *et al*. 1991; Fowler *et al*. 1998), cannabis (Drake & Wallace, 1989; Dixon *et al*. 1991; Fowler *et al* 1998) and other illicit drugs (Drake & Wallach, 1989; Dixon *et al*. 1991; Mueser *et al*. 1992; Fowler *et al*. 1998).

In such research, problematical substance use has been associated with symptom worsening or relapse (Carey *et al*. 1991), homelessness or housing instability (Drake *et al*. 1991), poor compliance with medication (Pristach & Smith, 1990), increased burden upon the sufferer's family (Clark, 1994) and increased treatment costs (Bartels *et al*. 1993). Problematical substance use is a health concern in and of itself because of the physiological and psychological harms that may result.

While clinical evidence suggests cause for concern, there are several reasons why such research may not reveal an accurate picture of the association between substance use and psychotic illness in the general population. First, clinical samples may be subject to a number of selection biases (Berkson, 1946; Caron & Rutter, 1991; Galbaud Du Fort *et al*. 1993). Secondly, there are a number of factors that could explain an association between problematical substance use and psychosis, for example, age, or other mental health problems. Since most of the research on this issue is also based on relatively small samples, there is a limited ability to examine these possibly confounding factors.

There has been some examination of the population-level association between psychosis and drug use problems in the general population. The US Epidemiological Catchment Area (ECA) study assessed the prevalence of DSM-III mental disorders in representative samples from five sites across the US (Robins & Regier, 1991). The ECA estimated that the rate of schizophrenia was 3·4 times higher among those with a DSM-III alcohol use disorder (Helzer *et al*. 1991) and 5·9 times higher among those with a DSM-III drug use disorder (Anthony & Helzer, 1991). There has also been an analysis using ECA data of the relationship between drug use and a 'self-reported psychotic experience' (Tien & Anthony, 1990). In this paper, a 'case' was a person who reported experiencing at least one psychotic symptom (from 12 Diagnostic Interview Schedule (DIS) items) within a follow-up year; only persons under 50 years were included. Age-matched samples of cases ($N = 477$) and controls ($N = 1818$) were compared in a series of logistic regressions controlling for baseline mental health problems and demographic factors. Daily cannabis use (RR = 2·0, 95% CI 1·25, 3·12) and lifetime DSM-III alcohol abuse/dependence (RR = 7·9, 95% CI 1·99, 31·41) were significant predictors of 'caseness'.

While these findings provided important US population-level information concerning the substance-associated risks of experiencing at least one psychotic symptom, a number of questions remain. First, do the associations observed among the North American general population exist in other countries? Secondly, are persons who are likely to meet criteria for psychotic disorders more liable to develop substance use problems when they use drugs? This issue may be examined by examining the conditional prevalence of substance use disorders among users, which indicates what proportion of persons who report any use of a substance also report problematical use. If persons with a psychotic disorder were more liable to problematical substance use, then the conditional prevalence estimate for this group would be higher than it would be for those without psychotic disorders. Thirdly, is there a relationship between problematical drug use and an increasing number of psychotic symptoms? Finally, we consider whether any observed association is due to the effects of demographic characteristics, personality, or other mental health problems.

One way to examine the association between substance use and the number of psychotic symptoms is to use ordinal logistic regression (OLR). OLR takes into account the ordering of an ordered categorical outcome variable (in this case, number of psychotic symptoms) (Bender & Grouven, 1997). While more common analytical methods such as logistic regression produce estimates of the size of the odds ratio for a dichotomous outcome variable, simply classifying an ordered scale into dichotomous variable would mean losing information about the intervals along the scale; the alternative would be to carry out a series of logistic regressions in which the dichotomous outcome variable was classified according to the different cut-points of the scale. OLR produces an estimate of the average change in the odds for each additional point along the ordered scale (here, for each

additional psychotic symptom reported), which means that one average odds ratio can be used.

The aims of the present paper were therefore to: (1) estimate the Australian population prevalence of psychosis among those under 50 years; (2) provide estimates of the population-level association between possible 'cases' of psychosis and drug use (the following drug use patterns were examined: (*a*) use of alcohol, cannabis, sedatives, stimulants and opiates; (*b*) regular use of tobacco, alcohol and cannabis; and (*c*) DSM-IV abuse or dependence on alcohol, cannabis, sedatives, stimulants and opiates); (3) examine the conditional prevalence of substance use disorders among users according to 'case' status; and, (4) examine whether there was an association between problematical drug use and increasing numbers of psychotic symptoms, using OLR, which took into account demographics, measures of mental health and of personality.

METHOD

The NSMHWB sample was a representative sample of residents in private dwellings across all States and Territories in Australia, conducted by the Australian Bureau of Statistics (ABS) in 1997. The sample excluded special dwellings (hospitals, nursing homes, hostels, etc.), and dwellings in remote and sparsely populated areas of Australia. Dwellings were selected using random stratified multistage area sampling, so that each person in all States and Territories had a known chance of participation. One person aged at least 18 years was randomly selected from each dwelling and asked to participate. Approximately 13600 private dwellings were approached, with a final sample size of 10641 persons (response rate of 78%). In the present analyses, only persons under the age of 50 years were included (comprising 6722 persons). This was because psychotic disorders and drug use are more common among younger persons, while organic mental disorders are more common among older persons. This decision also made the current analysis consistent with previous US population research (Tien & Anthony, 1990).

Respondents were asked about symptoms in the last 12 months to minimize uncertainty about recall over longer periods. Mental disorders were assessed by a modified version of the Composite International Diagnostic Interview (CIDI) (World Health Organization, 1993), which yielded diagnoses of DSM-IV disorders. Substance use disorders assessed were: abuse and dependence on alcohol, opiates, cannabis, stimulants and sedatives. Affective disorders assessed were: major depressive disorder, dysthymia, bipolar I disorder and bipolar II disorder. Anxiety disorders assessed were: panic disorder, agoraphobia, social phobia, generalized anxiety disorder, obsessive–compulsive disorder and post-traumatic stress disorder.

Table 1. *Questions contained in the psychosis screener*

1 In the past 12 months, have you felt that your thoughts were being directly interfered with or controlled by another person?
1a Did it come about in a way that many people would find hard to believe, for instance, through telepathy?
2 In the past 12 months, have you had a feeling that people were too interested in you?
2a In the past 12 months, have you had a feeling that things were arranged so as to have a special meaning for you, or even that harm might come to you?
3 Do you have any special powers that most people lack?
3a Do you belong to a group of people who also have these special powers?
4 Has a doctor ever told you that you may have schizophrenia?

All persons were asked whether they currently used tobacco and if they were current users, if their use was daily (regular). Respondents were assessed for alcohol use disorders if they had consumed at least 12 standard (10 g of alcohol) drinks in the last 12 months. Respondents who reported using cannabis, stimulants, sedative or opiates more than five times in the past 12 months were assessed for abuse/dependence.

The psychosis screener (PS) was developed for use in the NSMHWB, using elements of the CIDI to assess the presence of characteristic psychotic symptoms. It comprised seven items (see Table 1), three of which (1a, 2a, 3a) were asked only if the respondent endorsed a previous question (1, 2, 3 respectively). The first six items covered the following features of psychotic disorders: delusions of control, thought interference and passivity (Question 1 and 1a); delusions of reference or persecution (Question 2 and 2a); and grandiose delusions (Question 3 and 3a). The final item (Question 4) assessed

whether a respondent had ever received a diagnosis of schizophrenia (scores ranged from 0 to 6). The effectiveness of this screener in detecting cases of schizophrenia or schizoaffective disorders has been analysed using a sample of persons from an in-patient psychiatric setting, and a sample of persons from a variety of mental health services, which indicated that a score of $\geqslant 3$ discriminated adequately between cases and non-cases of schizophrenia or schizoaffective disorder (further details of these analyses may be obtained from the authors).

Analyses

Univariate associations between 'case' status and drug use variables were examined. The first group of these was substance use. Persons were considered to have used alcohol in the past 12 months if they reported drinking 12 or more standard drinks; and they were coded as having used other drugs (cannabis, sedatives, stimulants or opiates) if they reported using such drugs more than five times within the past 12 months. The second group of variables was frequent use; daily use was examined in the case of alcohol and tobacco, and at least weekly use in the case of cannabis. The third group of variables was the presence or absence of the following DSM-IV use disorders: cannabis abuse/dependence; alcohol abuse/dependence; and abuse/dependence upon sedatives, stimulants or opiates ('other drug use disorder'). The conditional prevalence – that is, prevalence among users – was estimated for DSM-IV alcohol and cannabis abuse and dependence, as well as for other drug use disorders (abuse/dependence).

Prevalence estimates were weighted to conform to independent population estimates by State, part of State, age and sex, and balanced repeated replicate weights used to account for the complex survey sampling design. Prevalence estimates and their standard errors were calculated using SUDAAN Version 7.5.3 (Research Triangle Institute, 1997). Odds ratios (OR) and 95% confidence intervals (95% CI) for univariate associations were estimated using unweighted data.

A series of OLR were carried out using STATA 5.0 (STATA Corporation, 1997). OLR takes into account the natural ordering of the levels of an ordinal outcome variable. It produces an average odds ratio that represents that average change in odds for each additional point along the scale. The first OLR included the following demographic variables as predictors of psychosis scores: sex (reference 'female'); age (reference '18–24'; comparison groups '25–34', '$\geqslant 35$'); employment status (reference 'employed'; comparison category 'not in the labour force/unemployed'); educational attainment (reference 'less than secondary'; comparison categories 'secondary', 'post-secondary'); and, marital status (reference 'married/de facto'; comparison 'divorced/separated/widowed/never married'). The second OLR added the following mental health variables as predictors: Eysenck's Neuroticism score from the EPQ (Eysenck & Eysenck, 1991) (range 0–12); DSM-IV anxiety disorder (reference 'no'); and, DSM-IV affective disorders (reference 'no'). The third OLR added the following measures of drug use: regular tobacco use (reference 'no'); DSM-IV abuse: alcohol, cannabis, sedatives, stimulants, opiates (reference 'no'); and, DSM-IV dependence: alcohol, cannabis, sedatives, stimulants, opiates (reference 'no').

All demographic variables were retained. Significant mental health and drug use variables were retained in the final model. Successive models were checked for changes in significance using the likelihood ratio test. The proportional odds assumption (POA) was tested for each significant predictor variable (this is the assumption of ordinal logistic regression that the size of the logit is similar between each cut point on the ordinal scale). The POA was tested by carrying out a series of logistic regressions examining different cut-points on the ordinal scale; in the case of the PS, these were a score of 1, 2, 3, 4 and 5. The size of the logits were compared, and the POA was considered to have been met if the 95% CI of the logits overlapped for all cut-points. For all the significant predictors, the POA was met, indicating the average odds ratio from the OLR was an appropriate statistic (Bender & Grouven, 1997).

RESULTS

A total of 99 persons under the age of 50 years screened positively for psychosis (a weighted prevalence rate of 1·2% in this age group). Table 2 shows the prevalence of substance use

Table 2. *Prevalence (percentage) of substance use and DSM-IV substance use disorders, according to psychosis 'case' status*

	Non-cases %	Psychosis 'cases' %	OR	95% CI
Regular tobacco use	27·3	59·9	3·97	2·64, 5·97
Alcohol use	77·7	78·4	1·01	0·63, 1·64
Daily alcohol use	15·2	23·5	1·71	1·07, 2·74
Alcohol use disorder	8·2	23·7	3·93	2·48, 6·24
Cannabis use	10·5	30·4	3·98	2·59, 6·14
Weekly cannabis use	6·9	22·6	4·15	2·58, 6·68
Cannabis use disorder	3·3	16·2	5·86	3·37, 10·18
Sedative use	1·9	11·4	7·32	3·99, 13·44
Sedative use disorder	0·6	4·6	10·11	4·20, 24·36
Stimulant use	1·3	10·1	10·22	5·26, 20·87
Stimulant use disorder	0·5	3·2	9·57	3·30, 27·77
Opiate use	1·3	5·1	4·74	2·02, 11·10
Opiate use disorder	0·4	1·9	7·93	2·36, 26·64

Table 3. *Proportion of users meeting criteria for a DSM-IV use disorder according to psychosis case status*

	Non-cases % of users	Psychosis 'cases' % of users	OR (95% CI)
Alcohol abuse	3·5	5·5	1·62 (0·59, 4·48)
Alcohol dependence	7·0	24·7	5·03 (3·01, 8·41)
Cannabis abuse	10·8	11·9	0·88 (0·26, 2·96)
Cannabis dependence	20·5	41·3	2·86 (1·37, 5·99)
Other drug user disorder	31·0	33·5	1·51 (0·59, 3·83)

and DSM-IV substance use disorders according to case status. The odds of regular tobacco use were around four times greater among those screening positively for psychosis (60%), compared to 27% of non-cases.

Similar proportions of cases and non-cases reported that they had used alcohol within the past 12 months (78%). However, a greater proportion of cases reported daily alcohol use: around 1 in 4 cases compared to just under 1 in 7 non-cases. There was an even stronger relationship between case status and the risk of meeting criteria for a DSM-IV alcohol use disorder: around 1 in 4 cases met criteria for abuse or dependence, compared to 1 in 12 non-cases – fourfold increased odds.

Persons screening positively for psychosis were significantly more likely than non-cases to report cannabis use within the past 12 months (30% *v.* 10% respectively), weekly cannabis use was around four times more common among cases, and cases were six times more likely than non-cases to meet criteria for DSM-IV cannabis abuse or dependence.

Similar patterns were observed for sedative, stimulant and opiate use within the past 12 months. Under 2% of non-cases reported the use of each of these drugs, compared to between 5% and 11% of cases. Cases were also significantly more likely to meet criteria for sedative, stimulant and opiate use disorders. Given the small numbers of users, caution must be taken in these estimates, as significant error may be involved (reflected in the size of the 95% confidence intervals around the odds ratios).

While the prevalence estimates in Table 2 indicate how common use disorders were among the entire sample of persons included for analysis, the figures in Table 3 indicate how common use disorders were among those who used the substances. These conditional prevalence estimates of drug use disorders are one way of estimating the liability of users to problematical substance use. A higher con-

Table 4. *Significant predictors of psychosis scores – results of ordinal logistic regression**

	Coefficient	S.E.	*Z*	*P*	OR	95% CI
EPQ Neuroticism score	0·140	0·014	10·02	< 0·001	—	—
DSM-IV affective disorder	0·611	0·109	5·59	< 0·001	1·84	1·49, 2·28
Regular tobacco use	0·362	0·078	4·66	< 0·001	1·44	1·23, 1·67
DSM-IV anxiety disorder	0·549	0·120	4·57	< 0·001	1·73	1·37, 2·19
DSM-IV cannabis dependence	0·681	0·181	3·77	< 0·001	2·00	1·39, 2·80
DSM-IV alcohol dependence	0·387	0·127	3·06	< 0·005	1·47	1·15, 1·89
DSM-IV opiate harmful use	1·810	0·796	2·27	< 0·05	6·10	1·28, 29·05

* $\chi^2_{16\ df} = 647{\cdot}32$, $P < 0{\cdot}0001$, pseudo $R^2 = 0{\cdot}09$. Demographic variables included in this model, but for simplicity, are not presented here.

ditional prevalence estimate indicates that a greater proportion of people who report any use of a substance will also report problematical use of that substance.

As Table 3 shows, among alcohol and cannabis users, there was no relationship between psychosis case status and the likelihood of meeting criteria for DSM-IV abuse. Similarly, users of other drug types (sedatives, stimulants or opiates) who screened positively for psychosis were no more likely than non-cases to meet criteria for other DSM-IV drug use disorders (sedatives, stimulants or opiates). This means that among those who reported using sedatives, stimulants or opiates, for example, those who had screened positively for psychosis were no more likely to have problematical use.

There was a significant relationship for both alcohol and cannabis dependence (Table 3). Cases who reported cannabis use in the past year were almost three times more likely to be dependent upon cannabis than non-cases who had used cannabis (95% CI 1·4, 6·0). Similarly, cases who had used alcohol were five times more likely to be alcohol dependent than non-cases who had used alcohol – 1 in 4 cases who were drinkers compared to 1 in 14 non-cases who were drinkers.

As outlined in the method section, OLR was carried out to estimate the relationship between problematical drug use after taking into account the effects of demographic factors and measures of mental health problems. Tests revealed that it was appropriate to use the average OR across all cut-points of the PS (see Method section) for all predictors (Table 4).

Table 4 presents the mental health and drug use variables that remained significant in the final OLR model; for simplicity, demographic and weighting variables are not presented here. Both DSM-IV affective and anxiety disorders were significantly associated with higher PS scores (average OR 1·8 and 1·7, respectively). Higher scores on the Neuroticism scale of the EPQ were also associated with higher psychoticism scores.

Taking into account the effects of these mental health and demographic factors, several problematical substance use variables remained significant predictors of psychotic symptoms (Table 4). With each additional symptom reported, there was a doubling of the odds of cannabis dependence (OR = 2·0), while there was a somewhat smaller increase in the odds of alcohol dependence and regular tobacco use existed per additional symptom (around 1·45). Opiate abuse was 6·1 times more likely per additional symptom, although the 95% CI around this estimate was very wide (1·3, 29·1).

DISCUSSION

In the Australian population, people screening positively for psychosis using a short screener were likely to have significant substance use problems. The majority of these persons were daily tobacco smokers, around 1 in 4 reported daily alcohol use, with a similar proportion reporting at least weekly cannabis use. A significant minority met criteria for alcohol and cannabis abuse/dependence. Furthermore, 1 in 5 reported the use of sedatives, stimulants or opiates more than five times within the past year, and one-third of these users met criteria for a use disorder. The rates of illicit drug use, and of regular and problematical use of all substances, were all significantly higher than those among non-cases.

These findings are consistent with clinical research involving persons with psychotic dis-

orders, which has found high rates of tobacco use (Masterson & O'Shea, 1984; Goff *et al.* 1992; Glassman, 1993), cannabis use and use disorders (Fowler *et al.* 1998; Wheatley, 1998), alcohol use problems (Drake *et al.* 1989; Drake & Wallach, 1989; Fowler *et al.* 1998) and illicit drug use (Drake & Wallach, 1989). They are also consistent with the findings of the ECA, which found elevated rates of schizophrenia among persons with drug and alcohol use disorders (Anthony & Helzer, 1991; Helzer *et al.* 1991).

Of particular concern was the finding that dependence among alcohol and cannabis users was significantly more likely among 'cases' of psychosis than 'non-cases'. This was examined by calculating the prevalence of cannabis and alcohol dependence among users of these substances. Cases who reported cannabis use were almost three times more likely to be dependent users than non-cases who had used cannabis, while cases who had used alcohol were five times more likely to be alcohol dependent than non-cases who had used alcohol. It may be that such persons are at higher risk of developing problematical use when they use these drugs. This is worrying as the use of cannabis in particular may increase the risks of worsening of or relapse to psychotic symptoms (Linszen *et al.* 1994; Hall & Degenhardt, 2000); dependent cannabis use would presumably further increase these risks.

This study also found that a number of problematical substance use variables remained significant predictors of higher scores on the psychosis screener even after accounting for demographics, neuroticism, and DSM-IV anxiety and affective disorders. Hence, it was not the case that the confounding variables considered here explained the univariate associations between 'case' status and problematical substance use. Hence, this study indicated that the association between psychotic symptoms and problematical drug use in the Australian population is not due to the effects of demographic characteristics, personality, or to the presence of other mental health problems.

Given the cross-sectional nature of the data from the NSMHWB, however, it is difficult to distinguish between other competing explanations for the associations observed here. These include the hypotheses: that drug use is a form of self-medication for persons with psychosis; that psychosis is drug-induced; and that drug use exacerbates or precipitates psychotic symptoms among vulnerable individuals (Hall, 1998; Blanchard *et al.* 2000; Hall & Degenhardt, 2000; McKay & Tennant, 2000). Prospective studies have found that cannabis use was related to an increased risk of receiving a diagnosis of schizophrenia within the following 15 years (Andreasson *et al.* 1987); while prospective studies of persons with psychosis found that cannabis use predicts relapse to psychotic symptoms among persons with psychotic disorders (Jablensky *et al.* 1991; Linszen *et al.* 1994). In the case of the Linszen *et al.* (1994) study, other substance use (including alcohol) was controlled. Replications of these findings are needed. Controlled outcome studies of substance abuse treatment for persons with psychosis are also needed to see whether cessation of drug use predicts improvement in psychotic symptoms (Hall, 1998).

One limitation of this study was that the psychosis screener was (by definition) not an instrument designed to produce diagnoses of DSM-IV psychotic illnesses, so: (*a*) some persons who were classed as 'cases' may not have met diagnostic criteria for psychotic illnesses; and (*b*) some persons who may have met such criteria may not have been correctly identified as 'cases'. There has also been some concern among researchers of the validity of field assessments of psychotic disorders, particularly among substance using members of this population (Blanchard *et al.* 2000). Although structured interviews produce reliable assessments (Blanchard *et al.* 2000), researchers have recommended that the most accurate method of assessing psychotic disorders is through multiple sources of information (Blanchard *et al.* 2000), a considerable feat for general population research.

However, the prevalence estimate produced here (1·2%; 95% CI 1–1·4%) is similar to that produced by the ECA using diagnoses of DSM-III psychotic disorders (0·8–1·2%) (Keith *et al.* 1991). Furthermore, unless there was a relationship between the measurement of substance use and the construct that the psychosis screener was attempting to measure, which is unlikely, such measurement error is likely to reduce the strength of the association observed here between substance use and 'caseness'.

Another factor to consider was that the NSMHWB was a household survey – it did not assess persons in dwellings such as hospitals, inpatient psychiatric institutions and correctional facilities. This meant that persons with psychotic disorders who were in such facilities were not included in the survey; such persons would have been likely to have more severe psychiatric problems, and perhaps more likely to have substance use problems. However, this is not likely to have affected the strength of the observed association between substance use and psychotic symptoms – rather, it would most likely have meant that persons who had more severe symptoms of psychosis, with more severe substance use problems, were undersampled (meaning that those from the 'extremes' of the distribution were not included).

The impact of these measurement and sampling limitations can be assessed to some degree by comparing the findings of the current study with those of the Low Prevalence Study (LPS) carried out in Perth, Melbourne, Brisbane and Canberra as an additional part of the NSMHWB (Jablensky *et al*. 2000). This study comprised persons who were assessed by experienced clinicians according to ICD-10 criteria for psychotic disorders and significant proportions of this sample had resided in institutions (20%), hostels (14%), or lived in rooming houses, hotels, shelters or homeless (9%) during the past month (Jablensky *et al*. 2000).

Reassuringly, drug use patterns were markedly similar in the LPS and the NSMHWB samples (Table 5). Current tobacco smoking was reported by 73% of males and 56% of females (*v*. 64% and 65% for the current sample), 37% reported drinking alcohol at least several times per week in the last year (*v*. 37% of the current sample) and 24% near daily cannabis use. Three in ten (30%) met lifetime criteria for alcohol abuse or dependence, with 25% meeting lifetime criteria for cannabis abuse/dependence and 13% lifetime abuse/dependence on other drugs (Jablensky *et al*. 2000).

Table 5. *Prevalence* (*percentage*) *of substance use and DSM-IV substance use disorders among cases from the NSMHWB sample*, *and from the Low Prevalence Study sample*

	NSMHWB 'cases'* %	LPS† %
Tobacco use	64 (M); 65 (F)	73 (M); 56 (F)
Near daily alcohol use	37	37
Alcohol use disorder	24	30
At least weekly cannabis use	23	24
Cannabis use disorder	16	25
Other drug use disorder	7	13

* All diagnoses, 12-month.
† All diagnoses, lifetime.
NSMHWB, National Survey of Mental Health and Well-Being; LPS, Low Prevalence Study; M, male; F, female.

There are a number of implications of the present study. First, there was a strong relationship between screening positively for psychosis and reporting problematical use of tobacco, alcohol, cannabis and other drugs. The mental health risks of such problematical use need to be disseminated to persons at risk of psychotic illness, to persons who have already been diagnosed with a psychotic illness and to persons who are heavy substance users. The risks of exacerbation of, or relapse to mental health problems, also need to be highlighted.

Secondly, more attention needs to be given to the physical health risks of heavy or problematical substance use. The significantly higher rate of tobacco smoking among persons who screened positively for psychosis means they are at greater risk of tobacco-related diseases such as lung cancer (US Surgeon General, 1982). This risk may be particularly high since there is some evidence to suggest that persons with psychosis smoke more heavily and use higher tar cigarettes (Masterson & O'Shea, 1984), which would increase smoking-related harms. Nicotine substitution may be one way in which these harms could be reduced among this population, as well as interventions aimed at abstinence. Unfortunately, there is no research that has examined the adequacy of such treatments for this group. Future research could evaluate the feasibility of such interventions.

Cannabis smokers may also face physical health risks (Hall *et al*. 1994; Hall & Solowij, 1998). For example, recent evidence suggests that cannabis smokers may face an increased risk of mouth and throat cancers (Zhang *et al*. 1999). Furthermore, there are significant risks associated with the heavy use of alcohol including cognitive impairment, liver damage and cardiovascular disease (English *et al*. 1995).

The use of alcohol, cannabis, sedatives, opiates and stimulants may be contra-indicated

with antipsychotic medications (Lutz, 1976); it may also interfere with an individual's functioning, for example in lowered treatment compliance (Pristach & Smith, 1990) and increased housing instability or homelessness (Drake *et al.* 1991). These adverse outcomes would reduce the likelihood of leading stable lives.

Conclusion

In the Australian population persons screening positively for psychosis (report at least three psychotic symptoms) were more likely to use tobacco, cannabis and alcohol regularly, and to have met criteria for substance use disorders in the past year. They also appeared to be more likely to have dependent use of cannabis and alcohol if they reported using these drugs, perhaps indicating greater vulnerability to dependent use than persons who did not screen positively.

The association between problematical drug use and psychotic symptoms was not explained by demographic characteristics, or to the presence of anxiety or affective disorders. The odds of cannabis and alcohol dependence, and regular tobacco use, were significantly greater with each additional psychotic symptom reported. This finding is of particular concern given the prevalence of these three substance use problems.

The present study suggests that in the Australian population, problematical substance use is much more likely among persons reporting an increasing number of psychotic symptoms. Future work might need to address problematical substance use among persons with psychotic symptoms.

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