Onset and lifetime use of drugs in New Zealand: Results from Te Rau Hinengaro: The New Zealand Mental Health Survey 2003–2004

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Abstract
Introduction and Aims. Onset and lifetime use of drugs have not previously been reported for all adult ages in New Zealand. This paper reports such results and, for people born in New Zealand, compares age of onset across ethnic groups.

Design and Methods. A nationally representative cross-sectional survey was carried out in 2003–2004, with oversampling of Maori and Pacific people. Participants were aged 16 years or more, living in permanent private dwellings. In the Composite International Diagnostic Interview (CIDI 3.0), participants were asked if they had ever used drugs (alcohol, tobacco and five groups of other drugs) and the age of first use (except for tobacco). Estimates are weighted.

Results. The response rate of 73.3% yielded 12 992 interviews. The percentage of participants who had ever used drugs was: 94.6% for alcohol, 50.8% for tobacco and 42.6% for any extramedical drug, including 41.6% for cannabis, 4.2% for cocaine and 2.9% for opioids. Use was much more common in recent cohorts for extramedical drugs. The median age of onset in each age cohort was always lowest for alcohol, then cannabis, then opioids, then cocaine. Among those born in New Zealand, Maori were more at risk of use than ‘Others’ with the lowest risk for Pacific people.

Discussion and Conclusions. Interventions to prevent or to delay the onset of drug use need to occur before and during adolescence. The major cohort differences and the widespread experience of cannabis use help to explain the diversity of opinion in New Zealand about how to deal with this drug.

Key words: alcohol, cannabis, street drugs, epidemiology, ethnic groups.

Introduction

The burden of disease attributed to smoking and alcohol use places them as fourth and fifth among risk factors globally [1]. There is also international concern about the use of drugs such as cannabis, cocaine and opioids as well as other illicit drugs or drugs used for non-medical purposes [2]. There is a need for data on onset of use and the proportion of the population who have ever used a drug. Information on the onset of drug use indicates the appropriate age range to target for primary prevention. Furthermore, comparisons across birth cohorts provide a history of the onset of drug use in a country. The proportion of the population who have ever used a drug is relevant to understanding social context; whether or not someone has ever used a drug is one factor which may influence their views on regulation of drugs and their attitudes towards use of drugs by young people.

Drug use differs markedly across drugs, countries [3,4] and historical time [5]. Hence, it is necessary for each country to investigate its own patterns of onset and use. This paper describes the onset of drug use in New Zealand and lifetime use, the percentage of the population who have ever used drugs. It also investigates ethnic differences in onset across ethnic groups.

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born in New Zealand as such differences indicate where interventions for addressing ethnic inequalities should be targeted.

One source of information on the onset of drug use comes from longitudinal studies starting in childhood. In New Zealand there are two such studies: the Dunedin Multidisciplinary Study [6,7] (http://dunedinstudy.otago.ac.nz/) and the Christchurch Health and Development Study (CHDS) [8] (http://www.chmeds.ac.nz/research/chds). These studies provide quite precise estimates of the onset of drug use and each has a rich set of prospectively collected covariates. However, as these two cohorts were both born during the 1970s, they provide no information about earlier or later birth cohorts whose use of drugs would have been affected by changes in the availability and acceptability of various drugs and by changes in drug preferences.

A second set of information on the onset of drug use comes from cross-sectional surveys of current use [9–15]. However, current use will always underestimate lifetime use because it excludes those who have used a drug and then stopped or whose use was only ever experimental.

The third possible source is data from cross-sectional surveys which ask about onset of use. Such surveys are vulnerable to recall errors, but do provide data across a wide age range, reflecting the experience of different birth cohorts. At older ages differential survival also begins to produce survivor bias in estimates based on cross-sectional surveys; users of some drugs may have died or moved to institutional care so that their birth cohort may appear to have been less likely to use drugs than was actually the case [16]. Questions about lifetime use and age of onset have been used in a number of surveys of adults in the USA [16–18], Australia [19,20] and Mexico [21], and in one recent national drug survey [15] in New Zealand. However, the focus of the New Zealand report [15] was on trends over time in current use, rather than on onset and the cumulative proportion who had ever used drugs. Also, no one more than 45 years of age was surveyed.

This paper reports the lifetime use and onset of drug use in New Zealand based on data from the New Zealand Mental Health Survey (NZMHS) [22–24], a national cross-sectional survey. It covers:

- Ethnic comparisons of the onset of drug use in young adults born in New Zealand.

The ethnic comparisons contrast Māori, Pacific people and a composite ‘Other’ group who are mostly of European descent. Māori are the indigenous people of New Zealand. The term ‘Pacific’ is used to refer to the ethnicity of the indigenous inhabitants of Pacific islands such as Samoa, Tonga, the Cook Islands and Fiji. These ethnic groups have been shown to differ in current use of alcohol, tobacco and other drugs [12–14,23].

**Design and methods**

**Design**

The design of the NZMHS was for a national cross-sectional probability sample [24,25] of New Zealanders aged 16 years or more living in permanent private dwellings. To provide estimates of acceptable precision for Māori and for Pacific people, as well as for the total population, the number of Māori was doubled and the number of Pacific people quadrupled relative to that expected without oversampling. The survey was carried out in late 2003 and throughout 2004.

**Ethics**

All 14 health ethics committees throughout New Zealand approved the survey.

**Interview**

Computer-assisted personal interviews were carried out face-to-face using the World Mental Health Surveys Composite International Diagnostic Interview (CIDI 3.0) (http://www.hcp.med.harvard.edu/wmhcidi) with some non-diagnostic modifications for New Zealand (http://www.moh.govt.nz/moh.nsf/by+unid/3195F8D3155E1C2ACC2571FC00131A6D?Open).

**Measurement of lifetime drug use and onset**

No age of first use was reported for tobacco, merely whether someone was a current or past smoker or volunteered that they had tried smoking a few times. Age of first use was asked for alcohol. Everyone was asked if they had ever used each of five drug classes: cannabis, cocaine, prescription drugs used without the recommendation of a health profession or for any reason other than they were supposed to be used, opioids and other drugs such as lysergic acid diethylamide or glue. Anyone who had used a particular drug or drug class was asked about age of first use and use in the past 12 months. Alternative names were given for drugs. For
cannabis, cocaine and opioids this was straightforward. For prescription drugs the list was long and confusing, and it is possible that some respondents replied incorrectly about legitimate use of drugs. The main purpose of these questions was to establish if drug use had occurred so that only respondents who had used drugs were asked the symptom questions which could lead to diagnoses of abuse or dependence.

**Ethnicity**

The New Zealand 2001 census ethnicity question was used; this permits self-identification with multiple ethnicities. Anyone reporting Māori ethnicity was classified as Māori, anyone else reporting any Pacific ethnicity was classified as Pacific and the remainder were placed in a composite ‘Other’ group (this is the standard prioritisation used in health research in New Zealand—http://www.nzhis.govt.nz/moh.nsf/pagesns/402?Open).

**Analysis**

Weights were used to take account of unequal probabilities of selection arising through selection of one person per household, oversampling of Māori and Pacific people through targeting and screening, adjustment for non-response and post-stratification to the New Zealand 2001 census distribution of age, sex and ethnicity (Māori/Pacific/Other) [25]. SUDAAN software (Research Triangle Institute, Research Triangle Park, NC, USA) was used to take account of the complex sample design using Taylor series linearisation (TSL). Cross-tabulations were used to investigate associations of age with lifetime use of drugs. Onset was analysed with survival analysis using 1 year intervals. The median age of onset of those going on to use a drug was taken as the age corresponding to 50% of the observed maximum cumulative incidence [26]. Kaplan–Meier curves were produced in SAS (SAS Institute, Cary, NC, USA). Proportional hazards models were fitted in SUDAAN. All P-values reported are based on Wald tests from TSL design-based coefficient variance–covariance matrices. All intervals quoted are 95% confidence intervals.

**Results**

The survey produced 12 992 interviews. The response rate was 73.3%. Table 1 shows that alcohol had been used by 94.6% of the population, nearly twice as much as the next most frequent drug, tobacco (50.9%), although the tobacco percentage may be an underestimation as the question was about ever being a smoker. Any extramedical use of drugs (other than alcohol or tobacco) was only slightly higher than the use of cannabis (42.6% vs. 41.6%) which indicates that very few people had used any other drugs without also using cannabis. Cocaine use (4.2%) was only a tenth as common as cannabis and opioid use was also uncommon (2.9%). In addition, prescription drugs had been used for non-medical purposes by 6.5% (n = 861) and 9.5% (n = 1199) had used any of the fifth residual category of drugs such as LSD, glue, peyote; which drugs were used in these two composite groups is not known as respondents merely indicated if they had used any drug in the group. In summary, almost everyone had used alcohol at some time, half had been smokers and more than 40% had ever used cannabis, whereas only a very small minority had used cocaine or opioids, even once. There was some misuse of prescription drugs and use of other illicit drugs.

Table 1 also presents lifetime use of drugs by birth cohort, as indicated by the age at interview. With interviews in 2003/2004, the age group of 16–24 years, for instance, was born between 1979 and 1988. The pattern across birth cohorts differs by drug. Cohort differences were small for alcohol; the percentage reporting ever smoking was lower in the more recent birth cohorts as expected from attempts to reduce smoking in New Zealand, and for all other drug categories the percentage who had ever used rose slightly from the age group of 16–24 years to the age group of 25–44 years, then decreased steeply across the two older age groups. In addition to alcohol and tobacco, all further results are presented only for cannabis, cocaine and opioids. This is because the composite extramedical use of drugs category produced results very similar to those for cannabis, and because it is not known what drugs had been used in the prescription and residual other drug groups. The results for the extramedical use of drugs are available on request.

A consistent finding across all drugs is the lower percentage of the age group of 16–24 years who reported ever having used drugs compared with the age group of 24–45 years. To determine if this resulted from a decline in use or less time to initiate use, it is necessary to make use of the data on the age at the first use of a drug. In survival analysis, cohorts can be compared across the same ages to see if by any given age one group is more or less likely to have ever tried a drug. Therefore, the remainder of results reported are from survival analyses.

**Onset of drug use**

Figure 1 shows the onset curves for use of alcohol, cannabis, cocaine and opioids for the four birth cohorts. These show the cumulative percentage of the population who have ever used a particular drug by any given age. There is no onset curve for tobacco because
Table 1. Lifetime use of drugs: the percentage of the population who had ever used each drug by current age (N = 12 992)

| Current age (birth years)<sup>c</sup> | Alcohol | Tobacco<sup>a</sup> | Extramential use of drugs<sup>b</sup> | Cannabis | Cocaine | Opioids |
|-------------------------------------|---------|---------------------|--------------------------------|
|                                     | %       | SE                  | %                               | %       | %       | %       |
| All ages (No. users)                | 94.6    | 0.3                 | 50.8                            | 42.6    | 41.6    | 4.2     |
| 16–24 (n = 1535) (1979–1988)        | 92.7    | 0.9                 | 46.2                            | 54.3    | 53.6    | 4.4     |
| 25–44 (n = 5304) (1959–1979)        | 95.4    | 0.4                 | 49.7                            | 58.6    | 57.6    | 6.4     |
| 45–64 (n = 3909) (1939–1959)        | 95.9    | 0.4                 | 54.3                            | 34.5    | 33.6    | 3.2     |
| 65+ (n = 2244) (≤1939)              | 92.0    | 0.7                 | 51.9                            | 4.5     | 3.1     | 0.1     |
|                                    | 34.2    | [<0.0001]           | 16.3                            | 1657.0  | 1546.6  | 283.7   |

<sup>a</sup>Tobacco was asked about differently and may not include some who experimented. <sup>b</sup>Includes cannabis, cocaine, opioids, prescription drugs and all other drugs except for alcohol and tobacco. <sup>c</sup>Because of the duration of the survey there is a 1 year overlap in birth years between age groups. SE, standard error.
the age of first use was not recorded. The onset curve for the composite extramedical use of drugs (not shown) was almost identical to that for cannabis except for barely visible differences for the oldest cohort.

The cohort differences seen in the percentage of the population who had ever used a drug by the time of interview (Table 1) are seen even more clearly in the onset curves in Figure 1. The lower percentage with lifetime use in the youngest age group, compared with the age group of 25–44 years, occurred because some young people had not yet begun using, not because the cumulative percentage of the population who had ever tried a drug was lower by any given age. The key features of Figure 1 are that: (i) for all drugs the cumulative percentage of the population who have ever used a drug is higher for more recent cohorts at any given age; and (ii) all curves rise steeply during adolescence and are almost flat after approximately 25 or 30 years of age, indicating that few people tried a drug for the first time after this age. Differences in the median age of onset are less obvious in Figure 1. In the three age groups under 65 years of age, the survival estimate of the median age of onset for those who do go on to use a drug was always lowest for alcohol (14, 15, 16 years), intermediate for cannabis (17, 18, 21 years), higher for opioids (19, 22, 23 years) and highest for use of cocaine (21, 24, 26 years).

Table 2 complements Figure 1 by providing numerical estimates of how much higher the risk of onset of use of each drug was for each successive cohort. It shows a monotonic progression in risk for each cohort, but the slope varies markedly across the drugs with a maximum hazard ratio of 2.7 for alcohol, 55.5 for cannabis, 74.8 for opioids and 248.7 for cocaine. Temporal trends are much more marked for drugs other than alcohol.

**Ethnic differences in the onset of drug use**

Ethnic comparisons in this survey of the use of alcohol or drugs in the past 12 months have shown marked but inconsistent ethnic differences [23]. The percentage using drugs was highest for Māori (26.2%) and lower
and similar for Others (12.1%) and Pacific people (11.3%). In contrast, Māori (80.2%) or Others (80.4%) were equally likely to drink, whereas Pacific people were much less likely to do so (51.7%). Understanding the onset of drug use in these ethnic groups is complicated by the high proportion of New Zealand residents surveyed who were born elsewhere (26.8%) and the marked differences across the ethnic groups in the proportion born in New Zealand. Almost all Māori (99.0%) were born in New Zealand. Only 33.6% of Pacific people were born in New Zealand and this percentage differed with age from 65.1% of those aged 16–24 years down to 1.8% of those 65 years and over. Three-quarters (75.8%) of the composite ‘Other’ group were born in New Zealand and this differed only slightly across the age groups from 72.2% to 78.3%.

To understand ethnic differences in the onset of drug use in New Zealand, comparisons were restricted to those born in New Zealand. Furthermore, because of the small numbers of Pacific people aged 45 years and over born in New Zealand (n = 62), only those under 45 years of age were included. These restrictions ensure that the results do reflect onset experiences in New Zealand rather than elsewhere.

Table 3 presents ethnic comparisons of the hazard ratios for the use of each drug. For alcohol, Māori and the composite ‘Other’ ethnic group had similar risk whereas Pacific people had lower risk. For cannabis Māori had the highest risk, but the risk was equal for Pacific people and the ‘Other’ group. For cocaine and opioids, the risk of use was highest for Māori, followed by Others, and lowest for Pacific. Adjustment for age, sex and their interaction made little difference to the hazard ratios. Because of age differences and age-by-sex interactions, Figure 2 shows ethnic comparisons only for the age group of 16–24 years, the age group most relevant to the current situation in New Zealand. Pacific people in this birth cohort do eventually drink alcohol, but onset is

<table>
<thead>
<tr>
<th>Ethnicity alone</th>
<th>Alcohol</th>
<th>Cannabis</th>
<th>Cocaine</th>
<th>Opioids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Māori (n = 1682)</td>
<td>1.0</td>
<td>1.7</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Pacific (n = 688)</td>
<td>0.6</td>
<td>1.0</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Other (n = 2654)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

| P(2) [P]        | 36.8 [<0.001] | 62.2 [<0.001] | 12.5 [<0.001] | 10.1 [<0.001] |

<table>
<thead>
<tr>
<th>Ethnicity adjusted for age, sex and age × sex (ages 16–24 vs. 25–44 years at the time of interview)</th>
<th>Alcohol</th>
<th>Cannabis</th>
<th>Cocaine</th>
<th>Opioids</th>
</tr>
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</tr>
<tr>
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<td>1.0</td>
<td>0.9</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

| P(2) [P]        | 39.3 [<0.001] | 59.8 [<0.001] | 12.5 [<0.001] | 10.2 [<0.001] |

Age × sex: P < 0.001 for cannabis and alcohol, as men and women were very similar in the most recent cohort (16–24 years at interview), but among those born earlier (25–44 years at interview) men were more likely than women to have begun use of these drugs by any given age. Models with ethnicity × age or ethnicity × sex had non-significant interaction terms for the drugs in Table 3 except for a marginally significant interaction between ethnicity and age for cocaine use (P = 0.03). Inclusion or exclusion of interaction terms had little effect on the ethnic difference estimates. CI, confidence interval.
delayed. For other drugs, it appears that a lower percentage of Pacific people will ever use those drugs.

Discussion

This survey (NZMHS) shows New Zealand to be a country in which almost everyone has tried alcohol, at least half have been smokers (more may have tried tobacco) and more than 40% have tried cannabis. Much smaller proportions have ever tried cocaine (4.2%) or opioids (2.9%). Non-medical use of prescription drugs was reported by 6.5% and 9.5% had used any other drugs.

Comparison with other studies is complicated by the clear differences across cohorts for drugs other than alcohol and tobacco, different age breakdowns and different age ranges. Nonetheless, the overall pattern in the NZMHS is similar to that in a 2001 New Zealand national telephone drug survey [15]. Comparison with the CDHS [8] is possible for the cumulative risk of use by the age of 25 years for those born in New Zealand. The longitudinal CHDS found 88.5% of Māori and 75.1% of non-Māori had ever used cannabis; the cross-sectional NZMHS found 76.3% for Māori and 65.5% for Others. A likely explanation is the advantage of longitudinal data collection in reducing errors of recall. Overall, the CHDS (which has 11% Māori) found 9.1% had ever used cocaine and 3.7% for opioids; for the NZMHS, the results were 14.1% for Māori and 7.0% for Others for cocaine, and 4.5% for Māori and 2.7% for Others for opioids. Another New Zealand birth cohort study has estimated that 70.1% had used cannabis by the age of 26 years [6].

For comparable cohorts, lifetime use of drugs is similar in New Zealand and Australia [19,20]. However, the use of cocaine is only approximately a quarter of that in the USA [16,17], which is not surprising given the distance from principal cocaine

Figure 2. Onset curves for use of alcohol, cannabis, cocaine and opioids for Māori (n = 404), Pacific people (n = 248) and Others (n = 534) who were 16–24 years old at interview and who were born in New Zealand.
trafficking routes. For each drug similar cohort patterns have been found in all three countries. Nonetheless, the patterns are not the same across drugs, with small cohort differences for legal drugs and large cohort differences for illegal drugs.

This New Zealand survey is part of the World Mental Health Survey Initiative. Comparison of 17 countries shows that almost everyone in the developed countries had used alcohol. The USA and New Zealand had by far the highest use of cannabis (42%). The USA was an outlier for high use of cocaine whereas New Zealand was similar to Latin American countries and higher than most European countries. The use of cannabis or cocaine was uncommon in the Middle East, Africa and Asia [28].

For people who had grown up in New Zealand, Māori, the indigenous people, were at higher risk of starting to use drugs than Pacific people, even though both have similar socioeconomic disadvantages [25,27]. The risks for the composite ‘Other’ group were between those for Māori and Pacific. Nonetheless, the magnitude of the hazard ratios differed across drugs, showing the importance of looking at individual drugs.

Apart from those born before 1939, the age of first use is almost always before 25 years for alcohol, and 30 years for cannabis, cocaine and opioids with the steepest rise in onset in mid-adolescence. Interventions to prevent or delay first use, or to minimise the harm caused by use, need to be before and during adolescence. The challenge is to find the appropriate range of strategies to apply to illegal drugs, and to alcohol, which is illegal to purchase below 18 years of age in New Zealand. The recent Australian report on preventing substance use, risk and harm [29] provides a comprehensive evaluation of possible options for prevention and is largely applicable to New Zealand. Some school-based programs have been successful [30,31], but there are also many other ways of making some difference to drug use in a population, by intervening at a national or local level.

The strengths of this survey are that it was nationally representative yet, through oversampling, had sufficient Māori and Pacific people to enable ethnic comparisons. At 73.3% the response rate was good for such a community survey, but there could be non-response bias, particularly from heavy users of drugs, even though it was introduced as a mental health survey, not a drug survey. There will have been some loss to age cohorts through death, particularly for the oldest age group. Age of onset was recalled which undoubtedly introduced inaccuracy and possibly bias. The major disadvantage, however, for understanding of recent drug trends in New Zealand is that methamphetamines and ‘herbal highs’ were not asked about separately.

Acknowledgements

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