An exploratory study of the health harms and utilisation of health services of frequent legal high users under the interim regulated legal high market in central Auckland

Chris Wilkins, Jitesh Prasad, KC Wong, Thomas Graydon-Guy, Marta Rychert

ABSTRACT

AIMS: To explore health problems and the accessing of health services by frequent legal high users under an interim regulated legal market in central Auckland.

METHOD: Frequent legal high users (monthly+) were recruited from outside eight randomly-selected, licensed, legal high stores in central Auckland from 23 April–7 May, 2014. Eligible participants were emailed a unique invitation to complete an on-line survey; 105 completed the survey.

RESULTS: Twenty-seven percent had suffered mental illness during their lifetimes. Eighty percent used synthetic cannabinoids (SC), and 20% ‘party pills’. Forty-seven percent of SC users used daily or more often. Other drugs used included alcohol (80%), cannabis (59%), ‘ecstasy’ (18%) and methamphetamine (15%). Fifty-eight percent of SC users were classified as SC dependent. The most common problems reported from SC use were: insomnia (29%); ‘vomiting/nausea’ (25%); ‘short temper/agitation’ (21%); ‘anxiety’ (21%); ‘strange thoughts’ (16%); and ‘heart palpitations’ (14%). The health services most commonly accessed by SC users were: a ‘doctor/GP’ (9%); ‘counsellor’ (9%); ‘DrugHelp/MethHelp’ websites (7%); ‘Alcohol & Drug Helpline’ (4%); ‘ambulance’ (3%); ‘A&E’ (3%); and hospitalisation (3%).

CONCLUSIONS: Frequent use of interim licensed SC products was associated with health problems, including dependency. Further research is required to determine the health risks of these products.
ARTICLE

SC include a wide range of compounds that bind to cannabinoid CB1 and CB2 receptors in the brain, and mimic the effects of delta-9-tetrahydrocannabinol (THC) in natural cannabis, although often with greater affinity.6,8 Case reports and case series have reported adverse effects from SC including tachycardia, vomiting, agitation, drowsiness, psychosis, hallucinations, anxiety, headache, seizures and suicidal ideation.6,9-15 Acute SC intoxication has resulted in emergency department (ED) admissions requiring supportive care, benzodiazepines, and fluids, with severe cases resulting in hospitalisation for up to 2 weeks.6,34 Some cases of dependence on SC have been reported after chronic use.6,17-19

Studies of SC users outside of clinical settings are currently limited to a very small number of on-line and other convenience studies completed in other countries.10,15,19 To date, there have been no similar studies of SC users in New Zealand, and little is known about patterns of use, the extent of adverse effects, levels of other drug use, and the accessing of health services of this group. The New Zealand retail environment under the interim PSA regime was unique, as it involved the sale of a restricted number of legal high products from licensed retail outlets under new retail restrictions.

We therefore undertook an exploratory study of frequent legal high users in central Auckland during the interim PSA period to identify the extent of health problems and utilisation of health services to inform further research. Frequent users of a drug are often the subject of exploratory research as their high-use patterns provide early warning of health risks.21 Central Auckland was a natural location to conduct our study as it had a high concentration of licensed legal high retail outlets.22

Methods

The aim of our study was to explore the patterns of use, health harms, extent of substance dependency, and utilisation of health services of frequent legal high users during the interim regulatory regime in central Auckland.

Frequent legal high users were recruited from outside of all eight interim licensed legal high stores in central Auckland from 23 April to 7 May, 2014. They were invited to complete an on-line survey examining their legal high and other substance use during the previous 6 months. All of the central Auckland legal high stores were open 7 days a week, with many staying open past midnight during mid-week and weekends (eg, typically 2am from Wednesday onwards and 4am Friday/Saturday). The recruiters were present outside of two randomly selected shops during each of seven shift times per day (ie, 9–10am, 10–12pm, 12–2pm, 3–5pm, 5–7pm, 9–11pm and 11pm–1am). Recruitment after 1am was deemed to pose a personal safety risk. The interviewers completed a total of 161 recruitment shifts over 3 weeks. The lunchtime and early evening shifts were by far the busiest times for the stores, but in the interest of recruiting a broad cross-section of buyers, we ensured interviewers were present outside of stores even at times and days when there were very few patrons. Furthermore, not all store patrons were engaged in buying legal highs. The importance of legal high sales varied from store to store, with some primarily set up to sell legal highs while others sold legal highs as part of a range of other retail business. All the stores sold other retail items, such as hemp products, t-shirts, smoking pipes and smoking paraphernalia. Consequently, the recruiters screened patrons to ascertain they were eligible for the study.

Patrons were approached as they exited stores and provided with a brief explanation of the study, and asked two screening questions about the frequency of their legal high use and purchase in central Auckland. To be eligible, patrons had to have used and purchased legal highs approximately monthly or more often over the past six months in central Auckland. Those who were eligible were emailed a unique invitation to complete an on-line survey. The eligibility questions were repeated at the beginning of the on-line survey, with those not meeting the criteria exited. The survey was programmed and managed using IBM™ SPSS data collection package. One hundred and five surveys were completed. Respondents were offered a $20 food voucher to compensate them for their time. The study was approved by the Massey University Human Subjects Ethics Committee.
Measures

Demographics
Participants were asked a range of demographic questions, including current and previous history of mental illness (eg, ‘depression, psychosis, schizophrenia, anxiety’), and whether they had “ever been a patient in a psychiatric ward or hospital for an overnight stay or longer.”

Patterns of substance use
Participants were asked how frequently they had used a list of 24 drug types in the previous 6 months, including three general categories of legal highs (‘synthetic cannabis’, ‘party pills’ and ‘other legal highs’).

Dependency on legal highs
Dependency on SC and ‘party pills’ was assessed using a five-question validated Severity Dependency Scale (SDS) with a cut-off score of four or greater for the five enumerated questions indicative of drug dependency.23,24

Physical and psychological problems
The frequent legal high users were asked if they had experienced any of a list of 21 acute physical and psychological problems from their substance use in the previous six months, and to name the substance(s) responsible for each problem.

Life impacts
The frequent legal high users were asked if they had experienced any of a list of 12 adverse life impacts from their substance use in the previous six months, and to name the substance(s) responsible for each problem.

Help-seeking
The frequent legal high users were asked if they wanted help to reduce their substance use, and to name the substance(s) they wanted help for.

Accessing health services
The frequent legal high users were asked if they had accessed any of 10 health and information services in relation to their substance use in the previous six months, and to name what substance(s) was involved in each instance.

Results

Demographics
Seventy-six percent of the frequent legal high users were male with a mean age of 29 years (median 27 years, range 18–52 years). Fifty-four percent were New Zealand/European, 23% were Māori, 9% were Indian, 7% were British, 5% were Pacific, 5% were Middle Eastern and 4% were Asian. Sixty-two percent were in full-time/part-time employment, 13% were students, 11% were on a sickness benefit, and 10% were unemployed. Fifty-three percent had a university degree or diploma, 23% a high school qualification, and 16% a trade qualification. Five percent had no educational qualifications.

History of mental illness
Twenty-seven percent had suffered from a mental illness at some point in their lives. Eight percent were ‘currently’, and 10% had ‘previously’, received treatment or medication for a mental illness. Five percent had been a patient in a psychiatric ward or hospital overnight or longer.

Legal high and other drug use
The frequent legal high users had used a mean of four drug types in the previous six months (median 4, range 1–12). The drug types most commonly used were alcohol (80%), ‘synthetic cannabis’ (80%), tobacco (69%), cannabis (59%), ‘party pills’ (20%), ‘ecstasy’ (18%), methamphetamine (15%), anti-depressants (12%), nitrous oxide (10%), salvia divinorum (9%) and amphetamines (9%). Eighty percent of the SC users used SC weekly or more often, 47% used daily or more often, and 32% used ‘more than once per day’. Only 12% of party pill users used party pills weekly or more often; none used daily.

Dependency on legal highs
Fifty-eight percent of the SC users were categorised as dependent on SC. Twenty-five percent of the party pill users were dependent on party pills.

Physical and psychological adverse effects from SC
The adverse effects most commonly reported from SC were: ‘trouble sleeping’ (29%); ‘vomiting/nausea’ (25%); ‘short temper/agitation’ (21%); ‘anxiety’ (21%); ‘strange thoughts’ (16%); and ‘heart palpitations’ (14%) (Table 1). Six percent reported...
Table 1: Proportion of frequent legal high users who attributed acute physical and psychological problems to different substances in the previous six months

<table>
<thead>
<tr>
<th>Physical and psychological problems</th>
<th>Synthetic cannabinoids (n=70)</th>
<th>Party pills (n=19)</th>
<th>Alcohol (n=80)</th>
<th>Cannabis (n=58)</th>
<th>Tobacco (n=69)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trouble sleeping</td>
<td>29%</td>
<td>5%</td>
<td>4%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Vomiting/nausea</td>
<td>25%</td>
<td>5%</td>
<td>17%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Short temper/agitation</td>
<td>21%</td>
<td>0%</td>
<td>8%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Anxiety</td>
<td>21%</td>
<td>6%</td>
<td>5%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Strange thoughts</td>
<td>16%</td>
<td>0%</td>
<td>4%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Heart palpitations</td>
<td>14%</td>
<td>24%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Skin problems</td>
<td>13%</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>13%</td>
<td>0%</td>
<td>8%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>Paranoia</td>
<td>12%</td>
<td>6%</td>
<td>3%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Weight loss</td>
<td>12%</td>
<td>19%</td>
<td>1%</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>Depression</td>
<td>11%</td>
<td>6%</td>
<td>11%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>10%</td>
<td>0%</td>
<td>3%</td>
<td>7%</td>
<td>12%</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>9%</td>
<td>0%</td>
<td>9%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Fainting/passing out</td>
<td>7%</td>
<td>0%</td>
<td>6%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Chest pains</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Tremors</td>
<td>6%</td>
<td>0%</td>
<td>3%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Suicidal thoughts</td>
<td>6%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Fits/seizures</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Hallucinations</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Teeth problems</td>
<td>3%</td>
<td>0%</td>
<td>4%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Other problems</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Overdose</td>
<td>0%</td>
<td>6%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

experiencing ‘suicidal thoughts’ and ‘fits and seizures’ in relation to SC use. Those reporting adverse effects from SC reported a mean of four problems (median 3, range 1–18). The most common adverse effects from party pills were ‘heart palpitations’ (24%) and ‘weight loss’ (19%). The most common adverse effect from alcohol was vomiting (17%).

Life problems
The most common life problems from SC were: ‘spending too much money’ (51%); ‘damaging a friendship or relationship’ (29%); ‘reduced work/study performance’ (21%); and ‘arguing with others’ (21%) (Table 2). Fifteen percent reported “losing their job or quitting study” as a result of their SC use. Those reporting life problems from SC reported a mean of three life problems (median 2, range 1–10). The most common life problem reported by the party pill users was ‘spending too much money’ (32%). Drinkers and smokers also commonly reported financial pressure, with drinkers also reporting damaging relationships (31%) and reduced work/study performance (16%).

Help seeking and accessing health services
Fifty-one percent of the frequent legal high users reported they wanted help to reduce their substance use. The drug types they wanted help with were: SC (61%); alcohol (32%); tobacco (18%); cannabis (16%); and ‘party pills’ (4%). Approximately one-in-ten SC users accessed a ‘counselling service’ (9%) and a ‘doctor/GP’ (9%) in relation to their SC use (Table 3). Three percent had accessed an ‘ambulance’, ‘Accident and Emergency Department’ and
Table 2: Proportion of frequent legal high users who attributed life problems to different substances in the previous six months.

<table>
<thead>
<tr>
<th>Life problem</th>
<th>Synthetic cannabinoids (n=70)</th>
<th>Party pills (n=19)</th>
<th>Alcohol (n=80)</th>
<th>Cannabis (n=58)</th>
<th>Tobacco (n=69)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spent too much</td>
<td>51%</td>
<td>32%</td>
<td>35%</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td>Damaged a friendship/relationship</td>
<td>29%</td>
<td>0%</td>
<td>31%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Had reduced work/study performance</td>
<td>21%</td>
<td>6%</td>
<td>16%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Argued with others</td>
<td>21%</td>
<td>5%</td>
<td>10%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>Couldn’t remember the night before</td>
<td>17%</td>
<td>5%</td>
<td>10%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Lost job/quit study</td>
<td>15%</td>
<td>0%</td>
<td>9%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Physically hurt yourself</td>
<td>4%</td>
<td>0%</td>
<td>9%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Got arrested</td>
<td>3%</td>
<td>5%</td>
<td>6%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Damaged someone’s property</td>
<td>1%</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Physically hurt someone else</td>
<td>1%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other problem</td>
<td>1%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Were sexually harassed</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 3: Proportion of frequent legal high users who accessed health services in relation to different substances in the previous six months.

<table>
<thead>
<tr>
<th>Health service</th>
<th>Synthetic cannabinoids (n=70)</th>
<th>Party pills (n=19)</th>
<th>Alcohol (n=80)</th>
<th>Cannabis (n=58)</th>
<th>Tobacco (n=69)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP/doctor)</td>
<td>9%</td>
<td>0%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Counselling services</td>
<td>9%</td>
<td>0%</td>
<td>8%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>DrugHelp/MethHelp</td>
<td>7%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Alcohol &amp; Drug Helpline</td>
<td>4%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Ambulance</td>
<td>3%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Accident &amp; Emergency</td>
<td>3%</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Hospitalisation (admitted)</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>First Aid</td>
<td>0%</td>
<td>5%</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
<td>2%</td>
<td>1%</td>
</tr>
</tbody>
</table>

had been ‘admitted to hospital’ as a result of SC use. Those accessing health services for SC had accessed a mean of two services (median 2, range 1–6). One party pill user had accessed ‘First Aid’. Eight percent of drinkers had accessed a counsellor in relation to their alcohol consumption.

Discussion

Approximately a quarter of our sample of frequent legal high users reported suffering from mental illness, and this is of concern as legal highs have been associated with inducing psychotic relapse, as well as triggering new psychotic events.\textsuperscript{11,14}

We found approximately half of SC users used SC daily or more often and were categorised as dependent on SC. The frequency of SC use and level of dependency found in our study greatly exceeds the levels found in overseas studies (see\textsuperscript{10,15,19,20}) and this reflects the less frequent recruitment criteria in these studies (ie, ‘last year’ or ‘lifetime’ use). The proportion of SC users classified as dependent on SC in our study is higher than the proportion of frequent
regime will essentially be the same as the
are being considered for the full regulatory
indicate the product testing standards which
intended by the PSA. Discussion documents
to any formal product testing as originally
outlined earlier, the legal high products sold
during the interim regime were not subject
to any formal product testing as originally
intended by the PSA. Discussion documents
indicate the product testing standards which
are being considered for the full regulatory
regime will essentially be the same as the
international agreed standards for medicines
(i.e., International Conference Harmonisation
[ICH] guidelines). Consequently, there is
a good reason to believe the legal high products
approved under the full regime will pose a
lower health risk than those sold during the
interim regime. They are unlikely to include
traditional smoking products, for example.
However, even approved medicines can
cause adverse reactions if they are used:
by vulnerable individuals; at higher than
recommended dosage levels; via high risk
modes of administration, such as injection;
or in conjunction with substances which can
amplify adverse effects, such as alcohol. The
hedonistic consumption patterns associated
with recreational alcohol and other drug
use may accentuate the adverse health risks
from clinically-tested legal high products,
and clinical testing should seek to recreate
these real world conditions to fully identify
risks. Finally, while many of the frequent
legal high users in our study had histories of
mental illness, a recent evaluation suggests
the interim PSA regime may have reduced
legal high-related mental illness by reducing
the availability of these products to licensed
rather than convenience outlets.

We acknowledge a number of limitations
with this study. While we recruited
from randomly selected legal high stores in
central Auckland, the sample is not a repre-
sentative sample of frequent legal high users
in central Auckland or other parts of New
Zealand. Central Auckland may be different
from other parts of the country in important
ways, including the concentration of legal
high stores and other late night nightlife
venues. Participants needed to be able to
access the internet to complete the survey.
Although internet usage is very high in New
Zealand (e.g., only 1% those under 40 years
do not use the internet) and the survey
could be completed via smart phone or
tablet, difficulties with accessing the internet
may have excluded more vulnerable users.
Nevertheless, 11% of our sample was on
a sickness benefit and a further 10% were
unemployed. The low numbers of respon-
dents in our sample reporting “party pill”
use indicate these results should be treated
with caution. We had planned a larger
sample size, but recruitment was brought
to an unexpected halt by the banning of all
interim licensed products. The incidence of
ecstasy users (monthly+) classified as
dependant on ecstasy (9%) (using the
same SDS scale), and is in fact closer to the
proportion of frequent methamphetamine
users (monthly+) classified as dependent on
methamphetamine (66%) in New Zealand. The
utilisation of ED services in relation to
SC in our sample (3%) was very close to the
rate found by Winstock and Barratt among
last year SC users (2.4%).

The new PSA regime was modelled on the
assumption that the patterns of use of legal
highs would be similar to those previously
seen with legal BZP party pills during the
mid-2000s. However, a national population
survey of BZP use in 2006 found only 16% of
monthly BZP users used BZP weekly or
more often, and none reported daily use. The
sales turnover of the BZP legal high
market was estimated to be $28 million per
year, while the recent interim legal high
market generated an annual turnover of
$140 million. These differences illustrate
the important implications of what type of
legal high products gain licenses under a
legal regime.

Our findings suggest that alcohol and
other drug use may have played a part in
the substance-related problems experienced
by the frequent legal high users, and this
requires further research. Barrett et al found
those who used SC concurrently with
alcohol reported more side-effects, while
those who used SC with cannabis did not.
A previous study of BZP legal high users
in New Zealand found concurrent use of
cannabis and other drugs, taking large quan-
tities of BZP party pills in a single session,
concurrently using 5-hydroxytryptophan
(5-HTP) recovery pills, and being female,
were all independent predictors of experi-
encing adverse effects from BZP.

Although the interim PSA regime ended in
May 2014, regulatory work on the full PSA
regime has continued, with new regulations
and discussion documents released in early
November 2014, and further retail regu-
lations scheduled for release in mid-2016. As
outlined earlier, the legal high products sold
during the interim regime were not subject
to any formal product testing as originally
intended by the PSA. Discussion documents
indicate the product testing standards which
are being considered for the full regulatory
regime will essentially be the same as the

adverse effects, and the substances deemed responsible, were self-reported and not supported by urine or blood analysis. The use of illegal drugs may have been under-reported to some extent due to social stigma or fear of prosecution. Although, our sample reported very high levels of illegal drug use compared to surveys of the general population.

In conclusion, our exploratory study suggests frequent use of interim licensed SC products was associated with health risks, including drug dependency. Further research is required to more precisely identify the health risks including general random population surveys and larger sample studies to identify specific risk factors. Our study illustrates the importance of post-approval research of legal high products which describe use patterns and adverse effects in natural settings to better understand harms.

Competing interests: 
Nil

Acknowledgements: 
Funding for this research was provided by Auckland Council and Massey University.

Author information: 
Chris Wilkins, Researcher, SHORE & Whariki Research Centre, College of Health, Massey University, Auckland; Jitesh Prasad, Project Manager, SHORE & Whariki Research Centre, College of Health, Massey University, Auckland; KC Wong, Statistician, SHORE & Whariki Research Centre, College of Health, Massey University, Auckland; Marta Rychert, Doctoral Student, SHORE & Whariki Research Centre, College of Health, Massey University, Auckland; Thomas Graydon-Guy, Technical Officer, SHORE & Whariki Research Centre, College of Health, Massey University, Auckland.

Corresponding author: 
Chris Wilkins, SHORE & Whariki Research Centre, Massey University, PO Box 6137, Wellesley Street, Auckland.
c.wilkins@massey.ac.nz

URL: 

REFERENCES:


