



Short Report

“So prohibition can work?” Changes in use of novel psychoactive substances among adolescents attending a drug and alcohol treatment service following a legislative ban



Bobby P. Smyth^{a,b,*}, Philip James^b, Walter Cullen^c, Catherine Darker^a

^a Department of Public Health & Primary Care, Trinity College Dublin, Ireland

^b Youth Drug & Alcohol Service, HSE Addiction Service, Belgard Rd, Tallaght, Dublin 24, Ireland

^c Graduate Entry Medical School, University of Limerick, Limerick, Ireland

Background

Novel psychoactive substances (NPS) have become a source of international concern (European Commission, 2011). The marketplace for these drugs has also been novel. As most NPS were not scheduled in legislation as being illegal, they have been sold commercially both via the internet and in specialist shops known as ‘headshops’ (Dargan, Hudson, Ramsey, & Wood, 2011; Kelleher et al., 2011).

While NPS are very heterogeneous, they can be broadly grouped by route of use. Firstly, there are the powdered stimulant drugs which typically are snorted, many of which are cathinones (Winstock, Mitcheson & Marsden, 2010). Secondly, there are the smoked synthetic cannabinoids (Dargan et al., 2011). Thirdly there are pills with amphetamine-type effects, commonly piperazines (Kavanagh & Power, 2014).

The lifetime prevalence of NPS use among young adults was 5% across Europe, peaking in Ireland at 16% (European Commission, 2011). By May 2010 the number of headshops in Ireland had increased to 102, equating to one shop per 45,000 people (Kelleher et al., 2011). The general public became concerned regarding NPS related health and social problems (Kavanagh & Power, 2014).

Much international literature points to the potential futility of simply banning NPS. It is argued that prohibition will move NPS from their quasi-legal status into criminal supply networks and that new drugs will emerge to quickly replace any banned NPS (Winstock et al., 2010). Surveys indicate ongoing easy access to and substantial use of NPS in spite of legislative bans (McElrath & O’Neill, 2011; Measham, Wood, Dargan, & Moore, 2011).

Nevertheless, the Irish government proceeded with a two-pronged legislative approach. Firstly, the Misuse of Drugs Act was

amended to add over 100 NPS on 10th May 2010. This made possession and sale of the specified drugs a criminal offence. Then in August 2010, the Criminal Justice (Psychoactive Substances) Act was introduced, stating ‘a person who sells a psychoactive substance knowing or being reckless as to whether that substance is being acquired or supplied for human consumption shall be guilty of an offence’. Over 90% of headshops subsequently closed (Kavanagh & Power, 2014).

In countries which have implemented bans, there is some evidence of reductions in NPS use. There was a decline in mephadrone-related emergency department visits in the UK and in cathinone-related calls to poison centres in USA following legislation (Loeffler & Craig, 2013; Wood, Greene, Dargan, 2013). In New Zealand, BZP use in the general population declined following a ban (Wilkins & Sweetsur, 2013).

The legislative changes in Ireland in 2010 presented a natural experiment opportunity to examine changes in substance use among treatment attending adolescents. We hypothesised that (1) use of NPS would fall following legislation, (2) use of other substances would increase and (3) adolescents using NPS in the post-ban period would exhibit more problematic use.

Method

Setting

The Youth Drug & Alcohol (YoDA) service is a specialist drug and alcohol treatment service for adolescents in Dublin. Assessment involves clinical interview and completion of structured questionnaires. Building of a therapeutic alliance is prioritised over data gathering. There were no changes to service delivery or referral criteria over the period 2009–2011.

Measures

The National Drug Treatment Report System (NDTRS) form is completed on all patients who complete assessment. Between one

* Corresponding author at: Youth Drug & Alcohol Service, HSE Addiction Service, Belgard Rd, Tallaght, Dublin 24, Ireland. Tel.: +353 1 6206416; fax: +353 1 6206401. E-mail address: smythbo@tcd.ie (B.P. Smyth).

and four current problem substances are recorded. The definition of “problem substance” is not operationalised.

The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), a WHO structured clinical interview, is utilised routinely in YoDA. For each substance ever used, questions are asked about the 3-month period prior to interview. This then generates a risk score for each substance which ranges from 0 to 39. As the YoDA clinical team noticed increasing use of NPS in early 2010, we modified the ASSIST to include three additional drug categories. These were “Snortable Headshop drugs”, “Smokable Headshop drugs”, and “Headshop pills”. This amendment was made on 14 February 2010 and yielded information on use and non-use of each category of NPS in subsequent assessments.

Participants

To determine levels of use prior to the legislative ban, we included all assessments commenced during the 6-month period prior to 10th May 2010. The post-ban period was the 6 months before 10th May 2011. This ensured that seasonal impacts, such as school and national holidays, were similar in both periods.

Statistics

Assuming a baseline rate of problematic NPS use of 40% and a fall in use to 10%, we needed a sample of 38 people in each period to have 80% power to detect such a change, with p value set at 0.05.

We decided a priori that the principal outcomes of interest were (1) recent use on any NPS and (2) problematic use of any NPS. We analysed secondary outcomes, examining changes in use of subcategories of NPS. We explored the relationship between NPS use and all other measured socio-demographic and drug use covariates.

To examine for a significant difference between proportions, we conducted a chi square test, or Fisher Exact test where expected cell count was less than 5. In order to control for possible confounding, we planned to conduct two separate multivariate binary logistic regression analyses to identify covariates associated with problematic use of any NPS (from NDTRS) and with recent use of any NPS (from ASSIST). Covariates closely associated ($p < 0.10$) with these outcomes were eligible for inclusion in the model. They were retained or excluded based on goodness of fit.

To examine variations in ASSIST risk scores before and after the ban we utilised the Mann–Whitney U test as scores are not normally distributed.

Results

There were 94 assessments commenced by 92 adolescents, with 50 during the pre-ban period, and 44 during the post-ban period. The median age was 17 years (interquartile range [IQR] 15–17) and 83% were male. Only 69% were engaged in education, training or employment. The main referrers were parents (45%) and social workers (21%). There were significantly more males in the pre-ban period (92% vs 73%, $p = 0.01$). There were no other significant differences between the groups with regard to socio-demographic or referral characteristics.

The NDTRS form was completed in 80 (85%) cases and the modified ASSIST was completed in 48 (72%) of cases. There were seven (7%) cases who dropped out of the assessment process and consequently had no NDTRS or ASSIST data.

Those attending prior to the ban were more likely to demonstrate problematic alcohol use (Table 1). The Pre-ban assessments had a greater number of problem substances (Median = 2, IQR 1–3) compared to post-ban assessments (Median = 1, IQR 1–2, $p = 0.005$ [Mann–Whitney U test]). The pre-ban

assessments were more likely to recently use of amphetamines and cocaine.

Although rates of lifetime use of NPS were very similar in the two periods, adolescents attending after the ban demonstrated significantly lower rates of both recent use and problematic use of any NPS, of Snortable NPS and of Smokable NPS.

No socio-demographic or substance use covariate was significantly associated with problematic use of any NPS. Those reporting recent (past 3 month) use of any NPS were more likely to also report recent use of cocaine (83% vs 33%, $p = 0.003$), amphetamines (82% vs 35%, $p = 0.007$) and benzodiazepines (69% vs 34%, $p = 0.03$). There was no significant association between recent NPS use and other covariates although it tended to be greater in males (54% vs 14%, $p = 0.06$).

Among recent NPS users, their ASSIST risk score was significantly greater in pre-ban assessments ($n = 19$, median 16 [IQR 4–31] vs 2 [IQR 2–6], $p = 0.02$).

Multivariate analysis

It was not possible to conduct a multivariate analysis of covariates associated with current problematic use of any NPS with the time-period included in the equation, as there were no cases identified in the post-ban period.

A multivariate analysis examining covariates associated with recent use of any NPS was conducted. The best fit involved a model which included time-period, gender and recent amphetamine use. This confirmed that attendees in the pre-ban period were more likely to report recent use of any NPS (adjusted odds ratio 7.4, 95%

Table 1

Substance use among adolescents entering treatment before and after a legislative ban on novel psychoactive substances (NPS).

	Total		Pre-ban		Post-ban		p value
	n	%	n	%	n	%	
Current problem substance use ($n = 80$)							
Alcohol	49	61	32	73	17	47	0.02
Cannabis	70	87	40	91	30	83	0.33 ^a
Sedatives ^b	14	17	7	16	7	19	0.68
Ecstasy	4	5	3	7	1	3	0.62 ^a
Heroin	3	4	1	2	2	6	0.58 ^a
Cocaine	15	19	10	23	5	14	0.31
Any NPS	14	17	14	32	0	0	<0.001
Snortable NPS	6	7	6	14	0	0	0.03 ^a
Smokable NPS	7	9	7	16	0	0	0.01 ^a
NPS oral pills	1	1	1	2	0	0	1.0 ^a
Any use in past 3 months ($n = 48$) ^c							
Alcohol	42	91	15	94	27	90	1.0 ^a
Cannabis	43	93	15	94	28	93	1.0 ^a
Sedatives ^b	16	36	8	50	8	28	0.13
Amphetamine	11	24	7	44	4	14	0.03 ^a
Opioid	0	0	0	0	0	0	NA
Cocaine	12	27	9	56	3	10	0.002 ^a
Any NPS	22	48	14	82	8	28	<0.001
Snortable NPS	12	26	8	50	4	13	0.01 ^a
Smokable NPS	15	33	10	62	5	17	0.002
NPS oral pills	5	11	3	20	2	7	0.31 ^a
Lifetime use ($n = 47$)							
Any NPS	37	79	14	82	23	77	0.73 ^a
Snortable NPS ^d	18	41	8	50	10	36	0.35
Smokable NPS ^e	31	67	11	69	20	67	0.89
NPS oral pills ^d	14	32	5	33	9	31	1.0 ^a

^a Fishers test.

^b Benzodiazepines and zopiclone-type medications.

^c Data missing in two or three cases for each drug category. Data collection instrument (the ASSIST) was amended on 14 February 2010, so assessments after this date are included below.

^d Data missing in three cases.

^e Data missing in one case.

CI 1.5–37, $p = 0.01$). The model fit was very good, correctly predicting 82% of outcomes and the Nagelkerke R square was 0.48.

Discussion

We found substantial reductions in use of NPS among adolescents entering treatment 6–12 months after legislation prohibiting their use, supply and sale. We deliberately cast the net wide in terms of NPS due to concerns that success at reducing use of a single drug-type might conceal increased use of other emerging and not yet illegal NPS (Dargan et al., 2011). Further new substances did indeed arrive into the drugs marketplace in Ireland following the initial legislation (Kavanagh & Power, 2014; O'Byrne, Kavanagh, McNamara, & Stokes, 2013). Nevertheless, there was a fall in use of the overall group of NPS.

The detected reduction in use among the adolescents in this study mirrors reductions in use of specific categories of NPS in other populations following similar bans internationally (Loeffler & Craig, 2013; Wilkins & Sweetsur, 2013; Wood et al., 2013). A recent Irish study of treated heroin dependent adults also found reduced NPS use following the legislation (O'Byrne et al., 2013).

The legislation has certainly not eliminated use of these drugs. There was evidence of ongoing use of all categories of NPS 6–12 months after the laws were changed. We had speculated that young people who persisted with use of these drugs following their prohibition would exhibit more problematic patterns of use compared to those accessing them during the pre-ban period when they were readily available in headshops. We found no evidence to support this hypothesis. Indeed we found that the ASSIST scores present in users of NPS after the ban were significantly lower than those before the ban, indicating less frequent and less problematic use.

We also examined the possibility that NPS may simply have temporarily displaced other more established illegal drugs such as cocaine, amphetamines and cannabis. Not only did we fail to find any evidence of this, we found that adolescents in the post-ban period were less likely to use cocaine and amphetamines. Polydrug use was more evident in the pre-ban period. While the reason for this is unclear it does not raise concerns regarding untoward effects of the legislation on patterns of use. Nevertheless, it is possible that the legislation may have generated other social or personal harms not measured in this study (Greenfield & Paoli, 2012).

Our study cannot explain why these adolescents reduced their NPS use. It seems unlikely that concerns regarding criminal sanction acted as an important deterrent. They demonstrated ongoing use of a broad range of similarly illegal drugs after the legislative ban. Looking beyond NPS, we know that availability is a key factor influencing use of other substances, such as cannabis and alcohol (Babor et al., 2010; MacCoun & Reuter, 2001). In the months following legislation 93% of the headshops closed thereby curtailing easy access to these drugs. While generally sceptical of supply orientated policies, Caulkins (2012) does acknowledge that such policies can be very efficient in certain types of drug markets.

Although, there were just two principal outcomes, we conducted multiple additional statistical tests to examine secondary outcomes and to explore factors associated with NPS use. Nevertheless, we opted to make no adjustments for the many tests undertaken because they can result in greater type II error rate, reduced power, and increased likelihood of missing important findings. Our power to detect significant associations was reduced due to the sample size being smaller than recommended in our power calculations. The key sources of information (i.e. NDTRS and ASSIST) were unavailable in 15–30% of cases raising the possibility

of selection bias. There was scope for subjectivity in determining “problem substance use” as this term is not operationalised. As we did not longitudinally collect data on the same individual patients, there could be additional confounders unmeasured in this study. The findings may not generalise to other settings with more established patterns of NPS use or with different supply networks, such as extensive internet based sourcing of NPS. It is also possible that efficient criminal supply networks may take longer to establish than 6–12 months. The reason for the higher prevalence of amphetamine and cocaine use in the pre-ban period is unclear. It does raise the possibility that there were other secular changes in adolescent drug use occurring over the study timeframe.

Overall, the legislative measures undertaken in Ireland in response to escalating use of NPS coincided with reduced use of the broad category of NPS within this narrow but important group of high risk adolescents attending treatment services. While we watch with interest the outcome of attempts to regulate this marketplace, such as those in New Zealand, our findings do not provide a rationale for Ireland to alter its prohibitionist approach to NPS at this time.

Funding

No external funding was obtained for the purposes of this research project.

Conflict of interest

None of the authors have any conflicts of interest to declare.

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