

# BMJ Open Multilevel population-based cross-sectional study examining school substance-misuse policy and the use of cannabis, mephedrone and novel psychoactive substances among students aged 11–16 years in schools in Wales

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## ABSTRACT

**Objectives** To examine whether young peoples' risk of cannabis, mephedrone and novel psychoactive substances (NPS) use is associated with school substance-misuse policy.

**Design** A cross-sectional survey of secondary school students combined with a School Environment Questionnaire and independently coded school substance-misuse policies (2015/6).

**Setting** 66 secondary schools in Wales.

**Participants** Students aged 11–16 years (n=18939).

**Results** The prevalence of lifetime, past 30-day and daily cannabis use was 4.8%, 2.6% and 0.7%, respectively; lifetime prevalence of mephedrone use was 1.1% and NPS use was 1.5%. Across 66 schools, 95.5% (n=63) reported having a substance-misuse policy, 93.9% (n=62) reported having a referral pathway for drug using students, such that we were insufficiently powered to undertake an analysis. We found little evidence of a beneficial association between lifetime cannabis use and involving students in policy development including student council consultation (OR=1.24, 95% CI 0.89 to 1.73), other student consultation (OR=1.42, 95% CI 0.94 to 2.14) or with the use of isolation (OR=0.98, 95% CI 0.67 to 1.43), with similar results for cannabis use in past 30 days, daily and the lifetime use of mephedrone and NPS. The School Environment Questionnaires found that 39.4% (n=26) schools reported no student involvement in policy development, 42.4% (n=28) reported student council consultation, 18.2% (n=12) used other student consultations and 9.7% (n=3) mentioned isolation. The independently coded content of policies found that no school policy recommended abstinence, one mentioned methods on harm minimisation, 16.1% (n=5) policies mentioned student involvement and 9.7% (n=3) mentioned isolation.

**Conclusions** Policy development involving students is widely recommended, but we found no beneficial associations between student involvement in policy development and student drug use. This paper has highlighted the need for further contextual understanding around the policy-development process and how schools manage drug misuse.

## Strengths and limitations of this study

- The first study to examine the risk of daily cannabis, mephedrone and NPS use with variations in the presence, development and content of a school's substance-misuse policy.
- This is the first study to link data from students and teachers and independently code the content of policies to disaggregate associations with student drug use.
- The large school (n=66) and student sample (n=18939) sizes meant we had statistical power to detect small effects.
- This study is cross-sectional and thus causal relationships cannot be established; and future longitudinal research on student awareness of policies and how policies are implemented and enforced may be beneficial.

## BACKGROUND

The latest Global Burden of Disease Study found the risk factors for disability-adjusted life years attributed to drug use disorders in young people had increased between 1990 and 2013.<sup>1</sup> A consistent finding across studies is that illicit drug use begins to increase in mid-adolescence and peaks in early adulthood.<sup>2,3</sup> The legislation governing the regulation and availability of illicit drugs is changing, with the possession of cannabis legalised for those over the age of 21 years in seven states in the USA.<sup>4</sup> Higher potency (percentage of delta-9 tetrahydrocannabinol) cannabis products have become available,<sup>5</sup> and the advent of novel psychoactive substances (NPS). These changes have led to an increased number and availability of drugs of unknown toxicity and dose.<sup>6</sup> In this context, schools provide a population-wide

conduit for educating young people about the potential effects and harms of drugs and means to minimise them.

School-based drug prevention programmes and policies are the dominant mode of universal education in early adolescence on drug-related harms and how to minimise them.<sup>7 8</sup> Policies set normative values and expectations for student behaviour, as well as outlining the procedures for dealing with substance-misuse-related incidents in school.<sup>9 10</sup> The importance of policies and the value of student involvement in their development is highlighted in both the Health Promoting Schools Framework<sup>11 12</sup> and Article 12 of the United Nations Convention on the Rights of the Child (UNCRC).<sup>13 14</sup> Policies aim to reduce the exposure and demand for drugs by outlining the rules encompassing: principles of abstinence or harm minimisation, student sanctions associated with possession (eg, isolation) and support mechanisms and practices (eg, referral pathways for students in need of support). The content of policies has been found to be highly variable<sup>10 15 16</sup> and whether schools implement them is an important predictor of student drug use.<sup>7</sup>

There have been few evaluations of school policy and student drug use, and none in Europe that have gone beyond alcohol and tobacco.<sup>17–19</sup> The International Youth Development (IYD) study, a longitudinal study of 3264 students across 188 schools in the USA and Australia found that school administrator reported use of out-of-school suspensions, and low policy enforcement were associated with increased use of marijuana in the past month, and student recall of abstinence-based curricula was associated with a reduced risk of use of marijuana in the past month.<sup>7 16</sup> These studies did not, however, examine the association between cannabis use and the simple presence of a policy, independently code content of policies or examine associations with other illicit drugs. Moreover, as these studies have been relatively small, none have had sufficient power to examine NPS use or daily cannabis use which has been more closely associated with harms than lifetime or monthly use.<sup>7 16</sup>

This paper examines the association between the presence of a school substance-misuse policy, student involvement in policy development, policy content and school practices regarding substance misuse, with risk of student drug use.<sup>7 20–22</sup> Outcomes were lifetime, last 30-day and daily use of cannabis, and lifetime use of mephedrone and NPS. We used data from the School Health Research Network—a large, population-based cross-sectional survey of young people aged 11–18 years in Wales, UK. We combined survey responses from students with data from a School Environment Questionnaire and independently coded the content of school policies to address the following objectives:

1. To examine if student cannabis, mephedrone and NPS use is associated with the presence of a school's substance-misuse policy.
2. To examine if student cannabis, mephedrone and NPS use is associated with the type of student involvement

in the development of a school's substance-misuse policy.

3. To examine if student cannabis, mephedrone and NPS use is associated with a school's substance-misuse policy content (messages on: abstinence, harm minimisation and the condemnation of drug use).
4. To examine if student cannabis, mephedrone and NPS use is associated with a school's practices (use of isolation to manage student behaviour and referral pathway for students).

## METHODS

This study used data collected from the School Health Research Network Student Health and Well-being Survey of secondary schools in Wales in 2015.<sup>23</sup> The School Health Research Network (herein 'the network') is a multiagency partnership led by the Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement at Cardiff University, with the Welsh Government, Public Health Wales, Cancer Research UK and 113 secondary schools throughout Wales (as of December 2015) which aims to improve the quality of school-based health improvement research in Wales. This manuscript adheres to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines on the reporting of observational studies.

### Study design and recruitment

The Student Health and Wellbeing Survey uses measures from the WHO's Health Behaviour in School-aged Children Survey, with additional questions that reflect current policy and research priorities in Wales. At the time of the survey, the network schools represented 113 (53%) of the 212 secondary schools in Wales, with representation in all 22 local authority areas. Schools were asked to include a minimum of two randomly selected, mixed-ability classes per year group. Students completed the survey in English or Welsh on a secure website between September and December 2015. Teachers completed one School Environment Questionnaire per school on paper between March and June 2016. Schools were further contacted between June and August 2016 to request a copy of their school substance-misuse policy, for content analysis. Out of the 113 schools invited to take part, 23% (n=26) schools did not take part and 9.7% (n=11) schools opted out of questions on drug use. These schools were excluded from the analysis. Of the remaining 67.3% (n=76), 3.5% (n=4) schools did not return a School Environment Questionnaire. Out of the 63.7% (n=72) remaining schools, complete data were provided across 58.4% (n=66) schools, and these schools were used for the final analysis. The final sample is based on 18939 students aged 11–16 years.

### Patient and public involvement

All network schools are invited to an annual event to discuss concerns and priorities. This resulted in additional questions on legal highs being added to the 2015 survey.

There was no patient and public involvement in the design, recruitment and conduct of the study, although schools facilitated the data collection. Results are disseminated via a research brief (a concise summary of the published papers) to all member schools and posted on the School Health Research Network (SHRN) website.

## Measures

### Cannabis use

Cannabis use was measured by asking students to report whether they have ever used cannabis in their lifetime using the question 'Have you ever taken cannabis in your life?' (responses: 'never'; '1–2 days'; '3–5 days'; '6–9 days'; '10–19 days'; '20–29 days' or '30 days (or more)'). Cannabis in the last 30 days was also measured using the question 'Have you ever taken cannabis in the last 30 days?' (responses: 'never'; '1–2 days'; '3–5 days'; '6–9 days'; '10–19 days'; '20–29 days' or '30 days (or more)'). Daily cannabis use was measured using the response option of '30 days or more' in the last 30 days. Binary variables were created to indicate the lifetime (never vs >1–2 days), monthly (never vs >1–2 days) and daily use in the last 30 days (<30 days vs ≥30 days).

### Mephedrone and NPS use

Mephedrone and NPS use were measured by asking students to report whether they had ever tried the drugs, using the question 'In your life have you ever tried any of the following? Mephedrone (also called m-cat and meow-meow)' (responses 'yes', 'no'), legal highs (like pep stoned, Benzylpiperazine (BZP), black mamba, clockwork orange)' (responses 'yes', 'no').

### School substance-misuse policy

One teacher from each school reported whether or not they had a written substance-misuse policy with the response options of 'yes', 'in development' and 'no'. A binary variable was created to indicate presence or absence of a policy (yes=1; in development and no=0). Schools who reported they had a policy were asked to provide a copy. An indicator variable was then created noting whether each school either did not have a policy, teachers reported they had a policy but we did not receive a copy, an 'unverified policy' or teachers reported they had a policy and we received it, a 'verified policy'.

### Student involvement in school substance-misuse policy

One teacher from each school reported whether students were involved in the development of the school substance-misuse policy with the response options of 'no student involvement', 'student council', 'student voice', 'wider student consultation', 'suggestion box' and 'other'. An indicator variable was created to indicate student involvement (no student involvement=0, student council involvement=1 and other student involvement=2).

### School policy content

School policies were coded against an a priori coding frame consisting of whether they mentioned:

abstinence, harm minimisation or condemned drug use (eg, 'Drugs have no place in this school', 'Drugs are not permitted on school premises') and mentioned the use of isolation.

### School practices

Schools were asked whether they used isolation to manage student behaviour ('Does your school use isolation to manage student behaviour?'), and whether the school used referrals to help drug using students ('Does your school have a specified pathway or a referral process in place to provide expertise and resources for students who misuse drugs?'). Binary variables indicating presence or absence were used for all questions.

### Covariates

Students were asked to report their gender, year and month of birth. Students were asked to select the ethnicity that best described them, from the following options: white, mixed race, Asian or Asian British, black or black British, Chinese or other. Family structure was assessed by asking students who they lived with, and responses were categorised into the following: both parents, single mother, single father, parent and step-parent, foster parent(s) and other. The Family Affluence Scale (FAS) was used as an indicator of familial material affluence as it has better criterion validity and is less affected by non-response bias than other similar measures.<sup>24–26</sup> The scores for each item were summed to give a total affluence score. Free school meals (FSM) are provided in Wales for those students whose parents are in receipt of a range of state benefits such as income support and job-seekers allowance. FSM entitlement was used as a measure of family-level socioeconomic status, and the percentage of students entitled to receive free meals within each school was divided into quartiles, 1 (<9% eligible to FSM), 2 (>9%–14.4% eligible), 3 (14.5%–22.9% eligible) and 4 (23%–100%). The Welsh Index of Multiple Deprivation (WIMD) for each school was examined. The WIMD is an area-based measure of relative socioeconomic deprivation at the lower super output level (average population 5000 residents) and is used to identify areas with the highest concentrations of deprivation with a range from most deprived (1) to least deprived (1909).<sup>27</sup> The WIMD was divided into quintiles 1 (1–446), 2 (447–1071), 3 (1072–1408), 4 (1409–1631) and 5 (1632–1909).

### Research consent

Schools returned a registration form indicating their intention to participate in the student survey. Schools informed parents about the survey using two of three methods (letters sent home with students, letter sent via email or text message) and parents had the option of withdrawing their child from data collection ('opt-out' consent procedure). The survey was voluntary and completed anonymously. The first question asked students for their consent to participate and if they said no, the survey automatically closed. Schools were provided with

information and slides to share with students in advance of the survey.

### Statistical analyses

All analyses were undertaken in STATA V.14.0. We compared the whole sample to that which provided complete data ('the complete case sample') using  $\chi^2$  for categorical variables and t-tests for continuous variables. To account for hierarchical structure (students within schools), we employed multilevel logistic regression models to examine the relationship between school-level policy variables and student cannabis, mephedrone and NPS use, using the `melogit` command. We assessed whether there were interactions between school policy variables with year group and gender, but found none. We therefore pooled data for boys and girls and across year groups. We adjusted ORs with compositional variables (gender, year group, ethnicity, family structure, family affluence, FSM entitlement and area-level deprivation of the school) in model 1 and then adjusted for school context variables (involvement of students in policy development and use of isolation) in model 2. Further analysis examined the association between content extracted from policies (condemnation of drugs) and the risk of student drug use.

We first estimated the intraclass correlation coefficient (ICC), Akaike information criterion (AIC) and the Bayesian information criterion (BIC) for models without explanatory variables. We recalculated ICCs to examine whether students compositional variables, parental (FAS) and school-level socioeconomic deprivation (in model 1), or school context (in model 2) explained the greatest variation in the association with the risk of student drug use between schools (ie, which had the greatest effect on the ICC). The AIC and BIC are penalised measures of model fit and were used to identify the most parsimonious model (ie, which model had the lowest value).

Preliminary analysis identified that across the 66 schools, 95.5% (n=63) schools had a substance-misuse policy, 3.0% (n=2) had a policy in development and 1.5% (n=1) had no policy. Similarly, 93.9% (n=62) schools reported there was a referral process for drug-using students. Because of the almost universal coverage of school substance-misuse policies and a referral pathway, we were insufficiently powered to undertake analysis so these variables were not included in multi-level analyses.

## RESULTS

Complete data were provided across 58.4% (n=66) schools by 18939 students (54.1% girls and 45.9% boys, aged 11–16 years). Students with complete data were more likely to be girls, in year 9 (aged 13–14 years), non-white and non-smoker, but no differences were found in FAS or FSM scores.

Table 1 provides the student characteristics according to cannabis, mephedrone and NPS use across the lifetime. The prevalence of lifetime, last 30-day and daily cannabis

use was 4.8%, 2.6% and 0.7%, respectively; lifetime prevalence of mephedrone use was 1.1% and NPS use was 1.5%. Drug use was more common among students who were male, in older year groups, were black and mixed race, resided with foster parents and classified in the lowest tertile on family affluence across all substances. There was little difference according to FSM entitlement or area-level deprivation. Across the 66 schools, 95.5% (n=63) reported having a substance-misuse policy, 42.4% (n=28) and 18.2% (n=12) reported consulting with student council and other student consultation, respectively, 80.3% (n=53) reported their school used isolation and 93.9% (n=62) reported their school had a referral pathway in place for drug-using students.

Table 2 shows that in model 2, there was no beneficial association between the involvement of students in policy development, student council consultation (OR=1.24, 95% CI 0.89 to 1.73), other student consultation (OR=1.42, 95% CI 0.94 to 2.14) and the use of isolation (OR=0.98, 95% CI 0.67 to 1.43) and the risk of lifetime cannabis use. These findings were repeated for last 30 days and daily cannabis use, as well as the lifetime use of mephedrone and NPS. The use of isolation was associated with an increased risk of mephedrone use (OR=1.96, 95% CI 1.17 to 3.28). Across outcomes, the greatest reduction in ICCs, BICs and AICs was in model 2, adjusting for the school context variables: involvement of students in policy development, use of isolation and condemnation of drugs.

### Subgroup analysis of school policy content

Of the 95.5% (n=63) teachers who reported their school had a substance-misuse policy, 47.0% (n=31) provided a policy for verification and coding of content. No policies recommended abstaining from drug use, 3.2% (n=1) contained methods on harm minimisation and 58.1% (n=18) condemned drug use. The School Environment Questionnaires showed that 39.4% (n=26) schools reported no student involvement in policy development, 42.4% (n=28) reported student council consultation and 18.2% (n=12) other student consultation; 80.3% (n=53) reported using isolation. The independently coded content of policies, however, found that only 16.1% (n=5) school substance-misuse policies mentioned student consultation, 29.0% (n=9) described the development process but no student involvement, 54.0% (n=17) did not describe their policy development process and 9.7% (n=3) policies included isolation.

## DISCUSSION

In this population-wide, cross-sectional study of school substance-misuse policies and student drug use, in line with UK Governments' recommendations<sup>20–22</sup> and the Health Promoting Schools Framework,<sup>11 12</sup> over 90% of schools had a substance-misuse policy. Student involvement in policy development, use of isolation to manage student behaviour and policy content were not associated

**Table 1** Sociodemographic characteristics of students and schools according to illicit drug use

Characteristics		Lifetime cannabis use	Cannabis last 30 days	Cannabis daily	Lifetime mephedrone use	Lifetime novel psychoactive substances use
Students (n=18 939)		4.8 (908)	2.6 (502)	0.7 (141)	1.1 (214)	1.5 (291)
Gender						
Male	45.5 (8609)	5.3 (454)	2.7 (255)	1.0 (90)	1.5 (128)	1.9 (161)
Female		4.4 (454)	2.4 (247)	0.5 (51)	0.8 (86)	1.3 (130)
Year group						
Year 7	22.0 (4179)	0.2 (10)	0.2 (9)	0.1 (4)	0.3 (14)	0.4 (17)
Year 8	21.4 (4051)	1.3 (54)	1.1 (44)	0.4 (18)	1 (39)	1.1 (45)
Year 9	19.5 (3689)	2.4 (89)	1.3 (48)	0.3 (12)	0.8 (28)	1.2 (46)
Year 10	19.3 (3656)	7.8 (284)	4.6 (169)	1.2 (43)	1.4 (53)	1.8 (66)
Year 11	17.8 (3364)	14.0 (471)	6.9 (232)	1.9 (64)	2.4 (80)	3.5 (117)
Ethnicity						
White	89.0 (16 848)	4.6 (778)	2.4 (409)	0.6 (98)	0.8 (143)	1.2 (208)
Mixed race	3.3 (630)	7.1 (45)	4.3 (27)	0.9 (6)	1.7 (11)	2.9 (18)
Asian or British Asian	3.8 (725)	2.8 (20)	1.7 (12)	0.8 (6)	1.5 (11)	1.8 (13)
Black or black British	1.4 (257)	7.0 (18)	5.1 (13)	1.6 (4)	3.9 (10)	3.9 (10)
Chinese	0.6 (122)	27.9 (34)	25.4 (31)	16.4 (20)	22.1 (27)	24.6 (30)
Other	1.9 (357)	3.6 (13)	2.8 (10)	2.0 (7)	3.4 (12)	3.4 (12)
Family structure						
Both parents	64.7 (12 257)	3.3 (399)	1.7 (208)	0.4 (45)	0.7 (90)	0.8 (99)
Single mother	17.7 (3346)	6.3 (212)	3.4 (113)	0.9 (30)	1.2 (40)	1.9 (64)
Single father	2.5 (473)	8 (38)	4.6 (22)	2.1 (10)	1.5 (7)	2.7 (13)
Parent and step-parent	12.7 (2413)	7.3 (177)	4.4 (106)	1.1 (26)	1.6 (38)	2.8 (68)
Foster parent	0.9 (164)	17.7 (29)	11.6 (19)	7.3 (12)	11 (18)	13.4 (22)
Other	1.5 (286)	18.5 (53)	11.9 (34)	6.3 (18)	7.3 (21)	8.7 (25)
FAS						
Low income (7–11)	5.5 (1043)	7.3 (76)	5.3 (55)	3 (31)	3.4 (36)	4.2 (44)
Middle income (12–15)	52.5 (9947)	4.7 (471)	2.3 (232)	0.5 (52)	1 (97)	1.4 (138)
High income (16–19)	42 (7949)	4.5 (361)	2.7 (215)	0.7 (58)	1 (81)	1.4 (109)
FSM						
1 (<9%)	27.7 (5245)	4 (210)	2.1 (108)	0.5 (29)	1 (54)	1.6 (82)
2 (9%–14.4%)	20.8 (3929)	5.3 (210)	3.1 (123)	0.9 (37)	1 (38)	1.5 (61)
3 (14.5%–22.9%)	23.6 (4475)	5.1 (227)	2.8 (125)	0.8 (38)	1.1 (49)	1.4 (65)
4 (23%–100%)	27.9 (5290)	4.9 (261)	2.8 (146)	0.7 (37)	1.4 (73)	1.6 (83)
WIMD						
1 (1–446) Most deprived	21.6 (4096)	5.2 (213)	2.7 (112)	0.7 (31)	1.3 (52)	1.6 (66)
2 (447–1071)	22.9 (4337)	5 (219)	3.1 (134)	0.9 (40)	1.2 (54)	1.7 (73)
3 (1072–1408)	20.5 (3887)	4.5 (174)	2.4 (92)	0.7 (26)	0.8 (33)	1.3 (52)

Continued

Table 1 Continued

Characteristics		Lifetime cannabis use	Cannabis last 30 days	Cannabis daily	Lifetime mephedrone use	Lifetime novel psychoactive substances use
4 (1409–1631)	19.2 (3630)	5.6 (205)	3.2 (116)	1 (36)	1.2 (43)	1.9 (69)
5 (1632–1909)	15.8 (2989)	3.2 (97)	1.6 (48)	0.4 (11)	1.1 (32)	1 (31)
Least deprived						
Schools (n=66)						
Have a substance-misuse policy	95.5 (63)	4.8 (877)	2.6 (486)	0.7 (138)	1.1 (212)	1.5 (282)
Student involvement in policy development						
Student council consultation	42.4 (28)	5.2 (438)	2.9 (249)	0.9 (73)	1.2 (99)	1.7 (149)
Other student consultation	18.2 (12)	4.2 (179)	2.3 (97)	0.7 (29)	1 (44)	1.3 (56)
Use isolation	80.3 (53)	4.8 (702)	2.7 (399)	0.8 (114)	1.3 (188)	1.6 (231)
Referral pathway for drug using students	93.9 (62)	4.8 (870)	2.7 (485)	0.8 (137)	1.1 (207)	1.6 (282)

All data are % (n).

All school data % are % of students in schools with a policy.

FAS, Family Affluence Scale; FSM, Free School Meal; WIMD, Welsh Index of Multiple Deprivation.

with beneficial effects on the risk of student cannabis use. Only one school had a policy that contained harm-minimisation information, despite it being a key focus of the UK Governments' drug-prevention policy.<sup>20–22 28</sup> The independently coded content of policies highlighted areas for further qualitative investigation in order to understand in more detail the policy-development process and how schools manage substance-misuse-related incidents, as school-reported practices in the School Environment Questionnaire did not always replicate the content of policies.

The first research objective was related to the presence of a school substance-misuse policy. Across the 66 schools, 95.5% (n=63) schools reported that their school had a substance-misuse policy, 3% (n=2) had a policy in development and 1.5% (n=1) reported not currently having a substance-misuse policy. This replicates findings by Beyers and colleagues<sup>16</sup> with 96.8% of schools reporting having a substance-misuse policy. The universal adoption of school substance-misuse policy is aligned with the UK Governments' guidance<sup>13 20–22 28</sup> and the Health Promoting Schools Framework.<sup>11 12</sup> As a result, we were insufficiently powered to undertake an analysis and do not know whether having a substance-misuse policy is associated with student drug use.

The involvement of students in the development of their school substance-misuse policy is an important element highlighted in Article 12 of the UNCRC<sup>13 14</sup> and

the Health Promoting Schools Framework.<sup>11 12</sup> We found no indication of a beneficial association between the involvement of students, in the form of a student council or other student consultation, and student drug use. This may be because student involvement in policy development is only one element of the Health Promoting Schools Framework. It may be that student involvement in policy development is not enough on its own to change student drug use. More consistent effects on student tobacco and alcohol use have been found when other elements of the Health Promoting Schools Framework are implemented, such as when staff and student councils collectively determine priorities and the involvement of parents and other outside health agencies<sup>29</sup>; however, effects on drug use of the Health Promoting Schools Framework (HPS) are mixed.<sup>11 12</sup> It would be beneficial for future research to explore the level of student engagement in policy development. We found that 16.1% (n=5) school substance-misuse policies mentioned student consultation, 29% (n=9) described the development process but not student involvement and 54% (n=17) did not describe their policy-development process.

The third research objective examined whether student cannabis, mephedrone and NPS use was associated with varying policy content (messages on: abstinence, harm minimisation and the condemnation of drug use). Although there are no directly comparable estimates as previous studies have used school staff reports on policy

**Table 2** Unadjusted and adjusted ORs (95% CI) for the association between teacher-reported practices and policy content with lifetime cannabis use, cannabis use in the last 30 days, cannabis use daily in the last 30 days, lifetime mephedrone and NPS use

	Lifetime cannabis use			Cannabis last 30 days			Cannabis daily			Lifetime mephedrone use			Lifetime NPS use		
	Null	Model 1	Model 2	Null	Model 1	Model 2	Null	Model 1	Model 2	Null	Model 1	Model 2	Null	Model 1	Model 2
Teacher reported (n=18939)															
Student involvement in policy development		1.24	0.89 to 1.73		1.25	0.85 to 1.84		1.38	0.82 to 2.32		1.06	0.67 to 1.56		1.31	0.92 to 1.87
Student council															
Other consultation		1.42	0.94 to 2.14		1.35	0.84 to 2.17		1.46	0.79 to 2.70		1.00	0.62 to 1.60		1.16	0.75 to 1.79
Use isolation		0.98	0.67 to 1.43		1.08	0.70 to 1.67		1.12	0.64 to 1.98		1.96	1.17 to 3.28		1.03	0.69 to 1.55
ICC	0.09	0.06	0.10	0.10	0.07	0.06	0.11	0.04	0.03	0.07	0.03	0.02	0.06	0.02	0.02
BIC	7192.83	6174.39	6200.6	4593.39	4143.34	4170.80	1666.77	1570.19	1597.59	2347.79	2247.80	2270.28	3008.63	2814.19	2841.51
AIC	7177.13	5970.31	5972.98	4577.70	3939.27	3943.18	1651.08	1366.12	1369.97	2332.09	2043.72	2042.66	2992.93	2610.11	2613.89
Policy content (n=9006)															
Condemns		0.77	0.45 to 1.31		0.98	0.54 to 1.77		1.18	0.67 to 2.06		1.05	0.65 to 1.72		1.68	1.06 to 2.66
ICC	0.13	0.09	0.15	0.09	0.09	0.09	0.11	<0.01	<0.01	0.14	0.05	0.03	0.11	0.03	0.01
BIC	4061.79	3452.20	3460.37	2461.90	2264.91	2274.01	968.85	944.59	953.37	1292.08	1318.97	1328.03	1491.93	1454.51	1459.33
AIC	4047.58	3253.24	3254.31	2447.69	2065.96	2067.95	954.64	752.74	754.41	1277.87	1120.01	1121.97	1477.72	1255.55	1253.27

Reference categories for teacher-reported variables: no involvement of students in policy development; no use of isolation.

Reference categories for policy content variables: not condemning drug use. Model 1 adjusts for compositional variables: gender, year group, ethnicity, family structure, Family Affluence Scale, Free School Meal Entitlement and Welsh Index of Multiple Deprivation. Model 2 adjusts for school context variables: involvement of students in policy development, use of isolation and condemnation of drugs.

AIC, Akaike information criterion; BIC, Bayesian information criterion; ICC, interclass correlation coefficient; NPS, novel psychoactive substances.

content, the IYD study in US and Australian schools found 69.7% of Australian and 98.3% of US schools had a policy that emphasises students abstain from drug use.<sup>7</sup> We found no schools had a policy recommending abstinence, but 58.1% (n=18) of schools did condemn drug use. It is not clear whether this can be attributed to a difference between the USA and Australia with UK schools or historical differences, as the IYD data were collected in 2002/2003. Interestingly, only one school policy contained harm-minimisation materials. A lack of content on harm minimisation in school-based drug prevention is a gap in the evidence that future research and policy development may wish to consider. Harm-minimisation approaches may exert maximal effects on more harmful patterns of cannabis use, such as monthly and daily use which are more associated with harm than lifetime measures.<sup>7</sup>

Finally, we examined whether student cannabis, mephedrone and NPS use is associated with school practices of using isolation and a referral pathway for drug-using students. Welsh Government and Article 12 of the UNCRC recommend that schools provide provisions for children, including referral pathways for students in need of help and support.<sup>14</sup> We were unable to examine the impact of having a referral pathway, as over 90% of schools reported they had a pathway in place. Furthermore, we found no indication of a beneficial association of isolation and student drug use across all substances and time points. This finding further supports the need for future qualitative research in order to understand the role of isolation to manage student behaviour. We found 80.3% (n=53) schools reported using isolation but only 9.7% (n=3) school substance-misuse policies contained information about isolation. It is possible that schools use isolation to manage student behaviour, but not when dealing with substance misuse, such that it would not be reported in the school's substance-misuse policy.

Our results extend previous research by verifying school reports of practices regarding substance misuse against policy content, and producing estimates for policy content, whereas previous studies have relied solely on school-reported practices.<sup>7</sup> This is important as school reports may be more likely to be vulnerable to recall or social-desirability biases. It is also possible that school reports in the School Environment Questionnaire reflect the disciplinary practices implemented, whereas those contained in policies do not, are no longer applied or not applied in substance-misuse-related incidents. Evans-Whipp *et al* found that both school administrator and student reports of low policy enforcement predicted an increase in the likelihood of later cannabis use.<sup>7</sup>

This study has a number of limitations which should be considered. The analyses are cross-sectional, and hence causal relationships cannot be established. Future research should employ a longitudinal design which would allow for control of prior substance use and provide stronger causal evidence. Second, school-reported policy measures require further validation with

observed practices. Third, analysis was conducted on substance-misuse policies only and the description of disciplinary practices applied to drug-using students may be present in other policies. We did not examine students' awareness of the content of the school policies or whether they thought teachers would impose sanctions, as these have previously been examined.<sup>7 10 16</sup> This study's strengths include its size and the ability to adjust for the potentially confounding effects of area, school and family-level socioeconomic disadvantage.

## CONCLUSION

School substance-misuse policies have a near universal coverage in Welsh secondary schools. National government recommendations on the involvement of students in policy development were not associated with student drug use. While nearly all schools had a referral process for drug-using students, few recommend methods of harm minimisation. Future prospective research on the impact of harm minimisation in school substance-misuse policies, and student involvement in policy development and awareness of content may help strengthen this limited evidence base.

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## REFERENCES

1. Degenhardt L, Whiteford HA, Ferrari AJ, *et al.* Global burden of disease attributable to illicit drug use and dependence: findings from the Global Burden of Disease Study 2010. *Lancet* 2013;382:1564–74.
2. Chen K, Kandel DB. The natural history of drug use from adolescence to the mid-thirties in a general population sample. *Am J Public Health* 1995;85:41–7.
3. Degenhardt L, Chiu WT, Sampson N, *et al.* Toward a global view of alcohol, tobacco, cannabis, and cocaine use: findings from the WHO World Mental Health Surveys. *PLoS Med* 2008;5:e141.
4. Hall W, Lynskey M. Why it is probably too soon to assess the public health effects of legalisation of recreational cannabis use in the USA. *Lancet Psychiatry* 2016;3:900–6.
5. Ghosh TS, Van Dyke M, Maffey A, *et al.* Medical marijuana's public health lessons—implications for retail marijuana in Colorado. *N Engl J Med* 2015;372:991–3.
6. European Monitoring Centre for Drugs and Drug Addiction. New psychoactive substances in Europe. An update from the EU Early Warning System (March 2015). [http://www.emcdda.europa.eu/publications/rapid-communications/2015/new-psychoactive-substances\\_en](http://www.emcdda.europa.eu/publications/rapid-communications/2015/new-psychoactive-substances_en) (accessed 10 Oct 2017).
7. Evans-Whipp TJ, Plenty SM, Catalano RF, *et al.* Longitudinal effects of school drug policies on student marijuana use in Washington State and Victoria, Australia. *Am J Public Health* 2015;105:994–1000.
8. Porath-Waller AJ, Beasley E, Beirness DJ. A meta-analytic review of school-based prevention for cannabis use. *Health Educ Behav* 2010;37:709–23.
9. Goodstadt MS. Substance abuse curricula vs. school drug policies. *J Sch Health* 1989;59:246–50.
10. Evans-Whipp TJ, Bond L, Toumbourou JW, *et al.* School, parent, and student perspectives of school drug policies. *J Sch Health* 2007;77:138–46.
11. Langford R, Bonell CP, Jones HE, *et al.* The WHO Health Promoting School framework for improving the health and well-being of students and their academic achievement. *Cochrane Database Syst Rev* 2014;4:CD008958.
12. World Health Organisation. Promoting health through schools. Report of a WHO Expert Committee on Comprehensive School Health Education and Promotion. *World Health Organ Tech Rep Ser* 1997;870:1–93 <http://apps.who.int/iris/handle/10665/41987>.
13. Welsh Government. Guidance for substance misuse education. 2013 <http://gov.wales/topics/educationandskills/schoolshome/wellbeing/substance-misuse/?lang=en> (accessed 10 Oct 2017).
14. Nations U. Convention on the Rights of the Child. 1989 <http://www.ohchr.org/EN/ProfessionalInterest/Pages/CRC.aspx> (accessed 10 Oct 2017).
15. Evans-Whipp T, Beyers JM, Lloyd S, *et al.* A review of school drug policies and their impact on youth substance use. *Health Promot Int* 2004;19:227–34.
16. Beyers JM, Evans-Whipp T, Mathers M, *et al.* A cross-national comparison of school drug policies in Washington State, United States, and Victoria, Australia. *J Sch Health* 2005;75:134–40.
17. Desousa C, Murphy S, Roberts C, *et al.* School policies and binge drinking behaviours of school-aged children in Wales—a multilevel analysis. *Health Educ Res* 2008;23:259–71.
18. Maes L, Lievens J. Can the school make a difference? A multilevel analysis of adolescent risk and health behaviour. *Soc Sci Med* 2003;56:517–29.
19. Moore L, Roberts C, Tudor-Smith C, *et al.* School smoking policies and smoking prevalence among adolescents: multilevel analysis of cross-sectional data from Wales. *Tob Control* 2001;10:117–23.
20. Welsh Assembly Government. Working together to reduce harm: The substance misuse strategy for Wales 2008–2018. 2008 <http://gov.wales/topics/people-and-communities/communities/safety/substancemisuse/publications/strategy0818/?lang=en> (accessed 10 Oct 2017).
21. Home Office Drug Strategy. 2017. <https://www.gov.uk/government/publications/drug-strategy-2017> (accessed 10 Oct 2017).
22. Scottish Government. The Road to Recovery: A New Approach to Tackling Scotland's Drug Problem. 2008 <http://www.gov.scot/Publications/2008/05/22161610/0> (accessed 10 Oct 2017).
23. Hewitt G, Roberts J, Fletcher A, *et al.* Improving young people's health and well-being through a school health research network: Reflections on school-researcher engagement at the national level. *Research for All* 2018;2:16–33.
24. Torshheim T, Currie C, Boyce W, *et al.* Material deprivation and self-rated health: a multilevel study of adolescents from 22 European and North American countries. *Soc Sci Med* 2004;59:1–12.
25. Currie C, Molcho M, Boyce W, *et al.* Researching health inequalities in adolescents: the development of the Health Behaviour in School-Aged Children (HBSC) family affluence scale. *Soc Sci Med* 2008;66:1429–36.
26. Hartley JE, Levin K, Currie C. A new version of the HBSC Family Affluence Scale - FAS III: Scottish Qualitative Findings from the International FAS Development Study. *Child Indic Res* 2016;9:233–45.
27. Welsh Government. Welsh Index of Multiple Deprivation 2014 (WIMD 2014) Guidance on use. 2014 <http://gov.wales/statistics-and-research/welsh-index-multiple-deprivation/?lang=en> (accessed 10 Oct 2017).
28. Department for Education and Skills. Guidance for schools. 2004 <http://webarchive.nationalarchives.gov.uk/20130323074002/https://www.education.gov.uk/publications/standard/publicationDetail/Page1/DfES%200092%202004> (accessed 10 Oct 2017).
29. Bond L, Patton G, Glover S, *et al.* The Gatehouse Project: can a multilevel school intervention affect emotional wellbeing and health risk behaviours? *J Epidemiol Community Health* 2004;58:997–1003.