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A multilevel population-based cross-sectional study examining school substance misuse policy and the use of cannabis, mephedrone and novel psychoactive substances amongst 11-16 year olds in schools in Wales.

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A multilevel population-based cross-sectional study examining school substance misuse policy and the use of cannabis, mephedrone and novel psychoactive substances amongst 11-16 year olds in schools in Wales.

Midgley, L.^{1,2}, Murphy, S.¹, Moore, G.¹, Hewitt, G.¹, Fletcher, A.³, White, J.²

¹Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), School of Social Sciences, Cardiff University, 1-3 Museum Place, Cardiff, CF10 3BD, UK; ²Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), Centre for Trials Research, Cardiff University, Heath Park, Cardiff, CF14 4YS, UK; ³Y Lab, School of Social Sciences, Cardiff University, Cardiff, UK

Correspondence concerning this article should be addressed to Luke S. Midgley.

E-mail: MidgleyLS@cardiff.ac.uk; Phone: +44 (0)29 2087 9161

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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 (n= 18,939).

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 (42.4%, OR=1.24, 95% CI 0.89, 1.73), other student consultation (18.2%, OR=1.42, 95% CI 0.94, 2.14) or with the use of isolation (80.3%, OR=0.98, 95% CI 0.67, 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 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.
- 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 (DALYs) attributed to drug use disorders in young people had increased between 1990 and 2013.¹ A consistent finding across studies is that illicit drug use begins to increase in mid-adolescence and peaks in early adulthood.^{2 3} 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 in seven states in the United States.⁴ Higher potency (percentage of delta-9 tetrahydrocannabinol-THC) cannabis products have become available,⁵ 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.⁶ 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.^{7 8} Policies set normative values and expectations for student behaviour, as well as outlining the procedures for dealing with substance misuse related incidents in school.^{9 10} The importance of policies and the value of student involvement in their development is highlighted in both the Health Promoting Schools Framework^{11 12} and Article 12 of the United Nations Convention on the Rights of the Child (UNCRC).^{13 14} 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 such as isolation, and support mechanisms and practices such as a referral pathway for students in

need of support, although content is highly variable^{10 15 16} and whether schools implement policies is has been found to be important.⁷

There have been few evaluations of school policy and student drug use, and none in Europe. The International Youth Development study, a longitudinal study of 3264 students across 188 schools in the United States and Australia, found that school administrator reported use of out of school suspensions and low policy enforcement was 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.^{7 16} 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 had sufficient power to examine NPS use or cannabis use on a daily basis, which have been more closely associated with harms than lifetime or monthly use.^{7 16}

This paper examines the association between the presence, student involvement in the development, content of school's substance misuse policies and school practices used by schools with the risk of student drug use^{7 17-19} 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 school's substance misuse policy;
- 3) To examine if student cannabis, mephedrone and NPS use is associated with 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 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 2015.²⁰ 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 (DECIPHer) 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 STROBE guidelines on the reporting of observational studies.

Study design and recruitment

The Student Health and Wellbeing Survey uses measures from the World Health Organization’s Health Behaviour in School-aged Children Survey (HBSC), 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 was provided across 58.4% (n=66) schools and these schools were used for the final analysis. The final sample is based on 18,939 11-16 year olds.

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 have 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, 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 (e.g. “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 measures²¹⁻²³. 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 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 5,000 residents) and is used to identify areas with the highest concentrations of deprivation with a range from (1) most deprived to

(1909) least deprived ²⁴. The WIMD was divided into quintiles 1 (1-446), 2 (447-1071), 3 (1072-1408), 4 (1409-1631) and 5 (1632-1909).

Research ethics and consent

Ethical approval for the survey was granted by Cardiff University School of Social Sciences research ethics committee (SREC/1530). 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 χ^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

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3 boys and girls and across year groups. We adjusted odds ratios with compositional variables
4 (gender, year group, ethnicity, family structure, family affluence, free school meal
5 entitlement, and area-level deprivation of the school) in model one and then adjusted for
6 school context variables (involvement of students in policy development and use of
7 isolation) in model two. Further analysis examined the association between content
8 extracted from policies (condemnation of drugs) and the risk of student drug use.
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20 We first estimated the interclass correlation coefficient (ICC), Akaike Information Criterion
21 (AIC) and the Bayesian Information Criterion (BIC) for models without explanatory variables.
22 We recalculated ICCs to examine whether students compositional variables, parental (FAS)
23 and school level socioeconomic deprivation (in model one), or school context (in model two)
24 explained the greatest variation in the association with the risk of student drug use between
25 schools (i.e. which had the greatest effect on the ICC). The AIC and BIC are penalised
26 measures of model fit and were used to identify the most parsimonious model (i.e. which
27 model had the lowest value).
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42 Preliminary analysis identified that across the 66 schools, 95.5% (n=63) schools had a
43 substance misuse policy, 3% (n=2) had a policy in development and 1.5% (n=1) had no
44 policy. Similarly, 93.9% (n=62) schools reported there was a referral process for drug using
45 students. Because of the almost universal coverage of school substance misuse policies and
46 a referral pathway, we were insufficiently powered to undertake analysis so these variables
47 were not included in multi-level analyses.
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RESULTS

Complete data were provided across 58.4% (n=66) schools by 18,939 students (54.1% female and 45.9% male, 11-16 year olds). Students with complete data were more likely to be female, in year 9 (aged 13-14), 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 was 1.1% and NPS use was 1.5%. Drug use was more common amongst students who were male, older year groups, 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 free school meal 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 two there was no beneficial association between the involvement of students in policy development, student council consultation (OR=1.24, 95%

CI 0.89, 1.73), other student consultation (OR=1.42, 95% CI 0.94, 2.14) and the use of isolation (OR=0.98, 95% CI 0.67, 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. Across outcomes the greatest reduction in ICCs, BICs and AICs was in model two adjusting for the school context variables: involvement of students in policy development, use of isolation and condemnation of drugs.

Sub-group analysis of school policy content

Of the 95.5% (n=63) teachers who reported their school had a substance misuse policy, 47% (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 shows that 39.4% (n=26) schools reporting no student involvement, 42.4% (n=28) reporting student council consultation and 18.2% (n=12) other student consultation, with 80.3% (n=53) reporting using isolation. The independently coded content of policies however found only 16.1% (n=5) school substance misuse policies mentioned student consultation, 29% (n=9) described the development process but no student involvement, 54% (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,¹⁷⁻¹⁹ and the Health Promoting Schools Framework,^{11 12} 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 with beneficial effects on the risk of student cannabis, mephedrone and NPS 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.^{17-19 25} 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 colleagues¹⁶ 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^{13 17-19 25} and the Health Promoting Schools Framework.^{11 12} 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.

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3 The involvement of students in the development of their school substance misuse policy is
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5 an important element highlighted in Article 12 of the United Nations Convention on the
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7 Rights of the Child (UNCRC)^{13 14} and the Health Promoting Schools Framework.^{11 12} We
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9 found no indication of a beneficial association between the involvement of students, in the
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11 form of a student council or other student consultation and student drug use. This may be
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13 because student involvement in policy development is only one element of the Health
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15 Promoting Schools Framework. It may be that student involvement in policy development is
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17 not enough on its own to change student drug use. More consistent effects on student
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19 tobacco and alcohol use have been found when other elements of the HPS framework are
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21 implemented, such as when staff and student councils collectively determine priorities and
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23 the involvement of parents and other outside health agencies;²⁶ however effects on drug
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25 use of the HPS are mixed.^{11 12} It would be beneficial for future research to explore the level
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27 of student engagement in policy development. We found that 16.1% (n=5) school
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29 substance misuse policies mentioned student consultation, 29% (n=9) described the
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31 development process but not student involvement and 54% (n=17) did not describe their
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33 policy development process.
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43 The third research objective examined whether student cannabis, mephedrone and NPS use
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45 was associated with varying policy content (messages on: abstinence, harm minimisation
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47 and the condemnation of drug use). Although there are no directly comparable estimates as
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49 previous studies have used school staff reports on policy content, the International Youth
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51 Development study in the US and Australian schools found 69.7% of Australian and 98.3% of
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53 US schools had a policy that emphasises students abstain from drug use.⁷ We found no
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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 US and Australia with UK schools or historical differences as the IYD data was 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.⁷

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.¹⁴ 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 schools use to manage student behaviour. We found 80.3% (n=53) schools report using isolation but only 9.7% (n=3) schools 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 upon school-reported practices.⁷ 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 incidence. Evans-Whipp found that both school administrator and student reports of low policy enforcement predicted an increase in the likelihood of later cannabis use.⁷

This study has a number of limitations which should be considered. The analyses are cross sectional, and hence causal relationships cannot be established. Second, school reported policy measures require further validation with observed practices. Thirdly, 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.^{7 10 16} 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. Whilst 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, student involvement in policy development and awareness of content, may help strengthen this limited evidence base.

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Contributors

LM and JW wrote the first draft of the manuscript which was reviewed and amended by all authors. GM, GH and LM led the development of drug related questions in the School Health Research Network survey. SM, AF, GH and GM designed and manage the School Health Research Network in Wales, including the collection of survey data reported in this study. All authors approved the final manuscript.

Competing interest statement

All authors have completed the ICMJE uniform disclosure format www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

Data sharing statement

Details on data access to the School Health Research Network survey can be found by contacting Graham Moore: MooreG@cardiff.ac.uk

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Table 1. Socio-demographic 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 (8,609)	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 (4,179)	0.2 (10)	0.2 (9)	0.1 (4)	0.3 (14)	0.4 (17)
	Year 8	21.4 (4,051)	1.3 (54)	1.1 (44)	0.4 (18)	1.0 (39)	1.1 (45)
	Year 9	19.5 (3,689)	2.4 (89)	1.3 (48)	0.3 (12)	0.8 (28)	1.2 (46)
	Year 10	19.3 (3,656)	7.8 (284)	4.6 (169)	1.2 (43)	1.4 (53)	1.8 (66)
	Year 11	17.8 (3,364)	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 (3,346)	6.3 (212)	3.4 (113)	0.9 (30)	1.2 (40)	1.9 (64)
	Single father	2.5 (473)	8.0 (38)	4.6 (22)	2.1 (10)	1.5 (7)	2.7 (13)
	Parent and step-parent	12.7 (2,413)	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)	11.0 (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 (1,043)	7.3 (76)	5.3 (55)	3.0 (31)	3.4 (36)	4.2 (44)
	Middle income (12-15)	52.5 (9,947)	4.7 (471)	2.3 (232)	0.5 (52)	1.0 (97)	1.4 (138)
	High income (16-19)	42.0 (7,949)	4.5 (361)	2.7 (215)	0.7 (58)	1.0 (81)	1.4 (109)
FSM	1 (<9%)	27.7 (5,245)	4.0 (210)	2.1 (108)	0.5 (29)	1.0 (54)	1.6 (82)
	2 (9.0-14.4%)	20.8 (3,929)	5.3 (210)	3.1 (123)	0.9 (37)	1.0 (38)	1.5 (61)
	3 (14.5-22.9%)	23.6 (4,475)	5.1 (227)	2.8 (125)	0.8 (38)	1.1 (49)	1.4 (65)
	4 (23.0-100%)	27.9 (5,290)	4.9 (261)	2.8 (146)	0.7 (37)	1.4 (73)	1.6 (83)
WIMD	1 (1-446) Most deprived	21.6 (4,096)	5.2 (213)	2.7 (112)	0.7 (31)	1.3 (52)	1.6 (66)
	2 (447-1071)	22.9 (4,337)	5.0 (219)	3.1 (134)	0.9 (40)	1.2 (54)	1.7 (73)
	3 (1072-1408)	20.5 (3,887)	4.5 (174)	2.4 (92)	0.7 (26)	0.8 (33)	1.3 (52)
	4 (1409-1631)	19.2 (3,630)	5.6 (205)	3.2 (116)	1.0 (36)	1.2 (43)	1.9 (69)

	5 (1632-1909) Least deprived	15.8 (2,989)	3.2 (97)	1.6 (48)	0.4 (11)	1.1 (32)	1.0 (31)
Schools (n = 66)							
Have a substance misuse policy		95.5 (63)	4.8 (877)	2.60 (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)	1.0 (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). FAS: Family Affluence Scale; FSM: Free School Meal; WIMD: Welsh Index of Multiple Deprivation

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Table 2. Unadjusted and adjusted odds ratios (95% Confidence Intervals) 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 =18,939)															
Student involvement in policy development			1.24 0.89,1.73			1.25 0.85,1.84			1.38 0.82,2.32			1.06 0.67,1.56			1.31 0.92,1.87
Student council			1.42 0.94,2.14			1.35 0.84,2.17			1.46 0.79,2.70			1.00 0.62,1.60			1.16 0.75,1.79
Other consultation			0.98 0.67,1.43			1.08 0.70,1.67			1.12 0.64,1.98			1.96 1.17,3.28			1.03 0.69,1.55
Use of isolation	0.09	0.06	0.06	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 =9,006)															
Condemns			0.77 0.45,1.31			0.98 0.54,1.77			1.18 0.67,2.06			1.05 0.65,1.72			1.68 1.06,2.66
ICC	0.13	0.09	0.09	0.15	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 (FAS), Free School Meal Entitlement (FSM) and Welsh Index of Multiple Deprivation (WIMD). Model 2 adjusts for school context variables: Involvement of students in policy development, use of isolation and condemnation of drugs. ICC: interclass correlation coefficient; BIC: Bayesian Information Criterion; AIC: Akaike Information Criterion, NPS: Novel Psychoactive Substances.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7-8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-10
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	11
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	11-12
		(b) Describe any methods used to examine subgroups and interactions	11
		(c) Explain how missing data were addressed	7
		(d) If applicable, describe analytical methods taking account of sampling strategy	12
		(e) Describe any sensitivity analyses	11
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-8
		(b) Give reasons for non-participation at each stage	7-8
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	13-14
		(b) Indicate number of participants with missing data for each variable of interest	13-14
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13
		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	14
Discussion			
Key results	18	Summarise key results with reference to study objectives	14-18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14-18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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A multilevel population-based cross-sectional study examining school substance misuse policy and the use of cannabis, mephedrone and novel psychoactive substances amongst 11-16 year olds in schools in Wales.

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A multilevel population-based cross-sectional study examining school substance misuse policy and the use of cannabis, mephedrone and novel psychoactive substances amongst 11-16 year olds in schools in Wales.

Midgley, L.^{1,2}, Murphy, S.¹, Moore, G.¹, Hewitt, G.¹, White, J.²

¹Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), School of Social Sciences, Cardiff University, 1-3 Museum Place, Cardiff, CF10 3BD, UK; ²Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), Centre for Trials Research, Cardiff University, Heath Park, Cardiff, CF14 4YS, UK.

Correspondence concerning this article should be addressed to Luke S. Midgley.

E-mail: MidgleyLS@cardiff.ac.uk; Phone: +44 (0)29 2087 9161

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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 (n= 18,939).

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, 1.73), other student consultation (OR=1.42, 95% CI 0.94, 2.14) or with the use of isolation (OR=0.98, 95% CI 0.67, 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 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 = 18,939) 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 (DALYs) attributed to drug use disorders in young people had increased between 1990 and 2013.¹ A consistent finding across studies is that illicit drug use begins to increase in mid-adolescence and peaks in early adulthood.^{2 3} 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 in seven states in the United States.⁴ Higher potency (percentage of delta-9 tetrahydrocannabinol-THC) cannabis products have become available,⁵ 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.⁶ 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.^{7 8} Policies set normative values and expectations for student behaviour, as well as outlining the procedures for dealing with substance misuse related incidents in school.^{9 10} The importance of policies and the value of student involvement in their development is highlighted in both the Health Promoting Schools Framework^{11 12} and Article 12 of the United Nations Convention on the Rights of the Child (UNCRC).^{13 14} 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 (e.g. isolation), and support mechanisms and practices (e.g. referral pathways for students in

need of support).The content of policies has been found to be highly variable^{10 15 16} and whether schools implement them is an important predictor of student drug use.⁷

There have been few evaluations of school policy and student drug use, and none in Europe that have gone beyond alcohol and tobacco.¹⁷⁻¹⁹ The International Youth Development study, a longitudinal study of 3264 students across 188 schools in the United States 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.^{7 16} 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.^{7 16}

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^{7 20-22} 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 2015.²³ 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 (DECIPHer) 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 STROBE guidelines on the reporting of observational studies.

Study design and recruitment

The Student Health and Wellbeing Survey uses measures from the World Health Organization’s Health Behaviour in School-aged Children Survey (HBSC), 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 was provided across 58.4% (n=66) schools and these schools were used for the final analysis. The final sample is based on 18,939 11-16 year olds.

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 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 have 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, 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 (e.g. “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.²⁴⁻²⁶ 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 measured of relative socioeconomic deprivation at the lower super output level (average population 5,000 residents) and is used to identify areas with the highest concentrations of deprivation with a range from (1) most deprived to (1909) least deprived.²⁷ The WIMD was divided into quintiles 1 (1-446), 2 (447-1071), 3 (1072-1408), 4 (1409-1631) and 5 (1632-1909).

Research ethics and consent

Ethical approval for the survey was granted by Cardiff University School of Social Sciences research ethics committee (SREC/1530). 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 χ^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 odds ratios with compositional variables (gender, year group, ethnicity, family structure, family affluence, free school meal entitlement, and area-level deprivation of the school) in model one and then adjusted for school context variables (involvement of students in policy development and use of isolation) in model two. Further analysis examined the association between content extracted from policies (condemnation of drugs) and the risk of student drug use.

We first estimated the interclass 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 one), or school context (in model two) explained the greatest variation in the association with the risk of student drug use between schools (i.e. 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 (i.e. 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 18,939 students (54.1% female and 45.9% male, 11-16 year olds). Students with complete data were more likely to be female, in year 9 (aged 13-14), 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 amongst 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 free school meal 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 two there was no beneficial association between the involvement of students in policy development, student council consultation (OR=1.24, 95% CI 0.89, 1.73), other student consultation (OR=1.42, 95% CI 0.94, 2.14) and the use of isolation (OR=0.98, 95% CI 0.67, 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, 3.28). Across outcomes the greatest reduction in ICCs, BICs and AICs was in model two adjusting for the school context variables: involvement of students in policy development, use of isolation and condemnation of drugs.

Sub-group 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

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3 student consultation. 80.3% (n=53) reported using isolation. The independently coded
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5 content of policies, however, found only 16.1% (n=5) school substance misuse policies
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7 mentioned student consultation, 29.0% (n=9) described the development process but no
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9 student involvement, 54.0% (n=17) did not describe their policy development process, and
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12 9.7% (n=3) policies included isolation.
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24 **DISCUSSION**

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27 In this population-wide, cross-sectional study of school substance misuse policies and
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29 student drug use, in line with UK Governments' recommendations ²⁰⁻²² and the Health
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31 Promoting Schools Framework, ^{11 12} over 90.0% of schools had a substance misuse policy.
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33 Student involvement in policy development, use of isolation to manage student behaviour
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35 and policy content were not associated with beneficial effects on the risk of student
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37 cannabisuse. Only one school had a policy that contained harm minimisation information,
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39 despite it being a key focus of the UK Governments' drug prevention policy. ^{20-22 28} The
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41 independently coded content of policies highlighted areas for further qualitative
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43 investigation in order to understand in more detail the policy development process and how
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45 schools manage substance misuse related incidents, as school reported practices in the
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47 school environment questionnaire did not always replicate the content of policies.
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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, 3.0% (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 colleagues¹⁶ 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^{13 20-22 28} and the Health Promoting Schools Framework.^{11 12} 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 United Nations Convention on the Rights of the Child (UNCRC)^{13 14} and the Health Promoting Schools Framework.^{11 12} 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;²⁹ however, effects on drug use of the HPS are mixed.^{11 12} 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, 29.0% (n=9) described the development process but not student involvement and 54.0% (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 content, the International Youth Development (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.⁷ 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 US and Australia with UK schools or historical differences, as the IYD data was 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.⁷

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.¹⁴ We were unable to examine the impact of having a referral pathway, as over 90.0% 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 upon school-reported practices.⁷ 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 found that both school administrator and student reports of low policy enforcement predicted an increase in the likelihood of later cannabis use.⁷

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. Thirdly, 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.^{7 10 16} 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. Whilst 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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Contributors

LM and JW wrote the first draft of the manuscript which was reviewed and amended by all authors. GM, GH and LM led the development of drug related questions in the School Health Research Network survey. SM, AF, GH and GM designed and manage the School

Health Research Network in Wales, including the collection of survey data reported in this study. All authors approved the final manuscript.

Competing interest statement

All authors have completed the ICMJE uniform disclosure format www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

Data sharing statement

Details on data access to the School Health Research Network survey can be found by contacting SHRN: SHRN@cardiff.ac.uk

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Table 1. Socio-demographic 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 (8,609)	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 (4,179)	0.2 (10)	0.2 (9)	0.1 (4)	0.3 (14)	0.4 (17)
	Year 8	21.4 (4,051)	1.3 (54)	1.1 (44)	0.4 (18)	1.0 (39)	1.1 (45)
	Year 9	19.5 (3,689)	2.4 (89)	1.3 (48)	0.3 (12)	0.8 (28)	1.2 (46)
	Year 10	19.3 (3,656)	7.8 (284)	4.6 (169)	1.2 (43)	1.4 (53)	1.8 (66)
	Year 11	17.8 (3,364)	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 (3,346)	6.3 (212)	3.4 (113)	0.9 (30)	1.2 (40)	1.9 (64)
	Single father	2.5 (473)	8.0 (38)	4.6 (22)	2.1 (10)	1.5 (7)	2.7 (13)
	Parent and step-parent	12.7 (2,413)	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)	11.0 (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 (1,043)	7.3 (76)	5.3 (55)	3.0 (31)	3.4 (36)	4.2 (44)
	Middle income (12-15)	52.5 (9,947)	4.7 (471)	2.3 (232)	0.5 (52)	1.0 (97)	1.4 (138)
	High income (16-19)	42.0 (7,949)	4.5 (361)	2.7 (215)	0.7 (58)	1.0 (81)	1.4 (109)
FSM	1 (<9%)	27.7 (5,245)	4.0 (210)	2.1 (108)	0.5 (29)	1.0 (54)	1.6 (82)
	2 (9.0-14.4%)	20.8 (3,929)	5.3 (210)	3.1 (123)	0.9 (37)	1.0 (38)	1.5 (61)
	3 (14.5-22.9%)	23.6 (4,475)	5.1 (227)	2.8 (125)	0.8 (38)	1.1 (49)	1.4 (65)
	4 (23.0-100%)	27.9 (5,290)	4.9 (261)	2.8 (146)	0.7 (37)	1.4 (73)	1.6 (83)
WIMD	1 (1-446) Most deprived	21.6 (4,096)	5.2 (213)	2.7 (112)	0.7 (31)	1.3 (52)	1.6 (66)
	2 (447-1071)	22.9 (4,337)	5.0 (219)	3.1 (134)	0.9 (40)	1.2 (54)	1.7 (73)
	3 (1072-1408)	20.5 (3,887)	4.5 (174)	2.4 (92)	0.7 (26)	0.8 (33)	1.3 (52)
	4 (1409-1631)	19.2 (3,630)	5.6 (205)	3.2 (116)	1.0 (36)	1.2 (43)	1.9 (69)
	5 (1632-1909) Least deprived	15.8 (2,989)	3.2 (97)	1.6 (48)	0.4 (11)	1.1 (32)	1.0 (31)
Schools (n = 66)							
Have a substance misuse policy		95.5 (63)	4.8 (877)	2.60 (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)	1.0 (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)
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All data are % (n). FAS: Family Affluence Scale; FSM: Free School Meal; WIMD: Welsh Index of Multiple Deprivation
All school data % are % of students in schools with a policy.

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Table 2. Unadjusted and adjusted odds ratios (95% Confidence Intervals) 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 =18,939)														
Student involvement in policy development														
Student council														
Other consultation														
Use isolation														
ICC	0.09	0.06	0.06	0.10	0.07	0.06	0.11	0.04	0.03	0.07	0.03	0.02	0.06	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
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
Policy Content (n =9,006)														
Condemns														
ICC		0.13	0.09	0.09	0.15	0.09	0.09	0.11	<0.01	<0.01	0.14	0.05	0.03	0.11
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
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

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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 (FAS), Free School Meal Entitlement (FSM) and Welsh Index of Multiple Deprivation (WIMD). Model 2 adjusts for school context variables: Involvement of students in policy development, use of isolation and condemnation of drugs. ICC: interclass correlation coefficient; BIC: Bayesian Information Criterion; AIC: Akaike Information Criterion, NPS: Novel Psychoactive Substances.

For peer review only

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7-8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-10
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	11
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	11-12
		(b) Describe any methods used to examine subgroups and interactions	11
		(c) Explain how missing data were addressed	7
		(d) If applicable, describe analytical methods taking account of sampling strategy	12
		(e) Describe any sensitivity analyses	11
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-8
		(b) Give reasons for non-participation at each stage	7-8
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	13-14
		(b) Indicate number of participants with missing data for each variable of interest	13-14
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13
		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	14
Discussion			
Key results	18	Summarise key results with reference to study objectives	14-18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14-18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.