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ORIGINAL RESEARCH

The prevalence of substance use in anaesthesia practitioners in South Africa

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Background: In the United States the mortality associated with substance abuse among anaesthesia residents is twice that of non-anaesthesia residents. Since no data exist, the primary objective of this cross-sectional study was to establish the prevalence of substance use in South African anaesthesia practitioners. Secondary objectives were to compare the prevalence in male and female practitioners, and in private and state practice anaesthetists. Years of experience and level of training were explored as possible risk factors for hazardous or harmful use.
Methods: Participants completed a self-administered, validated WHO questionnaire, over a ten-day period surrounding the 2018 South African Society of Anaesthesiologists (SASA) congress. All doctors practising anaesthesia in South Africa were eligible. Recruitment was via an email link sent to all SASA members, as well as a web-based link at the congress.
Results: A total of 1 961 SASA members and 113 non-members (anaesthesiologists, registrars and non-specialists) were invited to participate (total 2 074). There were 434 responses (response rate 20.9%, margin of error 4.18%); 364 were suitable for analysis. The most commonly lifetime-used substances were alcohol (92.8%), tobacco (42.3%), cannabis (34.7%), and sedatives (34.4%). Questionnaire scores defined low-, medium- and high-risk categories according to substance use during the previous three months. Sedative (12.6%) and alcohol (12.1%) users were deemed to be at moderate risk. The prevalence of opioid use was 1.9% (n = 7). Prevalence of substance use was similar in male and female practitioners, as well as in those working in private practice or in state hospitals.
Conclusion: The prevalence of current use of alcohol and sedatives is of major concern. A significant proportion of respondents were assessed to be at moderate risk of hazardous or harmful substance use. Gender and practice setting have little impact on substance use. Wellness efforts should be aimed at all anaesthesia practitioners in South Africa.

Keywords: substance use disorders, drug abuse, prevalence, South Africa

Introduction

Substance abuse is linked to a more than three times higher incidence of suicide in young male anaesthesia practitioners, when compared with other physicians.[1] The prevalence of this behaviour should therefore be considered when analysing the complex topic of wellness in anaesthesiologists.

In the United States, anaesthesiology residents are twice as likely to die from chemical dependency abuse than non-anaesthesia residents,[2] and are over-represented by a factor of seven at rehabilitation facilities.[2] The healthcare system in South Africa is unique and exists as a dichotomy of private and state care, each with its own unique challenges and stressors. No data exists for substance use in South African anaesthesia practitioners, either in private or state practice.

The primary objective of this cross-sectional study was to describe the prevalence of substance use in anaesthesia practitioners in South Africa, in order to establish baseline data. The prevalence of lifetime and of current use, defined as use within the previous three months, was determined. For this purpose, a validated WHO questionnaire was used, which defines low-, moderate-, and high-risk categories for addiction to a substance.

The secondary objectives were to compare the prevalence of substance use in male and female practitioners, and in private and state practice. The number of years spent in anaesthesia practice was also explored as a possible risk factor for addiction. Finally, a comparison was made of the prevalence in non-specialists, training specialists (registrars), and specialist anaesthesiologists. We postulated that the incidence of substance use would be similar in all groups.

Methods

This study was conducted as a self-administered questionnaire, with closed-ended questions, and was only made available online in a digital format. Approval was obtained from the Human Research Ethics Committee of the University of Cape Town (HREC 190/2018) prior to distribution. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) questionnaire developed by the World Health Organization (WHO) for use in a primary healthcare setting was utilised. This questionnaire was developed in collaboration with an international team of substance abuse researchers, and has been validated in seven countries.[3] In the present study, the questionnaire was modified to include demographic data (Supplementary File 1).

The questionnaire screens for use of tobacco products, alcohol, cannabis, cocaine, amphetamine-type stimulants, sedatives, hallucinogenics, inhalants, opioids and 'other' drugs. Examples of each category of substance are listed in the questionnaire. These were altered slightly for the South African context. ASSIST identifies lifetime use (i.e. use of the substance at any time in a practitioner's life), as well as use in the previous three months. A risk score (low, moderate, or high risk) is then determined for each category of substance, based only upon use in the previous three months.

The questionnaire is comprised of eight questions: question one examines lifetime use; question two examines frequency of use in the past three months; question three asks about urge or desire to use a substance; question four explores the frequency of social, legal, health or financial problems related to drug use; question five examines interference with responsibilities; question six asks whether anyone has ever expressed concern about usage; question seven asks about any attempt to stop or reduce substance use; and question eight asks about injection of substances. In addition to the physical use of a substance, the urge to use a substance (question three) has been postulated to be consistent with more frequent use, a previous problem with the substance, or a stronger potential for addiction.

Scoring is done per category by adding the scores of questions two through seven. Question eight is not included in the scoring but is used as an indicator of risk. For all substances apart from alcohol, a score of 0–3 indicates low risk, 4–26 indicates moderate risk ("likely to indicate hazardous or harmful substance use"), and greater than 27 high risk ("likely to indicate substance dependence"). Low-risk alcohol use scores 0–10, moderate risk 11–26, and high risk greater than 27. ASSIST recommends no treatment for low-risk scores, a brief intervention for moderate-risk users, and specialist referral for high-risk users.[4] Since our questionnaire was administered anonymously, no intervention could be provided. However, at the conclusion of the questionnaire, the respondent could see their risk score and category with a brief explanation, as calculated online. Contact details for drug and alcohol help lines, as well as the SASA Wellness team, were provided.

The questionnaire was run for a ten-day period surrounding the 2018 South African Society of Anaesthesiologists (SASA) congress. Participants were recruited via a public link made available on email sent to all SASA members before the congress, as well as electronic distribution via a web-based link at the congress, on social media. Although not specifically validated for self-completion, it was felt that this method would better assure anonymity. The email was sent out once, with one follow-up/reminder five days later. The link to the questionnaire was then closed after ten days, allowing no further recruitment.

Data was captured using REDCap, which is a secure web application for building and managing online surveys and databases, specifically designed for research studies. The REDCap system is run by Safe Surgery SA and the Anaesthesia Network of South Africa (ANSA).

All anaesthesia practitioners who were doctors practising in South Africa, were eligible. Specialist-, trainee-, and non-specialist anaesthesiologists were included. The SASA email database was used. The demographic data distinguished between state versus private practice. Work environment, drug handling, and stressors were postulated to differ in the two settings, which could influence substance use patterns. The prevalence of substance use was postulated to vary according to the length of exposure to both work environment stress, as well as access to drugs. Therefore, the number of years in practice was also captured. The prevalence of substance use in male and female practitioners was also recorded.

Demographic variables were all categorical and were summarised using frequency tables and bar charts. ASSIST scores were categorised as defined in the questionnaire manual, and summarised overall and per stratification variable using frequency tables and percentages. Where comparisons of proportions between groups were possible, Pearson's chi square tests or Fisher's exact tests were conducted, as appropriate. If more than 25% of expected cell counts were less than five, Fisher's exact p values were reported. Incomplete responses were treated as voluntary withdrawal and were discarded from the data set. A p value < 0.05 was considered statistically significant. IBM SPSS version 25 was used to analyse the data.

Results

Participants eligible for the study were doctors currently practising anaesthesia in South Africa. This included specialists, trainee specialists and non-specialists. A total of 1 961 SASA members received the email link. In addition, 113 non-members were exposed to the link, via social media and during attendance of sessions, at the congress. Therefore, the total number of potential respondents was 2 074. The number of respondents was 434, which gave a response rate of 20.9%, and a margin of error of 4.18%. Incomplete questionnaires (n = 38) and non-South African practitioners were excluded (n = 20), as well as respondents who did not indicate their nationality (n = 12). The total number of analysed responses was 364, as shown in

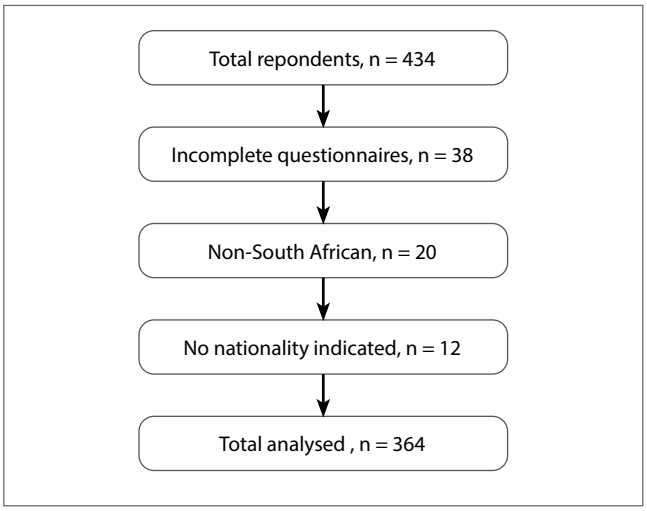

Figure 1. Analysed responses

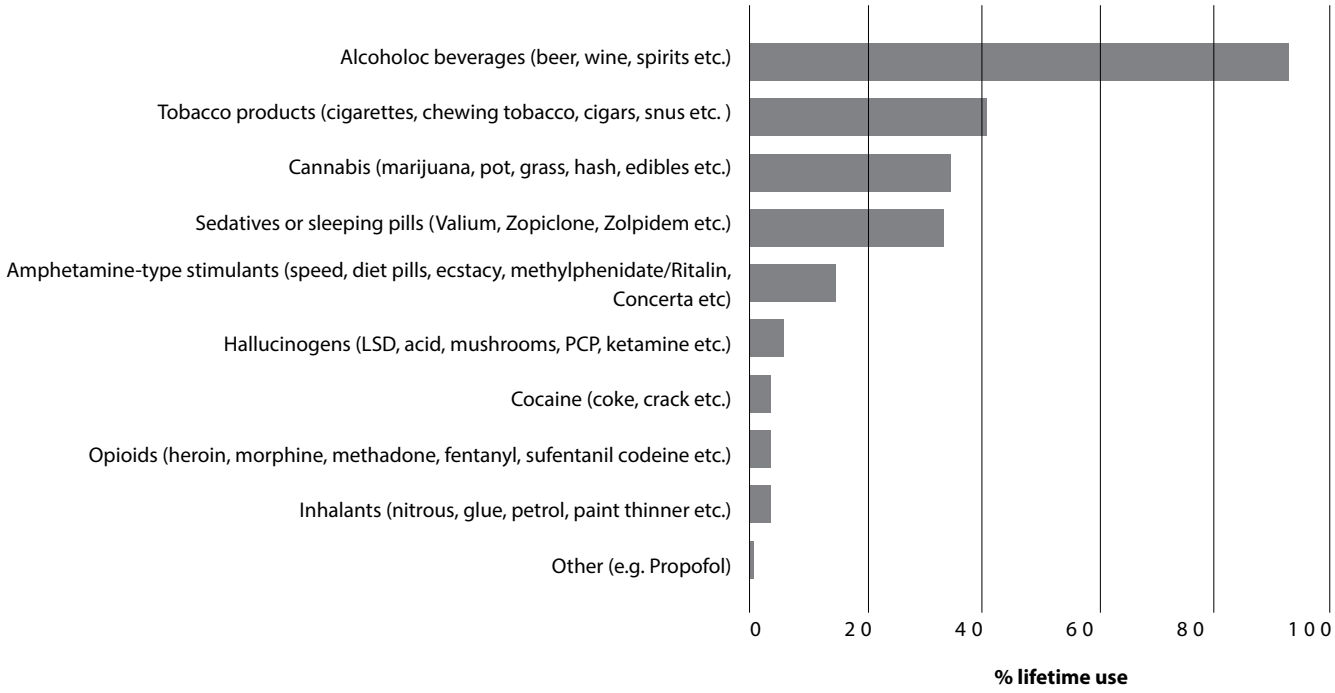

Figure 2. Lifetime use of substances

Figure 1. There were 168 female respondents (46.7%) and 192 males (53.3%).

Respondents were stratified according to qualification: specialists (71.7%), trainee specialists (18.4%), and general practitioners or medical officers (9.9%) practising anaesthesia. Forty-four per cent of the respondents had had more than 15 years of experience in anaesthesia, 16.2% 10–15 years, 25.5% 5–10 years, and 14.3% less than five years. Fifty-five per cent of respondents were from private practice and 45% from state hospitals.

The lifetime use of all agents investigated, in the order listed in the questionnaire, is shown in Table I. Figure 2 is a histogram summarising this information.

A detailed description of substances used in the previous three months, shown as a percentage of users of the individual agent, as well as of the total sample, appears in Table II. Only alcohol fell into the high-risk category, with 1% of users displaying high-risk behaviour (n = 3). Moderate-risk usage was highest for sedatives (12.6%) and alcohol (12.1%). The most commonly used substance was alcohol (n = 310), followed by sedatives (n = 74).

The overall prevalence of urge to use a substance in practitioners using a particular agent, is shown in Table III. There was a statistically significantly higher prevalence of urge to use alcohol in those who had been in practice 5–10 years, when compared with all other groupings of years of experience (p = 0.002). Females were more likely to experience an urge to use alcohol than males (p = 0.010). The urge to use sedatives was also significantly higher in non-specialists than in specialists (p = 0.016). Detailed data is available in Supplementary File 2.

With respect to secondary outcomes, there was no statistically significant difference between the prevalence of male and female users of any substance. There were also no differences between the proportions of practitioners in private versus state hospitals, using any of the substances, or in substance use according to number of years of experience.

Table I. Lifetime use of agents

	N = 364	% of users of each agent (CI)
Tobacco products (cigarettes, chewing tobacco, cigars, snus etc.)	153	42.3% (37.3–47.4)
Alcoholic beverages (beer, wine, spirits, etc.)	336	92.8% (89.7–95.1)
Cannabis (marijuana, pot, grass, hash, edibles etc.)	123	34.7% (30.0–39.8)
Cocaine (coke, crack, etc.)	12	3.4% (2.0–5.8)
Amphetamine-type stimulants (speed, diet pills, ecstasy, methylphenidate/Ritalin, Concerta etc.)	53	15.1% (11.7–19.2)
Inhalants (nitrous, glue, petrol, paint thinner, etc.)	9	2.6% (1.4–4.8)
Sedatives or sleeping pills (Valium, Zopiclone, Zolpidem etc.)	123	34.4% (29.6–39.4)
Hallucinogens (LSD, acid, mushrooms, PCP, ketamine, etc.)	19	5.4% (3.5-8.3)
Opioids (heroin, morphine, methadone, fentanyl, sufentanil codeine, etc.)	12	3.4% (2.0-5.9)
Other (e.g. Propofol)	2	0.6% (0.2-2.0)

CI - *95% confidence interval*

Discussion

This study examined the prevalence of lifetime and previous three-month usage of various potentially addictive substances, by a total of 364 male and female anaesthesia practitioners of varying years of experience. A WHO-validated questionnaire,

Table II. Substances used in the previous three months

	Overall prevalence (%; CI) N = 364	Low risk			Moderate risk			High risk		
		N	% of users of each agent	% of total sample	N	% of users of each agent	% of total sample	N	% of users of each agent	% of total sample
Tobacco	29 (8.0; 5.6 to 11.2)	4	13.8 (5.5 to 30.6)	1.1 (0.4 to 2.8)	25	86.2	6.9 (4.7 to 9.9)	0	0.0	0.0 (0 to 1.0)
Alcohol	310 (85.1; 81.1 to 88.4)	263	84.8 (80.4 to 88.4)	72.3 (67.4 to 76.6)	44	14.2	12.1 (9.1 to 15.8)	3	1.0	0.8 (0.3 to 2.4)
Cannabis	8 (2.2; 1.1 to 4.3)	8	100.0 (67.6 to100)	2.2 (1.1 to 4.3)	0	0.0	0.0 (0 to 1.0)	0	0.0	0.0
Cocaine	1 (0.3; 0 to 1.5)	1	100.0 (20.7 to 100)	0.3 (0 to 1.5)	0	0.0	0.0 (0 to 1.0)	0	0.0	0.0
Amph*	12 (3.3; 1.9 to 5.7)	8	66.7 (39.1 to 86.2)	2.2 (1.1 to 4.3)	4	33.3	1.1 (0.4 to 2.8)	0	0.0	0.0
Sedatives	74 (20.3; 16.5 to 24.8)	28	37.8 (27.6 to 49.2)	7.7 (5.4 to 10.9)	46	62.2	12.6 (9.6 to 16.4)	0	0.0	0.0
Opioids	7 (1.9; 0.9 to 3.9)	4	57.1 (25.0 to 84.2)	1.1 (0.4 to 2.8)	3	42.9	0.8 (0.3 to 2.4)	0	0.0	0.0

* **amph** - amphetamine
CI - *95% confidence interval*

Table III. Overall prevalence of urge to use a particular substance

	Urge to use substance (N) % of each agent, (CI)
Tobacco	25 86.2% (69.4 to 94.5)
Alcohol	160 50.5% (45.0 to 55.9)
Cannabis	0 0.0% (0 to 32.4)
Cocaine	0 0.0% (0 to 79.3)
Amphetamine	3 25.0% (8.9 to 53.2)
Sedative	41 55.4% (44.1 to 66.2)
Opioids	2 28.6% (8.2 to 64.1)

% - percentage of current users of the individual substance experiencing an urge to use the substance
CI - *95% confidence interval*

ASSIST, was used, and practitioners categorised as low, moderate, or high risk.

With respect to lifetime use, the five most commonly used agents were alcohol, tobacco products, cannabis, sedatives and amphetamine-type stimulants. Risk categories were assigned on the basis of questionnaire scores for substance use during the previous three months. Most commonly used were alcohol, sedatives, tobacco, and amphetamines. The majority of alcohol users were low risk. Practitioners at moderate risk used sedatives, alcohol, tobacco, and amphetamines. The knowledge of the latter scores would make it possible for these practitioners to self-refer for a brief intervention. Alcohol was the only substance with any high-risk use (n = 3). These practitioners could self-refer for specialist treatment.

The prevalence of opioid use was low (n = 7), although this is likely an underestimation. Opioid dependence is particularly devastating in anaesthesia, and re-integration into the workplace is problematic.[1] The United States is currently battling a worsening opioid crisis,[5] particularly fentanyl use. It is possible that this international trend may impact South Africa in the next few years. Our baseline data may provide valuable information to display a change in usage patterns within the profession in the future, if indeed opioid use becomes more common.

The finding of an increased urge to use a substance, in practitioners of 5–10 years' experience, in women, and on non-specialists, may be helpful in identifying psychological dependence, and is particularly associated with the progression to high-risk use.[4]

With respect to secondary outcomes, it was noteworthy that there was a similar prevalence of substance use in male and female practitioners, and in those working in the private practice or state hospital environment. There was inadequate statistical power to establish the relationship between years of experience, or the association between the level of qualification of the practitioner, and substance use.

There are no data available to provide a comparison of the incidence of substance use in South African anaesthesia practitioners and those in other countries. A retrospective survey conducted in 2002 found the prevalence of drug abuse or dependence in 133 anaesthesiology training programmes in the USA, to be 1.0–1.6%, with a higher prevalence in trainee specialist anaesthesiologists. A national survey of anaesthesiologists in France in 2004[6] found a prevalence of 59.0% for alcohol use,

41.0% for tranquillisers and hypnotics, 6.3% for cannabis, 5.5% for opiates and 1.9% for stimulants. Our data showed a higher overall prevalence of use of alcohol and stimulants, and less cannabis and opioid use.

Amongst the general population, substance use disorders have a higher prevalence in South Africa than in European countries, with a lifetime usage of 13.3%.[7] Although anaesthesia practitioners are not representative of the South African population with respect to age, gender, and average income, we also quote for interest the known prevalence for alcohol and tobacco use in the general population. The prevalence of lifetime use of alcohol, the most commonly misused substance in South Africa, is 25%. Fourteen per cent of the population has lifetime diagnosis of alcohol abuse and/or dependence.[7] This is similar to the prevalence found in our questionnaire of 12.9% of moderate and high-risk users amongst anaesthesia practitioners, and comparable to developed countries. Tobacco use was found to be lower than in the general population; 8% versus 17.6% respectively.[8]

There are several limitations to this study. The response rate for the survey was low (20.9%). Although the margin of error of 4.18% is acceptable, the sample was self-selected, and the sensitive nature of the electronic survey is likely to have introduced bias, and an under-estimate of the prevalence of substance use. It is theoretically plausible that respondents to a sensitive topic which includes substance abuse, particularly if the information could potentially result in loss of employment or license to practise, would not be truthful in their responses to a detailed questionnaire. However, there is evidence that there is little response bias if the questionnaire is anonymous,[9] and the risk of non-response to an emailed link should be offset against the benefit of anonymity.

Our study could have been biased towards obtaining information from physicians with access to the internet, smart phone applications, Twitter accounts, and an active email address. However, this was not expected to be a significant limitation, considering the general easy accessibility and widespread use of email and social media. Response rates to emailed or web-based surveys are comparable to a mail hard copy survey.[10]

The survey did not include doses of drugs which had been appropriately prescribed by a physician for a valid diagnosis, that might be used in excessive doses. However, based upon published literature, drugs prescribed and accessed via a treating physician, as opposed to self-prescription, are unlikely to be a major source of abuse. These therapeutic doses were therefore excluded by the questionnaire, to simplify the data collected.

A sign of potential drug abuse in the workplace is a willingness to remain at work, to take extra shifts or to stay late (in order to increase access to drugs).[11] It was therefore a concern that running the survey during a congress might miss the users who had elected to stay at work and forgo the congress in order to improve access to drugs. This was addressed by also emailing the survey to SASA members.

The ASSIST questionnaire classifies drugs in broad categories. It is therefore possible that the respondents may not have remembered or listed a substance that was not included in the list of examples. As many as possible common examples were listed, without making the survey too detailed. While this research aimed to report the prevalence of substance use, it did not explore causation. This is a possible area for future research.

Conclusion

This self-administered WHO questionnaire shows that the prevalence of lifetime use of both alcohol and sedatives by South African anaesthesia practitioners is of major concern. The overall use of alcohol exceeds that of the South African general population, and of anaesthesia practitioners internationally. A significant proportion of practitioners were assessed according to their previous three months' use to be at moderate risk, implying the likelihood of hazardous or harmful substance use. Although opioid use was low compared with other substances, the 1.1% prevalence may be an underestimate. Factors such as gender and practice setting appear to have little impact on substance use patterns. It is therefore our recommendation that wellness efforts be aimed at all practitioners of anaesthesia. The impact on the lives of substance users, their families, patients and colleagues is often devastating. This study may be regarded as the first step towards addressing the problem, namely the acknowledgement that it exists.

Declarations

We declare that we have no financial or personal relationship(s) which may have inappropriately influenced this paper.

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Supplementary File 1

Follow link or QR code:

https://app.box.com/s/v2lnxsa7wog2zxmlf57z7h2pf1vmqkoz

Supplementary File 2

Specialist Positive urge		Qualification			P value (Chi square or Fisher's exact)
		Registrar	GP or MO		
		Positive urge	Positive urge		
Tobacco	N	13	6	6	0.194
	% of each agent	76.5%	100.0%	100.0%	
Alcohol	N	117	28	15	0.932
	% of each agent	50.0%	52.8%	50.0%	
Cannabis	N	0	0	0	–
	% of each agent	0.0%	0.0%	0.0%	
Cocaine	N	0	0	0	–
	% of each agent	0.0%	0.0%		
Amph*	N	1	2	0	0.532
	% of each agent	14.3%	40.0%	0.0%	
Sedatives	N	26	10	5	0.016
	% of each agent	46.4%	76.9%	100.0%	
Opioids	N	1	1	0	1.000
	% of each agent	25.0%	33.3%	0.0%	

< 5 years Positive urge		Number of years in practice				P value (Chi square or Fisher's exact)
		5–10 years	10–15 years	15 years		
		Positive urge	Positive urge	Positive urge		
Tobacco	N	4	6	7	8	0.658
	% of each agent	80.0%	85.7%	100.0%	80.0%	
Alcohol	N	22	52	30	56	0.002
	% of each agent	51.2%	65.0%	57.7%	39.4%	
Cannabis	N	0	0	0	0	–
	% of each agent	0.0%	0.0%	0.0%	0.0%	
Cocaine	N	0	0	0	0	–
	% of each agent	0.0%	0.0%	0.0%	0.0%	
Amph*	N	1	1	0	1	–
	% of each agent	25.0%	25.0%	0.0%	50.0%	
Sedative	N	7	10	8	16	0.230
	% of each agent	87.5%	55.6%	57.1%	47.1%	
Opioids	N	0	1	1	0	–

		Gender		P value (Fisher's exact)
		Male	Female	
		Positive urge	Positive urge	
Tobacco	N	17	8	1.000
	% of each agent	85.0%	88.9%	
Alcohol	N	76	83	0.010
	% of each agent	43.9%	58.5%	
Cannabis	N	0	0	–
	% of each agent	0.0%	0.0%	
Cocaine	N	0	0	–
	% of each agent	0.0%	0.0%	
Amph*	N	1	2	0.236
	% of each agent	12.5%	50.0%	
Sedative	N	19	22	1.000
	% of each agent	54.3%	56.4%	
Opioids	N	1	1	1.000

		Private or mostly private	State or mostly state	P value (Fisher's exact)
		Positive urge	Positive urge	
Tobacco	N	14	11	0.268
	% of each agent	77.8%	100.0%	
Alcohol	N	83	77	0.113
	% of each agent	46.4%	55.8%	
Cannabis	N	0	0	–
	% of each agent	0.0%	0.0%	
Cocaine	N	0	0	–
	% of each agent	0.0%	0.0%	
Amph*	N	1	2	1.000
	% of each agent	25.0%	25.0%	
Sedative	N	21	20	0.643
	% of each agent	52.5%	58.8%	
Opioids	N	1	1	1.000
	% of each agent	25.0%	33.3%	