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Prevalence and correlates of atypical patterns of drug use progression: findings from the South African Stress and Health Study

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Abstract

Objective—Atypical sequences of drug use progression are thought to have important implications for the development of substance dependence. The extent to which this assumption holds for South African populations is unknown. This paper attempts to address this gap by examining the prevalence and correlates of atypical patterns of drug progression among South Africans.

Method—Data on substance use and other mental health disorders from a nationally representative sample of 4351 South Africans were analysed. Weighted cross tabulations were used to estimate prevalence and correlates of atypical patterns of drug use progression.

Results—Overall, 12.2% of the sample reported atypical patterns of drug use progression. The most common violation was the use of extra-medical drugs prior to alcohol and tobacco. Gender was significantly associated with atypical patterns of drug use with the risk pattern varying by the type of drug. None of the anxiety or mood disorders were associated with atypical patterns of use. Atypical patterns of drug use were not associated with increased risk for a lifetime substance use disorder.

Conclusion—Atypical patterns of drug use initiation seem more prevalent in South Africa compared to other countries. The early use of extra-medical drugs is common, especially among young women. Drug availability and social environmental factors may influence patterns of drug use. The findings have important implications for prevention initiatives and future research.

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Keywords

Substance use; Gateway violations; Mental disorders; South Africa

Introduction

Many studies have outlined a typical, staged pattern of progression into polysubstance use (known as ‘the gateway effect’) whereby frequent and heavy alcohol and tobacco use precedes and increases the risk of subsequent cannabis use, which in turn precedes the use of other illicit drugs (such as cocaine and heroin).¹⁻⁴ However the mechanisms underpinning this gateway effect remain contentious, with ongoing debate focused on the meaning of the predictive associations between the stages of drug use and the extent to which these observed associations are causal.^{1,5-6} A range of studies have shown clearly that frequent and regular use of alcohol, tobacco, and cannabis is associated with increased risk of transition to other illicit drug use;^{1,2,4} especially among younger age cohorts.^{1,5} This sequence of drug use progression has been observed for 85% to 90% of polysubstance users in both developed^{1,2,5} and developing country settings.⁷⁻⁹

This pattern of drug use progression seems most characteristic of occasional drug users and may not be typical of regular and problematic users of illicit drugs.¹⁰ Several studies of problematic drug users and high-risk youth in the USA found that significant proportions of participants violated this conventional sequence of drug use progression.^{6,11-14} These studies reported that a quarter to more than half of participants initiated cannabis use prior to using alcohol or tobacco and some started using other illicit drugs prior to using alcohol or cannabis.¹¹⁻¹⁴ Compared to individuals who followed the typical pattern of drug use progression, violators of this pattern reported: earlier initiation into illicit drug use; greater lifetime drug use;^{11,13-14} a higher prevalence of early onset internalizing mental disorders;¹⁵ were from different, typically younger, age cohorts;^{11-13,15-16} and came from more disadvantaged backgrounds characterized by high drug availability and greater poverty.^{6,11,13} While these findings suggest that violations from the gateway pattern may be markers for progression to more serious drug-related problems, two recent studies using representative samples found that deviations from the gateway pattern were relatively uncommon (ranging from 3% to 5% of all drug users) and not predictive of later substance dependence.¹⁵⁻¹⁶ Whether this is the case among South African drug using populations has not been fully explored.

At present little is known about patterns and correlates of drug use progression among South African samples. This lack of knowledge potentially hampers the development of interventions that delay or halt drug use progression. This paper aims to redress this gap by describing the prevalence and correlates of atypical patterns of drug use progression among a representative sample of South African drug users.

Method

Data for the South Africa Stress and Health (SASH) study were collected between January 2002 and June 2004 from a national probability sample of 4351 adult South Africans.

Study sample

The sample was selected using a three-stage stratified and clustered area probability design (see Williams et al., 2008 for a detailed account of the SASH study design).¹⁷ First, a stratified sample of areas was selected from the 2001 South African census enumeration areas (EAs). Then a probability sample of housing units was selected from each EA. Third,

one adult respondent was randomly selected from the eligible persons in each sample housing unit. Field interviews were conducted with 4433 (87.1%) of the selected respondents. Due to quality concerns, only 4351 of these interviews (98.1%) were retained for use in analysis.

Ethical approval for this study was granted by the University of Cape Town's Health Research Committee.

Survey instrument

The World Health Organisation's Composite International Diagnostic Interview, Version 3.0 (CIDI 3.0) was used to assess the presence of DSM-IV (Diagnostic and Statistical Manual, 4th edition) disorders.¹⁸ The CIDI is a structured, lay-administered interview that generates diagnoses according to the International Classification of Diseases, 10th edition (ICD-10) and DSM-IV diagnostic systems.¹⁸⁻¹⁹ For this study, the English version of the CIDI was translated into several other South African languages by panels of bilingual and multilingual experts using iterative back-translation procedures.

Measures

Drug use—All respondents were asked whether they had ever used a) alcohol, b) tobacco, c) cannabis, d) other drugs (including drugs such as cocaine, heroin, and methamphetamine but excluding medicines), or e) extra-medical drugs (that is over-the-counter or prescription medicines used to get 'high'). Following a positive response to these questions, the CIDI drug-use modules were administered to assess for the presence of lifetime and 12-month substance use disorders (alcohol abuse, alcohol dependence, drug abuse, drug dependence) and to obtain more information about drug-use patterns including age of onset, progression, and problem severity.

Other mental disorders—Other mental disorders assessed in this study included: anxiety disorders (panic disorder, agoraphobia, social phobia, generalised anxiety disorder, post-traumatic stress disorder), mood disorders (major depressive disorder, dysthymia), and impulse control disorders (intermittent explosive disorder). Lifetime prevalence, age of onset, 12-month prevalence, and disorder severity for 12-month cases were assessed for each disorder.

Covariates—This study included the following time-fixed covariates: sex, race/ethnicity (black, white, coloured, Indian/Asian) and age (18-29 years, 30-39 years, 40-49 years, and ≥50 years). Time-varying covariates included residence (rural or urban), completed level of education (none, grades 1-7, grades 8-11, Matric, and post-Matric levels), marital status (married, previously married or not married), employment (employed or unemployed); family income (zero, low average, high average, and high), and asset index. For the latter, 17 items that reflected individual and household wealth were used to construct a composite asset score which was categorised into low, medium, and high asset classes.

Order of onset and gateway violations—The onset order for each drug used (alcohol, tobacco, cannabis, other drugs and extra-medical drug use) was determined from retrospective age-of-onset reports. We defined gateway violations as the following:

- the use of cannabis prior to both alcohol and tobacco use (cannabis gateway);
- other drug use prior to both alcohol and tobacco use (other drug use gateway);
- extra-medical drug use prior to both alcohol and tobacco use (extra-medical drug use gateway).

Analysis procedures

To account for the stratified multi-stage sample design, data were weighted to adjust for differential probabilities of selection within households and for differential non-response. A post-stratification weight was used to make the sample distribution comparable to the distribution of the South African population in terms of age, sex, and province. The weighting and geographic clustering of data were taken into account using the Taylor series linearization method. Chi-square analyses were conducted to examine the bivariate associations between socio-demographic variables and gateway violations among users of each drug type. For these analyses, the reference group was the rest of the sample. Crude associations between gateway violators and lifetime DSM-IV anxiety, mood, and substance disorders were generated using other drug users as the reference group. For example, the association between cannabis gateway violators and mental disorders was calculated with the reference group being all participants who had ever used cannabis.

Results

Overall, 12.2% of respondents initiated substance use in an order that violated the typical pattern of substance use progression (Table I). The most common violation was initiation of extra-medical drug use before alcohol and tobacco (9.6%), followed by cannabis use before the use of alcohol and tobacco (2.6%). Respondents in the ≥ 50 years age group were the least likely to report illicit drug use before alcohol and tobacco, extra-medical drug use before alcohol and tobacco, and any gateway violations compared to respondents in the three younger age groups.

Among substance users, violations of the normative pattern of drug use initiation were much more common among extra-medical drug users (53.2%) and illicit drug users (51.7%) than cannabis users (36.0%). The violations were least common among alcohol (11.3%) and tobacco users (10.8%) (Table II).

Table III presents the results of bivariate analyses examining socio-demographic correlates of gateway violations. Gender was significantly associated with violations of each kind. Female respondents were significantly less likely than males to have used cannabis prior to using alcohol and tobacco and to have used other drugs prior to using alcohol and tobacco. In contrast, compared to male respondents, female respondents had significantly greater odds of initiating extra-medical drug use prior to alcohol and tobacco (Table III), with women comprising almost two-thirds of this subset of gateway violators.

Although age was not significantly associated with the use of cannabis prior to the use of alcohol and tobacco or the use of other drugs prior to alcohol and tobacco, respondents in the younger age groups comprised the bulk of these gateway violators. Age was significantly associated with the initiation of extra-medical drug use prior to the use of alcohol and tobacco. More specifically, respondents between 18-29 years of age were significantly more likely to use extra-medical drugs out of the gateway sequence compared with respondents in the ≥ 50 years age category.

Race/Ethnicity was unrelated to gateway violations of any kind. Education level and employment status were unrelated to the use of cannabis or extra-medical drugs before alcohol and tobacco. However these variables were associated with the precocious use of other drugs, with respondents with higher levels of education (Matric) and who were employed, significantly more likely to report using other illicit drugs prior to alcohol and tobacco than respondents who were unemployed and less educated (Grade 1-7). Finally, residing in an urban area and having a medium asset score was significantly associated with

using cannabis before alcohol and tobacco, but was not associated with the precocious use of other illicit drugs or extra-medical drugs.

Table IV presents the results of bivariate analyses examining associations between mental disorders and gateway violations. The presence of any lifetime disorder (including an alcohol or drug-related diagnosis) was unrelated to the use of cannabis before alcohol and tobacco, but significantly associated with the precocious use of both illicit and extra-medical drugs (Table IV). Both of these gateway violations were associated with a decreased likelihood of any type of lifetime mental disorder. When associations between specific types of disorders and the three gateway violations were examined, we found that lifetime mood and anxiety disorders were unrelated to gateway violations of any type. In contrast, the presence of any type of substance use disorder was associated with a significantly reduced likelihood of using illicit drugs prior to alcohol and tobacco or of using extra-medical drugs before alcohol and tobacco. Specifically, atypical patterns of use among extra-medical drug users were associated with significantly less chance of having a lifetime alcohol use disorder.

Discussion

This study examined the order of onset of drug use and considered the possible impact of deviations from the typical sequence of drug use initiation on the risk of developing a substance use disorder using a representative sample of South African adults. To our knowledge, this study is the first of its kind to describe violations of the gateway pattern of drug use progression in Africa. More specifically, we examined three atypical sequence of drug use progression: the use of cannabis prior to the use of alcohol and tobacco; other illicit drug use prior to the use of alcohol and tobacco; and extra-medical drug use before alcohol and tobacco.

In our study, 12.2% of respondents reported atypical sequences of drug use progression. While this proportion is relatively small, it is more than double that reported in studies conducted in developing country contexts where deviations from the normative pattern of drug use typically ranged from 3% to 5% of the sample.¹⁵⁻¹⁶ In part, this could be due to the fact that earlier studies did not consider extra-medical drug use prior to the use of alcohol and tobacco as a violation of the gateway pattern of drug use progression. While our examination of extra-medical drug use violators significantly increased the overall proportion of respondents reporting an atypical sequence of drug use initiation (as extra-medical drug use prior to the use of alcohol and tobacco was by far the most common violation), the proportion of respondents reporting cannabis use prior to the use of alcohol and tobacco was also slightly higher than the proportion presented in earlier studies.¹⁵⁻¹⁶ The proportion of substance users reporting violations of the gateway order of drug use initiation was also much higher in this study compared to previous studies.¹⁵ Our study found that more than half the extra-medical and illicit drug users and roughly a third of cannabis users had atypical sequences of drug use progression. Taken together, these findings suggest that the gateway pattern of drug use progression is not as common among South African substance users as previously thought.

One reason for this may lie in the increased availability of cannabis and other illicit drugs in South Africa since 1994.²⁰ Among younger age cohorts, who form the bulk of the cannabis and illicit drug gateway violators, this increased availability may have translated into increased opportunities to use these substances. At the same time, tighter regulations around the sale and use of alcohol and tobacco may have discouraged young people from starting their drug use trajectories with these substances. This explanation is supported by findings from studies conducted in other countries which report that opportunities to use substances

and drug availability influence the order of drug use initiation and transitions to different types of drugs.^{1,9}

However, this explanation cannot fully account for the high proportion of respondents who reported the use of extra-medical drugs before alcohol and tobacco. In this study, younger age cohorts were most likely to report extra-medical drug use prior to the use of alcohol and tobacco. Global epidemiological trends in substance use might help explain this finding, with recent studies reporting significant increases in extra-medical drug use among young people across a range of countries.²¹ Apart from these global trends, the precocious use of these substances may also be driven by the fact that these substances are easy to obtain and their use is relatively less stigmatised than the use of alcohol, tobacco, or illicit substances in South Africa.²² The important role that stigma may play in choice of first drug is also supported by our findings that female respondents were significantly more likely to report using extra-medical drugs prior to alcohol and tobacco than their male counterparts and that men were much more likely to report the early use of cannabis and other illicit drugs compared to females. Compared to men, women's use of alcohol, tobacco and other substances is still highly stigmatised in South Africa and is associated with a failure to fulfil a socially acceptable female role and sexual availability.²³ For women in this country, extra-medical drugs may seem a socially acceptable alternative to alcohol and tobacco.

Finally, while other studies have suggested that deviations from the normative pattern of drug use initiation are associated with the early onset of mood or anxiety disorders¹⁵, and that many individuals who deviate from the gateway pattern also have co-occurring mental health problems¹¹⁻¹³, this study found no significant associations between atypical patterns of drug use progression and the presence of mood or anxiety disorders. In addition, atypical patterns of drug use did not increase the odds of developing a substance use disorder. This challenges previous views that gateway violators have relatively more severe drug and cooccurring mental health problems and are at greater risk for substance dependence.¹¹⁻¹³ However, this finding should be interpreted with some caution. First, this survey did not assess for a number of key DSM-IV disorders, such as impulse control disorders (with the exception of intermittent explosive disorder) and psychotic disorders. Of particular concern is the exclusion of the conduct disorders as these disorders are strongly associated with increased risk for substance use, especially among adolescents.²⁴ In addition, many of our violators (particularly in the cannabis and extra-medical drug categories) were young and it is quite possible that they had not yet progressed to abusive or dependent drug use or other mental disorders. This may have skewed our findings regarding associations between gateway violations and substance dependence.

Our findings on multiple patterns of drug use progression have important implications for substance abuse prevention efforts in the country. Given large variations in the sequencing of drug use, prevention efforts need to target common risk factors for the use of any substance instead of only attempting to prevent the use of the so-called gateway substances of alcohol, tobacco and cannabis. Second, substance abuse prevention initiatives that traditionally have focused on the use of alcohol, tobacco and illicit drugs, also need to address extra-medical drug use. Third, screening for the use of alcohol, tobacco and other substances by mental health and other health care workers should also include questions on the inappropriate and problematic use of medicines. Health care workers should also be alerted to the high prevalence of extra-medical drug use among young women.

Despite these implications, findings from this study should be interpreted with reference to several limitations. First, this cross-sectional data set relied on recall to assess age of onset of substance use and patterns of drug use initiation. This may have led to reporting errors. However, given limited differences between the various age cohorts in patterns of drug use

initiation, it is unlikely that recall bias greatly influenced this study's findings. Second, although the SASH study obtained a high response rate, reporting errors on the substance use module of the CIDI may have occurred. It is possible that illicit drug use may have been underreported, particularly as this is a stigmatised activity.²⁴ Finally, our findings could have been skewed by the exclusion of homeless and institutionalised people from the study. Persons who find themselves homeless and institutionalised represent a particularly vulnerable population group with typically more severe substance-related problems than the general population.²⁵

These limitations highlight the need for future research on patterns of drug use progression in South Africa and their associated mental health consequences. To minimise concerns regarding the accuracy of retrospective data, longitudinal prospective studies that track young people over time and allow researchers to unpack patterns of drug use (and other mental disorder problem) progression are required. Such studies would also benefit from examining possible associations between other mental disorders not included in this study (especially conduct disorders) and drug use progression. In addition, qualitative research that provides detailed contextual information on factors associated with drug use progression would be useful for guiding the development of interventions to delay or halt this progression.

Conclusion

Despite some limitations, this is the first South African study to examine atypical sequences of drug use progression. Key findings include: atypical patterns of drug use progression are more common than in other settings and particularly prevalent among extra-medical and illicit drug users; extra-medical gateway violators are mostly young and female; and compared to non-violators, violators of the normative pattern of drug use progression are not at greater risk for a mental disorder or a substance use disorder. These findings are potentially valuable for guiding efforts to prevent or halt drug use progression across the country. Most importantly, they suggest that common risk factors underpinning the initiation of substance use, rather than particular drugs of abuse, should be the target of prevention initiatives.

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Table 1

Prevalence of each violation by cohort and total: South Africa

Violations	18-29 (n=1640)		30-39 (n=1066)		40-49 (n=768)		50+ years (n=877)		Total (n=4351)		p-value
	%	n	%	n	%	n	%	n	%	n	
01. Cannabis before both alcohol and tobacco	3.0	41	2.5	20	2.0	12	2.7	15	2.6	30	0.766
02. Other drugs before both alcohol and tobacco	0.9	14	1.8	9	0.5	3	0.2	1	0.2	27	0.028
03. Extra medical drugs before both alcohol and tobacco	10.6	167	11.7	133	8.2	66	6.8	61	9.6	427	0.010
04. Any of these 3: 01 or 02 or 03	13.7	213	14.4	154	10.3	79	8.8	73	12.2	519	0.003

Table II

Prevalence of each violation among users of each drug group, by age cohort and total

	18-29 (n=1640)		30-39 (n=1066)		40-49 (n=768)		50+ years (n=877)		Total (n=4351)		p-value					
	%	SE	n	%	SE	n	%	SE	n	%		SE	n			
Among alcohol users (n=1,532)																
01. Cannabis before both	5.4	0.010	28	5.1	0.015	16	4.3	0.015	10	3.5	0.011	9	4.8	0.006	63	0.702
02. Other illicit drugs before both	1.5	0.007	8	3.2	0.010	7	0.3	0.003	1	0	0	0	1.4	0.004	16	0.021
03. Extra medical drugs before alcohol and tobacco	7.7	0.013	39	8.5	0.019	37	5.3	0.014	19	2.0	0.008	8	6.3	0.009	103	0.006
04. Any of these 3	13.1	0.014	69	14.7	0.021	55	9.4	0.020	17	5.5	0.013	17	11.3	0.009	170	0.003
Among tobacco users (n=1,169)																
01. Cannabis before both	6.4	0.013	24	6.1	0.020	12	5.2	0.020	9	4.4	0.015	8	5.6	0.007	53	0.820
02. Other illicit drugs before both	2.2	0.010	7	2.5	0.015	3	1.3	0.008	3	0.6	0.006	1	1.7	0.005	14	0.555
03. Extra medical drugs before alcohol and tobacco	4.4	0.012	19	8.1	0.015	15	4.8	0.015	15	2.4	0.010	7	4.5	0.008	62	0.048
04. Any of these 3	12.0	0.021	47	14.6	0.028	33	10.0	0.024	25	6.1	0.017	14	10.8	0.011	119	0.074
Among cannabis users (n=288)																
01. Cannabis before both	27.9	0.040	41	30.9	0.067	20	29.5	0.098	12	45.1	0.076	15	31.3	0.029	88	0.348
02. Other illicit drugs before both	3.8	0.013	7	7.0	0.046	3	0	0	0	3.6	0.034	1	3.9	0.013	11	0.459
03. Extra medical drugs before alcohol and tobacco	10.0	0.027	11	8.9	0.043	6	8.9	0.048	4	12.3	0.070	3	9.9	0.023	24	0.954
04. Any of these 3	34.9	0.038	50	33.2	0.065	22	35.0	0.106	15	45.1	0.076	15	36.0	0.029	102	0.707
Among drug users (n=59)																
01. Cannabis before both	28.3	0.084	10	32.1	0.146	4	0	0	0	22.6	0.203	1	25.2	0.070	15	0.483
02. Other illicit drugs before both	27.7	0.075	12	57.0	0.158	8	23.5	0.170	2	22.6	0.203	1	35.9	0.068	23	0.279
03. Extra medical drugs before alcohol and tobacco	3.9	0.039	1	21.1	0.144	2	22.0	0.163	2	22.6	0.203	1	13.6	0.050	6	0.436
04. Any of these 3	46.3	0.113	18	76.4	0.090	11	31.8	0.200	3	22.6	0.203	1	51.7	0.080	33	0.102
Among extra-medical drug users (n=807)																
01. Cannabis before both	3.9	0.014	10	6.5	0.022	9	3.8	0.015	4	5.7	0.026	5	4.9	0.009	28	0.655
02. Other illicit drugs before both	2.1	0.012	5	5.3	0.028	4	2.0	0.014	2	1.3	0.013	1	2.8	0.010	12	0.334
03. Extra medical drugs before alcohol and tobacco	52.1	0.038	167	53.3	0.045	133	48.2	0.049	66	41.1	0.047	61	49.8	0.023	427	0.238
04. Any of these 3	55.5	0.036	176	58.2	0.037	138	51.5	0.051	70	42.3	0.047	63	53.2	0.022	447	0.069

Table III

Socio-demographic characteristics of gateway violators

	OVERALL (n=4351)		A Cannabis before both (n=88)		B Other drugs before both (n=27)		C Extra-medical drugs before both (n=427)			
	%	n (%)	OR*	p-value	n (%)	OR*	p-value	n (%)	OR*	p-value
Cohort										
18-29	39.1	41 (44.2)	1.0	-	14 (40.9)	1.0	-	167 (43.0)	1.0	-
30-39	22.1	20 (20.7)	0.83	0.522	9 (44.7)	1.95	0.128	133 (26.8)	1.12	0.446
40-49	18.1	12 (14.1)	0.68	0.334	3 (9.3)	0.49	0.305	66 (15.5)	0.76	0.096
50+	20.7	15 (21.0)	0.90	0.760	1 (5.1)	0.23	0.176	61 (14.7)	0.62	0.019
Gender										
Male	46.3	70 (81.8)	1.0	-	16 (68.6)	1.0	-	131 (36.6)	1.0	-
Female	53.7	18 (18.2)	0.19	<0.001	11 (31.4)	0.39	0.016	296 (63.4)	1.56	0.001
Race										
Black	76.2	67 (72.4)	1.0	-	19 (71.2)	1.0	-	355 (82.4)	1.0	-
Coloured	10.4	14 (11.5)	1.17	0.656	6 (12.9)	1.33	0.605	38 (8.3)	0.71	0.342
White	10.0	7 (16.0)	1.72	0.172	2 (15.9)	1.72	0.521	20 (6.4)	0.56	0.396
Indian/Asian	3.4	0 (0)	-	-	0 (0)	-	-	14 (3.0)	0.80	0.521
Education										
None	6.8	3 (5.1)	1.0	-	0 (0)	-	-	17 (4.6)	1.0	-
Grade 1-7	19.1	16 (14.9)	1.03	0.972	3 (6.3)	1.0	-	87 (19.7)	1.59	0.243
Grade 8-11	35.4	34 (40.0)	1.50	0.605	11 (37.0)	3.18	0.134	142 (36.9)	1.61	0.207
Matric	23.5	18 (22.9)	1.30	0.769	10 (45.3)	5.92	0.019	103 (23.2)	1.52	0.301
Matric +	15.3	13 (17.4)	1.52	0.613	2 (11.4)	2.26	0.193	67 (15.6)	1.57	0.276
Marital Status										
Currently married	50.6	37 (47.7)	1.0	-	10 (33.9)	1.0	-	215 (51.5)	1.0	-
Previously married	6.5	5 (8.5)	1.40	0.526	1 (9.3)	2.14	0.459	27 (4.1)	0.59	0.043
Never married	42.9	46 (43.8)	1.09	0.743	16 (56.8)	1.99	0.124	185 (44.5)	1.02	0.887
Employment										
Unemployed	69.0	58 (62.9)	1.0	-	18 (49.4)	1.0	-	291 (67.1)	1.0	-
Employed	31.0	30 (37.1)	1.32	0.414	9 (50.6)	2.30	0.035	136 (32.9)	1.10	0.566

	OVERALL (n=4351)		A Cannabis before both (n=88)		B Other drugs before both (n=27)		C Extra-medical drugs before both (n=427)	
	%	n (%)	OR*	p-value	n (%)	OR*	n (%)	OR*
Income								
Zero	13.7	19 (23.2)	1.0	-	4 (17.2)	1.0	57 (14.0)	1.0
Low	29.5	19 (21.3)	0.41	0.007	13 (47.7)	1.29	149 (32.8)	1.09
Low average	15.4	11 (13.3)	0.50	0.093	4 (17.5)	0.91	73 (17.2)	1.10
High average	19.6	16 (18.0)	0.53	0.096	2 (8.6)	0.35	65 (15.5)	0.75
High	21.8	23 (24.2)	0.64	0.203	4 (8.9)	0.32	83 (20.6)	0.91
Location								
Rural	38.4	31 (28.2)	1.0	-	11 (26.6)	1.0	158 (35.1)	1.0
Urban	61.6	57 (71.8)	1.60	0.027	16 (73.4)	1.72	269 (64.9)	1.17
Asset index								
Low	39.3	30 (27.2)	1.0	-	11 (34.6)	1.0	158 (37.6)	1.0
Medium	37.4	42 (48.2)	1.89	0.025	12 (49.4)	1.51	194 (43.3)	1.24
High	23.3	16 (24.6)	1.54	0.154	4 (16.0)	0.78	75 (19.2)	0.85

Types of violators: A: Cannabis before alcohol and tobacco. B: Other drugs (illicit, includes cocaine) before alcohol and tobacco. C: Extra-medical drugs before alcohol and tobacco. D: Any violator (A, B or C)

* OR – comparison group is the rest of the sample

Table IV
Odds of Lifetime DSM-IV disorders among gateway violators compared to drug users

	Cannabis before both (compared to cannabis users) (n=288)		Other drugs before both, compared to drug users (n=59)		Extra-medical drugs before, compared to extra-medical drug users (n=807)	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
ANY LIFETIME DISORDER	58 (63.7)	1.04 (0.61-1.76)	13 (56.7)	0.26 (0.08-0.87)	150 (34.0)	0.70 (0.53-0.93)
Any anxiety disorder	17 (19.7)	0.76 (0.41-1.41)	6 (20.6)	0.80 (0.25-2.58)	84 (17.6)	0.92 (0.65-1.29)
PTSD	2 (1.6)	0.44 (0.09-2.06)	0 (0)	-	5 (1.0)	0.49 (0.16-1.47)
GAD with hierarchy	5 (4.4)	0.69 (0.25-1.95)	2 (4.3)	1.62 (0.21-12.38)	22 (4.5)	1.32 (0.67-2.59)
Panic Disorder	1 (0.8)	0.75 (0.08-7.36)	1 (2.7)	1.59 (0.09-26.76)	7 (1.6)	0.62 (0.23-1.64)
Social Phobia	4 (7.2)	0.82 (0.25-2.64)	0 (0)	-	12 (2.6)	0.89 (0.39-2.00)
Agoraphobia	11 (13.2)	1.00 (0.47-2.13)	4 (15.0)	3.58 (0.60-21.39)	61 (13.2)	1.24 (0.82-1.87)
Major Depressive Disorder	12 (13.4)	0.93 (0.45-1.92)	2 (8.2)	0.25 (0.05-1.26)	53 (10.3)	0.84 (0.56-1.26)
Any substance use disorder	51 (55.6)	1.17 (0.71-1.95)	15 (60.5)	0.21 (0.07-0.63)	368 (83.6)	0.48 (0.34-0.69)
Drug dependence	6 (6.2)	1.39 (0.49-3.95)	0 (0)	-	4 (1.0)	0.59 (0.17-2.10)
Drug abuse	27 (29.5)	0.94 (0.55-1.62)	5 (21.6)	0.16 (0.05-0.52)	38 (11.1)	0.88 (0.55-1.41)
Alcohol dependence	8 (9.0)	0.57 (0.25-1.29)	3 (11.8)	0.93 (0.20-4.33)	10 (2.4)	0.39 (0.18-0.84)
Alcohol abuse	40 (44.2)	1.15 (0.69-1.91)	6 (31.8)	0.35 (0.11-1.10)	31 (8.7)	0.31 (0.20-0.48)