A retrospective chart review of the clinical and psychosocial profile of psychotic adolescents with co-morbid substance use disorders presenting to acute adolescent psychiatric services at Tygerberg Hospital

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Background. A large number of adolescents meet criteria for 'dual diagnosis' (a psychiatric disorder plus co-morbid substance use disorder (SUD)), which prolongs treatment response and complicates intervention strategies. The current service model in Cape Town divides the care of such patients into psychiatric treatment and a separate substance use intervention. Child and adolescent mental health services face the challenge of high rates of readmission of adolescents into psychiatric facilities before utilisation of community-based substance abuse services.

Objective. There is a scarcity of available treatment guidelines for dual-diagnosis adolescents, and a lack of systematically documented epidemiological and clinical data in South African adolescent populations.

Method. A retrospective chart review of adolescent psychiatric admissions to the Tygerberg Adolescent Psychiatric Unit during 2010 was conducted. Relevant epidemiological, clinical and demographic data for those presenting with a dual diagnosis (specifically psychotic disorders and SUD) was recorded.

Results. Results suggest a high prevalence of SUD among adolescents presenting with a first-episode psychosis. Statistically significant correlations with lower levels of education were found in those with ongoing substance abuse (specifically cannabis and methamphetamine), and a significant relationship between choice of debut drug and ongoing drug use was also demonstrated. Risk factors for SUD (psychosocial adversities, childhood trauma, family and community exposure to substances, early debut drug ages), risky sexual behaviours, and clinical psychiatric profiles of adolescents with dual diagnosis are described.

Conclusions. This cohort had an enhanced risk as a result of genetic vulnerability and environmental availability of substances, and the findings emphasise the differences in presentation, choice of drugs of abuse and psychosocial difficulties of adolescents with a dual diagnosis presenting to a psychiatric facility. We aim to influence role-players to provide more integrated services, and highlight the need for future prospective studies in this adolescent group to assist in improving outcomes.

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Tygerberg Hospital serves as the Western Cape (WC)'s only tertiary-level acute inpatient facility for the assessment and management of adolescents (13 - 18 years) presenting with severe mental illness. A substantial number of these adolescents meet criteria for a dual diagnosis (defined as psychiatric disorder plus co-morbid substance use disorder (SUD)). The presence of these co-existing diagnoses prolongs initial treatment response and complicates subsequent intervention strategies. The current service model divides the care of such patients into a psychiatric inpatient treatment component and a separate post-discharge substance use intervention. One of the challenges the child and adolescent mental health (CAMH) service faces is the high rate of readmission of adolescents into psychiatric services before utilisation of community-based substance abuse services can even occur. Furthermore, existing adolescent substance abuse and rehabilitation programmes (offered by the Department of Social Services) do not address co-occurring mental illness. This situation has arisen not only due to a lack of evidence-based treatment guidelines for dual-diagnosis adolescents, but also because, to date, epidemiological as well as clinical data for this group have not been systematically documented in South Africa (SA).

There is evidence that co-morbid substance use in patients with psychotic disorders has important implications for patient management, in that co-morbid SUDs are often associated with a variety of adverse outcomes such as treatment non-compliance, high rates of relapse and rehospitalisation.[1] Psychosis and substance abuse occur together more frequently than can be explained by chance alone. Dixon[2] reported that a substantial proportion of substance abusers experience psychosis, and that a SUD is one of the greatest obstacles to the effective treatment of people with schizophrenia.

In 2008, in a large population-based study, Miettunen *et al.*[3] examined cannabis use and prodromal symptoms of psychosis in 6 330 Finnish adolescents. The study concluded that cannabis use was associated with prodromal symptoms in adolescents and that this effect was not secondary to any confounding effects of other drugs, emotional or behavioural problems or family background. Furthermore, an apparent shared underlying genetic vulnerability to both SUD and mental illness has been well documented.[4-6] Mental illness itself may also lead to an increase in drug-seeking behaviour to alleviate symptoms, while mental illness may be induced by substance abuse.[7] Caspi *et al.*[4] demonstrated that the presence of a functional polymorphism of the COMT gene is likely to moderate the influence of adolescent cannabis use on the development of psychosis in adulthood.

A significant increase in the abuse of methamphetamine in the WC, in addition to already high levels of alcohol and cannabis use, has resulted in the Tygerberg adolescent psychiatry unit seeing an increase in the number of patients with methamphetamine-related psychotic disorders presenting for admission. It has been established that abuse of amphetamines is associated with the development of schizophrenia-like symptoms (including hallucinations and paranoid delusions) and mood disturbances. Grelotti *et al.*[8] describe patients with prolonged methamphetamine abuse being at risk of persistent psychotic features and showing poor response to antipsychotic treatment, even after stopping methamphetamine use. The risks for development of amphetamine-related psychosis include young age of onset of substance abuse, high doses of amphetamine, and having a family member with an amphetamine-related psychotic disorder.[8]

Risk factors for the development of a psychotic illness in adolescent substance abusers described in the international literature include severity and duration of use, age at time of first substance use, genetic, familial or personality vulnerabilities to the development of psychosis, and the type of substance used.[9-11]

To the best of our knowledge, no published data currently exist for adolescent dual-diagnosis (psychiatric disorder with co-morbid SUD) populations in Africa. Our sample will therefore be the first demographic and clinical profile of a psychiatrically hospitalised South African adolescent population with dual diagnoses. The importance of this information lies in the need to provide clinical data to various role-players (departments of Health, Social Development and Education) involved in the planning of targeted intervention strategies aimed at reducing the burden of disease and the load on health services in the WC.

Methods
Data collection
A retrospective chart review was conducted of all adolescents admitted to the Adolescent Psychiatry Inpatient Unit at Tygerberg Hospital between 1 January 2010 and 31 December 2010. For the purposes of this study, only adolescents who presented with a dual diagnosis, defined as the presence of a psychotic disorder with a co-morbid SUD (according to the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition, text revision 2000 (DSM-IV-TR)[12]), were included.

Adolescents (aged 13 - 17 years inclusive), as well as those who were 18 years old but still attending school, were included in the study. Clinicom (the WC Department of Health data collection system) was used to identify the above patients. Folders were reviewed retrospectively and relevant data entered into a structured data sheet by a single investigator (AL). Data collected included demographic information, educational background, detailed drug use history, psychiatric diagnosis, co-morbid medical and medication history, contact with social services, forensic history, family history (psychiatric and substance), and documented stressors.

Statistical analysis
All data were entered into a single database. Descriptive statistics were compiled by a statistician using frequency tables, means and standard deviations (SDs). Cross-tabulation with the chi-square test was used to compare categorical variables. One-way ANOVA was used to compare means of ordinal variables between groups. Statistica 10 was used for all the statistical analyses. A 5% significance level ($p<0.05$) was used as guideline for determining significant results.

Ethical considerations
Ethics approval was granted by the Committee for Human Research of Stellenbosch University (N11/01/002). The study was conducted in accordance with the International Committee for Harmonisation (ICH),[13] Good Clinical Practice (GCP)[14] guidelines and SA GCP,[15] as well as the Declaration of Helsinki.[16]

Results
Demographic profile
Sample size. A total of 141 adolescents were admitted to the Tygerberg Adolescent Psychiatry Inpatient Unit during the period January 2010 - December 2010. Patients who were admitted more than once were only included once in the sample, and two folders contained incomplete records. The total suitable sample (number of

patients who fulfilled the inclusion criteria) was 75 (54%) out of 139 complete records.

Gender. Of the participants, 55 (73%) were male and 20 (27%) female.

Age. The age range of the sample was between 13 and 18 years, with a mean of 16.43 years (SD 1.002).

Area of residence was coded according to geographical service areas in the WC province (Fig. 1).
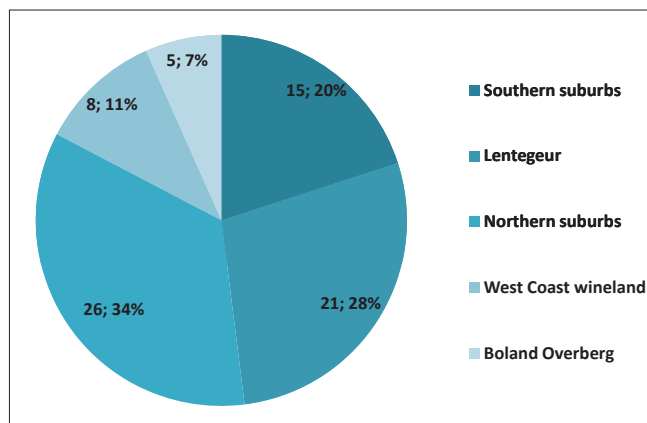

Fig. 1. Patient distribution by residential area.

Educational status. Of the patients 46 (61%) were not currently attending school. The mean highest level of education (HLOE) obtained was grade 8 (SD 2.19). The mean number of years out of school was 1.45 years (SD 1.66).

Social history. Of the total sample, 20 (27%) had had prior contact with social services. One (1%) was in formal out-of-home placement, and 43 (57%) had a documented history of childhood abuse.

Clinical characteristics
Psychiatric presentation. For 44 (59%) of the sample, this admission was their first presentation to psychiatric services; 31(41%) reported a previous psychiatric history and/or contact with psychiatric services.

Psychiatric diagnoses. Diagnoses on admission and discharge were recorded. Each diagnosis (primary and secondary) was counted (Tables 1 and 2). No statistically significant correlations could be demonstrated between diagnosis on discharge and any specific substances (cannabis, methamphetamine, alcohol, methaqualone (mandrax)).

Medical history. Of the patients 5 (7%) had a history of infection (any reported), 4 (5%) reported a previous head injury, and 6 (8%) reported a history of epilepsy.

Table 1. DSM-IV-R Axis I diagnoses on admission

	%
Substance-induced psychosis	55
Substance abuse	15
Polysubstance abuse	11
Other (Adjustment disorder, Anxiety disorder, V code)	8
Schizophreniform disorder	7
Bipolar disorder	7
Major depressive disorder with psychosis	7
Schizophrenia	5
Psychosis due to general medical condition	4
Schizo-affective disorder	3
Substance-induced mood disorder	3

Table 2. DSM-IV-R diagnoses on discharge

	%
Polysubstance abuse	53
Substance-induced psychosis	24
Schizophrenia	21
Substance abuse	16
Other (Adjustment disorder, Anxiety disorder, V code)	13
Schizophreniform disorder	12
Bipolar disorder	12
Psychosis due to general medical condition	4
Schizo-affective disorder	4
Major depressive disorder with psychosis	4
Substance-induced mood disorder	1

Forensic history. Of the patients 21 (28%) had a forensic history, 47 (63%) did not report any involvement with the law, and 7 (9%) were undocumented or information was missing.

Family history. Of the patients 15 (20%) were born to mothers who reported using illicit drugs during pregnancy, and 38 (50.7%) had relatives with a previous history of psychiatric disorders, 21.1% of which (8 cases) were related to substance use.

Sexual history. Of the patients 25 (33%) were sexually active, and 12 (16%) reported no sexual activity. However, 38 (51%) chose not to reveal their sexual histories. Of those with documented sexual histories, only 2 (8%) reported using contraceptives.

Stressors. Patients reported single or multiple stressors: 59 (79%) reported 'relational' factors (i.e. family conflict, divorce), as their major stressor, 9 (12%) had experienced a recent bereavement,
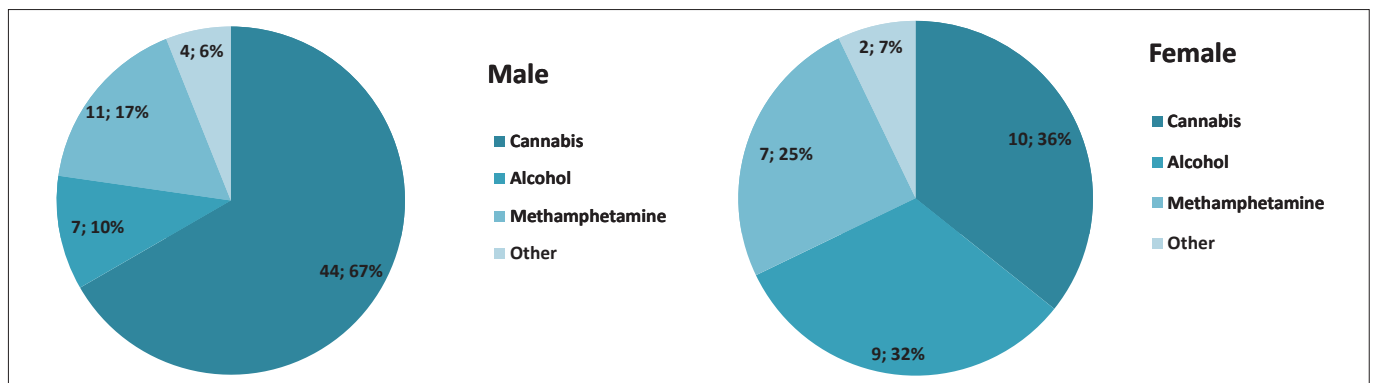
Fig. 2. Specific debut drugs across gender.

32 (43%) had a history of significant trauma (witnessed or experienced), 8 (11%) reported 'homelessness' or unstable/not fixed) home environment as a major stressor, 41 (55%) listed financial constraints as a problem at home, and 35 (47%) reported being bullied at school.

Substance history

Individual drug categories were recorded for cannabis, methamphetamine, alcohol and methaqualone. The category 'other' included volatile hydrocarbons, heroin, cocaine and nicotine.

Introducer. Substances had been introduced to 52 (69%) of the sample by friends/peers, and to 8 (11%) by family members; 5 (7%) reported being introduced to drug use by both friends and family, and 10 (13%) chose not to reveal this information.

Drug debut. The debut drugs of choice and the average ages of drug debut were as follows: of the sample of 75 patients, 20 (27%) recorded more than one drug as their chosen debut drug. Drug debut across gender is presented in Fig. 2, while the specific ages of drug debut are presented in Table 3.

Table 3. Average ages of debut drug use

	Number of patients who debuted with drug	Number of patients for whom age of debut was available	Average debut age (years) (based on available debut ages)	SD of debut age (based on available debut ages)
Cannabis	54	45	14.0	1.71
Alcohol	16	10	14.2	1.55
Methamphetamine	18	15	13.8	1.78
Other	6	2	13.5	2.12

Table 4. Specific substance history

Drug history	Cannabis	Alcohol	Methamphetamine	Methaqualone	Other
Average age of user (yrs)	14.11	14.33	14.08	14.38	14.00
Tested (yes) (n (%))	45 (60)	N/A	38 (51)	26 (35)	N/A
Blood	N/A	N/A	N/A	N/A	N/A
Urine	45 (60)		38 (51)	26 (35)	
Result					
Negative	29 (39)		30 (40)	21 (28)	
Positive	10 (13)		5 (7)	1 (1)	
Most frequent pattern of documented use	Daily	Daily	Daily	Irregular	Daily
Ongoing use (yes) (n (%))	57 (76)	34 (45)	35 (47)	11 (15)	13 (17)

N/A = not applicable.

Rehabilitation services. No patient had had any contact with rehabilitation services for substance use prior to the psychiatric admission.

Further analyses of possible correlations between individual substances and categories of data (such as age, education level, gender, introducer, ongoing use) were performed but statistically significant results were limited probably owing to the small sample numbers and available documented information. Only statistically significant results for individual substances are presented below.

Specific substance history. The history of individual drug use is presented in Table 4.

Cannabis. There was a statistically significant relationship between cannabis as a debut drug and ongoing cannabis use. There was 1 case of ongoing cannabis use (25%) in the 'unknown debut drug' group, as opposed to 8 (100%) of those who did not debut with cannabis, and 45 (83%) of those who did debut with cannabis, reporting ongoing cannabis use (p=0.00013). The difference between HLOE reached in those with ongoing cannabis use and those who did not currently use cannabis was statistically significant (p=0.02): the mean HLOE reached in patients with ongoing cannabis use was grade 8 (SD 0.270), compared with grade 9 in those who did not currently use cannabis.

Methamphetamine. The difference in HLOE between patients with ongoing methamphetamine use and those who did not currently use methamphetamine was statistically significant (p=0.04). The mean HLOE in patients with current use was grade 7.6 (SD 0.349) compared with grade 8.4 in non-users (SD 0.625).

Alcohol. The difference between males and females with regard to reporting of alcohol as debut drug was statistically significant (p=0.013). A greater proportion of girls (45%) reported using alcohol as their debut drug, while only 12% of males admitted to alcohol debut, and 40% of males reported alcohol debut as 'unknown'.

Discussion
Demographics
Substance abuse among adolescents in South African communities is an escalating problem. Studies of South African adolescent school-going populations[17] and psychiatric inpatient populations[18,19] have highlighted the scarcity of clinical and demographic data concerning at-risk youth. Such data are urgently needed to inform substance abuse prevention and intervention strategies. Accounting for over half (54%) of the total admissions to the Tygerberg Adolescent Inpatient unit over a year, this sample highlights the very high occurrence of co-morbid substance use in adolescents presenting with a psychotic episode. Our figures are in keeping with international figures that suggest a higher prevalence of SUD among adolescents presenting with a first-

episode psychosis than among adults with schizophrenia (20 - 75% v. 20 - 50%).[20] Several theories have been put forward to account for the increased prevalence of SUD in this population group, including a 'self-medication' hypothesis, bi-directional genetic-environmental vulnerability, psychosocial influences and peer group/academic stressors.[6,4,21]

This sample group was collectively representative of the adolescent population across the WC, as evidenced by the geographical distribution in Fig. 1. The area categorised as 'northern suburbs' has a greater representation, since Tygerberg serves as both district and regional hospital for this area specifically, and as the tertiary hospital for all other areas in the WC.

Educational status
An alarming 61% of adolescents in our sample were not currently attending or enrolled in school, with an average of 1.45 years out of school, in keeping with local data on non-psychotic substance-using teenagers, who also have poor scholastic histories. A longitudinal study conducted in Cape Town high schools over 2 years found an association between poor academic performance, school drop-out and alcohol use (particularly binge drinking).[22] A worrying statistically significant association was demonstrated with HLOE achieved in relation to specific debut drugs (cannabis and methamphetamine) and ongoing use of these drugs. Ongoing use of cannabis, which is currently the most common drug of abuse among youth under age 20 in the WC,[23] was associated with a lower educational level reached (grade 8), while ongoing use of methamphetamine (the second most commonly used illicit drug in youth under 20 in the WC[23]) was also associated with a lower level of education (grade 7.6). This highlights that currently drug-using psychotic adolescents are achieving lower levels of education and literacy, which may have longer-term implications for mental health outcomes, high-risk behaviours and compliance. In addition, not only are these adolescents further intellectually vulnerable as a result of their drug choice, but cannabis is well known to contribute to psychotic vulnerability and expression of psychosis in adolescence.[24,25]

Social status and stressors
Only 27% of the subjects were known to social services, and just 1% was in official out-of-home placement. Given the high proportion (57%) who reported a history of childhood abuse and an even greater percentage (79%) admitting to 'relational/family' factors being major stressors, greater involvement of social services would have been expected. It has been well documented in the local[26] as well as the international literature that the major factors influencing early youth exposure to and ongoing use of substances include domestic psychosocial stressors and family drug use, as well as community regulatory norms that encourage substance experimentation.[23] Van Hasselt et al.[27] also reported the associated risk between childhood maltreatment (especially physical and sexual abuse) and earlier onset of substance use.

Furthermore, substance abuse treatment centres are primarily under the aegis of the Department of Social Development in SA, with contributions from various other sectors such as Justice, Health and Education. Concerns regarding the poor integration of cross-sectoral services (such as Health and Social Development) have been raised in many fora (unpublished Central Drug Authority report, September 2011). Many of the youth presenting at a tertiary level with a dual diagnosis are reported to have been unable to access substance treatment centres easily because of their co-existing psychiatric disorder. Adolescents with psychosis are often not accepted into facilities for rehabilitation until their 'psychotic illness' has been treated, which is problematic, given the complex relationship between ongoing substance use and persistence of psychotic symptoms. Dual diagnosis as a barrier to accessing treatment for substance use is also reported in developed countries such as the USA.[28] In our sample no patient had had contact with a rehabilitation centre before the current admission. Limited or restricted access to rehabilitation services further compromises this already difficult-to-treat population. This situation further highlights the poor integration of current services and underlines the urgency for greater collaboration between the Health and Social Development sectors.

Clinical psychiatric profile

Psychiatric diagnoses are documented in Tables 1 and 2. Of the sample 59% presented with a 'first episode' of psychosis, a population at particularly high risk, given that this is the age at which major psychiatric disorders such as schizophrenia are usually expressed for the first time. Substance abuse at this stage creates diagnostic difficulties, in that many substances (such as cannabis and methamphetamine) may present with a clinical picture that mimics symptoms of major psychiatric disorders such as schizophrenia. This complicates intervention, in that the clinician may be uncertain whether to allow a medication-free period before treating the psychosis and risk a longer duration of untreated psychotic illness (an indicator of poor prognosis) or to treat (perhaps unnecessarily) the patient with antipsychotic medication that has its own potentially serious complications in adolescence. This diagnostic difficulty is evidenced again by the diagnosis of 'substance-induced psychotic disorder' given to 55% of patients on admission, and retained in only 24% on discharge. A similar measure of the co-morbidity of an Axis 1 disorder of psychosis and a co-morbid SUD was found in 28.6% of the sample described by Paruk et al.[18] in a KwaZulu-Natal adolescent cohort.

Further analysis of the significance of the change in diagnoses from admission to discharge would have been useful, but was not possible given the sample size and documentation validity. More than half of the sample had the co-morbidity of 'poly-substance abuse', which highlights the reality that these adolescents are experimenting with and using more than one illicit drug, which may further complicate diagnostic clarity. The diagnosis of schizophrenia was made in 21% of the sample, indicating the presence of severe

mental illness in a high-risk substance-abusing population, with multiple confounding influences (such as genetic vulnerability, early trauma exposure), poor social support structures, low education levels and forewarning of future high levels of psychiatric morbidity.

A positive psychiatric family history is important in the diagnosis and prognosis of mental illness in adolescents. Of this sample 20% had early-life exposure to illicit substances by mothers who misused substances during their pregnancy. According to a study by Zammit et al.,[29] adverse effects on the fetus as a result of maternal use of substances (such as tobacco and alcohol) during pregnancy may increase the risk of psychopathology in the child. In particular, there was a non-linear association between use of more than 21 units of alcohol per week by mothers and the development of psychotic symptoms in their offspring. This study does not include specific maternal substance use history, but it would be useful to include this in future studies.

Half (50.7%) of the study sample had relatives with a psychiatric history, which in 21.1% of cases was related to substance use. We know that one of the major risk factors for early drug experimentation is exposure to substances at an early age by substance-abusing parents and family members.[30] Our cohort is therefore at enhanced risk for dual diagnosis as a result of both genetic vulnerability, as evidenced by a family history of mental illness, and an environment characterised by easy availability of substances.

This study also echoes a growing concern that HIV/AIDS awareness programmes targeted at youth may not be having the desired effect. Risky sexual behaviour in adolescence is often a result of impaired judgement, impulsivity, previous early sexual assault and substance abuse. Substance abuse may decrease sexual inhibition and further impair judgement, increasing this risk. Of our sample 51% did not disclose their sexual histories, which raises concerns about sexual experimentation and promiscuity, and 8% of those who did admit to being sexually active did not have protected sex. Engaging in unprotected sex and multiple casual sexual relationships are associated with unplanned pregnancies (and possibly school drop-out) and increased rates of sexually transmitted diseases including HIV. According to Plüddemann et al.,[31] adolescents who drink alcohol and/or use other drugs are more likely to be sexually active than are those who do not, and also more likely to engage in unprotected sex. In addition to this risk, our sample may be at greater cumulative risk of cognitive and judgement impairment as a result of the psychotic illness. This may highlight the need for more aggressive substance and sexual education to be addressed at health care centres, in particular mental health settings.

Previous studies have suggested that substance abuse in adolescence is associated with an increased risk of multiple experiences of violence and crime.[32] In our sample, however, only 28% reported interaction with the law, while 63% had no forensic history. One may speculate that this may have been influenced by police involvement being

a feature only of more serious offences, or that the presence of a possible mental illness resulted in re-routing of the adolescent into the health rather than the criminal justice system.

Substance history

Adolescents in this sample were primarily introduced to substances by peers and friends (69%). This is in keeping with other local studies,[22,26] which report that adolescents are more likely to use substances if they are available and used by their immediate circle of friends, especially if they are influenced by peer pressure. Of note, 47% of our cohort admitted to being bullied at school; this may have included peer pressure to experiment with drugs in addition to directed aggression.

Cannabis was the most common debut drug across the genders (Fig. 2), although 26% reported more than one debut drug. This differs from the finding of Flisher et al.[17] that a non-clinical sample of Cape Town high-school learners who used cannabis were more likely to have debuted with alcohol or tobacco first. A possible reason for the difference in findings from Flisher's study may be the smaller sample number in this study, but it is possible that in a particularly vulnerable cohort of psychotic adolescents, psychiatric symptoms may have pre-dated the substance use, and that cannabis as a debut drug may have been used to self-medicate early psychotic symptoms. Cannabis use to self-medicate early and prodromal symptoms is well described in the literature.[4,6]

In this sample a greater number of females (45%) than males reported alcohol as a debut drug. Alcohol is often considered more 'socially acceptable' than other drugs and is readily accessible even in impoverished communities of the WC, a province well known for its wine production. As a result, alcohol may not be considered a 'drug' by many, and this could be the reason for the low reporting among males. Interestingly, 40% of males could not recall when they had started using alcohol. This is in contrast to the high prevalence of 'self-reported' drug use (including alcohol) in a KwaZulu-Natal cohort of general adolescent psychiatric inpatients.[18] Again it could be hypothesised that the dual-diagnosis cohort is additionally impaired by their psychotic presentations, and this may influence the differences noted in self-reporting and recall.

A surprising finding was that debut drug ages (Table 3) were higher than expected when compared with national figures (unpublished Central Drug Authority report, September 2011), which suggest that the average age of substance dependence is 12 years and falling. For cannabis and methamphetamine, the two most abused drugs in the WC, the average debut ages were 14 years and 13.8 years, respectively. It is important to note that differences in figures between a clinically psychiatrically ill cohort (this study sample) and a national non-psychiatric sample may indicate a different cause and pathogenesis for the SUD, and a different type of substance abuse intervention programme may therefore be required in a dual-diagnosis population of adolescents.

Referring to Table 4, which records specific drugs and their patterns of use in the sample, cannabis once again featured as the most commonly used drug among adolescents with dual diagnosis. This is similar to results from a study by Latt et al.,[33] which also found cannabis to be the commonest illicit drug abused by patients with psychosis (schizophrenia and other psychotic disorders) presenting acutely to the emergency department. An important finding is the statistically significant relationship between cannabis as a debut drug and ongoing cannabis use. Pencer et al.[34] reported a higher rate of cannabis use at baseline and at 2-year follow-up in adolescents with first-episode psychosis compared with adults. It further raises the possibility that this population of substance-abusing psychotic adolescents may represent a group different to the general adolescent population in SA, that may therefore require more effective inter-sectoral collaboration and interventions that target SUD specifically associated with psychotic/psychiatric illnesses.

Limitations

As this was a retrospective chart review, the quality of the clinical notes could not be standardised as they were recorded by different doctors at different levels of training. The data were however captured by a single investigator to ensure uniformity. The small sample size limited the statistical analysis, and the severity of illness in the population described may limit generalisation to other adolescent populations.

Conclusion

This review emphasises differences in presentation, choice of drugs of abuse and psychosocial difficulties of adolescents with a dual diagnosis presenting to a tertiary psychiatric facility. The findings highlight the need for integrated services, particularly collaboration between health and social development, given the influence of risk factors such as psychosocial adversity, child abuse, community exposure to substances, and poor academic performance on a psychiatrically vulnerable adolescent population. Mental illness may be a significant barrier to access to SUD services for these adolescents, and lack of professional and managerial awareness of the complexity of SUD co-existing with psychotic disorders may lead to poorer outcomes and an eventual increase in the burden of disease. It is important that all stakeholders involved in the planning and delivery of services consider these findings as an indication both of the need for appropriate interventions for this specific group of substance users and of the current strain on adolescent psychiatric inpatient services in the WC. This study highlights the need for future prospective studies to focus on this particular population group and contribute to the literature on factors influencing outcome, risk and vulnerability in local samples of adolescents with a dual diagnosis.

References

1. Meuser KT, Draker RE, Wallach MA. Dual diagnosis: A review of etiological theories. Addict Behav 1998;23:717-734. [PMID: 9801712] [http://dx.doi.org/10.1016/S0306-4603(98)00073-2]

2. Dixon L. Dual diagnosis of substance abuse in schizophrenia: prevalence and impact on outcomes. Schizophr Res 1999;35:93-100. [PMID: 10190230] [http://dx.doi.org/10.1016/S0920-9964(98)00161-3]

3. Miettunen J, Tomanen S, Murray GK, et al. Association of cannabis use and prodromal symptoms of psychosis in adolescence. Br J Psychiatry 2008;190:470-471. [PMID: 18515902] [http://dx.doi.org/10.1192/bjp.bp.107.045740]

4. Caspi A, Moffitt TE, Cannon M, et al. Moderation of the effect of adolescent-onset cannabis use on adult psychosis by a functional polymorphism in the catechol-O-methyltransferase gene: longitudinal evidence of a gene X interaction. Biol Psychiatry 2005;57:1117-1127. [PMID: 15866551]

5. Maxwell JC. Emerging research on methamphetamine. Curr Opin Psychiatry 2005;18:235-242. [PMID: 16639146]

6. Hall W, Degenhardt L. Cannabis use and the risk of developing a psychotic disorder. World Psychiatry 2008;7:68-71. [PMID: 18560513]

7. Drewe M, Drewe J, Riecher-Rossler A. Cannabis and risk of psychosis. Swiss Med Wkly 2004;134:659-663. [PMID: 15611887]

8. Grelotti DJ, Kanayama G, Pope HG. Remission of persistent methamphetamine-induced psychosis after electroconvulsive therapy: presentation of a case and review of the literature. Am J Psychiatry 2010;167:17-23. [PMID: 20068123] [http://dx.doi.org/10.1176/appi.ajp.2009.08111695]

9. Daudin M, Cohen MD, Edel Y, et al. Psychosocial and clinical correlates of substance use disorder in an adolescent inpatient psychiatric population. J Can Acad Child Adolesc Psychiatry 2010;19:264-273. [PMID: 21037917]

10. McKay JR, Murphy RT, Rivinus TR, Maisto SA. Family dysfunction and alcohol and drug use in adolescent psychiatric inpatients. J Am Acad Child Adolesc Psychiatry 1991;30:967-972. [PMID: 1757446] [http://dx.doi.org/10.1097/00004583-199111000-00015]

11. Becker DF, Grilo CM. Ethnic differences in the predictors of drug and alcohol abuse in hospitalized patients. Am J Addict 2007;16:389-396. [PMID: 17882610] [http://dx.doi.org/10.1080/10550490701525343]

12. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed., text revision. Washington, DC: American Psychiatric Association, 2000.

13. Committee for Harmonisation Guidelines. Publications, Guidelines, Efficacy Guidelines, E6. 1996. www.ich.org (accessed January 2011).

14. World Health Organization. Good Clinical Practice Guidelines, E6(R1). 1996. www.ichgcp.net (accessed January 2011).

15. Department of Health. SA Good Clinical Practice Guidelines. 2006. www.doh.gov.za (accessed January 2011).

16. World Medical Association Declaration of Helsinki. Edinburgh, 52nd WMA General Assembly, October 2000. http://www.wma.net (accessed January 2011).

17. Flisher AJ, Parry CDH, Muller M, Lombard C. Stages of substance use among adolescents in Cape Town, South Africa. J Subst Use 2002;7:162-167. [PMID: 12507802] [http://dx.doi.org/10.1080/14659890209169346]

18. Paruk S, Ramlal S, Burns JK. Adolescent-onset psychosis: a 2-year retrospective study of adolescents admitted to a general psychiatric unit. South African Journal of Psychiatry 2009;15:86-91.

19. Weich L, Pienaar W. Occurrence of comorbid substance use disorders among acute psychiatric inpatients at Stikland Hospital in the Western Cape, South Africa. African Journal of Psychiatry 2009;12:213-217. [PMID: 19750250]

20. Meister K, Burlon M, Rietschel L, Gouzoulis-Mayfrank E, Bock T, Lambert M. Dual diagnosis psychosis and substance use disorders in adolescents: part 1. Fortschr Neurol Psychiatr 2010;78:81-89. [PMID: 20146152]

21. Kilpatrick DG, Acierno R, Saunders B, Resnick HS, Best CI, Schnurr PP. Risk factors for adolescent substance abuse and dependence: Data from a national sample. J Consult Clin Psychol 2000;68:19-30. [PMID: 10710837] [http://dx.doi.org/10.1037/0022-006X.68.1.19]

22. Morojele NK, Parry CDH, Ziervogel CF, Robertson BA. Adolescent alcohol misuse: correlates and implications. African Journal of Drug and Alcohol Studies 2001;1:110-124.

23. South African Community Epidemiology Network on Drug Use (SACENDU) Update. Medical Research Council, South Africa, and Department of Health, June 2011.

24. Kapur S, Mizrahi R, Li M. From dopamine salience to psychosis-linking biology, pharmacology and phenomenology of psychosis. Schizophr Res 2005;79:59-68. [PMID: 16005191] [http://dx.doi.org/10.1016/j.schres.2005.01.003]

25. Hall W. The mental health risks of adolescent cannabis use. PLoS Med 2006;3:159-162. [PMID: 16420097] [http://dx.doi.org/10.1371/journal.pmed.003003]

26. Brook JS, Morojele, NK, Pahl T, Brook, D. Predictors of drug use among South African adolescents. J Adolesc Health 2006;38:26-34. [PMID: 16387245] [http://dx.doi.org/10.1016/j.jadohealth.2004.08.004]

27. Van Hasselt V, Ammerman R, Glancy L, Bukstein O. Maltreatment in psychiatrically hospitalized dually diagnosed adolescent substance abusers. J Am Acad Child Adolesc Psychiatry 1992;31:868-874. [PMID: 1400119] [http://dx.doi.org/10.1097/00004583-199209000-00014]

28. Sterling S, Weisner C, Hinman A, Parthasarathy S. Access to treatment for adolescents with substance use and co-occurring disorders: challenges and opportunities. J Am Acad Child Adolesc Psychiatry 2010;49:637-726. [PMID: 20610133] [http://dx.doi.org/10.1016/j.jaac.2010.03.019]

29. Zammit S, Thomas K, Thompson A, et al. Maternal tobacco, cannabis and alcohol use during pregnancy and risk of adolescent psychotic symptoms in offspring. Br J Psychiatry 2009;195:294-300. [PMID: 19794196] [http://dx.doi.org/10.1192/bjp.bp.108.062471]

30. Maltzman I, Schweiger A. Individual and family characteristics of middle class adolescents hospitalized for alcohol and other drug abuse. Br J Addict 1991;86:1425-1447. [PMID: 19794196] [http://dx.doi.org/10.1111/j.1360-0443.1991.tb01729.x]

31. Plüddemann A, Flisher A, Mathews C, Carney T, Lombard C. Adolescent methamphetamine use and sexual risk behaviour in secondary school students in Cape Town, South Africa. Drug Alcohol Rev 2008;27:1-6. [PMID: 18825548] [http://dx.doi.org/10.1080/09595230802245253]

32. Morojele NK, Brook, JS. Substance use and multiple victimisation among adolescents in South Africa. Addict Behav 2006;31:1163-1176. [PMID: 16253426] [http://dx.doi.org/10.1016/j.addbeh.2005.09.009]

33. Latt N, Jurd S, Tennant C, et al. Alcohol and substance use by patients with psychosis presenting to an emergency department: changing patterns. Australas Psychiatry 2011;19:354-359. [PMID: 21851228] [http://dx.doi.org/10.3109/10398562.2011.579971]

34. Pencer A, Addington J, Addington D. Outcome of a first episode of psychosis in adolescence: a 2-year follow-up. Psychiatry Res 2005;133:35-43. [PMID: 15698675] [http://dx.doi.org/10.1016/j.psychres.2004.10.004]