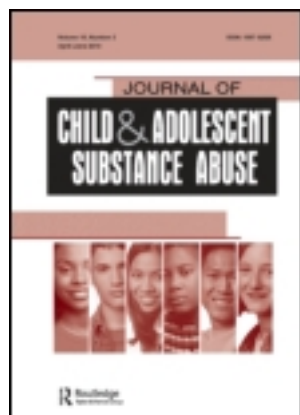


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Methamphetamine Use and Sexual Risk Behavior among High School Students in Cape Town, South Africa

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Objective: To investigate whether methamphetamine use is associated with sexual risk behavior among adolescents. Method: A cross-sectional survey of 1,561 male and female high school students in Cape Town (mean age 14.9 years) was conducted using items from the Problem Oriented Screening Instrument for Teenagers (POSIT) HIV Risk Scale. Results: Nine percent of the students had tried methamphetamine and 30% of male and 17% of female students reported sexual debut. Multinomial logistic regression analyses showed that methamphetamine use in the past year was significantly associated with being in a higher HIV/STI risk category (RRR=2.1, 95% CI: 1.10–4.03, $p < 0.05$). Conclusions: Methamphetamine use, coupled with a high HIV prevalence in South Africa, raises serious cause for concern about the potential for methamphetamine to further exacerbate the prevalence and spread of HIV in Cape Town.

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KEYWORDS *adolescents, HIV, methamphetamine, sexual risk behavior, youth*

INTRODUCTION

According to the UNAIDS 2008 global report on the AIDS epidemic, young people ages 15 to 24 account for an estimated 45% of new HIV infections worldwide. In 2007, an estimated 270,000 HIV-infected children younger than 15 years died because of AIDS—more than 90% of them in sub-Saharan Africa (UNAIDS, 2008). UNAIDS estimated the national adult HIV prevalence for South Africa for 2007 to be more than 15%, translating to an estimated 5.7 million people living with HIV, making this the largest HIV epidemic in the world. In South Africa methamphetamine use by adolescents began to emerge as an issue in 2004, increasing rapidly in subsequent years, particularly in Cape Town. For example, only 0.3% of all patients admitted to drug counseling or rehabilitation centers in Cape Town had methamphetamine as their primary or secondary drug of abuse in the first half of 2002, in comparison to 46% in the first half of 2006. Even more concerning, this figure rose to 73% for patients who were under 20 years of age (Plüddemann, Myers, & Parry, 2008).

A number of studies have found associations between the use of methamphetamine and sexual risk behavior increasing the chances of exposure to HIV. However the majority of these studies have been conducted among men who have sex with men, as indicated by a comprehensive compilation of methamphetamine-related literature (Hammer, 2007). Relatively fewer studies have been conducted in predominantly heterosexual populations, and even fewer among heterosexual adolescent populations. One of the first studies specifically reporting associations between methamphetamine and sexual risk behavior in an adolescent population was conducted by Yen (2004). Yen's study indicated that adolescent methamphetamine users had a higher mean number of sexual partners, and high-frequency methamphetamine users also had a higher mean number of sexual partners than low-frequency methamphetamine users. High-frequency methamphetamine users were also more likely to report having had unprotected sex. The first survey of 4,605 Cape Town high school students' methamphetamine use, conducted in 2005, found that 13% of male and 12% of female grade 9 students had tried methamphetamine at least once (Plüddemann, Flisher, Mathews, Carney, & Lombard, 2008). This study also provided the first indication of an association between methamphetamine use and sexual risk behavior among Cape Town high school students, finding that methamphetamine use in the past 12 months was associated with being sexually active. The 2003 U.S. Youth Risk Behavior Survey also found associations between methamphetamine use and sexual risk behaviors, with heavy methamphetamine users being more than 4 times more likely to report having had sexual intercourse before the age of 13 years, being more likely to have sex with multiple partners, and more often having

been/gotten someone pregnant compared to those who used methamphetamine on 1 or 2 occasions (Springer, Peters, Shegog, White, & Kelder, 2007).

The purpose of the present study was to further investigate the association between methamphetamine use and sexual risk behavior among adolescents in Cape Town. We sought to replicate the previously observed association between methamphetamine use and being sexually active, and to additionally explore the level of sexual risk behavior among sexually active teens. We also examined whether the relationship between methamphetamine use and sexual risk behavior could be better accounted for by the concurrent use of other substances or sociodemographic factors. This was done by examining level of sexual risk behavior (no sexual activity, sexual activity, risky sexual activity) among a large sample of 1,561 students from Cape Town and comparing sexual risk level by past-year methamphetamine use. A correspondence analysis was used to examine correlates of sexual risk behavior and a multinomial regression was used to adjust for other substance use and demographic factors that were potentially confounding the relationship between methamphetamine use and sexual risk behavior.

METHOD

Design and Sampling Strategy

The school population was all public high schools ($N=54$) in the South Educational District, one of four education management districts in the city of Cape Town. Fifteen schools were randomly selected from this population, such that the probability of selection was directly proportional to the number of students in the school. This district was believed to be the most affected by methamphetamine use, based on treatment demand data and newspaper and other anecdotal reports. Subsequently 1 class of approximately 35 students was randomly selected from each of grades 8, 9, and 10. Data were collected in July and August 2006.

Procedures

Questionnaires were administered by trained staff in a standardized way in a classroom setting without the presence of school staff. Students were seated in such a way as to preserve confidentiality. Personal Digital Assistants (PDAs) were used to administer the questionnaires and students were able to choose from one of three major local languages (English, Afrikaans, and isiXhosa). PDAs have been used in a number of local studies and have been found to be very effective (Jaspan et al., 2007; Seebregts et al., 2009).

Each student provided informed assent. Parents were informed of the study by letter and given the opportunity to withdraw their child from the study. Very few parents withdrew their children from the study and very few students refused to participate ($N=50$). Ethical clearance for the study

was obtained from the University of Cape Town's Faculty of Health Sciences Research Ethics Committee.

Measures

The questionnaire included basic demographic characteristics, substance use history, and a 13-item HIV/STI Risk Screen, based on the Problem Oriented Screening Instrument for Teenagers (POSIT) HIV Risk Scale (Rahdert, 1991). In order to document the socio-economic status (SES) of the learners, a question asking learners to describe their "living circumstances" by selecting one of five categories was used. The options were: "We don't have enough money for food," "We have enough money for food, but not clothes," "We have enough money for food and clothes, but are short of other things," "We have the most important things, but few luxuries," and "We have money for luxury goods and extra things." Substance use measures covered tobacco, alcohol, cannabis, methaqualone, cocaine, heroin, Ecstasy, and methamphetamine. For each of these substances students were asked whether they had ever tried them, and whether they had used them in the past 12 months, past 30 days, and past 7 days.

The HIV/STI Risk Screen was developed by Jaramara and colleagues (unpublished manuscript) to create a HIV/STI risk screen for South African adolescents. In a series of reliability and validity analyses, Jaramara and colleagues refined Rahdert's (1991) 28-item POSIT HIV/STI Risk Scale to a 13-item HIV/STI Risk Screen. The refined scale was internally consistent ($\alpha = .80$ for the entire sample and alphas ranging from .77 to .83 across languages) and stable over 6 to 10 days ($r = .84$ for the entire sample and coefficients ranging from .79 to .91 across languages). Associations with conceptually related measures provided evidence for convergent and divergent validity. For the purposes of analysis for our study, however, we created three HIV/STI risk categories from this scale, utilizing eight items as follows:

1. Low risk: students who had never had sexual intercourse;
2. Medium risk: students who affirmed the question "Have you ever had sexual intercourse?" and affirmed up to two sex risk items (items 2–8) in the Appendix; and
3. High risk: students who affirmed the question "Have you ever had sexual intercourse?" and affirmed three or more subsequent sexual risk items in the Appendix.

The authors conferred on the categorization based on their extensive collective expertise in the field of adolescent risk behavior.

Data Analysis

Data was analyzed using SPSS 16.0 and STATA 10. For the calculation of the substance use and sexual risk behavior prevalence confidence intervals, we

took the study design (clustering at school level) into account in STATA's survey analysis settings. Chi-square tests were used for basic comparisons. As a tool to try to address the issue around the use of multiple substances by participants, we used multiple correspondence analysis (MCA). In correspondence analysis (Greenacre, 2007) an attempt is made to find a low dimensional graphical representation of the association between the rows and columns of a contingency table. It is an exploratory multivariate technique that converts frequency table data into graphical displays in which rows and columns are depicted as points. Much of the value of correspondence analysis relates to its multivariate treatment of data through the simultaneous consideration of multiple categorical variables. The multivariate nature of correspondence analysis can reveal relationships that would not be detected in a series of pairwise comparisons of variables. Correspondence analysis also helps to show how variables are related, not merely that a relationship exists. The graphical display can help in detecting structural relationships among variable categories. A relationship is generally indicated between variables that appear in the same region of space. However, points on the plot clustered around the origin remain unresolved in the analysis (Greenacre, 2007).

Multinomial logistic regression was performed to establish the size and significance of the association between methamphetamine use and various sexual risk behaviors, after adjusting for confounders. The outcome variables in these regressions were the sexual risk categories described in the Method section. Methamphetamine use (past year) was the main predictor variable in these analyses, and adjustment was made for factors that were shown to be related to both methamphetamine use and sexual risk behavior indices in the correspondence analysis and where tests of association were significant ($p < 0.05$).

RESULTS

Demographics

The final sample comprised 1,561 students, with slightly more females (53%) than males. The majority identified themselves as "Colored" (76%), with 43% and 38% reporting Afrikaans and English respectively as their home language. (Note: The terms "white," "black," and "Coloured" became entrenched in the apartheid era. They refer to demographic markers and do not signify inherent characteristics. They refer to people of European, African, and mixed [African, European, and/or Asian] ancestry, respectively. These markers were chosen for their historical significance. Their continued use in South Africa is important for monitoring improvements in health and socioeconomic disparities, identifying vulnerable sections of the population, and planning effective prevention and intervention programs.) The mean age of the students was 14.9 years ($SD=1.36$). The ages ranged from

12 to 20 years. Based on the SES, almost 75% of the students came from lower- to middle-income households (i.e., they chose one of the first four options of the SES question).

Sexual Risk Behavior

Table 1 shows the proportions of male and female students who engaged in various sexual risk behaviors. Almost one-third of the male students reported that they had had sexual intercourse, roughly double that of the female students. Of the sexually active students, male students were also significantly more likely to have had sex before their fifteenth birthday, had anal sex, and to have had sex with two or more people in the past three months. However, similar proportions of males and females affirmed other sexual risk questions, including having been sexually involved with someone more than five years older than them, having thought they or their partner might be pregnant, and having had sex without a condom. A higher

TABLE 1 Proportions and Confidence Intervals of Male and Female Students Who Affirmed Selected Sexual Risk Questions

Sexual Risk Questions	Males % (N=731) (95% CI)	Females % (N=822) (95% CI)	Chi-square p-value
Ever had sexual intercourse?	30.2 (21.5–39.0)	16.5 (10.4–22.6)	40.9 $p < 0.001$
Proportions of students who affirmed the above question follow below			
	N=221	N=136	
Sex before your fifteenth birthday?	62.9 (58.1–67.7)	36.0 (27.2–44.9)	24.4 $p < 0.001$
Ever been high on drugs or alcohol when you had sex with someone?	32.1 (25.1–39.2)	22.1 (11.9–32.2)	4.2 $p > 0.05$
Had sex with two or more people in the past three months?	28.5 (20.7–36.4)	11.8 (4.2–19.3)	13.7 $p < 0.01$
Ever had anal intercourse (sex in your butt)?	29.4 (23.3–35.5)	14.7 (5.2–24.2)	10.0 $p < 0.05$
Ever been sexually involved with someone more than five years older than you?	34.4 (29.2–39.6)	30.2 (22.0–38.3)	0.7 $p > 0.05$
Ever thought you or your partner might be pregnant?	34.8 (27.6–42.1)	37.5 (27.7–47.3)	0.3 $p > 0.05$
Ever had sexual intercourse without using a condom?	57.5 (48.2–66.8)	57.4 (46.8–67.9)	0.0004 $p > 0.05$

Note. 95% confidence intervals (CIs) and chi-squares calculated taking design of study into account.

proportion of the male students who reported sexual debut admitted to having been high on alcohol or drugs while having sex compared with the female students, but this difference was not statistically significant.

Substance Use

Table 2 shows the proportions of students reporting the use of various substances, from “lifetime use” (“Have you ever tried [substance]?”) to use of the substance in the past seven days. The table shows that tobacco use was most common, followed by alcohol and cannabis. Almost 9% of the students had tried methamphetamine at least once, while 3% or less had tried Mandrax (methaqualone), cocaine, Ecstasy, or heroin. Reported substance use in the past seven days was generally low, except for tobacco. Tobacco and alcohol use proportions were very similar for male and female students. Male students were, however, more likely to have tried cannabis (29.3%) than female students (20.8%). Ten percent of the male students had tried methamphetamine at least once compared with 8% of the female students. However, the proportion of males who had tried methamphetamine in the past 12 months (6.4%) was almost twice the proportion for the females (3.3%).

Methamphetamine Use and Sexual Risk Behavior

Comparing students in three methamphetamine use categories and three HIV/STI risk categories (Table 3) indicated that students who had used methamphetamine in the past year were significantly more likely to be in the “high HIV/STI risk” category (35.1%) than students who had never used methamphetamine (8.5%).

The MCA (for included variables, see Figure 1) indicated an association between methamphetamine use in the past year and being in the “HIV/STI

TABLE 2 Self-Reported Drug Use ($N=1,561$)

	Lifetime % (95% <i>CI</i>)	Past 12 months % (95% <i>CI</i>)	Past 30 days % (95% <i>CI</i>)	Past 7 days % (95% <i>CI</i>)
Tobacco	60.2(53.2–67.1)	33.0(27.2–38.8)	27.2(21.6–32.8)	25.4(20.6–30.2)
Alcohol	54.1(48.8–59.3)	22.0(15.3–28.7)	12.5(9.0–16.0)	7.1(5.0–9.2)
Cannabis	24.8(20.9–28.7)	12.9(10.3–15.4)	7.7(6.1–9.3)	6.4(4.9–7.9)
Methamphetamine	8.8(6.2–11.4)	4.7(3.1–6.4)	2.8(1.6–3.9)	1.8(1.0–2.6)
Mandrax (methaqualone)	2.6(1.8–3.3)	1.1(0.4–1.7)	0.6(0.1–1.0)	0.3(0.0–0.7)
Cocaine/Crack	2.5(1.5–3.5)	1.3(0.6–2.0)	0.5(0.1–0.9)	0.6(0.1–1.0)
Ecstasy	3.2(2.2–4.2)	1.2(0.7–1.7)	0.6(0.2–1.0)	0.5(0.1–0.9)
Heroin	2.2(1.6–2.9)	1.0(0.6–1.5)	0.6(0.2–1.0)	0.4(0.1–0.8)

Note. 95% *CI*s calculated taking design of study into account.

TABLE 3 Methamphetamine Use Categories by HIV/STI Risk Categories

	Never Used Meth <i>N</i> % (95% <i>CI</i>)	Lifetime Meth Use ^a <i>N</i> % (95% <i>CI</i>)	Past Year Meth Use <i>N</i> % (95% <i>CI</i>)
HIV/STI Risk Low	1129 79.3 (70.4–86.0)	39 61.9 (49.1–73.2)	36 48.7 (32.0–65.6)
HIV/STI Risk Medium	174 12.2 (8.0–18.2)	12 19.1 (12.6–27.8)	12 16.2 (7.7–31.0)
HIV/STI Risk High	121 8.5 (5.9–12.0)	12 19.1 (10.5–32.2)	26 35.1 (21.9–51.2)

Notes. 95% *CI*s calculated taking design of study into account. ^aLifetime methamphetamine use=Used methamphetamine, but not in past 12 months.

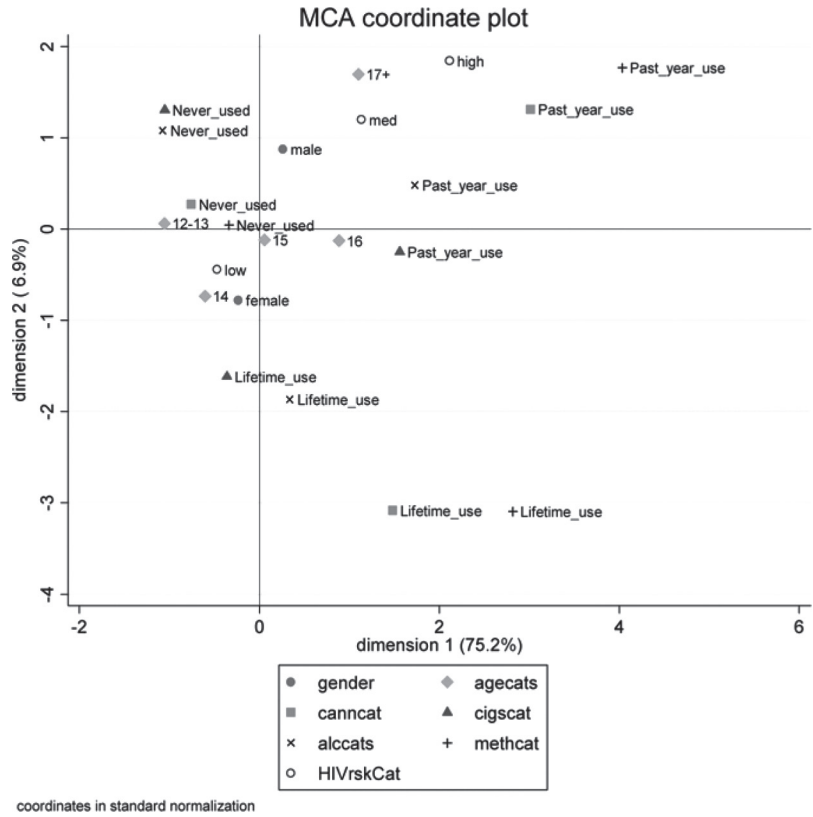


FIGURE 1 Multiple correspondence analysis coordinate plot for selected variables (*N*=1,536). Notes. cigscat=Tobacco use categories (Lifetime use=Not used in the past year); alccats=Alcohol use categories; canncat=Cannabis use categories; methcat=Methamphetamine use categories; HIVrskCat=HIV/STI risk categories; agecats=Age categories (i.e., 12–13, 14, 15, 16, 17+).

high risk” category. Methamphetamine use in the past year was also closely associated with cannabis and alcohol use in the past year, and the use of both substances was associated with “HIV/STI high risk” scores, and to some extent with “HIV/STI medium risk” scores (all appeared in a proximal region of space on the MCA graph, especially on Dimension 1, indicating an association: Figure 1). Being older (17 or older) and male also seemed to be a factor. On Dimension 1 (which accounted for 75% of the chi-square information in the analysis), lifetime use of cannabis and methamphetamine also appeared to be associated with “HIV/STI high risk” scores.

In order to further clarify the significance of the above associations, we conducted multinomial logistic regression analysis, with the HIV/STI risk categories as outcome variable and methamphetamine use category as the main predictor variable. In our model we added gender, cannabis use in the past 12 months, alcohol use in the past 12 months, tobacco use in the past 12 months, and age categories as covariates, judged to be the strongest possible confounders from the MCA and chi-square tests. (SES was not found to be related to HIV/STI risk or methamphetamine use, and therefore not included in the analysis/model.) In this model, only methamphetamine use in the past 12 months (not “lifetime methamphetamine use”) was significantly associated with being in a higher HIV/STI risk category ($RRR=2.1$, 95% CI : 1.10–4.03, $p < 0.05$).

Discussion

The findings of this study clearly indicate a strong association between methamphetamine use and engaging in certain sexual risk behaviors. Even after adjusting for a number of potential confounders, methamphetamine use was still implicated as a significant factor. This research supports other studies (such as Yen, 2004) among adolescents specifically, but also further confirms that methamphetamine use is not only a risk factor among men who have sex with men (MSM) populations. The vast majority of studies on this issue have been conducted among this group, as is clearly indicated in an index of PubMed literature on methamphetamine, including all methamphetamine-related studies up to January 2007 (Hammer, 2007). A number of emerging studies have also shown these associations in heterosexual populations, although most have been in adult populations. The present study further supports the findings of an earlier study by Plüddemann and colleagues (Plüddemann, Flisher, et al., 2008), which was able to show some “peripheral” associations between methamphetamine use and sexual risk behaviors—however, without the benefit of the potential confounding variables we have been able to examine in the present study.

Important to note, however, is also that the MCA (a rarely used technique in the public health and social sciences) clearly seemed to indicate a “cluster of associations” between various “risk behaviors,” including methamphetamine use, cannabis use, tobacco, and alcohol use. This MCA may provide some support to the theory (Mpofu, Bility, Flisher, Onya, & Lombard,

2005; Mpofu, Caldwell, Smith, Flisher, Mathews, & Vergnani, 2006) that certain adolescents may be prone to “risk behaviors” in general, thereby engaging in these risky health behaviors, which may include sexual risk behavior, substance use or abuse, and other risk behaviors. Nevertheless, it would still appear that methamphetamine in particular makes an additional significant contribution to sexual risk behaviors among adolescents, likely more so than any other substances, as indicated by the regression analysis.

The limitations of the present study include that it was cross-sectional, with no opportunity to follow up on the adolescents’ behavior patterns. We also did not have access to previous behavior or other health and mental health measures on the adolescents surveyed, which would have provided better longer-term “risk behavior profiles” of the adolescents surveyed. We were therefore also unable to formulate direct predictive models and therefore not able to determine definitively the exact extent of the contribution of methamphetamine use to these sexual risk behaviors.

In conclusion, the present study is one of still relatively few which have investigated the association between methamphetamine use and sexual risk behavior in high school-attending adolescents ages 15 (on average). In the context of South Africa’s HIV prevalence, and being the country with the second highest number of HIV-infected individuals in the world, the potential for methamphetamine to further exacerbate this epidemic is extremely concerning. Local and national government authorities should urgently address methamphetamine use in Cape Town and the rest of South Africa, through intensifying both prevention messaging and treatment and aftercare support services for those with methamphetamine dependence. International drug control bodies, including the United Nations Office on Drugs and Crime (UNODC), the International Narcotics Control Board (INCB), and others should further attempt to sharpen laws governing the sale, importation, and perhaps even production of precursor chemicals used to manufacture methamphetamine. Further efforts targeting HIV prevention and treatment are also paramount in South Africa and many other countries, including perhaps particularly those affected by methamphetamine use.

APPENDIX: HIV/STI RISK SCREEN ITEMS USED TO ASSESS SEXUAL RISK BEHAVIOR

1. Have you ever had sexual intercourse?
2. Did you have sexual intercourse before your fifteenth birthday?
3. Have you ever been high on drugs or alcohol when you had sex with someone?
4. Have you had sex with two or more people in the past three months?
5. Have you ever had anal intercourse (sex in your butt)?

6. Have you ever been sexually involved with someone more than five years older than you?
7. Have you ever thought you or your partner might be pregnant?
8. Have you ever had sexual intercourse without using a condom?

REFERENCES

- Greenacre, M. (2007). *Interdisciplinary statistics: Correspondence analysis in practice*. Boca Raton, FL: Chapman & Hall/CRC.
- Hammer, M. R. (2007). *A key to methamphetamine-related literature*. New York, NY: Division of HIV Prevention, AIDS Institute, New York State Department of Health.
- Jaramara, S. L., Parillo, K. M., Townsend, L., Mathews, C., Rahdert, E., Flisher, A. J., ... Snyder, F. R. (n.d.). *An HIV/STI risk screen for South African adolescents*. Unpublished manuscript.
- Jaspan, H., Flisher, A. J., Mathews, C., Seebregts, C., Berwick, J. R., Wood, R., & Bekker, L.-G. (2007). Methods for collecting sexual behavior information from South African adolescents—A comparison of paper versus personal digital assistant questionnaires. *Journal of Adolescence*, 30(2), 353–359.
- Mpofu, E., Bility, K., Flisher, A. J., Onya, H., & Lombard, C. (2005). Correlates of drug use in rural Africa: Drug/substance use and sexual behaviour in Mankweng District, South Africa. *Journal of Psychology in Africa*, 15(1), 11–15.
- Mpofu, E., Caldwell, L., Smith, E., Flisher, A. J., Mathews, C., & Vergnani, T. (2006). Rasch modeling of the structure of health risk behavior in South African adolescents. *Journal of Applied Measurement*, 7(3), 323–334.
- Plüddemann, A., Flisher, A. J., Mathews, C., Carney, T., & Lombard, C. (2008). Adolescent methamphetamine use and sexual risk behaviour in secondary school students in Cape Town, South Africa. *Drug & Alcohol Review*, 27(6), 687–692.
- Plüddemann, A., Myers, B. J., & Parry, C. D. (2008). Surge in treatment admissions related to methamphetamine use in Cape Town, South Africa: Implications for public health. *Drug & Alcohol Review*, 27(2), 185–189.
- Rahdert, E. R. (1991). *The adolescent assessment/referral system manual*. Rockville, MD: Department of Health and Human Services, Alcohol, Drug Abuse, and Mental Health Administration.
- Seebregts, C. J., Zwarenstein, M., Mathews, C., Fairall, L., Flisher, A. J., Seebregts, C., ... Klepp, K. I. (2009). Handheld computers for survey and trial data collection in resource-poor settings: Development and evaluation of PDACT, a Palmtrade mark Pilot interviewing system. *International Journal of Medical Informatics*, 78(11), 721–731.
- Springer, A., Peters, R., Shegog, R., White, D., & Kelder, S. (2007). Methamphetamine use and sexual risk behaviors in U.S. high school students: Findings from a National Risk Behavior Survey. *Prevention Science*, 8(2), 103–113.
- UNAIDS. (2008). *2008 Report on the global AIDS epidemic*. Geneva, Switzerland: UNAIDS.
- Yen, C. F. (2004). Relationship between methamphetamine use and risky sexual behavior in adolescents. *Kaohsiung Journal of Medical Science*, 20(4), 160–165.