

A Systematic Review of the Relationship between High School Dropout and Substance Use

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A systematic review of peer-reviewed, empirical literature published between 1990 and 2006 was undertaken to determine whether existing research could provide evidence, and a deeper understanding of the relationship between dropping out of high school and the use of substances such as tobacco, alcohol, cannabis/marijuana and other illicit drugs. Forty-six articles were reviewed. The review describes the heterogeneity of theoretical frameworks employed, as well as the limited ability of any one to adequately explain the relationship between high school dropout and substance use. A refinement of the many confounding and mediating variables into coherent conceptual categories would aid more robust theory building and theory integration. In spite of differences in dropout definitions and diverse measures of substance use across studies, the main findings point to a largely consistent relationship between dropping out of high school and substance use. However, socially disadvantaged and poor persons, dropouts, and drug users are over-represented in some of the loss to follow-up groups in longitudinal studies surveyed. More rigorous mechanisms to retain participants in longitudinal studies should be employed. Suggestions for future research include comparisons between urban and rural populations, employing qualitative research methods, and research in developing countries, which have the least favourable school outcomes and a dearth of research on high school dropout.

KEY WORDS: High school dropout; Substance use; Systematic review

INTRODUCTION

There does not seem to be a country in the world that does not experience the problem of students leaving school before attaining that country's equivalent of a high school diploma. In developing coun-

tries a comparison of the gross enrolment ratios (GER's)¹² in primary and secondary education suggests that just over 40% of children enrolled in primary education, drop out before proceeding to secondary schooling (EFA Global Monitoring Report 2003/4). Although the GER's in developed countries are more favourable, high school dropout is still evident. Lahey (2003) cites non-completion rates of 23% in Australia, 9% in Germany, 12% in the

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¹ Defined by the Education For All Monitoring Report 2002 as the "Number of pupils enrolled in a given level of education, regardless of age, expressed as a percentage of the population in the relevant official age group. The GER can be higher than 100% as a result of grade repetition and entry at younger and older ages than the typical grade-level age".

United States and Canada, and 6% in Korea. The dropout rate in Norway is 3% among junior high school students, and 10.8% among those who enter the voluntary high school (Wichstrøm 1998). About 55% of high school students in Cape Town, South Africa dropped out before completing their schooling (Flisher et al. 2004).

It is widely recognised that a number of adverse consequences exist for those students who fail to complete their schooling. Governments and the international community view education as fundamental to reducing world poverty and promoting a more equitable, peaceful and sustainable future for all (EFA Global Monitoring Report 2002, 2003/4). In South Africa, where poverty is endemic, and social and economic inequities persist, educational achievement would perhaps go a long way in addressing these disparities.

Given the long-term negative costs, whether to remain in school or whether to drop out, although often beyond the control of the individual adolescent, is one of the most important actions that youth may take (Brooks-Gunn et al. 1993). For many, another perhaps equally important action will involve whether to initiate, and indeed continue the use of substances such as tobacco, alcohol and/or illicit drugs.

A recent World Health Organisation fact sheet (2002) reports that among teens aged 13 to 15 years internationally, approximately one in five smokes cigarettes. Key findings from The National Household Survey on Drug Abuse released in 2000 and conducted in the United States, reveal that roughly 9.7 million 12- to 20-year-olds reported drinking alcohol in the month prior to the survey; and of these, 6.6 million reported binge drinking and 2.1 million reported heavy drinking (Alcohol Policies Project 2003). Prevalence rates from many European countries reveal a similar picture (Gabhai and François 2000; Marieke et al. 2001). Various school surveys among 15- to 16-year-old students conducted in Western European countries by the European Monitoring Centre for Drugs and Drug Addiction (2000) suggest that between 39.8% (United Kingdom) and 4.7% (Portugal) of these youth have used any illegal drug in their lifetimes. Lifetime cannabis use among these adolescents ranges from between 37.5% (United Kingdom) and 3.8% (Portugal); lifetime ecstasy use varies between 9.0% (Ireland) and 1.0% (Sweden); and lifetime cocaine use ranges from 4.3% (Spain) to 0.6% (Sweden). In South Africa high prevalences of the use of tobacco, alcohol and illicit drugs among adolescents has been noted. In Cape

Town, for example, Flisher et al. (2004) reported that the proportions of students in Grade 11 who had used tobacco, alcohol and cannabis in the previous month were 27%, 31% and 7% respectively.

The negative health consequences of substance use and abuse are extensively documented in scientific and lay literature internationally and will not be repeated here. The preceding discussion has provided an overview of the prevalence rates of two seemingly dissimilar behaviours among adolescents around the world: dropping out of school and using/abusing substances. An understanding of the association between dropping out and substance use would have valuable implications for prevention of both risky behaviours, and concurrently the promotion of health and well-being among the world's young persons.

The aims of the review are, therefore, to provide a synthesis of findings from dropout and substance use research; to provide an overview of dominant theoretical paradigms guiding the research; to identify shortcomings in current research and areas for future research; and to provide a valuable resource for those intending to conduct research in these fields.

REVIEW METHODOLOGY

The review comprises English language articles that were published in peer-reviewed journals between 1990 and 2006. All articles investigated either a direct or indirect association between high school dropout and substance use/abuse. A database search for relevant articles was conducted on PsycINFO, PsycARTICLES, Medline, Pubmed, Eric, ISAP (The Index of South African Periodicals), Social Science Index and Academic Search Premier. Details of published works were obtained using permutations of the following key words: *school dropout, high school dropout, school disengagement, education, education attainment, tobacco, cigarettes, alcohol, drugs, illicit drugs, marijuana, cannabis, heroin, cocaine, crack, LSD, PCP, and hard drugs*. The reference lists of retrieved articles were scanned for further relevant publications. A hand search was done of the table of contents of those journals from which articles were accessed for the review.

RESULTS

The search resulted in the retrieval of 46 articles that met the inclusion criteria (Table 1). The majority of the studies originated in the United States of America ($N = 41$), while one was from South Africa

Table 1. Sample description, direction of substance use/dropout relationship and main findings

Authors Location of study	Sample	Direction of substance use/dropout relationship	Main findings Findings related to theories (where applicable)
<i>Cross sectional studies</i> Fagan and Pabon (1990) New York, New Orleans, Dallas, Chicago, Los Angeles, San Diego—USA.	<i>N</i> = 2467. White, black & Hispanic DO: <i>N</i> = 398 Students: <i>N</i> = 2069 Age range: 13–20 y	Reason for dropping out ← Drug or alcohol use Dropout ↔ Alcohol & illicit drugs	Drug or alcohol problems were the least frequently mentioned reason for DO. Male & female DO have more serious & frequent involvement in alcohol & drug use than students ($p < .001$). Regular use (\geq once per month) differs significantly between DO & students depending on drug type & gender. An integration of social control, social learning & strain theories was able to distinguish DO from graduates, but added little explanatory power to the relationship between DO and substance use.
Franklin (1992) Arlington, Texas.	<i>N</i> = 102. Mostly white DO only	Dropout ↔ Drugs & alcohol	The most frequent diagnosis (DSM-III) among DOs was substance abuse disorder (35% of the sample). “Delinquent” youth (lifestyle cluster) were least involved in school & consistently reported more use of all substances (r : between 0.25 and 0.50, $p < .01$) + highest rate of hard drug use. Church attendance may compensate for more detrimental behaviours (including substance use). 37% had dropped out by age 19 y. Alcohol use was negatively related to high school completion (-0.79 , $p > .05$)
Zimmerman and Maton (1992) Baltimore, USA.	<i>N</i> = 218. African-American males only	School attendance ↔ Alcohol, cannabis, hard drug & cigarette use	At-risk students report greater use of tobacco, alcohol, marijuana, enhancers & steroids in past 4 months than low-risk students (between 8.10, $p < .01$, 1-tail (tobacco) and 2.18, $p < .05$, 1-tail (steroids)).
Brooks-Gunn et al.(1993) Baltimore, USA (prenatal clinic).	<i>N</i> = 251. African-American Age: > 18 y	Dropout ↔ Alcohol use	
Eggert and Herring (1993) Rockville, Maryland [Re-connecting At-Risk Youth].	<i>N</i> = 363. White & minority groups High risk for DO: <i>N</i> = 160 Low-risk for DO: <i>N</i> = 203 Age range: 14–19 y	Dropout risk ↔ Substance use (tobacco, alcohol, marijuana, enhancers, dampeners)	

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings
Flisher and Chalton (1995) Cape Town, South Africa.	<i>N</i> = 400. Coloured DO: <i>N</i> = 68 Students: <i>N</i> = 332 Age range: 13–19 y	Dropout ↔ Cigarette, cannabis, cannabinoids/mandrax, solvents, alcohol, injectable drugs	Relative to in-school students, DO tended to have higher rates of cigarette use (OR: 0.52; CI: 0.28–0.94), cannabis use (OR: 0.88; CI 0.16–4.77), lifetime alcohol use (OR: 0.82; CI: 0.47–1.45), recent & greater intensity of alcohol use (OR: 0.77; CI: 0.34–1.73).	
Franklin and Streater (1995) Forth Worth, Arlington, Texas.	<i>N</i> = 200, mostly white DO only Mean age: 17 y	Alcohol & drug use among dropouts	21.5% of DOs reported drug/alcohol problems as reasons for leaving school. 3.3% were at risk in their alcohol use. 8% abused alcohol to extent that it had become a clinical disorder. 50.5% were at risk in their drug use. 24.5% abused drugs to the extent of becoming a clinical disorder.	
Beauvais et al. (1996) Three school districts, five reservations in SW-USA.	<i>N</i> = 2015. Mexican-, white- American & American Indian DO: <i>N</i> = 1/3 Academic problems: <i>N</i> = 1/3 Students: <i>N</i> = 1/3	Dropout ↔ Alcohol, marijuana, hard drugs	Lifetime use & current moderate- to heavy use of all drugs was significantly higher for DOs compared to students experiencing academic problems and those not experiencing academic problems—regardless of gender and ethnicity.	
Yamadaet al.(1996) National, USA [National Household Survey on Drug Abuse].	<i>N</i> = 672. 12th graders Mostly 17–18 y	Dropout ← Alcohol, marijuana	<i>Findings support problem behaviour and peer cluster theory. Although not investigated, would also support deviant affiliation theory.</i> Increases in the incidence of frequent drinking (–0.414)*, liquor & wine consumption (–0.061)*, and frequent marijuana use (–0.501)* significantly reduces the probability of high school graduation.	
Ellickson et al. (1997) California & Oregon [RAND] Adolescent Panel Study].	<i>N</i> = 4586. White, black, Latino & Asian DO: 11% Mean age: 13 y	Dropout ↔ Substance use, drugs Violent behaviour	*Estimated probit coefficients Co-occurrence of substance use & violent behaviour (ratio between 1.4 & 2.9, <i>p</i> < .001) and violent behaviour & school DO (ratio between 1.4 & 2.2, <i>p</i> < .001). <i>Findings support problem behaviour theory.</i>	

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings
Gfroerer et al. (1997)	National, USA [National Household Survey on Drug Abuse].	$N = 14960$ College: $N = 4848$ School graduates: $N = 7134$ DO: $N = 3018$	Dropout ↔ Marijuana, cocaine, cigarettes, alcohol + heavy alcohol use	Compared to high school graduates, DOs were more likely to use marijuana (OR: 1.36; CI: 1.06–1.76), cocaine (OR: 1.55; CI: 0.93–2.58), cigarettes (OR: 2.59; CI: 2.17–3.08), heavy alcohol (OR: 1.19; CI: 0.88–1.59), but less likely to use alcohol (OR: 0.84; CI: 0.69–1.02) after controlling for age, race & gender. Lifetime use: DO are likely to have tried substances at rates between 1.3 and 3x greater than in-school students. Current use: DO are likely to currently use substances at rates between 1.2 and 6.4x greater than in-school students.
Swaim et al. (1997)	Three school districts in SW-USA.	$N = 1512$. Non-Hispanic white, native- & Mexican-American Mean ages: Between 16.02 & 17.65 y	Prevalence of alcohol, marijuana, inhalant, stimulant & LSD use among dropouts compared to in-school peers.	Compared to in-school students, DOs are more likely to be frequent alcohol users (OR: 2.53), classify themselves as heavy drinkers (OR: 3.16), and report frequent drunkenness (OR: 3.00)—regardless of ethnicity.
Arellano et al. (1998)	Three school districts in SW-USA.	$N = 1805$. Mexican-American & non-Hispanic white DO: $N = 1010$ Students: $N = 795$ Age range: 13–21 y	Dropout ↔ Alcohol use	DOs were significantly more likely to test for drugs than were students adjusted for gender & age (OR: 2.2; CI: 1.2–3.9); unadjusted (OR: 2.8). Earlier drug use was significantly associated with having dropped out (OR: 3.1).
Guagliardo et al. (1998)	Washington, DC.	$N = 1720$. Mostly African-American DO: $N = 5.1\%$ Age range: 12–20 y	Dropout ↔ Illegal drugs	The direct association between peer drug associations & poly-drug use was significant & large for all gender & ethnic groups (between 0.58 & 0.74, $p < .001$). Family sanctions exerted a direct effect on polydrug use for males (between -0.27 & -0.19 , $p < .001$). Family sanctions exerted an indirect effect on polydrug use, mediated by peer drug associations (between -0.18 & -0.14 , $p < .001$).
Swaim et al. (1998)	Three school districts in SW-USA.	$N = 910$. Mexican-American & non-Hispanic White DO only Age range: 13–21 y	Peer drug use → Polydrug use: alcohol, marijuana & other drugs	<i>Findings support peer cluster theory. Aspects of social control theory (family sanctions, religious identification and school adjustment) were mediated by peer drug associations providing some support for this theory.</i>

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings
Wang et al. (1998)	National, USA [Teen Attitudes & Practices Survey].	<i>N</i> = 492352 (DO) (weighted) Age range: 15–18 y	Rate of cigarette use among dropouts compared to in-school peers.	Regular smoking rate for DO was 58.3% compared to in-school peers (18.1%).
Obot and Anthony (1999)	National, USA [National Household Survey on Drug Abuse].	<i>N</i> = 2629. African-American Age: > 18 y only	Dropout ↔ Injecting drug use (IDU)	Compared to high school graduates, and after adjusting for age, gender & Hispanic background, DOs (OR: 2.2; CI: 1.25–4.02) & GED holders (OR: 2.7; CI: 1.18–6.25) were more likely to have injected a drug recently. GED holders (OR:3.1; CI: 1.19–8.27) were more likely to have started, then stopped drug injecting.
Obot et al. (1999)	National, USA [National Household Survey on Drug Abuse].	<i>N</i> = 2642. African-American Age: > 18 y only	Dropout ↔ Injecting drug use (IDU)	Compared to high school graduates, and after adjusting for age, gender & Hispanic background, school DOs (OR: 1.9; CI: 1.34–2.6) & GED holders (OR: 2.3; CI: 1.4–3.8) were more likely to have ever injected a drug.
Obot and Anthony (2000)	National, USA [National Household Survey on Drug Abuse].	<i>N</i> = 2589. White, non-Hispanic Age: > 18 y only	Dropout ↔ Injecting drug use (IDU)	Compared to high school graduates, and after adjusting for age & gender, DOs with no GED (OR: 2.2; CI: 1.32–3.60) & with GED (OR: 3.4; CI: 1.99–5.71) were more likely to have a lifetime history of IDU. DOs with GED were more likely to have a recent history of IDU (OR: 4.4; CI: 1.31–14.96).
Aloise-Young and Chavez (2002)	Three school districts in SW-USA.	<i>N</i> = 1812. Mexican-American & non-Hispanic white DO: <i>N</i> = 822 Students: <i>N</i> = 990 Age range: 13–21 y	Reason for leaving school ↔ Marijuana, cocaine & alcohol use Dropout ↔ Marijuana, cocaine & alcohol use	32.7% Mexican American & 30.1% non-Hispanic white DOs cited substance use as contributor to decision to leave school. Non-significant ethnic difference. Substance use was higher for DOs than students (except for those who left for family reasons, namely Mexican-Americans). SES did not affect reason × ethnicity interaction. Findings did not support strain or social control theory, but provided support for primary socialization theory.

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings Findings related to theories (where applicable)
Aloise-Young et al. (2002)	Three school districts in SW-USA.	<i>N</i> = 3360. Mexican-American & non-Hispanic white DO: <i>N</i> = 1213 At risk: <i>N</i> = 1016 Students: <i>N</i> = 990 Age range: 13–21 y	Dropout ↔ Cigarette use At risk for dropout ↔ Heavy cigarette use	DOs smoked more than enrolled students, regardless of ethnicity. DOs more likely to smoke at younger age than both control groups. DOs (OR: 6.46; CI: 5.06–8.24) & students at risk for dropout (OR: 2.80; CI: 2.16–3.64) were significantly more likely to be heavy smokers (> 1/2 pack per day) than enrolled students. 2.2% of non-marijuana users were DO. 2.5x as many (5.8%) non-chronic marijuana users & 6x as many (12.8%) chronic marijuana users were DO. Chronic users had a 1.6%, & non-chronic users a 0.06% higher probability of being a DO compared to non-users. Controlling for other drug use did not affect this finding. Controlling for alcohol use, only chronic use remained significant. Other drug use was not related to DO. Alcohol use was significantly related to DO.
Roebuck et al. (2004)	National, USA [National Household Survey on Drug Abuse]	<i>N</i> = 15168 Age range: 12–18 y	Dropout ↔ Marijuana, alcohol, any drug use	
<i>Longitudinal studies</i> Crum et al. (1993)	New Haven, Baltimore, St Louis, Durham-Piedmont, Los Angeles.	<i>N</i> = 686 (alcohol disorder; <i>N</i> = 160; and non-alcohol disorder; <i>N</i> = 526)	Dropout → Alcohol abuse & dependence	Controlling for potential confounders (demographics and a history of psychiatric disorders), those who dropped out of school were significantly more likely to develop alcohol abuse or dependence than those who graduated or earned a GED (RR: 6.34; CI 2.42–16.61).
Kaplan and Lui (1994)	Houston, USA.	<i>N</i> = 2805 DO: <i>N</i> = 344	Dropout ← Drugs: marijuana & narcotics	Temporal relationship between DO & drug use remains after entering controls (<i>b</i> 0.312, <i>se</i> 0.153, <i>p</i> < .05), and persists after entering mediating variables measured at baseline (<i>b</i> 0.254, <i>se</i> 0.158, <i>p</i> < .05), but loses significance after entering mediating variables measured at time 2 (<i>b</i> 0.160, <i>se</i> 0.159, ns).

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings related to theories (where applicable)
Ensminger et al. (1996)	Woodlawn, Chicago.	$N = 954$ of 1st grade cohort ($N = 1242$). Mostly African-American. DO = 23%	Dropout \leftarrow Marijuana use	Logistic regression path models showed that marijuana use (> 40 times in lifetime) was directly related to DO for males (OR: 1.97) and females (OR: 3.58). Over the 10-year period, smoking declined significantly among those who had attained high school or more; showed little change among males who had less than high school education; and increased among females who had less than high school education.
Escobedo and Peddicord (1996)	National, USA.	Combined birth cohorts (1908–1967) from Cancer Control & Epidemiology, National Health Interview Survey & Hispanic Health & Nutrition Examination Survey. White, African-American & Latino	Dropout \rightarrow Cigarette smoking	Early onset cannabis users were significantly more likely to DO than non-users (OR: 8.1; CI: 4.3–15.0); reduced odds of DO (OR: 3.1; CI: 1.2–7.9) were family functioning, truancy, IQ (at 8 y) & educational aspirations.
Fergusson et al. (1996)	Christchurch, New Zealand [Church Health & Development Study]	$N = 927$ DO at 16 y: 5.3%	Dropout \leftarrow Early cannabis use (before age 15 y)	<i>Findings support problem behaviour theory.</i> There was a significant association between early frequency of cannabis use & DO ($p < .0001$). Significant covariates that reduced the association were maternal age, gender, IQ (at 8 y), conduct problems (at 8 y), self-esteem (at 15 y) & daily smoking (at 16 y). There was a significant association between early frequency of cannabis use and DO that remains after adjusting for mediating variables ($p < .0001$). <i>Early cannabis user was associated with affiliations with deviant peers and DO providing indirect support for deviant affiliation theory.</i>
Fergusson and Horwood (1997)	Christchurch, New Zealand [Church Health & Development Study]	$N = 935$ DO at 18 y: 18.7%	Dropout \leftarrow Early cannabis use (before age 16 y)	

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings
Garnier et al. (1997)	Urban California, USA [Family Life-style Project].	<i>N</i> = 201. European-American	Dropout ← Teen drug use	Teen drug use was related to DO (<i>p</i> < .001) also when DO was measured as a categorical variable (<i>p</i> < .001). Among the significant predictors of DO was teen drug use (<i>p</i> < .01). Others were poor school performance in grade 6, lower high school academic potential & more family stress. After accounting for control variables, early substance use was not related to DO for females, whereas males have a 60% likelihood of DO compared to non-users (regression coefficient: .40, <i>p</i> < .05).
Krohn et al. (1997)	Rochester, USA [Rochester Youth Development Study].	<i>N</i> = 775. African-American, Hispanic & white DO: 39.5% (at 10th wave)	Dropout ← Alcohol & drug use	After accounting for control variables, DO is significantly related to later drug use for females (.27, <i>p</i> < .05) and later alcohol (.14, <i>p</i> < .05) & drug (.15, <i>p</i> < .05) use for males. Alcohol use (OR: 1.29; <i>p</i> < .001), cigarette use (OR: 1.85, <i>p</i> < .001) & marijuana use (OR: 1.68, <i>p</i> < .001) predict DO. Controlling for co-variables, only cigarette use (OR: 1.37, <i>p</i> < .001) remained a significant predictor of DO. Cigarette use predicts DO for all ethnic groups; marijuana use predicts DO for Latinos only; alcohol reduces odds of DO for Asians & blacks. DO is associated with an increased risk of alcohol abuse relative to those with a college degree (un-adjusted RR: 2.3; CI: 1.1–4.7) and (adjusted for gender RR: 2.10; CI 1.0–4.4). The risk remains after removing those with early onset alcohol problems from the sample.
Ellickson et al. (1998)	California & Oregon [RAND Adolescent Panel Study]	<i>N</i> = 4390. White, black, Latino & Asian DO: 11%.	Dropout → Alcohol & drug use Dropout ← Drug use: alcohol, cigarette & marijuana use	
Crum et al (1998)	Chicago, USA.	<i>N</i> = 953. Black	Dropout → Alcohol abuse & dependence	

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings Findings related to theories (where applicable)
Wichstrøm (1998) National, Norway [Young in Norway Study].		$N = 5308$ DO: $N = 234$ Age range: 12–20 y	Dropout ← Alcohol (drunkenness) → intoxication	DO were more often intoxicated (5.85, $p < .001$) & consumed more alcohol (3.00, $p < .01$) than students/graduates. Parental care, truancy & peer problem behaviour may act as confounders/mediators in the DO-intoxication relationship. Findings provide partial support for problem behaviour, differential association, and social control theory, although the postulated pathways were not clear.
Brook and Balka (1999) East Harlem, New York, USA.		$N = 1332$ and $N = 1182$ (5 years later). African-American & Puerto Rican	Dropout ← Marijuana use	Early marijuana use is a strong predictor of DO (OR: 1.91; CI: 1.59–3.47) with controls on age, gender, and ethnicity. The predictive relationship remained (OR: 2.00; CI: 1.09–3.66) when a variety of psychosocial factors were included.
Tanner et al. (1999) National, USA [National Longitudinal Survey Youth Cohort].		$N = 2257$, Age range 14–17 y	Dropout ← Drug use: alcohol, marijuana, other drugs	For both males & females, drug use (and skipping school) were 2 of 5 “delinquency” variables that had unique negative effects on educational outcomes even after controlling for confounders.
Battin-Pearson et al. (2000) Seattle, USA [Seattle Social Development Project].		$N = 778$ and $N = 770$ (2 years later). European-, African-, Asian- & native American DO = 11%	Dropout before 10th grade ← General deviance: drug use, non-violent offences	The general deviance model was a significant & direct predictor of DO beyond the effect mediated by academic achievement & explained 37% of the variance in DO (Std. path coefficient: .22, $p < .001$). <i>Findings support general deviancy (problem) and deviant affiliation theory, where general deviancy and deviant affiliation had both direct and indirect effects on DO.</i>

Table 1 continued.

Authors Location of study	Sample	Direction of substance use/dropout relationship	Main findings Findings related to theories (where applicable)
Bray et al. (2000) SE-USA public schools.	N = 1392 Aged 16–18 y	Dropout ← Having initiated marijuana, cigarette, alcohol & other drugs	After controlling for demographics, marijuana initiation is related to an increase in the probability of DO at age 16 y (OR: 3.87), age 17 y (OR: 2.24), age 18 y (OR: 3.45). Controlling for multiple substance use, these probabilities remain except for age group 17 y (OR: 1.44). Only cigarette initiation is related to an increase in the probability of DO at age 17 y (OR: 2.39) and for all ages (OR: 1.77).
Register et al. (2001) National, USA [National Longitudinal Survey Youth Cohort].	N = 3525. <i>Males only</i>	Educational attainment (no. school years completed) ← Drug use (hard drugs & marijuana)	The probability of adolescent drug use* was a significant and negative determinant of educational attainment among all and white students. On average, adolescent drug use reduces eventual educational attainment by about 1 year for all and white students. *All drugs = hard drugs and marijuana.
Fuller et al. (2002) Baltimore, USA [Risk Evaluation & Assessment of Community Health (REACH II)].	N = 270. Mostly African-American Non-IDU* (N = 135); IDU (N = 135) Age range: 15–30 y *IDU: Injecting drug user	Dropout ← Transition to IDU*	Recently transitioned IDU's were more likely to report high school DO than non-injecting, but drug-using controls (OR: 1.8; CI: 1.04–3.11). The odds of transitioning to injecting drug use increases after adjusting for other variables, including race/ethnicity (OR: 3.1; CI: 1.43–6.70).
McClusky et al. (2002) Rochester, USA [Rochester Youth Development Study].	N = 538. Latino, white & African-American <i>males only</i>	Dropout ← Substance use: alcohol, marijuana, hard rugs	Early substance use significantly increased likelihood of DO for whites (OR: 1.55), African-Americans (OR: 1.30) & Latinos (OR: 1.45) even after family & school events are considered. For Latino youth, once impregnation was introduced, the relationship between early substance use & DO disappeared.

Table 1 continued.

Authors	Location of study	Sample	Direction of substance use/dropout relationship	Main findings
Newcomb et al. (2002) Seattle, USA [Seattle Social Development Project].		$N = 754$. European-, African- & Asian-American	School failure \leftarrow Polydrug use	The latent construct, general deviance (which included measures of polydrug use, sexual involvement, delinquency & school problems) contributed significantly to failure to complete high school (std factor loadings: .20, $p < .001$). Of the substances, only tobacco use had a unique effect on school failure (.11, $p < .01$). <i>Findings support problem behaviour (general deviancy) theory.</i>
Dee and Evans (2003) National, USA [National Center for Educational Statistics' NELS:88].		$N = 7317$ (8th grade), $N = 7466$ (2 years later), $N = ?$ (2 years later)	Graduation \leftarrow Alcohol use	Students who reported drinking during sophomore year were 3.5% points less likely to complete high school. Sophomores who drank heavily were >5% points less likely to complete high school.
Fergusson et al. (2003) Christchurch, New Zealand.		$N =$ between 870 & 910 of birth cohort ($N = 1265$). DO = 18.7%	Dropout \leftarrow Cannabis use	The association between frequency of cannabis use at age 16, and DO remained significant even after adjusting for confounding factors: used cannabis (OR:1.5), used 10–99 times (OR:2.4), used 100+ times (OR:3.7). No significant association between DO and subsequent frequency of cannabis use at age 17–25 years found after adjusting for parental history of criminality, adolescent conduct problems, deviant peer affiliations, novelty seeking, cannabis use before age 16.
Lynskey et al. (2003) Victoria, Australia.		$N = 1601$	Dropout \rightarrow Cannabis use Early school leaving \leftarrow Weekly cannabis use	Association between weekly cannabis use & early school-leaving was strongest at younger ages, diminishing with increasing age: year 10 (OR: 6.8; CI: 2.8–16.0); year 11 (OR: 3.2; CI: 1.4–7.3); year 12 (OR: 1.8; CI: 0.69–4.6). After controlling for confounders, the pattern of ORs remained the same (OR: 5.6; CI: 2.0–15.0); year 11 (OR: 2.2; CI: 0.9–6.0); year 12 (OR: 1.1; CI: 0.4–2.9).

Table 1 continued.

Authors Location of study	Sample	Direction of substance use/dropout relationship	Main findings Findings related to theories (where applicable)
Kogan et al. (2005) National, USA [National Center for Educational Statistics' NELS:88].	N = 1762, African-American DO = 18% Age range: 16–18 y	Dropout → Cigarette use, marijuana use	Independent of prior substance use & problem behaviour, DO were 2.2x more likely to report cigarette use, and 1.3x more likely to report marijuana use during past 30 days than were in-school students. DO status significantly predicted later marijuana and cigarette use. <i>Findings support problem behaviour theory for some youth, but not others.</i>
Drapela (2006) National, USA [National Center for Educational Statistics' NELS:88].	N = 10678, DO only DO: 10% between 1st & 3rd waves (8th & 12th grade)	Dropout → Additive index of drug use: Cigarette use (daily). Alcohol, marijuana & cocaine use (past 12 months and past 30 days)	Being a DO was associated with a 30% increase in substance use after controlling for demographic variables, and early drug use. Once antecedent measures of "school problems" were entered into the model, DO did not differ from students in levels of drug use. <i>Findings support strain theory in that negative parental reactions to DO (source of strain) had a significant effect on DO's drug use.</i>
Green and Ensminger (2006) Woodlawn, Chicago.	N = 530, African-American DO = > 20%	Dropout ← Marijuana use	Frequent adolescent marijuana use (> 20 times in lifetime) was associated with an increased risk of DO (Marginal effects for males: .207, p = .004. Marginal effect for females: .200, p = .030).

In South Africa, "coloured" refers to people who descend from multiple Asian, European, or African ancestry.

DO: Dropout; RR: Relative risk; OR: Odds ratio; CI: Confidence interval; SEM: Structural equation modelling; se: Standard error; IDU: Injecting drug user; GED: General equivalency diploma

(Flisher and Chalton 1995), three from New Zealand (Fergusson and Horwood 1997; Fergusson et al. 2003; Fergusson et al. 1996), one from Norway (Wichström 1998) and one from Australia (Lynskey et al. 2003). The ensuing section of the review is structured in terms of those findings that are theoretically informed and those that are largely a-theoretical in nature. The former group is introduced first followed by the latter grouping. The review concludes with recommendations for future research.

Findings Related to Theoretical Framework/s

For purposes of coherence, an overview of each of the theories is combined with the relevant, pertinent findings.

Social control theory proposes that when the moral bond that ties people to each other and to social norms is broken, mechanisms of social control in the form of restraints on antisocial behaviour become ineffectual (in Aloise-Young and Chavez 2002). When social controls are weak, individuals are more likely to deviate from societal norms for appropriate behaviour, for example, by using illicit drugs and/or drunkenness (Fagan and Pabon 1990). They are also more likely to show poor commitment to conventional society and conventional social groups, school being one example of such a group.

Support for this theory's propositions is mixed. On the one hand, Aloise-Young and Chavez (2002) found that those adolescents in their sample who left school, because of low school bonding (reflecting a poor commitment to school), did *not* evidence the highest level of substance abuse, as would be expected. On the other hand, in their predictive models of early school dropout, Battin-Pearson et al. (2000) found that the relationship between school bonding and dropout was mediated by poor academic performance, while Fagan and Pabon (1990), investigating the relative contribution of a variety of factors in distinguishing dropouts from students, found that dropout is in fact a function of a number of social bonds that include school integration, rather than of delinquency and/or substance use behaviours alone.

Problem-prone behaviour and general deviancy theory describe adolescent dropping out and substance use as being two of a constellation of problem behaviours, co-varying with other deviant behaviours to which certain adolescents are prone (in Battin-Pearson et al. 2000; Beauvais et al. 1996; Fagan and Pabon 1990; Fergusson and Horwood 1997; Fergusson et al. 1996; Kaplan and Liu 1994; Newcomb et al.

2002; Obot and Anthony 1999). Specifically, different forms of deviant behaviour co-vary because adolescents who hold non-conforming attitudes and values, and who attempt to establish their identities as independent and adult persons, are more likely to be engaged in a variety of non-conformist behaviours such as smoking, drug and alcohol use, and abandoning the student role (including dropping out of school) amongst others.

This theoretical orientation enjoys the most consistent support among the review's studies. Fergusson and colleagues found that early cannabis users were a group at risk for a variety of subsequent problems such as abuse of other substances, truancy, school dropout and mental health problems (Fergusson et al. 1996; Fergusson and Horwood 1997). Besides obvious academic problems, Beauvais et al. (1996) found that dropouts in their sample also used all forms of drugs, evidenced current moderate to heavy drug use and were more likely to perpetrate and be victims of violent behaviour. Two studies developed latent constructs of "general deviance" which included delinquency, drug and other substance use, and early sexual involvement (Battin-Pearson et al. 2000; Newcomb et al. 2002). Both studies were able to confirm the general deviance hypothesis. In one, general deviance was found to be a stronger predictor of high school failure (including both truancy and dropping out) than was any single act of deviance (Newcomb et al. 2002). In the other, in spite of a proposed mediational effect of poor academic achievement on high school dropout, general deviance had a direct effect on school dropout beyond the influence of poor academic achievement (Battin-Pearson et al. 2000).

Primary socialisation theory proposes that when ties to school and/or family are weak, and ties to peers are strong (particularly substance-using peers), the adolescent is most at risk (in Aloise-Young and Chavez 2002). These authors found support for this proposition in that substance use was highest for those dropouts who cited "leaving school to be with friends" as a reason for dropping out.

The primary socialisation premises are mirrored in *social learning theory*; where it is proposed that learning processes that lead to deviant behaviours, including substance use/abuse, occurs in association with peers (in Fagan and Pabon 1990). These learning processes are thought to be most influential in the face of weak social bonds, where delinquent socialisation becomes the strongest learning influence. In these circumstances, it may be asked, how exactly do

peer relationships operate to increase the risk of both substance use and/or dropping out of school? Three closely related theoretical positions—peer cluster theory (in Beauvais et al. 1996), deviant affiliation theory (in Battin-Pearson et al. 2000) and the theory of differential association (in Wichstrøm 1998) provide some answers to this question.

Peer cluster theory proposes that school problems are a major factor in creating deviant peer clusters. Those experiencing problems at school are thought to have a way of seeking each other out and together they form peer groups. These peer clusters encourage, support and normalise a range of deviant behaviours including attitudes sympathetic to dropping out and substance use. From this perspective, and that of deviant affiliation theory, attachment to, and affiliation with deviant peers is likely to lead to deviant attitudes and behaviours through the processes of social learning and attitude formation. Moreover, bonding with anti-social peers will influence adolescents' own anti-social proclivities.

Swaim et al. (1998) provide the strongest support for a socialisation model of adolescent polydrug use, based on peer cluster theory. Among these researchers' sample of dropouts, associations with drug-using peers accounted for the largest proportion of variance directly related to adolescent substance abuse for both male and female, Hispanic and non-Hispanic white participants. Furthermore, associations with drug using peers also mediated the effects of school adjustment, religious identification and family sanctions on drug use.

Although not referring directly to *deviant affiliation theory* as a mechanism to explain their significant results, both Brook and Balka (1999) and Fergusson and Horwood (1997) found that early adolescent drug use was associated with higher affiliations with delinquent and substance-using peers. These findings clearly support the deviant affiliation perspective. In another study, correlations between drug use, bonding to anti-social peers and dropping out of school were all positive (Battin-Pearson et al. 2000). Moreover, their latent construct, "bonding to antisocial peers", was found to have both a direct and an indirect (mediated by poor academic achievement) effect on dropout.

The *theory of differential association* views the above pathways marginally differently. Here the proposition is that substance use is the catalyst that brings substance-using adolescents together. The newly found peers act as role models and operate to reinforce behaviour/s that may increase the likeli-

hood of dropping out of school (Wichstrøm 1998). Relevant to this theory, Wichstrøm found that dropouts compared to school completers and in-school students in his sample, were intoxicated significantly more often per year, used narcotics more often, and had more friends who got drunk regularly, used cannabis and had brushes with the police.

Strain theory proposes that school failure causes frustration, which results in students becoming alienated from school (in Aloise-Young and Chavez 2002). In order to acquire status, students experiencing this frustration seek out alternative self-defining behaviours that are often deviant in nature, such as the use of various substances. From this perspective, school failure, poor school performance and dissatisfaction with school, as well as high rates of substance use, should all be strongly related to dropping out of school. Contrary to these expectations, Aloise-Young and Chavez (2002), found that their sample of students who left school because of bad grades, did *not* evidence the highest rates of substance use as would be expected.

Main Findings from Cross-sectional and Longitudinal Studies

Tobacco Use

Across all the cross-sectional studies reporting on their sample's use of tobacco (cigarette smoking), dropouts were more likely to report current cigarette smoking than were in-school students (Flisher and Chalton 1995; Wang et al. 1998; Zimmerman and Maton 1992) (regardless of ethnicity (Aloise-Young et al. 2002)), or high school graduates (Gfroerer et al. 1997). They were also more likely to do so at an earlier age and to be heavy smokers (Aloise-Young et al. 2002). In-school students identified as being at risk for dropping out of school were also more likely to smoke cigarettes than were low-risk students (Eggert and Herting 1993) and more likely to be heavy cigarette smokers than normally performing in-school students (Aloise-Young et al. 2002).

A number of longitudinal studies were able to demonstrate the unique effect of cigarette use on high school dropout. After controlling for hypothesised covariates (gender, race, age, family and academic background, problem behaviour and peer influence, and school context), Elickson et al. (1998) found that only cigarette use remained a significant predictor of dropout across all race groups. Independent of prior substance use and problem behaviour, Kogan et al.

(2005) found that dropouts were 1.6 times more likely to report cigarette use. Newcomb et al. (2002) were also able to provide evidence of the unique effect of tobacco use on high school failure. Examining cigarette smoking trends over time, Escobedo and Peddicord (1995) found that men who had less than a high school education were more likely to continue cigarette use at similar rates over time, while among women with less than a high school education, cigarette use increased over time. Significant declines in cigarette use were found among high school graduates.

Alcohol Use

In some cross-sectional studies a clear association between alcohol use and dropout (Aloise-Young and Chavez 2002; Arellano et al. 1998; Fagan and Pabon 1990; Flisher and Chalton 1995; Wichström 1998; Zimmerman and Maton 1992); being at risk for dropout (Eggert and Herting 1993); experiencing academic problems (Beauvais et al. 1996); and completing high school (Dee and Evans 2003) was found. In one cross-sectional study the relationship between alcohol use and dropout was less clear (Gfroerer et al. 1997). This study found that the association between current alcohol use and dropout was no longer evident after adjusting for age, gender and race.

Among the longitudinal studies, Ellickson et al. (1998) found that alcohol use predicted dropping out. However, after controlling for covariates, such as demographic variables, family and academic background, deviance and school environment, alcohol use reduced the odds of dropping out for Asian and Black adolescents. Yamada et al. (1996) were able to conclude that high school graduation is negatively associated with alcohol consumption. Wichström (1998) found that the relationship between dropping out, and intoxication and quantity of alcohol consumption might be mediated by parental care, truancy and peer problem behaviour.

Rosa Crum and colleagues investigated, whether young adults who dropped out of school were at greater risk for later development of an alcohol disorder. In one study, dropping out of school was significantly associated with an increased risk of later alcohol abuse, even after controlling for the possible effects of early onset alcohol problems (Crum et al. 1998). The other found that, compared to school graduates or those who earned a GED, those who dropped out of school were more likely to develop alcohol abuse or dependence (Crum et al. 1993).

Marijuana/Cannabis Use

A number of cross-sectional studies found that dropouts and in-school students identified as being at risk for dropping out of school reported more current marijuana/cannabis use than in-school students (Aloise-Young and Chavez 2002; Eggert and Herting 1993; Zimmerman and Maton 1992), and high school graduates (Gfroerer et al. 1997). They also reported more lifetime use than did in-school students, with female dropouts reporting more lifetime use than their male counterparts (Flisher and Chalton 1995). A combination of lifetime and current marijuana/cannabis use was reported more often by dropouts than in-school students (Aloise-Young and Chavez 2002), and in-school students experiencing academic problems irrespective of gender or ethnicity (Beauvais et al. 1996).

Evidence of a significant association between the frequency of early cannabis use and later dropping out was found in three longitudinal studies (Fergusson et al. 1996; Fergusson et al. 2003; Fergusson and Horwood 1997). In these studies, although the association changed depending on the entry of covariates and/or mediating variables, it remained statistically significant. Three other studies also provided evidence of marijuana/cannabis use proving to be a predictor of dropout, despite the inclusion of covariates (Brook and Balka 1999) and potential confounding variables (Lynskey et al. 2003) in the analyses. Additionally Roebuck et al. (2004) concluded that both chronic (weekly in the past year) and non-chronic (any use in the past year) marijuana use were significantly related to high school dropout even after controlling for other drug use in one model, and alcohol consumption in another. Ensminger et al. (1996) found that marijuana use was directly related to dropping out for both males and females although more so for the latter group. Marijuana use was associated with an increased risk for dropping out of school for both males and females among African-American youth in Chicago (Green and Ensminger 2006). Only one study found that after controlling for a variety of confounding variables, marijuana use no longer remained a significant predictor of dropping out except in the case of Latino youth (Ellickson et al. 1998).

Three longitudinal studies provided evidence of a “reverse causal pattern” whereby the experience of dropping out of school led to an increase in marijuana use (Ensminger et al. 1996; Green and

Ensminger 2006; Kogan et al. 2005). However, after adjusting for background factors and pre-existing levels of cannabis use Fergusson et al. (2003) found no significant association between dropping out of school and subsequent frequency of cannabis use. This contrary finding may be a function of the relatively young age (17–20 years) at which subsequent cannabis use was assessed compared to the age 32–33 years used by Ensminger et al. (1996) and Green and Ensminger (2006).

Illicit Drug Use (Other than Marijuana/Cannabis)

A number of cross-sectional studies found that, besides marijuana/cannabis, other current illicit drug use was found to be higher among dropouts and students at risk for dropping out than in-school students (Eggert and Herting 1993; Guagliardo et al. 1998; Zimmerman and Maton 1992), and high school graduates (Gfroerer et al. 1997). A combination of lifetime and current use of illicit drugs was also found to be higher among dropouts than in-school students (Aloise-Young and Chavez 2002), and in-school students experiencing academic problems irrespective of gender or ethnicity (Beauvais et al. 1996). Dropouts more often reported having ever used illicit drugs than in-school students in Flisher and Chalton's (1995) study. After adjusting for a number of confounders, such as age, gender, and Hispanic background, Obot and colleagues found that, compared to high school graduates and in some instances GED holders, dropouts were significantly more likely to have injected a drug recently (Obot and Anthony 1999; Obot et al. 1999) and more likely to have a lifetime history of injecting drug use (Obot and Anthony 2000).

Several longitudinal studies provided evidence of drug use being a significant predictor of dropout, two of which also demonstrated that dropping out of school was found to increase the likelihood of subsequent drug use. Garnier et al. (1997) found a significant positive correlation between teen drug use and dropping out of school, and that teen drug use was among a number of significant predictors of dropout. Other research, however, demonstrated that the relationship between dropping out and substance use was confounded by factors such as impregnating a partner among Latino males (McCLusky et al. 2002), and mediated by factors, such as motivation to perform well in school, being the object of negative social sanctions, and adoption of age-inappropriate roles, such as marriage, pregnancy and parenthood

(Kaplan and Liu 1994). Register et al. (2001) also found that the probability of adolescent drug use was a significant and negative determinant of educational attainment for white adolescents, but not for black and Hispanic students, where factors, such as family constellation, parental education levels, number of siblings, and marriage were significant determinants of educational attainment.

Within the construct "general deviance", Battin-Pearson et al. (2000) combined drug use with measures of non-violent and violent offences and sexual behaviour. These researchers were unable to provide any evidence of the unique effect of drug use on dropping out. Rather, general deviance (in addition to low SES, and bonding to anti-social peers) was a significant and independent predictor of dropout. Newcomb et al. (2002) employed a similar latent construct, encompassing polydrug use, sexual involvement, delinquency and school problems. Although general deviance contributed significantly to high school failure (both truancy and dropping out) only tobacco use, within the polydrug variable had a unique effect on school failure. Drapela (2006) used an additive index of drug use, which included daily cigarette use, and yearly and monthly alcohol, marijuana and cocaine use. She found that although having dropped out was associated with a 30% increase in drug use after controlling for demographic variables and early drug use, once antecedent school problems were entered into the regression model, dropouts did not differ significantly from students in levels of drug use.

A study by Krohn and colleagues explored the bi-directional relationship between dropping out, and drug and alcohol use (Krohn et al. 1997). These researchers found that after controlling for a number of potential confounding variables, the use of drugs and alcohol in early adolescence increased the risk of dropping out of school among males, but not among females. Regressions predicting alcohol and drug use following dropping out, also illustrate a gendered pattern of results. After accounting for a number of potential confounding variables, dropout is significantly related to both later drug and alcohol use for males and later drug, but not alcohol use for females.

DISCUSSION

It is evident that a great deal of research has been undertaken, almost exclusively in the developed world, in an effort to understand the relationship between dropping out of school and substance use.

Findings from the cross-sectional studies provide conclusive evidence of higher rates of cigarette, alcohol, marijuana and other drug use among dropouts and students at-risk for dropping out compared to in-school students or graduates.

The findings from longitudinal studies provide evidence of a significant, unique effect of cigarette use on dropout. Similarly, the majority of longitudinal studies that examined the relationship between marijuana use and dropout came to the same conclusion. Only one out of the 10 studies was able to demonstrate the confounding effects of age, gender, family structure and a variety of school related factors in the relationship between marijuana use and dropout. This may be because these researchers included alcohol and cigarette use in their final multivariate model whereas the other studies examined the use of marijuana only. Regarding the relationship between alcohol use and dropping out of school, longitudinal studies found that a number of factors confounded the relationship. These include family variables, school problems including academic background and deviant/problem behaviour including deviant peer behaviour suggesting that these factors are more salient than alcohol use in decisions to dropout of school.

The relationship between other drug use and high school dropout is not as clear. While some studies were able to demonstrate a unique relationship between the two behaviours, in others the relationship appears to differ by race and gender, and to be confounded and/or mediated by factors such as the adoption of age-inappropriate roles (pregnancy, impregnation, and marriage), motivation to perform well at school, and being the object of negative social sanctions. Furthermore, findings from those studies that included other drug use with other theoretically-informed variables such as deviant behaviour, sexual behaviour and school problems were unable to provide evidence of a unique effect of drug use on dropping out of school. This calls into question the usefulness of combining measures of drug use with other problem behaviours when examining the effect of drug use on school dropout.

Those students who had dropped out of school were also more likely to continue to use cigarettes, alcohol and marijuana at significantly elevated levels compared to high-school graduates suggesting the continuing influence of substances in these people's later functioning.

In summary, there is little doubt that dropouts use substances at elevated levels compared to their

in-school peers and/or school graduates. Evidence from the longitudinal studies largely support the unique effect of cigarette and marijuana use on dropping out of school. However, the relationship between alcohol and other drug use and high school dropout is a complex one that may benefit from further research.

Despite findings related to the theoretical frameworks as described above being able to distinguish dropouts from in-school students or graduates, they provide only marginal explanatory power to the substance use/dropout relationship. This may be because, as Drapela (2006) notes, there is no explicit theory of dropout and substance use. Why this is the case, and suggestions as to how future research may address this inadequacy form the final part of this review.

The Complexity of the Dropout Phenomenon

The relationship between substance use and dropping out school is arguably a function of the complexity of the dropout phenomenon and the "bewildering number and diversity" of factors that have been found to be associated with early school leaving (Rosenthal 1998: p. 422).

Recently, researchers in the Netherlands and in Australia have concluded that this array, and complexity of information is unhelpful (Smyth and Hattam 2001) and unsatisfactory (Dekkers and Driessen 1997) as it adds little to our understanding of why so many young people dropout of school. Smyth and Hattam (2001) summarise the situation well:

"The difficulty is that we know what the problem is—and we have for some time—but we only really know the problem from the outside; i.e., in terms of the statistical and calculative extent of non-completion. With few rare exceptions, our knowledge is sparse in terms of the complexity of what is really happening, and why" (p. 401).

There is little doubt that the issue of substance use is interwoven in this complexity and probably explains why it is that the theories were unable to provide any definitive explanation of the relationship between substance use and dropout.

Uncontrolled Confounding Factors

Although a number of studies included a variety of theoretically informed and/or empirically determined confounders in the relationship between substance use and high school dropout, the possibility

exists that not all potential confounders were included in their analyses. It is entirely possible that as yet undetected confounders may exist. Lynskey and Hall (2000) make this point when they draw attention to the fact that obvious biological hypotheses exist that explain the relationship between cannabis use and high school dropout, for example reduced motivation and cognitive impairment. However, the same cannot be said for the relationship between cigarette use and dropout, where it is more likely that some or other uncontrolled confounding factor/s are associated with an increased risk of tobacco use and dropout.

Addressing Negative Stereotypes and Advocating for Qualitative Research

The literature and theories on dropouts tend to cast dropouts as an homogenous (often deviant) group of young people who resist conforming to the demands of education systems whose imperative it is to ensure that they reach a prescribed benchmark of educational “success”.

After a careful examination of studies that tended to map the issue of high school dropout statistically or through surveys (Smyth and Hattam 2001), researchers advocating a ‘voiced’ or qualitative approach revealed a focus on the “...individual, personal, familial and cultural deficits...” (Smyth 2005: 3), that seemingly reside within individual students. In this way dropouts are blamed for their circumstances. Framed as “...depressed, helpless, and even without options... as losers” (Fine 1991: 4–5), the stereotypes that develop lead us to believe that dropouts are an homogenous group of “...unworthy, and immoral, or pitiable, victimised and damaged” young people (Fine 1991: 74).

On the contrary, as the numbers of dropouts increases, and in fact become the majority of high school-aged young people as is the case in South Africa and many developing nations, the imperative needs to shift to exploring the complex interdependent factors that cause early school leaving as experienced and lived by the leavers themselves. The notion of using student voices as data in dropout research has a very recent history (see Shacklock et al. 1998; Smyth 2005; Smyth and Hattam 2001), and it is interesting to note that only one of the reviewed studies used a qualitative method, combining it with a survey (Aloise-Young and Chavez 2002).

Furthermore qualitative research may also well uncover other salient factors that research to date has

not yet contemplated. As Rumberger (1995) suggested, a qualitative enquiry into cultural and other factors would be important in developing a better understanding of differences within and among ethnic groups in the tendency to complete high school.

Resilience in the Face of Risk

A further reason for the inconsistent findings from the theories and some of reviews’ studies may have to do with the fact that within the dropout population, there are large numbers of young people who, despite similar antecedents to dropping out of school, are not “depressed, helpless or losers” as the common stereotype suggests. Large numbers of dropouts also do not use substances (Beauvais et al. 1996 and Garnier et al. 1997). In every one of the review studies whose samples consisted of dropouts only, many more of these young people were not using substances than were. It is evident that protective factors may operate to provide some dropouts with the ability to resist substance use, and indeed other maladaptive behaviours. It is lamentable that only one study investigated the role of protective factors as confounders in the substance use/dropout relationship (Swaim et al. 1998). This study was able to demonstrate that family sanctions serve as a protective factor against polydrug use; dropouts were more likely to perceive their parents as “caring” if their parents held negative attitudes towards drug use.

Having suggested a change of focus from risk to protection and resilience, it is important to note that an exclusive focus on protective factors would be an incomplete strategy for reducing dropout and substance use (Pollard et al. 1999). These authors suggest that studies investigating both risk and protective influences would better inform prevention policies and programmes.

Methodological Issues

A number of methodological issues also need to be mentioned. Firstly, all but one of those studies whose samples consisted of both urban and rural youth ($N = 29$), did not provide some analysis focusing on a comparison among the groups—particularly with regard to dropping out of school where there is a lack of evidence suggesting urban/rural differences. The one study that did provide some comparative data, did so on the basis of a significantly higher rate of early school leaving among rural

compared to urban adolescents in Victoria, Australia (Lynskey et al. 2003). Future studies should take note of potential urban/rural differences and where possible incorporate comparative data.

Secondly, the studies employing longitudinal designs, all suffered varying degrees of attrition in their samples: a difficulty endemic to most longitudinal research. Those studies where attrition rates were relatively high (> 20%), evidence of differential attrition and non-random sample loss is apparent. Evidence suggesting that socially disadvantaged (Fergusson and Horwood 1997; Fergusson et al. 1996; Fergusson et al. 2003) and poor persons (Ensminger et al. 1996), dropouts (Crum et al. 1998; Lynskey et al. 2003; Winström 1998), and drug users (Crum et al. 1998; Kaplan and Liu 1994) are over-represented in some of the loss to follow-up groups is cause for concern. It is these groups of persons who are most at risk for dropout and/or substance abuse. That some studies did not provide an analysis or description of their lost participants, and/or that others only explored certain demographic characteristics of their lost participants, is a cause to evaluate their findings with some caution. It is suggested that more rigorous mechanisms to retain participants in longitudinal studies and lower the attrition rates should be employed.

Thirdly, there appears to be two distinct definitions of school dropout. The first encompasses those who had not attended school in more than 30 days, had not sought a transfer to another school, and had not sought re-admission. Only five of the studies employed this definition, which clearly allows for a possible return to schooling and subsequent graduation. The other definition is more loosely constructed, but encompasses those not enrolled in school, or having received a high school diploma. Some variation of this definition involves those students who had received the General Equivalency Diploma (GED). In five studies these youth were not considered high school dropouts (Brooks-Gunn et al. 1993; Ellickson et al. 1997; Garnier et al. 1997), while one included GED holders with the dropout group (McCluskey et al. 2002). Most often the data from those who had gained a GED was analysed separately and/or comparatively to dropouts and in-school students (Crum et al. 1993; Crum et al. 1998; Obot and Anthony 1999; Obot et al. 1999; Obot and Anthony 2000).

Although all the studies stated their definition of dropout clearly, the transitory nature of the first-mentioned definition as opposed to the more

permanent nature of the second does limit the ability to integrate findings across studies employing different definitions.

Related to the problem of varying definitions of dropout, the fluidity of educational attainment also needs to be considered. In all but one study, have no information about the various studies' dropouts beyond the point at which they were classified as having dropped out of school. This is regrettable given that Aloise-Young et al. (2002) found that a 3- to 6-year follow-up of their sample found that one third of dropouts had graduated, and one-third of students at risk for dropping out had dropped out of school.

Fourthly, the way in which the use of various substances is measured varies greatly. Among those studies that measured the use of just one substance or a number of substances but provided an analysis for each, most measured the use of their respective substance/s of interest in terms of recent or current use. The majority of the studies' measurements of substance use entailed constructing varying composite measures of substance use/abuse and/or categories of substance users, for example, an additive index of drug use employed by Drapela (2006). Some studies combined various measures of a number of substances into a single construct, for example, "drug positive" (Guagliardo et al. 1998). Two studies measured substance use as a continuous variable encompassing the cumulative measure of the number of times participants reported using any of a variety of illegal substances (Krohn et al. 1997; McCluskey et al. 2002). Other studies incorporated various measures of a number of substances into a broader category that included other aspects of drug affiliation or drug involvement (Eggert et al. 1993). Some studies combined lifetime and current measures of a variety of substances to create user categories, for example "problem drug user" (Ellickson et al. 1997). The range and inconsistent measurement of the use of substances among study participants makes comparison and an integration of findings difficult. However, if one assumes that *any* substance use comprises risk for these young people, then all have equal relevance and comparison and integration of findings may be undertaken with some confidence.

Fifthly, the accuracy of self-report of substance use is questionable in all but one of the studies reviewed. This is unfortunate given that there is no way in which self-report responses to items assessing substance use can be deemed entirely accurate. As an example, Brasseux et al. (1997) (in Guagliardo et al. 1998) found that almost half of respondents who tested

positive for marijuana use denied having used marijuana in the past 2 days, and 31% denied using the substance in the past 30 days. Guagliardo et al. (1998) subsequently employed a biological determinant of substance use (urinalysis) rather than a self-report indicator. Furthermore, Gfroerer et al. (1997) suggest that under-reporting may plague household studies where the anonymity of responses cannot be ensured. Fourteen of the reviewed studies were household surveys calling into question the accuracy of their substance use findings. Some measure to ensure anonymity of reporting can be exercised in school and/or college settings, but would exclude dropouts.

Finally, Lynskey and Hall (2000) draw attention to the variable reliability and validity of measures used in studies assessing the effects of cannabis use on educational attainment. They suggest that "...any substantial limitations in the reliability and validity of observed measures is likely to reduce the power of a study to control for the effects of [covariates]" (p. 1626). It is unfortunate that among this review's studies, only 14 reported this information when available.

Directions for Future Research

Given the foregoing, directions for future research include:

- Qualitative research may well identify contexts and reasons for dropping out and substance abuse, and the relationship between them, that have to date been overlooked in the empirical literature, and theories on high school dropout. Furthermore, qualitative data would greatly enrich the array of empirical findings that exist. Triangulation, where participant's own perceptions of, and reasons for dropping out of school is used to illustrate empirical findings would be particularly valuable.
- Theories and research that examine factors that protect dropouts from substance use is sorely needed. Future research should attempt to combine their investigation of risk factors with those that offer some students protection against risk.
- Research needs to be undertaken in developing countries. It is these countries that appear to have the least favourable school outcomes and yet there is a dearth of research to inform causes, consequences, and avenues for intervention/prevention. It is debatable whether findings from countries in the developed world would provide any insight into the dropout phenomenon in developing countries, such as the one from South Africa in this review, where it is the majority rather than the minority of high school learners who dropout of school, and where the social context is characterised by pervasive poverty, unemployment, and social inequality.
- The methodological issues mentioned earlier should be addressed where possible. For example, designing research

among rural adolescent dropouts, ensuring retention in longitudinal studies, defining dropout consistently and perhaps following-up on dropouts to assess their continued dropout status or otherwise, using consistent measures of substance use across studies and perhaps adding biological confirmation of substance use if possible, and determining and reporting the reliability and validity of measures used.

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REFERENCES

- Alcohol Policies Project. (2003). *Key findings on adolescent alcohol use from the National Household Survey on Drug Abuse and the Parents' Resource Institute for Drug Education Survey*, USA: Center for Science in the Public Interest.
- Aloise-Young, P. A., and Chavez, E. L. (2002). Not all school dropouts are the same: Ethnic differences in the relation between reason for leaving school and adolescent substance use. *Psychology in Schools* 39: 539–547.
- Aloise-Young, P. A., Cruikshank, C., and Chavez, E. L. (2002). Cigarette smoking and perceived health in school dropouts: A comparison of Mexican American and non-Hispanic white adolescents. *Journal of Pediatric Psychology* 6: 497–507.
- Arellano, C. M., Chavez, E. L., and Deffenbacher, J. L. (1998). Alcohol use and academic status among Mexican American and white non-Hispanic adolescents. *Adolescence* 33: 751–760.
- Battin-Pearson, S., Newcomb, M. D., Abbott, R. D., Hill K., G., Catalano, R. F., and Hawkins, D. (2000). Predictors of early high school dropout: A test of five theories. *Journal of Educational Psychology* 92: 568–582.
- Beauvais, F., Chavez, E. L., Oetting, E. R., Deffenbacher, J. L., and Cornell, G. R. (1996). Drug use, violence, and victimization among white American, Mexican American, and American Indian dropouts, students with academic problems and students in good academic standing. *Journal of Counseling Psychology* 43: 292–299.
- Brasseux, C., Guagliardo, M. F., and D'Angelo, L. (1997). Validity of self-reporting marijuana use in an adolescent population. Podium presentation, Annual Meeting of the Society of Adolescent Medicine, San Francisco, March 1997.
- Bray, J. W., Zarkin, G. A., Ringwalt, C., and Junfeng, Q. I. (2000). The relationship between marijuana initiation and dropping out of high school. *Health Economics* 9: 9–18.
- Brook, J. S., & Balka, E. B. (1999). The risks for late adolescence of early adolescent marijuana use. *American Journal of Public Health*, 89, 1549–1554.
- Brooks-Gunn, J., Guo, G., and Furstenberg, F. F. (1993). Who drops out of and who continues beyond high school? A 20-year follow-up of black urban youth. *Journal of Research on Adolescence* 3: 271–294.
- Crum, R. M., Helzer, J. E., and Anthony, J. C. (1993). Level of education and alcohol abuse and dependence in adulthood: A further inquiry. *American Journal of Public Health* 83: 830–837.

- Crum, R. M., Ensminger, M. E., Ro, M. J., and McCord, J. (1998). The association of educational achievement and school dropout with risk of alcoholism: A twenty-five year prospective study of inner-city children. *Journal of Studies on Alcohol* 59: 318–326.
- Dee, T. S., and Evans, W. N. (2003). Teen drinking and educational attainment: Evidence from two-sample instrumental variables estimates. *Journal of Labor Economics* 21: 178–209.
- Dekkers, H., and Driessen, G. (1997). An evaluation of the educational priority policy in relation to early school leaving. *Studies in Educational Evaluation* 23(3): 209–230.
- Drapela, L. A. (2006). Investigating the effects of family, peer, and school domains on postdropout drug use. *Youth & Society* 37: 316–347.
- EFA Global Monitoring Report. (2002). *Education for all. Is the world on track?* UNESCO. Retrieved 31st July, 2003 from http://www.portal.unesco.org/education/ev.php?URL_ID=11283&URL_DO=DO_TOPIC&URL_SECTION=201.
- EFA Global Monitoring Report. (2003/4). *Gender and Education for All. The Leap to Equality.* UNESCO. Retrieved 24th November, 2003 from http://www.portal.unesco.org/education/ev.php?URL_ID=23023&URL_DO=DO_TOPIC&URL_SECTION=20..
- Eggert, L. L., and Herting, J. R. (1993). Drug involvement among potential dropouts and “typical” youth. *Journal of Drug Education* 23: 31–55.
- Ellickson, P., Bui, K., Bell, R., and McGuigan, K. A. (1998). Does early drug use increase the risk of dropping out of high school?. *Journal of Drug Issues* 28: 357.
- Ellickson, P., Saner, H. S., and McGuigan, M. S. (1997). Profiles of violent youth: Substance use and other concurrent problems. *American Journal of Public Health* 87: 985–991.
- Ensminger, M. E., Lamkin, R. P., and Jacobson, N. (1996). School leaving: A longitudinal perspective including neighbourhood effects. *Child Development* 67: 1400–2416.
- Ensminger, M. E., Lamkin, R. P., and Jacobson, N. (2006). School leaving: A longitudinal perspective including neighborhood effects. *Child Development* 67: 2400–2416.
- Escobedo, L. G., and Peddicord, J. P. (1996). Smoking prevalence in US birth cohorts: The influence of gender and education. *American Journal of Public Health* 86: 231–236.
- Fagan, J., and Pabon, E. (1990). Contributions of delinquency and substance use to school dropout among inner-city youths. *Youth and Society* 21: 303–354.
- Fergusson, D. M., and Horwood, L. J. (1997). Early onset cannabis use and psychosocial adjustment in young adults. *Addiction* 92: 279–296.
- Fergusson, D. M., Lynskey, M. T., and Horwood, L. J. (1996). The short-term consequences of early onset cannabis use. *Journal of Abnormal Child Psychology* 24: 499.
- Fergusson, D. M., Horwood, L. J., and Beautrais, A. L. (2003). Cannabis and educational achievement. *Addiction* 98: 1681–1692.
- Fine, M. (1991). *Framing dropouts: Notes on the politics of an urban school*. Albany: State University of New York Press.
- Flisher, A. J., and Chalton, D. O. (1995). High-school dropouts in a working-class South African community: Selected characteristics and risk-taking behaviour. *Journal of Adolescence* 19: 105–121.
- Flisher, A. J., Evans, J., Muller, M., and Lombard, C. (2004). Test-retest reliability of self-reported adolescent risk behaviour. *Journal of Adolescence* 27: 207–212.
- Flisher, A., Townsend, L., Chikobvu, P., Lombard, C., & King, G. (2004). *Substance use and high school dropout*. Poster presentation at the American Public Health Association 132nd annual meeting, Washington DC, November 6–10, 2004.
- Franklin, C. (1992). Family and individual patterns in a group of middle-class dropout youths. *Social Work* 37: 338–344.
- Franklin, C., and Streeter, C. L. (1995). Assessment of middle class youth at risk to dropout: School, psychological and family correlates. *Children and Youth Services Review* 17(3): 433–448.
- Fuller, C. M., Vlahov, D., Ompad, D. C., Shah, N., Arria, A., and Strathdee, S. A. (2002). High-risk behaviors associated with transition from illicit non-injection to injection drug use among adolescent and young adult drug users: a case-control study. *Drug and Alcohol Dependence* 66: 189–198.
- Gabhain, S. N., and François, Y. (2000). Substance use. In C. Currie, K. Hurrelmann, W. Settertobulte, R. Smith, & J. Todd (Eds.), *Health and health behaviour among young people* (pp. 97–114). Copenhagen: WHO.
- Garnier, H. E., Stein, J. A., and Jacobs, J. K. (1997). The process of dropping out of high school: A 19-year perspective. *American Educational Research Journal* 34: 395–419.
- Gfroerer, J. C., Greenblatt, J. C., and Wright, D. A. (1997). Substance use in the US college-age population: Differences according to educational status and living arrangement. *American Journal of Public Health* 87: 62–65.
- Gfroerer, J., Wright, D., and Kopstein, A. (1997). Prevalence of youth substance use: The impact of methodological differences between two national survey. *Drug and Alcohol Dependence* 47: 19–30.
- Green, K. M., and Ensminger, M. E. (2006). Adult social behavioral effects of heavy adolescent marijuana use among African Americans. *Developmental Psychology* 42: 1168–1178.
- Guagliardo, M. F., Huang, Z., Hicks, J., and D’Angelo, L. (1998). Increased drug use among old-for-grade and dropout urban adolescents. *American Journal of Preventive Medicine* 15: 42–48.
- Kaplan, H. B., and Liu, X. (1994). A longitudinal analysis of mediating variables in the drug use—dropping out relationship. *Criminology* 32: 415–439.
- Kogan, S. M., Luo, Z., Brody, G. H., and McBride Murry, V. (2005). The influence of high school dropout on substance use among African American youth. *Journal of Ethnicity in Substance Abuse* 4: 35–51.
- Krohn, M. D., Lizotte, A. J., and Perez, C. M. (1997). The interrelationship between substance use and precocious transitions to adult statuses. *Journal of Health and Social Behavior* 38: 87–103.
- Lahey, K. (2003). *The cost of dropping out: The economic impact of early school leaving*. Australia: Business Council of Australia.
- Lynskey, M., and Hall, W. (2000). The effects of adolescent cannabis use on educational attainment: A review. *Addiction* 95: 1621–1630.
- Lynskey, M. T., Coffey, C., Degenhardt, L., Carlin, J. B., and Patton, G. (2003). A longitudinal study of the effects of adolescent cannabis use on high school completion. *Addiction* 98: 685–692.
- Marieke, L., Van Til, R. J., and Cohen, P. (2001). *Prevalence of alcohol use in Utrecht in 1997*. Amsterdam, Holland: Centrum Voor Drugsonderzoek.
- McCluskey, C. P., Krohn, M. D., Lizotte, A. J., & Rodriguez, M. L. (2002). Early substance use and school achievement: An examination of Latino, white and African American youth. *Journal of Drug Issues*, 32, 921–944.
- Newcomb, M. D., Abbott, R. D., Catalano, R. F., Hawkins, D., Battin-Pearson, S., and Hill, K. (2002). Mediational and deviance theories of late high school failure: Process roles of structural strains, academic competence, and general versus specific problem behaviors. *Journal of Counseling Psychology* 49: 172–186.
- Obot, I. S., and Anthony, J. C. (1999). Association of school dropout with recent and past injecting drug use among African American adults. *Addictive Behaviors* 24: 701–705.

- Obot, I. S., and Anthony, J. C. (2000). School dropout and injecting drug use in a national sample of white non-Hispanic American adults. *Journal of Drug Education* 30: 145–155.
- Obot, I. S., Hubbard, S., and Anthony, J. C. (1999). Level of education and injecting drug use among African Americans. *Drug and Alcohol Dependence* 55: 177–182.
- Pollard, J. A., Hawkins, J. D., and Arthur, M. W. (1999). Risk and protection: Are both necessary to understand diverse behavioral outcomes in adolescence?. *Social Work Research* 23: 145–158.
- Register, C. A., Williams, D. R., and Grimes, P. W. (2001). Adolescent drug use and educational attainment. *Education Economics* 9: 1–18.
- Roebuck, M. C., French, M. T., and Dennis, M. L. (2004). Adolescent marijuana use and school attendance. *Economics of Education Review* 23: 133–141.
- Rosenthal, B. S. (1998). Non-school correlates of dropout: An integrative review of the literature. *Children and Youth Services Review* 20(5): 413–433.
- Rumberger, R. W. (1995). Dropping out of middle school: A multilevel analysis of students and schools. *American Educational Research Journal* 32: 583–625.
- Shacklock, G., Smyth, J., & Wilson, N. (1998). *Conceptualising and capturing voices in dropout research*. Paper presented to the annual meeting of the Australian Association for Research in Education, Adelaide, November–December, 1998. Accessed 30 June 2005 from [http://www.aare.edu.au/98pap/sha98187.htm].
- Smyth, J. (2005). An argument for new understandings and explanations of early school leaving that go beyond the conventional. *London Review of Education* 3(2): 117–130.
- Smyth, J., and Hattam, R. (2001). ‘Voiced’ research as a sociology for understanding ‘dropping out’ of school. *British Journal of Sociology of Education* 22(3): 401–415.
- Swaim, R. C., Bates, S. C., and Chavez, E. L. (1998). Structural equation socialization model of substance use among Mexican-American and white non-Hispanic school dropouts. *Journal of Adolescent Health* 23: 128–138.
- Tanner, J., Davies, S., and O’Grady, B. (1999). Whatever happened to yesterday’s rebels? Longitudinal effects of youth delinquency on education and employment. *Social Problems* 46: 250–267.
- Wang, M. Q., Fitzhugh, E. C., Eddy, J. M., and Westerfield, R. C. (1998). School dropouts’ attitudes and beliefs about smoking. *Psychological Reports* 82: 984–986.
- Wichstrøm, L. (1998). Alcohol intoxication and school dropout. *Drug and Alcohol Review* 17: 413–421.
- Yamada, T., Kendix, M., and Yamada, T. (1996). The impact of alcohol consumption and marijuana use on high school graduation. *Health Economics* 5: 77–92.
- Zimmerman, M. A., and Maton, K. I. (1992). Life-style and substance use among male African-American urban adolescents: A cluster analytic approach. *American Journal of Community Psychology* 20: 121–138.