

Drugs, Lifestyle, and Health: A Longitudinal Study of Urban Black Youth

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Abstract: The association of drug use with indicators of health status was studied in a representative sample of urban Black youth interviewed first in adolescence and then six to seven later in young adulthood. Seven substances, with interaction terms as appropriate, were tested against a psychophysical health scale and also against a more inclusive general health scale. Both measures of health outcomes yielded similar findings. Earlier inhalants use and, under

certain conditions, methadone were linked to health change in males. Heroin had a delayed relationship to females' health. Additionally, methadone was associated with poorer health among young Black women who also were heavy alcohol drinkers. The observed relationships between drug use and health persisted after introducing controls for associated lifestyle factors. (*Am J Public Health* 1986; 75:52-57.)

Introduction

Generally, longitudinal studies of adolescent substance use have been concerned with factors predictive of drug use rather than its consequences.¹⁻⁹ The present paper reports findings from a longitudinal study of adolescents on the relationship between adolescent drug use and health in young adulthood. The aspects of health which concerned us were psychophysical and somatic, rather than psychogenic factors. The long-term somatic health consequences of youth drug use are of concern to public health workers because of their possible implications for the health status of the population directly involved and their societal effects: reduced productivity and increased demands on health care resources.

Epidemiologically based data on health consequences of illicit substance use are limited indeed^{10,11} and most of what we do know pertains to short-term effects reported from the experience of clinic samples, emergency rooms, and of individuals seeking drug treatment or in treatment programs.¹²⁻¹⁴ Few studies, furthermore, have adapted their research models to identify effects of individual substances in the presence of polydrug use, i.e., measures of drug involvement summed over a variety of substances usually have been employed. Nor has research accounted for the likely differential impact of gender, ethnicity, and socioeconomic factors on the health drug use relationship. Finally, the literature to date has not reported these relationships removing possibly confounding lifestyle factors.

Research reported here is part of an ongoing longitudinal investigation of a community representative sample of Black youth not from Latino backgrounds. Begun in adolescence, this study of health, drug use behavior, and related lifestyle factors now spans three waves and 15 years. The first two waves—adolescence and young adulthood—provided the data which are the basis for this study of the association between drug use and subsequent health status.¹⁵

The study questions and their sequence of testing were:

1. Given the fact that heroin has been labeled the "hardest" drug and has been the primary target of treatment services for illicit substance use, to what extent is heroin associated with a decline in health between adolescence and young adulthood?

2. Are drugs other than heroin implicated in this deterioration?

3. Can associations of drug use and long-term health indicators be plausibly explained by their interrelationship with lifestyle factors such as living conditions, social attainment, social networks, and/or outlooks on life?

4. Does the same model of relationships apply for males and females?

Methods

Source of Data

The study panel of urban Black adolescents were aged 12-17 when first studied in the late 1960s. The panel was drawn from a stratified probability sample of households within a single inner-city health district, Central Harlem (New York City). The initial sample of non-Latino Black adolescents (N = 668) was drawn over two consecutive years, using a sampling ratio of 1 in 25 households each year. The re-study similarly extended over two years and was conducted in 1975-76, six to eight years after initial study, when panel members were ages 18-23. In re-study, 94 per cent of the initial sample were located. The number of interviews completed was 536. This represented a response rate of 89 per cent, exclusive of those who had died or who were located and residing outside the metropolitan New York City area to which the re-study was restricted. (Included in the base for the retention rate are the 6 per cent of the original sample who were not located.)

At re-study, as in the initial study, the sample was 52 per cent male and 48 per cent female. Other characteristics of the sample are shown in Table 1. Congruent with the low 2 per cent refusal rate, tests of sample bias on varied demographic and health measures indicated that the sample available for the longitudinal analysis was substantially representative of all of those in initial study.

At both study times, data were collected through individual personal interviews conducted in the respondent's home by ethnic- and gender-matched interviewers using a structured interview schedule consisting largely of closed-end questions. Interviews lasted an hour and a half on average. On reinterview, besides extensive measurement of the independent variables (drug use) and of the dependent variables (health), the data set included measures in four domains: family background characteristics; role attainment and living conditions; interpersonal influences; psychosocial attitudes. Together these comprised an ecological model of health influences.¹⁶⁻¹⁸ A model that incorporates social contextual influences is especially important in analyzing outcomes for Black populations.¹⁹ A more complete description of data collection procedures has been published.²⁰

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TABLE 1—Personal Characteristics of Study Panel by Gender

Characteristics	Male (N=277)	Female (N=259)
Age (years)	%	%
18	9	6
19	16	14
20	18	18
21	26	24
22	21	23
23	10	15
Location of Current Residence		
Central Harlem	63	62
Elsewhere in Manhattan	13	12
Bronx	17	19
Elsewhere in Metropolitan Area	7	7
Educational Attainment		
Incomplete high school	36	31
High school completed	28	31
Beyond high school	36	38
Current Major Life Activity		
Work; work and school	44	33
School only	20	22
Looking for work only	22	16
In jail	4	*
In Armed Forces	2	*
Housewife	—	24
Nothing, staying home	8	6
Married	4	18
Have one or more children	27	52
Born in North	81	78
Mother born in South	73	69

*Half percent.
—No cases.

Research Model

As described below, separate gender models tested the influence of seven substances plus, for females, one drug interaction term and a range of mediating lifestyle influences on change in health between adolescence and young adulthood.

Measures of Drug Use

Life histories of drug use were obtained on reinterview. Respondents were asked whether or not they had ever used each of nine drugs or classes of drugs which were read to them one at a time: marijuana, acid or other psychedelic ("hallucinogens"), cocaine, heroin, methadone, "uppers", "downers", "glue or some other inhalant", alcohol. Multiple measures of onset were obtained as checks in establishing reliability of report on the timing of initiation into use of each drug (i.e., how old respondent was, how long ago it was, and what his/her major activity was at time of first use.) Usual frequency and recency or last time used were among other items of information obtained about each drug. Amount of current cigarette smoking was asked on both first and second interviews and comprised the tenth substance inquired into.

Reliability of drug reports on personal interview has been satisfactorily established by other investigators.²¹⁻²⁸ When reports in this study were compared for the small subset of users for whom information was available at both study times, retrospective reports of time of onset were concluded to be accurate within a one-year margin of error. Consequently, those reporting first use of a drug within one year of their initial interview have been classified as already using at baseline.

Multiple measures of use of each drug were reduced to a single measure of cumulative involvement, derived from the

product of duration of use and usual frequency. Analysis of residuals demonstrated that a log transformation of this product provided a better fit than the raw score. This log-dose measure was subsequently used to operationalize cumulative use or dose of each substance. Given the longitudinal research design, baseline use was also included as a separate dimension of each drug's use. This represented chronological time of exposure and thus captured longer-term vs shorter-term and possible lagged or delayed effects, along with other factors which might distinguish health change among those onsetting at an earlier vs later period of time.

Finally, users in this study were restricted to those whose use was more than experimental, i.e., who used more than once or twice, and had been using for at least one year before interview. In fact, analyses reported elsewhere confirm that onset of most drugs was completed in adolescence.²⁹

The research model retained seven individual substances, whose measures of cumulative involvement or dose had a correlation of at least .10 with young adult health. Among the common illicit substances, only marijuana showed no such correlation and consequently was excluded from the analysis. Preliminary analysis had suggested a relationship between methadone and poor health among young women which was restricted to those women who also drank heavily. Consequently, an interaction term between methadone and alcohol was introduced in the female model. Departing from our standard practice of including the same variables in both gender models, it was impracticable to include the methadone-alcohol interaction in the male equation because of its extremely high collinearity with the methadone dose variable ($r = .91$). In fact, virtually all male methadone users were heavy drinkers.

Measures of Health Outcome

Measures of psychophysical symptoms have been recommended as a sensitive indicator of the natural interface of somatic and psychological components of health.^{30,31} The present analysis, therefore, was performed on a nine-item psychophysical scale:

- repeated headaches;
- nervous or emotional trouble;
- dizziness, fainting spells or blackouts;
- chest pains;
- short of breath even without exercise;
- heart thumping or racing;
- shaking or trembling;
- stomach pains;
- indigestion, acid in the stomach.

The items were drawn from the literature³²⁻³⁵ and demonstrated Guttman lower bound reliabilities of .73 among males and .75 among females. Scale scores were constructed by dividing the raw count of symptoms reported by the total number of symptoms inquired about. These morbidity scores later were transformed into their standardized values for the regression analysis. Also note below that health change was the modeled outcome, thereby controlling for variations in health at baseline.

After performing the analysis with the psychophysical scale, we considered the possibility that different findings might result if health status had been measured by a broader ranged scale with greater somatic representation. The model was then replicated using a second, more inclusive scale of 47 health problems (48 for women). (Available on request from author)

Mediating Lifestyle Variables

Given the role of lifestyle variables in the research model as a control for potential confounding of the observed drugs and health relationship, criteria for selection were, for either gender, a correlation greater than .10 with the health outcome variable *and* with use of one or more of the following substances: heroin, methadone, inhalants, alcohol, cocaine. Of 24 variables tested, 10 lifestyle variables passed these criteria and are reported in subsequent analyses.

Control on Age and Prior Health

The research model was rounded out by inclusion of two variables as covariates in all analyses: 1) age at initial interview, which controlled for possible systematic age-related or maturational health change; 2) initial adolescent health score which controlled for preexisting variations in health and means that the regression coefficients of the independent variables measure *health change* between the two interviews.³⁶

Analytic Procedures

Proving causality in the logical sense at best is hazardous, if not impossible. Even under controlled experimental conditions causation in more than the temporal sense cannot be proved empirically.³⁷ When studying health effects of drug use, problems of causality are further compounded by polydrug use. With these cautions in mind, the procedures for testing the research model included estimating three successive equations by ordinary least squares methods:

- Equation 1 estimated the association of heroin use alone with young adult health, controlling for age and health at adolescent interview.

- Equation 2 added other substances which demonstrated significant simple correlations with young adult health for a simultaneous test of associations with use of all substances.

- The block of lifestyle variables was introduced in Equation 3 simultaneously with all the drug variables, in order to disentangle the direct associations of drug use from the confounding influence of lifestyle factors.

The entire analysis has been performed gender-specific, to determine separate causal sequences of drug use behavior and health outcomes among young Black men and women.

Results

Drug Use and Psychophysical Health

When tested in isolation from other drugs and lifestyle variables, baseline heroin use and cumulative heroin use each contributed to males' health change (Table 2, Equation 1). Whereas cumulative exposure to heroin, as expected, was associated with increased health decline between interviews, the regression coefficient for heroin use begun prior to first interview had a negative value. This indicated that for any given dose level, men who started using heroin prior to the first interview, regardless of age at the time, evidenced a smaller decline in health between interviews than men who were more recent onsetters. Examination of mean health scores of the two male heroin user groups at the two life stages made it clear that the earlier male heroin users were, in fact, in poorer health when measured at baseline: baseline users $\bar{X} = 18.4$ (S.D. = 20.9); for those initiating heroin after first interview, $\bar{X} = 12.3$ (S.D. 17.5). At second interview, however, baseline users' were in better health, on average, ($\bar{X} = 14.1$, S.D. 14.3) than later onsetters ($\bar{X} = 27.1$, S.D. 26.2).

When the model with only cumulative and early heroin use variables was tested for women, a different relationship

TABLE 2—Multiple Regression of Psychophysical Health on Drugs and Lifestyle^{1,2} Males (N=277)

	r	Equation 1		Equation 2		Equation 3	
		b	SE	b	SE	b	SE
Baseline Heroin	-.02	-1.14	.30	-.92	.32	-.67	.32
Cumulative Heroin ³	.16	.37	.08	.08	.11	.02	.10
Baseline Inhalants	.17			.27	.36	.29	.36
Cumulative Inhalants	.34			.67	.22	.65	.22
Baseline Alcohol	.05			.18	.11	.19	.11
Cumulative Alcohol	.12			-.02	.08	-.07	.08
Cumulative Methadone ⁴	.26			.30	.13	.27	.13
Baseline Hallucinogens	-.03			-.67	.48	-.60	.48
Cumulative Hallucinogens	.11			-.04	.10	-.02	.10
Baseline Cigarettes	-.03			-.28	.15	-.36	.15
Amount Cigarettes	.15			.19	.10	.10	.10
Baseline Cocaine	.08			.52	.31	.35	.31
Cumulative Cocaine	.10			.03	.06	.02	.07
Current Welfare	.08					-.10	.16
Born in South	-.01					.03	.12
Attained Education	-.27					-.09	
Social Dysfunction ⁵	.25						.08
Occupational Opportunity	.03					-.01	.01
Formal Participation	-.14					-.06	.06
No. Children	.09					.02	.08
Personal Efficacy	-.31					-.15	.07
Want to Change Self	.16					.12	.08
Baseline Health	.22		.06	.22	.06	.15	.06
Baseline Age	-.03	-.02	.03	.00	.03	.05	.04
		R ² =12%		R ² =23%		R ² =30%	

¹Health identified by standardized scores on 9-item scale.

²Unstandardized beta and standard error reported.

³Cumulative drug use scored by log of years of use multiplied by usual frequency.

⁴No methadone use reported at baseline.

⁵Summative index of in jail, idle, high school dropout.

TABLE 3—Multiple Regression of Psychophysical Health on Drugs and Lifestyle^{1,2} Females (N=259)

	r	Equation 1		Equation 2		Equation 3	
		b	SE	b	SE	b	SE
Baseline Heroin	.32	1.29	.43	1.54	.47	1.59	.45
Cumulative Heroin ³	.28	.03	.13	-.18	.19	-.24	-.19
Baseline Alcohol	.06			-.01	.14	.07	.14
Cumulative Alcohol	.20			.07	.11	-.04	.11
Cumulative Methadone ⁴	.23			-.07	.18	-.19	.18
Alcohol Methadone	.35			.47	.11	.50	.11
Baseline Inhalants	.13			.36	1.27	.74	1.25
Cumulative Inhalants	.12			.18	.55	.13	.55
Baseline Cocaine	.04			-.34	.39	-.32	.39
Cumulative Cocaine	.10			-.18	.11	-.18	.11
Baseline Hallucinogens	.05			.06	.68	.21	.65
Cumulative Hallucinogens	-.04			.09	.20	.14	.20
Baseline Cigarettes	.20			-.02	.19	—	.18
Amount Cigarettes	.19			.26	.13	.23	.13
Current Welfare	.17					.08	.14
Born in South	.16					.31	.14
Attained Education	-.30					-.04	.05
Social Dysfunction ⁵	.28					.11	.10
Occupational Opportunity	.17					.01	.01
Formal Participation	-.03					.08	.06
No. Children	.15					—	.09
Personal Efficacy	-.28					-.24	.07
Want to Change Self	.16					.17	.11
Baseline Health	.19			.19	.05	.17	.05
Baseline Age	.06	-.02	.04	.03	.05	-.05	.04
		R ² =15%		R ² =25%		R ² =35%	

¹Health identified by standardized scores on 9-item scale.
²Unstandardized beta and standard error reported.
³Cumulative drug use scored by log of years of use multiplied by usual frequency.
⁴No methadone use reported at baseline.
⁵Summative index of in jail, idle, high school dropout.

emerged (Table 3, Equation 1). Examination of mean health scores revealed little difference in baseline health between young women already using heroin ($\bar{X} = 10$, S.D. = 17.8) and those initiating later ($\bar{X} = 12.9$, S.D. 19.6). Earlier users' health had declined much more by second interview, however, yielding a mean health problems score ($\bar{X} = 45.9$, S.D. = 35.5) considerably higher than that of later onsetters ($\bar{X} = 23.1$, S.D. = 26.4).

Substances other than Heroin

Heroin users in this sample were polydrug users.²⁰ The next equation, therefore, added substances other than heroin to the model. (Table 2, Equation 2) When variables measuring the use of other drugs were added, the heroin dose response (cumulative use) became negligible in males, replaced by other substances, namely, inhalants and methadone. In contrast, among females, the addition of other substances to the model slightly strengthened the relationship of earlier heroin use to poor health. The combination of methadone with heavy alcohol drinking had an added and equally strong deleterious effect on their health (Table 3, Equation 2).

Mediating Role of Lifestyle

After observing that it was largely inhalants and methadone experience, not heroin, that were associated with change in males' psychophysical symptoms, the final question was posed as to whether these were explainable by lifestyle linkages (Table 2, Equation 3). Reestimating the equation with lifestyle variables indicated that cumulative inhalants and methadone were directly associated with poor health. The addition of the lifestyle variables only slightly diminished the size of the regression coefficients. With

females, similarly, the addition of the lifestyle variables failed to attenuate the already reported association of health and drug use (Table 3, Equation 3).

These findings raised several important issues. Even though the selected psychophysical scale had the advantage of established reliability in this and other research, there was little prior literature on chronic or longer-term problems from heroin use to recommend a psychophysical scale as more appropriate than a broader somatic measure. Therefore, we replicated the three equations reported above using an inclusive 47-item somatic health scale. The results of that analysis were similar (available on request from author).

Next, we examined further the meaning of the unexpected association of male's early heroin use and good health. We tested the possibility that the baseline heroin coefficient unintentionally captured the health relationship of a second drug which was conditioned on the time of onset of heroin use. Because of its observed direct effect on health and its close connection with heroin, methadone was the most

TABLE 4—Men's Psychophysical Health: Main and Interaction Terms for Heroin and Methadone Effects (unstandardized regression coefficients)

	Polydrug Model		Lifestyle Model	
	(Equation 2)	SE	(Equation 3)	SE
Baseline Heroin Use	-.56	.40	-.26	.39
Cumulative Heroin	.02	.11	-.04	.11
Cumulative Methadone	.53	.20	.54	.20
Baseline Heroin X Methadone	-.40	.30	-.46	.26

likely candidate for this test. When a multiplicative term for baseline heroin use and methadone dose (i.e., cumulative methadone) was added into Equations 2 and 3, the earlier reported methadone effect was observed among later heroin onsetters only. At the same time, the previously observed positive baseline heroin effect was greatly reduced (Table 4). Thus, the methadone-health association appeared dependent upon the timing of heroin onset. It was this contingency which accounted to a large extent for the observed decline in health among late but not early heroin users. Why methadone's association with health was contingent on the time men began using heroin cannot be answered at this point.

As to the *female* lagged relationship of heroin use to health, it was reinforced when baseline use was reformulated into annual intervals from year of interview. Testing health change against these annual intervals did not alter the relationship. If females started using heroin up to five years prior to second interview, they showed a slight health advantage compared to other users, $\bar{X} = 30.8$ (S.D. 36.4); if their heroin use began six to seven years before second interview, their health showed a small deficit, $\bar{X} = 37.6$ (S.D. 28.4); but if onset of heroin use had occurred 8–12 years prior to second interview, the relative deficit was large, $\bar{X} = 49.4$ (S.D. 39.4).

Discussion

This study was undertaken to assess the relationship of young adult health to drug use initiated in adolescence in a specified population subgroup—urban Black youth. This is a group who are at higher than average risk of both illicit drug use and, because of their low-income status, poorer health. The results, therefore, should not be broadly generalized until replicated on different samples, at different points in time, and at different stages in the life span.

Some comments are in order about the approach to health measurement used in this research. Evidence of the validity of self-reports as representations of health outcomes comes from several sources: 1) self-reports have proved useful proxies for objective health evaluations³⁸; 2) self-reported evaluation of well-being has provided the single best predictor of mortality^{39,40}; 3) longitudinal studies using self-reported indicators show that whatever bias exists toward under- or overreport tends to be constant over time. Using the same instrument to measure change in health therefore nets out such bias.⁴¹ The similarity in findings when drug use was tested against a selected psychophysical scale and by a more general somatic scale seems evidence in support of the view that somatic symptoms generally have psychological components, not necessarily restricted to a limited set commonly designated as psychophysical.

The specific objectives of this research were to test how, and how much, use of individual "recreational" substances were associated with change in physical health between adolescence and young adulthood. The outcome variable used in the model was not change in health *per se*, but, rather, gender-specific deviations from the average or norm of health change in this population. Average change in health during the transition between adolescence and young adulthood was the subject of an earlier paper. There we noted that the transition was marked by considerable instability or shift in individual health positions. This was evidenced also by the low health autocorrelations reported here: for males, .21, for females, .35. Generally, young men's health declined more than women's—a function of their relatively better health in

adolescence. On average, between adolescence and young adulthood, males increased two health problems compared to the average female increase of one.⁴²

The present study has demonstrated that drug use was related to this health decline. For males, inhalants and, under specified conditions, methadone were the offending substances. For females, heroin use begun in adolescence showed a strong relationship to poorer health in young adulthood, not to concurrent health in adolescence. The combination of heavy drinking in the presence of methadone use further added directly to women's risk of increased morbidity in young adulthood.

The research model permitted controls on the ordering of the health and drug use observations. Beyond such temporal controls, causal inferences are not warranted. We did, however, introduce lifestyle variables for the purpose of posing an alternative explanation of observed drug relationships. These did not diminish the drugs and health relationship. Instead, lifestyle factors were observed to have an independent and additive contribution toward increasing morbidity in young adulthood, for both males and females.

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Faculty Fellowships Announced in Health Care Finance

Applications are being sought for the third year of appointments to be made under the Robert Wood Johnson Foundation's Program for Faculty Fellowships in Health Care Finance.

The fellowships offer a year of advanced training and field experience followed by grants of up to \$15,000 in support of a related research project in the following year. They are open to faculty in university programs and departments where there is a health care finance and health policy focus, as well as to professionals in health-related disciplines considering a career in teaching and research. Relevant backgrounds include health services and hospital administration, public administration, public policy, law, business, medicine, political science, and economics.

Fellowships begin in September at the Johns Hopkins Center for Hospital Finance and Management with an intensive four-month study of the latest innovations in health care finance. During this period, the fellows will become acquainted with the unique large data bases available at the Center, and develop a major research project, to be completed in the second year of the Fellowship.

During the ensuing eight months, fellows will have a structured field and research experience in a relevant operating organization of their choice, provided the site meets objective standards established by the Program's National Advisory Committee. Past sites for the program have included major public and private health care financing organizations, medical centers, and alternative delivery systems.

Up to six fellows will be appointed in the third year of the program; they will receive stipends equal to their salaries prior to entering the Program, up to \$40,000 a year, plus fringe benefits and assistance with other costs associated with the fellowship year.

The program is being administered by the Johns Hopkins Center for Hospital Finance and Management, and directed by Carl J. Schramm, PhD, JD.

The deadline for applications to the third year of the program is January 20, 1986. For information and applications, contact: Carl J. Schramm, PhD, JD, Director, Program for Faculty Fellowships in Health Care Finance, Johns Hopkins Center for Hospital Finance and Management, 624 North Broadway, Baltimore MD 21205. Telephone: 301/955-6891.