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The Social Epidemiology of Substance Use

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INTRODUCTION

Tobacco, alcohol, and illicit substance use continue to result in substantial morbidity and mortality and significant societal economic costs despite considerable efforts to minimize use of licit substances and prevent use of illicit substances. Each year, more than 400,000 Americans die from cigarette smoking, and one in every five deaths in the United States is believed to be smoking related (1). Consequences of alcohol and illicit substance abuse include, among others, cirrhosis, job loss, and criminal behavior related to the acquisition and sale of illicit drugs. The economic costs of addiction were estimated as $400 billion yearly in the United States in 1999 (2). Substance use is associated with a wide range of risk behaviors. For the more commonly used substances, risk behavior includes symptoms of both dependence (e.g., reducing important activities because of use of the substance) and abuse (e.g., driving a car more than once while intoxicated, getting into trouble with superiors or co-workers because of intoxication). For example, in 2002, 4.7 percent of the population reported driving under the influence of an illicit drug and 14.2 percent reported driving under the influence of alcohol at least once during the past year (3).

Several academic disciplines, including, among others, sociology, psychology, anthropology, and epidemiology, have studied substance use behavior. To some extent, each of these disciplines has considered substance use through its own analytic lens. For example, although individual psychological factors are frequently explored in the psychological substance use literature, these constructs are not commonly discussed in the psychiatric epidemiologic literature that concerns itself with the determinants of substance abuse and dependence. However, in sum, evidence from these different fields of inquiry strongly suggests that the etiology of substance use and abuse is multifactorial and that genetic, psychological, and social factors are all determinants of substance use.

Why, then, should we concern ourselves with the social epidemiology of substance use? In some ways, all epidemiology is social; people are biologic and social organisms, and few biologic processes or behaviors are unmediated by their social context. This may be particularly true and important of behaviors in general and of substance use in particular. The experience of substance use has always been rooted in the social context (4). For example, despite the well-recognized consequences of alcohol abuse and dependence, alcohol drinking enjoys social sanction and is a common feature of both formal and informal social gatherings in the United States. Therefore, in many disciplines, substance use is seldom studied in isolation from the relevant social context considered, at least implicitly, to affect substance use patterns. Although this reinforces the importance of the social context as a determinant of substance use, it provides little help in understanding the specific social determinants empirically associated with substance use behavior.

The social epidemiology of substance use explicitly considers the social factors that shape the population distribution of substance use behavior. As a distinct area of research, the social epidemiology of substance use is nascent, and, as such, most of the work that has contributed to the body of knowledge that may be called the social epidemiology of substance use has frequently been carried out with a different primary focus. For example, much work has investigated the two "psychosocial" factors—psychological and social—that may be associated with substance use, often studying both (5, 6). This review systematically summarizes the key epidemiologic literature that has studied social (or exogenous) factors that may shape substance use behavior. We conclude our review with a note about methodological issues in studies dealing with the social epidemiology of substance use.

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REVIEW OF THE LITERATURE

The potential scope of the literature that may be considered relevant to the topic at hand is vast. To more appropriately define current understanding of the relation between social factors and drug use, we chose to limit the focus of our review to studies conducted after 1970. Additionally, these years include the newer studies that have used methods considered standard today. The published literature was identified by using the MEDLINE database (National Library of Medicine, Bethesda, Maryland) from 1970 to the present, covering both US and international studies that assessed social factors and substance use. We considered substance use in different stages—initiation, use and misuse, and cessation, abstinence, and relapse—and structured our searches to assess cigarette smoking, alcohol drinking, and use of illicit substances. The search was limited to English-language studies in biomedical research. Because the nature of substance use is interdisciplinary, it is covered by a variety of disciplines beyond medicine and public health; although we included articles from other disciplines that we considered particularly important, our search was not comprehensive in these areas. A full review encompassing disciplines beyond medicine and public health would be beyond the scope of a manuscript-length review. Keywords and terms used for the search included primarily the following: social environment, social perception, social class, socioeconomic factors, residence characteristics, social networks, discrimination, social support, segregation, collective efficacy, neighborhood, substance related disorders, drug abuse, drug dependence, smoking, tobacco, alcohol drinking, cannabis, cocaine, heroin, street drugs, and injection substance use. We retrieved additional studies from reference lists.

Given the large number of studies that at least allude to social factors in studying drug use, we limited our review to studies that explicitly were in part concerned with determining the relation between a particular social factor and substance use. In papers that have also considered psychological factors as determinants of substance use, we refer primarily to the relevant insight about how social factors shape substance use behavior. Guided by the predominant focus in social epidemiology, we mainly considered for this review exogenous social factors, that is, factors that go beyond the individual person and that reflect how the person and her or his relations to society at large can shape health and disease (7). As such, although we discuss it where relevant, we do not fully review the descriptive epidemiology of substance use for different endogenous characteristics (e.g., race/ethnicity). Since there are a large number of studies that have discussed certain social factors (e.g., social network norms) and different aspects of substance use but a paucity of literature on other social factors (e.g., neighborhood characteristics), we did not aim to be comprehensive but instead discuss key studies that illuminate the relations between a range of social factors and the natural history of substance use. We did not consider the nonprescription use of prescription drugs in this review. We also did not consider the growing epidemiologic literature on income inequality that is concerned with assessing the effect of distribution of socioeconomic status, rather than socioeconomic status itself, because this topic involves particular methodological issues deserving of separate treatment.

FINDINGS

We discuss substance use during three different stages: 1) initiation, 2) use and misuse, and 3) cessation, abstinence, and relapse. We chose to summarize the literature on social factors and licit and illicit substances primarily to afford comparison and contrast between the different determinants of use and misuse of different substances. Within each stage, we first discuss cigarettes and alcohol and subsequently discuss illicit substances, starting with marijuana and moving on to others. As much as possible, for each of the substances, we first talk about individual-level social factors, then discuss family and social network–level factors, and then conclude with community-level factors (8).

Initiation

Cigarettes and alcohol. Most of the work assessing the role of social factors in the initiation of cigarette use has studied family characteristics during one's childhood or adolescence as determinants of starting (table 1). A large prospective study in California and Oregon followed a racially and socioeconomically heterogeneous group of 3,056 adolescents between 1985 and 1995 (9). Low school achievement (operationalized as poor grades), a higher level of parental education, and being young in one's age cohort were associated with a higher likelihood of starting smoking. In contrast, being part of a nuclear family and a member of a minority group were associated with a lower likelihood of starting cigarette smoking. In a 26-year follow-up of African Americans in inner-city Chicago, Illinois, those with poorer relationships with their family were more likely to start smoking (10). Specifically, those who left home before age 18 years and had less strict parental rules about drug use were more likely to start smoking. In a cross-sectional study of 5,427 adolescents conducted in Brisbane, Australia, low school achievement, low household income, low levels of maternal education, and parental smoking were all associated with adolescent cigarette smoking (11). In contrast, a study of a sample of young Latina women in Los Angeles, California, found that parental smoking was not associated with smoking initiation (12). Cultural factors, particularly nontraditional family values and linguistic acculturation, were primarily associated with smoking initiation in this study; it is likely that these factors are particularly important in this group of mostly foreign-born women, explaining the lack of association between familial factors and smoking initiation observed in this study.

Other studies that have assessed initiation of multiple substances confirm the observation that adverse childhood family conditions are associated with a greater likelihood of initiation of cigarette use (13, 14). Conversely, positive parental-adolescent relationships have been associated with a lower risk of cigarette use (15), although this finding is not universal across studies (16). Smoking behavior of social network members and protobacco media influences also

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TABLE 1. Key studies that assess the relations between social factors and initiation of substance use

Study, year (reference no.)	Substance	Location	Sample	Conclusions
			Cigarettes and alcohol	
Conwell et al., 2003 (11)	Cigarettes	Brisbane, Australia*	5,427 adolescents (aged 14 years) whose mothers attended an antenatal clinic in Brisbane	Adolescent cigarette smoking was associated with parental smoking, low school achievement, low household income, and low levels of maternal education.
Dawson, 2000 (20)	Alcohol	United States*	42,862 adults (aged ≥18 years) from the National Longitudinal Alcohol Epidemiologic Survey	A positive association was found between percentage of alcoholic relatives and early onset of alcoholism, attributed to earlier initiation of drinking.
Ellickson et al., 2001 (9)	Cigarettes	California and Oregon†	3,056 adolescents recruited from 30 middle and junior high schools and interviewed during junior high (aged 13 years), high school (aged 18 years), and young adulthood (aged 23 years)	Poor grades (OR‡ = 1.20), higher levels of parental education (OR = 1.10), and being young for one's cohort (OR = 1.34) were associated with initiation at adolescence and young adulthood; being part of a nuclear family (OR = 0.70) and minority status were associated with a lower likelihood of initiation.
Ellickson et al., 2004 (18)	Cigarettes	California and Oregon†	6,259 students from 30 middle schools located in urban, suburban, and rural communities and followed from age 13 to age 23 years	Social bonding factors explained the higher rates of early initiation among African Americans relative to Whites; less exposure to pro-smoking social influences accounted for the lower rates of regular smoking at age 18 years for African Americans relative to Whites.
Juon et al., 2002 (10)	Cigarettes	Chicago, Illinois†	952 African Americans beginning in 1966–1967 (first grade), with follow-up in 1975–1976 and 1992–1994	Early initiators were more likely to leave home before age 18 years (OR = 2.92) and to have low levels of parental supervision (OR = 6.62) regarding drug rules.
Kaplan et al., 2001 (12)	Cigarettes	Los Angeles, California*	1,411 Latina women (aged 14–24 years) receiving services from family planning clinics in 1992–1993	Cultural factors, including nontraditional family values (OR = 1.30) and linguistic acculturation (OR = 1.25), influence smoking initiation.
			Illicit drugs	
Blackson and Tarter, 1994 (21)	Multiple drugs	United States†	530 boys (aged 10–12 years at baseline) and their fathers	Substance abuse by fathers showed no association with alcohol or drug use by sons.
Boyd and Mieczkowski, 1990 (30)	Cocaine	Metropolitan area, United States*	100 inpatients (aged ≥18 years; used crack in the past year) from a drug treatment program in a metropolitan area	21% of subjects were first initiated to crack cocaine through a family member, and 50% were initiated through a male friend; men and women tend to start their crack use with male friends and male family members.
Boys et al., 2002 (38)	Multiple drugs	England and Wales*	3,142 prisoners from England and Wales	Initiation of cocaine use while in prison was associated with being in local authority supervision as a child (OR = 1.70) and parental separation/divorce (OR = 1.50).
Burton et al., 1996 (31)	Cocaine	United States†	1,933 men; a national probability sample born between 1944 and 1954, interviewed first between 1974 and 1975 and then again in 1985	Socialization effect of marital role has a negative impact on initiation of cocaine use; marital role significantly reduces the odds of cocaine initiation when not occurring "early" or "late" in life.
Chassin et al., 1993 (19)	Multiple drugs	Arizona§	327 families with a history of parental alcoholism and demographically matched controls	Parental alcoholism may increase adolescent substance use by decreasing parental monitoring of the adolescent's activities and by increasing the adolescent's negative uncontrollable life events, both of which encourage associations with drug-using peers.

Table continues

have been shown to be important determinants of age at smoking initiation (17). Studies investigating the association between race/ethnicity and smoking initiation have been inconsistent, with some reporting that African-American adolescents are less likely than White adolescents to initiate smoking (9) and others finding that African-American adolescents are more likely than White adolescents to initiate smoking (18). Differences in social exposures, including network relations and norms, have been shown to explain racial/ethnic differences in smoking initiation (18).

In terms of alcohol, some (19, 20) but not other (21) studies have linked parental alcohol and substance use to adolescent initiation of alcohol use. Several studies (14, 22) have identified disruption of family structure and social networks that use alcohol as a risk factor for initiation of alcohol use. Although there are few comparisons of the role

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TABLE 1. Continued

Study, year (reference no.)	Substance	Location	Sample	Conclusions
Crofts et al., 1996 (28)	Injection drug use	Melbourne, Australia*	237 young people (aged 14–22 years) with a history of injection drug use	Injection drug users who have initiated others are more likely to be unemployed and to inject multiple drugs but are less likely to have been initiated by someone else.
Crum et al., 1996 (40)	Multiple drugs	Baltimore, Maryland†	1,416 students interviewed in first grade (1985) and followed up in sixth or seventh grade (1992)	Peer drug use of any type was associated with exposure opportunity; students in the highest tertile of neighborhood disadvantage were more likely, relative to the lowest tertile, to have been offered cocaine (OR = 5.6), tobacco (OR = 1.7), and alcohol (OR = 1.9).
De Wit, 1999 (35)	Multiple drugs	Ontario, Canada*	3,700 young adults (aged 18–35 years) from an area probability sample of the Ontario population	Frequent moving during early childhood and adolescence was associated with time to first drug use; male movers were more likely than females to report early initiation.
Dube et al., 2003 (39)	Multiple drugs	San Diego, California*	8,613 adult members of the Kaiser Health Appraisal Center in San Diego	Adverse childhood experience (i.e., abuse, neglect, parental divorce) increased the likelihood of early drug initiation, initiation during midadolescence, and initiation during adulthood.
Fawzy et al., 1987 (34)	Multiple drugs	Los Angeles area, California*	262 California youth (aged 13–17 years) recruited off the street and one of their parents	Family composition, family income, and family's social class were not predictive of youths' substance use behavior.
Frauenglass et al., 1997 (13)	Multiple drugs	Miami, Florida*	236 eighth-grade students from public middle school in the Little Havana area of Miami	Students with peers who were using illicit substances were more likely to use substances of any kind; family support counteracted the effects of deviant peer modeling.
Fuller et al., 2003 (27)	Injection drug use	Baltimore, Maryland†	226 adolescent and young adult (aged 15–30 years) Baltimore residents required to have injected for ≤5 years prior to study entry	Early shooting gallery attendees were more likely to be introduced to injection drug use by an older injection drug use peer (OR = 2.2) and to have a high-risk injecting network (OR = 3.3).
Guo et al., 2002 (37)	Multiple drugs	Seattle, Washington†	808 youths recruited in 1985 (aged 10–11 years) from 18 Seattle schools and followed up annually until 1991 and in 1993 and 1996	After adjustment for sociodemographic background and other family and peer factors, family conflict and low degree of family bonding remained significantly associated with illicit drug initiation.
Johanson et al., 1996 (42)	Multiple drugs	United States*	1,516 students attending urban public schools in the Mid-Atlantic United States; 80% African American	Youths who prayed, read the Bible, and attended church functions at least two times each week were about one fifth as likely to start taking drugs (OR = 0.19).
Kleinman, 1978 (32)	Heroin	New York City, New York*	381 African-American heroin addicts recruited upon entry into a methadone treatment program	Among those of lower-class origins, migrants were significantly less likely than natives to be addicted while young (11% vs. 23%); social class origin was an important predictor of age at addiction, especially for natives compared with migrants.
Levy and Pierce, 1990 (23)	Marijuana	Sydney, Australia†	996 adolescents aged 14–19 years at baseline; 76% (n = 756) followed up 1 year later	Drug use in the social network was associated with marijuana use and initiation.

Table continues

of familial and social network determinants in the initiation of licit drug use, a cross-sectional study of 2,017 high school students found that social network characteristics were more important than familial characteristics in explaining cigarette and alcohol use (16).

Thus, characteristics of one's family during childhood and adolescence (including poor relationships between parents and children, parental educational attainment, and possibly parental substance use) appear to be the primary social factors associated with smoking and alcohol initiation. However, characteristics of families may be less important in specific groups where other social circumstances, including social network use of substances or recent migration, may be more important.

Illicit drugs. There is a substantial literature on the role of social network and family factors as determinants of initiation of illicit drug use. In a prospective cohort study of 996 adolescents in Sydney, Australia, followed for 1 year, characteristics of one's social networks (particularly drug use in the social network) were associated with likelihood of initiating marijuana use (23). Similarly, prospective cohort studies of 3,021 youth in Munich, Germany, and of 1,725 US youth found that peer drug use was associated with incident cannabis use (24, 25). Measures of familial disadvantage (including single parenting and low familial socioeconomic

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TABLE 1. Continued

Study, year (reference no.)	Substance	Location	Sample	Conclusions
Li et al., 2002 (41)	Multiple drugs	China	833 institutionalized drug users	Peer role and perceptions of drug use played an important role in the initiation of drug use and differentiated between early and late drug initiation.
Miller and Miller, 1997 (25)	Marijuana	United States†	1,725 respondents aged 11–17 years selected at baseline (1977); 1,630 subjects interviewed at follow-up 1 year later	Peer marijuana use was associated with initiation among males (OR = 1.83) and females (OR = 2.06); familial characteristics such as socioeconomic status (OR = 3.33) and peer network characteristics such as commitment to friends (OR = 3.25) were associated with initiation among males, whereas, among females, history of victimization (OR = 1.92) was associated with initiation.
Neaigus et al., 2001 (26)	Injection drug use	New York City, New York*	575 noninjecting heroin users (aged ≥18 years)	Frequent former injectors have multiple social and network characteristics—e.g., having sex partners who had ever injected—that may increase their risk of injecting drugs.
Olds and Thombs, 2001 (16)	Multiple drugs	Ohio*	2,017 seventh through 12th graders	Measures of close friends' drinking and social norms were more important than perceived parental involvement variables in explaining cigarette use and alcohol consumption.
Roy et al., 2003 (29)	Injection drug use	Montreal, Canada†	415 street youths aged 14–25 years who had never injected	Homelessness was the most important predictor of initiation (hazard ratio = 3.3).
Simons-Morton et al., 2001 (15)	Multiple drugs	Maryland*	4,263 sixth-, seventh-, and eighth-grade students from seven middle schools	Teens whose parents are involved (for smoking, OR = 0.40), have high expectations (for smoking, OR = 0.39), and hold them in high regard (for smoking, OR = 0.63) are less likely to initiate substance use.
Sobeck et al., 2000 (36)	Multiple drugs	Midwestern suburbs of metropolitan area, United States†	547 students from five suburban/semirural school districts interviewed at the beginning and end of sixth grade	Compared with nonusers, new users were more likely to come from a single-parent family.
Stenbacka et al., 1993 (33)	Multiple drugs	Sweden*	Swedish conscription survey results (1969–1970) from 23,482 Swedish men aged 18–20 years	Low socioeconomic status was associated with decreased odds of being offered drugs (OR = 0.5).
von Sydow et al., 2002 (24)	Marijuana	Munich, Germany†	3,021 randomly selected persons aged 14–24 years who completed a baseline interview in 1995; 2,548 followed up successfully in 1998–1999	Incident cannabis use was predicted by peer drug use, adverse family circumstances, and low socioeconomic status.
Wallace et al., 1999 (14)	Multiple drugs	United States*	Samples from 1991 and 1994 of approximately 25,000 Black eighth, 10th, and 12th graders from 48 US states	For cigarette initiation, OR = 2.48 when students with no parents were compared with those with both parents; for alcohol initiation, OR = 1.39 when students with no parents were compared with those with both parents.
Wells et al., 1992 (43)	Multiple drugs	Seattle, Washington†	778 students from 18 Seattle elementary schools interviewed at baseline in fifth grade (1985) and followed up in sixth grade (1986)	Race differences in levels of problem behaviors did not parallel race differences in substance initiation; school experiences were more important predictors of initiation for Whites than for African Americans or Asian Americans.
Williams and Smith, 1993 (22)	Multiple drugs	South Carolina*	1,911 seventh through 12th graders in South Carolina public schools	Boys who did not have close family relationships were more likely to use substances.

* Cross-sectional study design.
† Prospective cohort study design.
‡ OR, odds ratio.
§ Case-control study design.

status) were also associated with incident cannabis use in both studies. Of note, in the US study, familial and social network characteristics were important determinants of incident marijuana use by men only; among women, history of victimization was the most consistently important predictor (25). In addition, in the US study, urbanicity was associated with initiation of marijuana use, although no attempt was made to identify the characteristics of urban living that may be associated with such initiation.

Social network characteristics, and to a lesser extent familial characteristics, are also the primary social factors identified in initiation of heroin or cocaine use. Social

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network characteristics that have been associated with initiation of injection drug use include having partners who injected drugs (26) and having a high-risk social network (27). In one cross-sectional study of injection drug users during the first 3 weeks of their injection drug use (28), adverse family conditions were associated with a greater likelihood of initiating injection drug use. The latter study also identified individual social circumstances as determinants of initiation of injection, including homelessness and unemployment, although the cross-sectional nature of the study makes it difficult to identify temporal associations between these factors and initiation of injection (28). Homelessness was also identified as an important predictor of initiating injection drug use in a prospective study of 415 adolescents in Montreal, Canada (29).

Two different studies (30, 31) identified drug use by family members as an important determinant of initiation of cocaine use; in a case-control study among African-American heroin users, lower familial socioeconomic status (based on the occupational status of the head of household during the respondent's childhood) was associated with younger age at initiation of heroin use among persons born in the United States but not among migrants (32), suggesting both that familial characteristics may be differently associated with different use of drugs and that cultural determinants (migration) may modify these relations. In contrast to these findings, a study of Swedish conscripts found that lower familial socioeconomic status was associated with a *lower* likelihood of being offered drugs (33); a cross-sectional study of 262 California adolescents found no consistent relation between family socioeconomic status and initiation of substance use (34). Several studies of initiation of multiple drugs have assessed familial social characteristics as potential determinants of substance initiation, also with conflicting results. However, several studies (14, 22, 24, 35–39) consistently associated disruption of family structure with initiation of adolescent drug use. Social network characteristics, particularly drug-using social networks, are also consistently associated with initiation of use of multiple substances. In general, studies have shown that persons with drug-using social networks are more likely to start drug use themselves (13, 16, 40, 41). Involvement in religious activities, possibly a proxy for involvement with non-drug-using social networks, has been shown to be associated with a lower likelihood of illicit drug initiation in one study (42).

The relation between social determinants and drug use initiation is likely modified by several individual characteristics. In a study of 1,911 adolescents in South Carolina public schools, interactions were found between gender and family structure, with boys who did not have close family relationships being most likely to start using substances (22). Similarly, a study of 3,700 young adults in Ontario, Canada, found that the likelihood of early initiation of drugs was greater among male versus female adolescents (35). The role of race/ethnicity in substance use initiation, while considered as a covariate in several of the studies listed here, has been assessed as the primary relation of concern in only a few studies. One prospective cohort study of 778 students from Seattle, Washington, elementary schools found that different factors were associated with initiation of alcohol, cigarettes, and marijuana by different races (43). Educational attainment was a more important predictor of initiation of substance use among Whites than among other races.

In terms of neighborhood-level factors, we are aware of one study that has assessed the relation between neighborhood social factors and initiation of drug use. A prospective cohort study of 1,416 students found that neighborhood disadvantage was associated with initiation of drug use, with a more pronounced effect for illicit (cocaine) than for licit (tobacco, alcohol) drugs (40).

In summary, while adverse family conditions during childhood appear to be an important social determinant of illicit drug use, there is no clear relation between familial socioeconomic status and initiation of illicit drug use. Characteristics of social networks, particularly drug use in the peer network, are prominently studied as social determinants of initiating illicit drug use. However, few studies have been designed to test competing familial or peer network influences. It is likely that individual characteristics, including gender and race, modify the association of adverse family conditions and social network characteristics with initiation of drug use. There is a paucity of studies assessing the relation between other social determinants, particularly contextual determinants, and initiation of drug use, although one study has shown that neighborhood socioeconomic status is associated with initiation of drug use (40).

Use and misuse

Cigarettes and alcohol. The role of individual race/ethnicity as a determinant of licit and illicit drug use is controversial, and a full discussion is again beyond the scope of this review. In brief, while there are racial/ethnic disparities in substance use (3), most studies suggest that these differences are attributable primarily to differences in socioeconomic status or to availability of drugs rather than to race/ethnicity itself (44) (table 2). In the United States, the National Survey on Drug Use and Health (3) has long shown socioeconomic differences in cigarette, alcohol, and illicit substance use. Persons reporting lower income describe a higher prevalence of cigarette and illicit substance use but a lower prevalence of alcohol use (3). Results from another US population survey have shown an independent association between a higher prevalence of current smoking and working-class jobs, low educational achievement, and low income (45).

Similar findings have been documented in other settings. For example, in a large cross-sectional German survey, a higher prevalence of smoking was found among persons who were unemployed or who had lower educational attainment (46). These cross-sectional findings are limited by the possibility of social selection; that is, use of substances is causally associated with lower socioeconomic status. However, three cohort studies, one in the United Kingdom (47) and two in the United States (48, 49), have shown that socioeconomic status influences adult smoking behavior (both US studies showed this finding to be the case independent of adolescent smoking) and that socioeconomic conditions over the life course are associated with increased

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TABLE 2. Key studies assessing the relation between social factors and substance use and misuse

Study, year (reference no.)	Substance	Location	Sample	Conclusions
Bahr et al., 1995 (58)	Alcohol	Utah*	27,000 seventh- through 12th-grade students interviewed in 1989	Family bonding was associated with low frequency of alcohol consumption and small quantity of alcohol consumed.
Barbeau et al., 2004 (45)	Cigarettes	United States*	24,276 adults (aged 18–64 years) from the 2000 National Health Interview Survey	Prevalence of current smoking was independently associated with working-class jobs, low educational achievement, and low income.
Ennett et al., 1997 (61)	Multiple drugs	Midwestern United States*	36 elementary schools	Students in schools in more socially advantaged neighborhoods had a higher prevalence of cigarette use and alcohol consumption.
Gilman et al., 2003 (48)	Cigarettes	Providence, Rhode Island†	657 offspring (aged 30–39 years) of participants of the Brown University birth cohort	Persons from lower socioeconomic backgrounds had a significantly increased risk of smoking initiation; low socioeconomic background during childhood increased the risk of progression to regular smoking and was associated with a reduced likelihood of smoking cessation.
Helmert et al., 2001 (46)	Cigarettes	Germany*	186,424 respondents from a German microcensus	A higher likelihood of smoking was found for persons with lower educational achievement, low occupational status, and unemployment.
Jefferis et al., 2003 (47)	Cigarettes	England†	6,537 respondents from the British birth cohort followed for 41 years	Persons with low socioeconomic backgrounds had a greater risk of being smokers at age 41 years.
Jefferis et al., 2004 (49)	Cigarettes	England†	3,180 respondents from the 1958 British birth cohort	Childhood socioeconomic circumstances predicted persistent smoking among women but not men, where the relation was mediated by educational attainment; for both men and women, stronger effects were found for adulthood vs. childhood socioeconomic circumstances.
Jones-Webb et al., 1995 (60)	Alcohol	United States*	723 African-American men and 743 White men from the National Alcohol Survey (1984)	Black men of lower socioeconomic status were more likely to report more drinking consequences and total problems than White men of lower socioeconomic status; White affluent men reported greater drinking consequences and problems than Black affluent men.
Kadushin et al., 1998 (59)	Multiple drugs	United States*	9,762 persons (aged 22–44) from 42 urban communities across the United States	Socioeconomic status confounds the association between Black ethnicity and alcohol dependence; Blacks have a greater likelihood of dependence compared with Whites because they are relatively poorer and less likely to be in the labor force.
Kafka and London, 1991 (51)	Multiple drugs	New England, United States*	37 students from two New England high schools, one urban and the other rural/suburban	Estimates of friends' substance use were associated with adolescent substance use, particularly for the closest friends.
Karvonen and Rimpela, 1997 (65)	Multiple drugs	Helsinki, Finland*	1,048 persons aged 16–18 years in 33 subareas of Helsinki	Small-area deprivation was not associated with smoking; deprivation was associated with heavier drinking among boys but not girls.
Kleinschmidt et al., 1995 (63)	Cigarettes	North West Thames Region, United Kingdom*	8,251 adults from the general population	Persons in the highest quintile of neighborhood deprivation had 1.52 times higher odds of being smokers compared with persons in the lowest quintile of neighborhood deprivation.
Lindenberg et al., 1999 (57)	Multiple drugs	United States*	60 Hispanic women of childbearing age (15–34 years) from a community health-service center serving indigents	Women with substance-use problems were more likely to report greater substance use by family members and peers.

Table continues

smoking rates among persons of lower socioeconomic status. Additionally, a prospective cohort study assessing the relation between unemployment and substance use found that men who had experienced more than 3 years of accumulated unemployment between the ages of 16 and 33 years were more likely to smoke and to engage in problem drinking than were men who had never been unemployed (50).

Multiple studies (12, 51, 52) have associated social network peer smoking with a greater likelihood of smoking. Similarly, a number of epidemiologic studies from different countries have found that family and social network

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TABLE 2. Continued

Study, year (reference no.)	Substance	Location	Sample	Conclusions
Lindstrom et al., 2003 (66)	Cigarettes	Sweden*	5,600 persons (aged 20–80 years) from the general population	Neighborhood factors were not associated with the likelihood of smoking.
Madianos et al., 1995 (52)	Multiple drugs	Greece*	2,448 adolescents (aged 12–17 years) and young adults (aged 18–24 years) from the general population	Peer use of drugs was significantly associated with both illicit and licit drug use.
Montgomery et al., 1998 (50)	Cigarettes and alcohol	England†	2,887 men from the 1958 British birth cohort study followed between ages 16 and 33 years	Men who had experienced >3 years of accumulated unemployment between ages 16 and 33 years were more likely to smoke (OR‡ = 2.11) and engage in problem drinking (OR = 2.15) than men who had never been unemployed.
Nakashima and Wong, 2000 (56)	Alcohol	Southern California*	484 Korean and 1,391 White ninth- and 12th-grade students from 15 schools with sizable proportions of Asian Americans	Peer encouragement to get drunk was associated with alcohol misuse among Korean Americans; peer encouragement and family norms were associated with alcohol misuse among Whites.
Oostveen et al., 1996 (53)	Alcohol	Limburg, the Netherlands*	696 young people aged 15–24 years from two populations, students and visitors of public drinking places	Heavy drinkers tend to perceive social norms of family and peers to favor drinking.
Reijneveld, 2002 (62)	Cigarettes	Seven cites in the Netherlands*	23,269 residents in 484 neighborhoods, general population age >16 years	Living in more deprived neighborhoods was associated with a significantly greater likelihood of smoking cigarettes.
Scheier et al., 1997 (54)	Alcohol	Eastern United States†	823 eighth-grade students from 56 middle and junior high schools in the eastern United States followed up in 10th grade	Peer models of drinking and normative expectations of peer and adult consumption strongly influence alcohol consumption.
Thundal et al., 1999 (55)	Alcohol	Goteborg, Sweden*	416 women interviewed between 1995 and 1996	Unemployment (OR = 2.9), less social support (OR = 2.6), lower socioeconomic status (OR = 4.1), peer drinking, and family structure were associated with women's alcohol dependence or abuse.
Tseng et al., 2001 (64)	Cigarettes	North Carolina*	648 women interviewed between 1993 and 1996	Living in a low-education area (OR = 1.7) and in a high-unemployment area (OR = 1.7) was associated with a greater likelihood of continued smoking among ever smokers.
Weitzman and Kawachi, 2000 (67)	Alcohol	United States*	17,592 young adults enrolled in 140 colleges	Students from campuses with higher-than-average social capital had a 26% lower risk of binge drinking than their peers.
			Illicit drugs	
Boardman et al., 2001 (74)	Multiple drugs	Detroit, Michigan*	1,101 Caucasian and African-American adults (aged 19–97 years)	After adjustment for socioeconomic status, a significant, positive association was found between neighborhood disadvantage and drug use (OR = 8.2); the net effect of neighborhood disadvantage on drug use among adults was most pronounced for persons with low incomes.
Buchanan et al., 2003 (80)	Injection drug use	Springfield, Massachusetts*	164 active injection drug users from two neighborhoods in Springfield	Injection drug users in more economically advantaged neighborhoods were more likely to share syringes from a single source and more likely to inject alone in their own residence.
Grunbaum et al., 2000 (68)	Multiple drugs	Texas*	475 students from five dropout prevention and recovery high schools	Family caring was inversely associated with marijuana use (OR = 0.90) and cocaine use (OR = 0.92); low educational aspiration (OR = 2.86) was associated with cocaine use.

Table continues

substance use and norms about substance use are associated with alcohol use and misuse (20, 53–57). For example, a cross-sectional assessment of 42,862 adults found that the percentage of alcoholic relatives was positively associated with the likelihood of developing alcohol dependence among alcohol drinkers (20). Although few studies have focused on comparing the relative contribution of family and social network norms, one cross-sectional study of 27,000 high school students in Utah showed that better family bonds were associated with less alcohol drinking among adolescents, although this finding was hypothesized to be mediated by social network involvement, whereby adolescents with stronger family bonds had fewer members of their social network who used substances (58). In one study designed to assess social influences on alcohol dependence among women, drinking among social networks, poor social support, and lower socioeconomic status (characterized by education and employment) were all associated with a

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TABLE 2. Continued

Study, year (reference no.)	Substance	Location	Sample	Conclusions
Hoffman et al., 1997 (78)	Injection drug use	Chicago, Illinois, and Washington, DC†	55 injection drug users (aged ≥18 years)	Network turnover (a higher proportion of new members entering a network) during follow-up was associated with risky behavior at follow-up (OR = 6.0).
Kandel, 1984 (69)	Marijuana	New York State*	1,325 young adults	Participation in a social network of other marijuana-using persons was associated with marijuana use.
Latkin et al., 1995 (75)	Injection drug use	Baltimore, Maryland*	292 Baltimore residents (aged ≥18 years) who had injected in the prior 6 months	Social network density (OR = 2.62) and size (OR = 1.13) were associated with injecting.
Lillie-Blanton et al., 1993 (44)	Cocaine	United States*	8,814 persons residing in households	After grouping into neighborhood clusters, no racial/ethnic differences were found in crack cocaine use.
Lovell, 2002 (76)	Injection drug use	Marseilles, France*	91 adults (aged ≥18 years) who had injected heroin in the past year	Location in the dense subgroup of a sociometric network of injection drug users greatly increased the chances of engaging in risky injection behavior (OR = 6.27).
Newcomb and Bentler, 1986 (71)	Cocaine	Los Angeles , California*,†	739 young adults (aged 19–24 years) from county schools	Greater perceived peer use and approval of use predicted cocaine use among young adult men and women.
Schroeder et al., 2001 (72)	Multiple drugs	East Baltimore, Maryland†	342 injection drug users (aged ≥18 years)	Network illicit drug use (OR = 4.31) and a high degree of neighborhood drug-related arrests predicted continuing heroin and cocaine use after adjustment for demographic and treatment variables.
Suh et al., 1997 (79)	Injection drug use	Baltimore, Maryland*	499 inner-city injection drug users aged ≥18 years	Injection drug users with large drug networks that also provided social support were more likely to share needles, while injection drug users with larger drug networks that did not provide support were more likely to inject in commercial settings.
Sussman et al., 2000 (70)	Multiple drugs	Southern California†	702 youth from 21 continuation high schools who completed baseline and follow-up interviews	Interpersonal influence measures (friends' use of drugs, prevalence of peer drug use, peer approval of drug use) did not predict substance abuse or dependence in multivariate models.
Tam et al., 2000 (73)	Multiple drugs	Sacramento, California*	217 persons (aged ≥18 years) from Kaiser Permanente's Dependency Treatment Program	Social/family problems were associated with alcohol and drug dependence compared with alcohol dependence only (OR = 3.01).
Zapka et al., 1993 (77)	Injection drug use	United States*,†	385 injection drug users from an inpatient drug detoxification and rehabilitation program	Participants who had more friends who used bleach kits (OR = 2.03) and a greater number of people with whom cleaning was discussed were more likely to bleach their works at baseline.

* Cross-sectional study design.
† Prospective cohort study design.
‡ OR, odds ratio.

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greater likelihood of alcohol dependence or abuse (55). A cross-sectional study of 9,762 adults from 42 urban communities in the United States found that lower socioeconomic status was associated with a greater likelihood of alcohol dependence (59). This study also found that neighborhood drug availability and norms were associated with alcohol dependence.

As is the case with substance initiation, the relation between social factors and alcohol use and misuse likely is modified by sociodemographic factors. For example, in a study of 484 Korean and 1,391 White high school students in California, social network drinking norms were the strongest predictor of alcohol misuse among Korean Americans, while a number of other factors, including familial norms and psychological variables, were important among Whites (56). In a cross-sectional study using data from the National Alcohol Survey, among men of poor socioeconomic status, Blacks were more likely than Whites to report more problems with drinking; among men of better socioeconomic status, Black men reported fewer alcohol drinking problems than did White men (60). In a prospective cohort study using data from a British birth cohort, childhood socioeconomic circumstances predicted persistent smoking among women but not men (49).

In terms of contextual determinants of smoking and alcohol use, area-level social and economic disadvantage may be associated with a greater likelihood of use of cigarettes and alcohol. In an ecologic analysis, rates of cigarette and alcohol use were higher in schools in more advantaged neighborhoods (61). A cross-sectional multilevel study of

Dutch cities found that living in deprived neighborhoods was associated with a greater likelihood of cigarette smoking (62). Similarly, a study in the United Kingdom showed that deprivation in the area of residence remained a significant predictor of smoking status even after the socioeconomic group of the person was taken into account (63). In a US analysis of 648 women, continued smoking by persons who had ever smoked was associated with living in low-education, high-unemployment areas (64). However, the small-area effects on smoking and drinking were less clear in a Finnish study of adolescents; small-area deprivation was associated with heavy drinking among boys (65). A Swedish study found limited evidence for a role of social capital in determining the likelihood of smoking (66). In contrast, in a US multilevel analysis controlling for individual volunteering, sociodemographics, and several college characteristics, students from campuses with higher-than-average levels of social capital had a lower individual risk of binge drinking than their peers at other schools, suggesting a role for social capital at least in limiting abuse of alcohol (67).

Thus, the extant literature primarily has focused on the role of family and social network norms about cigarette and alcohol use and their association with the likelihood of licit drug use and misuse. These relations may be modified by sociodemographic factors. Individual social characteristics, including low socioeconomic status and poor social support, also may be associated with a greater likelihood of cigarette and alcohol abuse or dependence, although the data in this regard are limited. In contrast to the literature on substance use initiation, there is little evidence of a role for adverse childhood family conditions in adult cigarette or alcohol use and misuse. A growing body of evidence suggests that area-level characteristics, particularly socioeconomic deprivation, are associated with a greater likelihood of smoking cigarettes and drinking alcohol.

Illicit drugs. A relation between socioeconomic status and marijuana use has been documented in several studies. A cross-sectional study of 23,482 Swedish men found that lower socioeconomic status was associated with a lower likelihood of marijuana use (33). A cross-sectional study of 3,142 prisoners in England and Wales found that use of heroin and cocaine was associated with lower educational attainment and homelessness (38). Low educational aspiration was associated with cocaine use among students who had dropped out of high school (68).

Similar to the licit substance use literature, most studies to assess the question have documented a relation between family and social network norms and the use of illicit substances (23, 52, 69), although some studies have failed to document this association (70). For example, in a prospective cohort study of 996 adolescents in Sydney, Australia, marijuana exposure through friends and siblings was a primary determinant of current marijuana use (23). Parental illicit drug use also has been associated with illicit drug use by adults in some studies (24, 57). Use of illicit drugs by members of one's social networks is associated with a greater likelihood of drug use (52, 71, 72). Adverse childhood family conditions have been associated with a greater likelihood of multiple drug use (73); conversely, more stable family relations have been shown to be associated with a lower likelihood of marijuana use (68).

One study has systematically assessed the relation between neighborhood characteristics and use of illicit drugs. In a study of 1,101 White and African-American adults from Detroit, Michigan, an association was found between neighborhood disadvantage and drug use after the authors controlled for individual social and psychological resources (74). This association was stronger for persons of low socioeconomic status. In the context of illicit drug use, a body of work has assessed the relations between social factors and drug risk behavior among injection drug users (e.g., Latkin et al. (75), Lovell (76), Zapka et al. (77), Hoffman et al. (78), Suh et al. (79), and Buchanan et al. (80)); a full synthesis of the relation between social factors and risk behavior is beyond the scope of this review.

Thus, multiple social factors have been associated with illicit drug use, although relatively few studies have explored each of these factors. Family and social network norms appear to play a role in illicit drug use and misuse. Different social network characteristics in particular seem to be related to drug-use risk behavior. A few studies have demonstrated associations of low individual socioeconomic status and neighborhood disadvantage with use and misuse of illicit drugs.

Cessation, abstinence, and relapse

Although cessation, abstinence, and relapse represent distinct stages in the natural history of substance use, there is a substantially more limited body of work about each of these stages than there is about initiation of substance use and about substance use and misuse. Therefore, this section presents key peer-reviewed literature that has assessed the relation between social factors and all three of these stages together.

Cigarettes and alcohol. Socioeconomic status and educational attainment have been associated with smoking cessation in multiple studies. In a cross-sectional study of 236,111 adults, persons below the poverty line were less likely to quit smoking during a 10-year period (81) (table 3). In a prospective cohort study of 414 adult smokers in Detroit, Michigan, smokers with less than a college education were less likely to quit compared with college-educated smokers (82). Social norms may mediate the relation between socioeconomic status and smoking cessation. In a cross-sectional study of 3,553 adult smokers from nine US states, college-educated heavy smokers were more likely to perceive pressure to quit (83), and low educational achievement was associated with a lower likelihood of cessation in another study (84). A US study of 2,626 smokers from 44 work sites found that, compared with other workers, blue-collar workers reported less pressure to quit smoking, less social support for quitting, and less nonacceptability of smoking among their co-workers (85). In one study, women were more likely than men to perceive pressure to quit, suggesting that some of these relations may be modified by gender (83). One Swedish study showed that emotional social support was independently associated with smoking cessation in multivariable models (86).

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TABLE 3. Key studies assessing the relation between social factors and substance cessation and relapse

Study, year (reference no.)	Substance	Location	Sample	Conclusions
Bond et al., 2003 (91)	Alcohol	Northern California*	367 men and 288 women from public and private alcohol treatment programs	Predictors of 90-day abstinence at 1- and 3-year follow-up included less drinking in social network and social support for reducing drinking.
Breslau et al., 1996 (82)	Cigarettes	Southeast Michigan*	414 persons (aged 21–30 years) from a health maintenance organization with a history of daily smoking	Smokers with less than a college education were 60% less likely to quit compared with college-educated smokers (hazard ratio = 0.40).
Broome et al., 2002 (90)	Multiple drugs	United States*	748 patients from 12 short-term inpatient treatment programs	Associating with deviant peers and living with a drug user or alcohol drinker was associated with relapse; abstinence support at home was associated with abstinence.
Chen et al., 2001 (87)	Cigarettes	New Jersey*	1,201 young-adult daily smokers followed up three times over 13 years	Becoming married to a nonsmoker (OR† = 4.7) and a decreasing proportion of friends who smoked (OR = 1.7) were associated with cigarette smoking cessation.
Flint and Novotny, 1997 (81)	Cigarettes	United States‡	236,111 adults (aged ≥18 years) from the US National Health Interview Survey	Persons below the poverty threshold were found to be significantly less likely to be quitters than those at or above the poverty threshold for all years between 1983 and 1993.
Hanson et al., 1990 (86)	Cigarettes	Malmo, Sweden‡	500 residents of Malmo born in 1914	Higher levels of emotional support were associated with successful cessation (OR = 3.1).
Kaskutas et al., 2002 (89)	Alcohol	Northern California*	654 persons entering treatment in heterogeneous public and private programs	Having a supportive social network is important for abstinence (OR = 2.79); persons in Alcoholics Anonymous may offer types of social support that differ from those offered by nonmembers.
van Oers et al., 1999 (92)	Alcohol	Rotterdam, the Netherlands‡	General population survey; n = 8,000	Education and abstinence were inversely associated.
Royce et al., 1997 (83)	Cigarettes	United States‡	3,553 adult smokers (aged 25–64 years) from nine states	College-educated heavy smokers were more likely than non-college-educated heavy smokers to report feeling pressure to quit (OR = 1.8).
Sorensen et al., 2002 (85)	Cigarettes	Rhode Island and Massachusetts‡	2,626 smokers from 44 work sites	Compared with other workers, blue-collar workers reported less pressure to quit, social support for quitting, and nonacceptability of smoking by their co-workers.

Table continues

Both family and social network norms have been associated with cessation of smoking (87) or with efforts to quit smoking (88). In a prospective cohort study of 1,201 young adult daily smokers followed over 13 years, becoming married to a nonsmoker and a decreasing proportion of friends who smoked were important predictors of smoking cessation (87). Family characteristics also may be important determinants of smoking cessation among adolescents. The RAND prospective Adolescent Young Adult Panel study of 3,056 adolescents in California and Oregon found that adolescents from families with higher levels of parental education were less likely to quit smoking (9). A prospective cohort study of 952 African Americans found that parental supervision and religiosity (possibly as a reflection of social network norms) were associated with a greater likelihood of cessation (10).

Most of the peer-reviewed literature in this area suggests that social support and social network norms also are associated with cessation of alcohol use. In one prospective cohort study of 654 persons entering treatment in Northern California, having persons who supported alcohol abstinence in one's supportive social networks was an important determinant of sustained abstinence (89). Another prospective cohort study of 748 patients from 12 short-term inpatient programs showed that abstinence support at home was associated with long-term abstinence (90). Other US and European studies have confirmed these observations (91–93).

Therefore, social norms, as manifest in families and in social networks, are consistently associated with likelihood of cessation and with sustained abstinence of cigarettes and alcohol. High socioeconomic status is associated with likelihood of cessation, although some of this relation may be mediated by social norms. Social support also is an important determinant of sustained cigarette and/or alcohol abstinence.

Illicit drugs. Social factors associated with cessation of illicit drug use are similar to the factors associated with cigarette and alcohol cessation. In a prospective cohort study of 706 marijuana users, higher education was associated with cessation of marijuana use (94). In contrast to cigarette and marijuana use, in the context of family relations, it is

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TABLE 3. Continued

Study, year (reference no.)	Substance	Location	Sample	Conclusions
Tillgren et al., 1996 (84)	Cigarettes	Sweden*	1,546 daily smokers from the general population interviewed at baseline in 1980–1981 and followed up in 1988–1989	For women, low educational level was significantly associated with continued smoking (OR = 2.5); being married/cohabiting was an important predictor of successful cessation.
Weisner et al., 2003 (93)	Alcohol	Northern California*	482 alcohol-dependent adults from Northern California	Having more drug users and heavy drinkers in one's social network was inversely related to abstinence.
West et al., 2001 (88)	Cigarettes	United Kingdom*	865 adult (aged ≥16 years) smokers randomly sampled from England and Wales	Pressure from one's partner to stop smoking was associated with attempts to quit (OR = 1.53) but was not significantly associated with successful attempts to quit smoking.
			Illicit drugs	
Chen and Kandel, 1998 (94)	Marijuana	New York State*	706 marijuana users followed from baseline in 1971 (aged 15–16 years) to 1990 (aged 34–35 years)	More education was significantly associated with marijuana cessation (OR = 1.76), as was becoming a parent for the first time (OR = 4.71).
Havassy et al., 1995 (98)	Multiple drugs	San Francisco Bay Area, California*	104 cocaine users (54 White, 54 Black) followed for 6 months after completing drug treatment	Greater social support predicted abstinence among Whites but not among Blacks.
Kandel and Raveis, 1989 (99)	Injection drug use	New York State*	1,222 young adults interviewed at baseline in 1971 (aged 15–16 years) and followed up in 1980 and 1984 (aged 28–29 years)	Having fewer friends involved in drug use was associated with cessation of marijuana use for women and cessation of cocaine use for men and women.
Knight and Simpson, 1996 (97)	Injection drug use	Texas*	439 daily heroin users admitted to three methadone maintenance clinics	Participants reporting positive changes in family conflict and peer deviance during treatment were less likely to inject drugs than those reporting no improvement.
Latkin et al., 1999 (100)	Injection drug use	Baltimore, Maryland*	335 adults (aged ≥18 years) who reported injecting and sharing drugs	Having a smaller proportion of drug users in one's network was an important predictor of cessation of drug use (OR = 25.4).
Lundgren et al., 2003 (95)	Injection drug use	Massachusetts*	9,018 women who reported having injected drugs in the past year	Mothers residing with their children were 73% more likely to enter methadone maintenance than mothers who do not reside with their children.
Sussman and Dent, 1999 (96)	Marijuana	United States*	566 adolescent marijuana users (aged 14–19 years) interviewed from 21 high schools	Less peer approval of marijuana use was associated with quit status; peer approval of drug use may be an important predictor of successful cessation.

* Prospective cohort study design.
† OR, odds ratio.
‡ Cross-sectional study design.

primarily the assumption of greater family responsibilities that has been associated with cessation of use. For example, becoming a parent for the first time has been associated with cessation of marijuana use (94); having children has been associated with entry into methadone maintenance by injection drug using women (95). A prospective cohort study of 566 adolescent marijuana users found that social networks that were less supportive of marijuana use were associated with likelihood of cessation (96).

Although socioeconomic factors are not consistently associated with cessation of illicit drug use, homelessness has been shown to be associated with a lower likelihood of seeking treatment for drug use and employment with an increased likelihood of seeking treatment (95). Importantly, several studies have found social supports and increased family responsibility to be associated with cessation of illicit drug use. One prospective cohort study of 439 daily heroin users admitted to three community-based methadone maintenance clinics found that reduction of family conflict, likely a marker of strengthening social supports, was associated with a decreased likelihood of drug injection (97). Social supports and social network norms not supportive of illicit drug use have been associated with both cessation and sustained abstinence (98, 99), although it has been suggested that this observation is different by racial/ethnic group (98). For example, a smaller proportion of drug users in one's social networks has been shown to be an important predictor of cessation (100). Thus, family and social network norms are the factors primarily associated with cessation of illicit drug use and sustained abstinence.

METHODOLOGICAL ISSUES

In evaluating the relation between social factors and substance use, several methodological issues arise that merit special attention. These issues include 1) assessment of exposure and outcome measures, 2) selection of an appropriate study design, and 3) choice of analytic model to describe the social factor–substance use relation.

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In epidemiologic studies, clear definition of the potential determinants and of the disease or behavior of interest is essential. Although this may seem self-evident, in studies considering the social epidemiology of substance use, it is not infrequent that exposure and outcome are either not clearly defined or not comparable across studies. For example, several studies reviewed here consider adverse familial conditions during childhood as a determinant of initiation of substance use. However, different studies have considered different, potentially adverse family conditions, including less parental supervision (10), marital conflict (11), or single-parent households (24). Although it is reasonable to think of these different measures as representing a similar construct (here summarized as "adverse family conditions"), it is also plausible that these variables represent related, but different constructs, each meriting attention. Growing up in a single-parent household can be a risk factor for initiation of use of different substances that is different from issues related to parental conflict.

Advances in the field will require both clearer specification of the constructs hypothesized to influence substance use and testing of the role these constructs play in different, replicable studies. Differences in measures used in the studies discussed here limit both the ability to generalize their observations and the deductive hypothesis testing that can follow in subsequent studies. Similarly, problems of outcome definition are not uncommon in this literature, particularly in the context of the substance misuse literature and in the literature about substance use cessation. In the former, although a growing number of studies make use of the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (101) criteria for assessing substance abuse/dependence, a number of studies assess frequency of use (58) or substance-related problems (60). Once again, even though these measures may plausibly represent similar constructs, it is also possible that social determinants of behavioral pathology (i.e., abuse or dependence) are not important risks for increased substance use frequency. These differences currently are obscured because of the paucity of studies that have specifically assessed different potential outcomes. Future work should consider the possible relations between social factors and different forms of substance misuse. In the context of substance cessation, the primary limitation in outcome specification is the window of analysis and the period of abstinence from substances examined. It is likely that studies that assess substance cessation over a narrow window in fact are assessing relapsing substance-use patterns (102), which may importantly have different determinants.

Choice of study design may play a particularly important role in studies aimed at understanding the relation between social factors and the natural history of substance use. For example, appropriate definition of substance use cessation requires studies with suitably long follow-up periods, probably involving use of a cohort study, analyzed either prospectively or retrospectively. A number of studies summarized in this review are indeed cohort studies, although they frequently differ regarding their length of follow-up. For example, two cohort studies summarized here about the determinants of cigarette cessation used a follow-up period of 13 years (87) and 1 year (88). While the former study identified both social network and family norms as determinants of cigarette cessation, the latter found that only family norms was a relevant determinant. It is plausible that social network norms are important determinants of cigarette cessation but not of the relapsing cigarette use patterns likely measured in the shorter follow-up period. Consistent choice of study design and of critical study features such as follow-up period are important for a clearer understanding of the role of some of the key determinants discussed here.

Ultimately, the observations summarized in this review are predicated on papers that primarily use linear analytic methods to assess the relation between social factors and substance use. While it is consistent with the general preponderance of linear models in risk factor epidemiology, reliance on linear assumptions may be particularly limiting when determinants of behavior are considered. Although linear models have been used to assess the relation between, for example, family socioeconomic status and initiation of cigarette use (9), this relation likely is not linear but rather follows a threshold whereby children in families of a particular socioeconomic status are at an increased risk of starting to smoke cigarettes. Analyses that consider possible threshold or other nonlinear effects (such as U- or J-shaped relations) can identify nuanced relations between social determinants and substance use that are otherwise obscured by assumptions of linearity.

SUMMARY AND FUTURE RESEARCH

To date, a number of studies have shown that specific social factors are associated with the various stages of substance use. Beginning with substance use initiation, social factors early during the life course have been linked to initiation of both licit and illicit substances. Specifically, adverse family conditions, assessed in multiple ways in different studies, including low levels of parental supervision and single-parent families, have been associated with both smoking and alcohol initiation. However, this finding may be less important in specific groups characterized by social networks that make substance use acceptable. Adverse family conditions during childhood also are linked to initiation of illicit substance use, although several studies have found illicit drugs in peer networks to be predominantly associated with initiation of illicit substance use. Although the role of contextual determinants in the initiation of illicit substance use has been suggested by some studies, there is very little research in this area. Family and social network norms are the primary social determinants that have been studied in the context of both licit and illicit substances. In light of the burgeoning evidence for genetic determinants of substance use (103, 104), it will be important for future work to distinguish between the influence of family norms and the potential role of shared genotype. Individual social factors such as socioeconomic status and social support also may play a role in determining cigarette and alcohol use and misuse, although the role of these factors is controversial and remains ill defined. Growing evidence suggests a role for contextual factors, particularly neighborhood deprivation, as determinants of cigarettes and alcohol use. Family and social network norms also are prominently considered in the litera-

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ture about substance use cessation, although social support appears to be an important determinant of substance use cessation independent of other factors.

The extant epidemiologic literature considering the relations between social factors and substance use has a number of strengths. Several of the studies reviewed here used prospective cohort designs that made it possible to convincingly assess the relation between social factors and different stages of substance use. In addition, key social determinants (e.g., social network norms) have been shown to be associated with different stages of substance use in multiple studies using different designs. These factors are clearly important social determinants of substance use and misuse and potentially can be targets of intervention. However, the social epidemiologic literature falls short in its consideration of a number of other social factors that may play important roles in substance use. There are three primary areas in which future research stands to make a substantial contribution.

First, although early research in the area is promising, there is a paucity of research that assesses the relation between contextual variables (e.g., neighborhood socioeconomic status, segregation) and substance use or misuse. Multilevel research methods are gaining in prominence in epidemiology (105) and present an opportunity to identify group-level variables that explain substantial interindividual variation in substance use. Such studies pose particular methodological demands; for example, they frequently require a larger sample size at multiple levels than do studies concerned with only individual-level determinants (106). To advance this area of research, studies will need to be designed specifically to test multilevel hypotheses.

Second, scant work has been published about some individual-level social factors (e.g., discrimination) and their potential role in substance use. The role of fundamental social factors, particularly individual socioeconomic status, as a determinant of substance use remains unclear, largely as a result of the methodological difficulties of separating socioeconomic status from closely linked confounders (e.g., race/ethnicity).

Third, evidence suggests that exogenous factors are inextricably linked with endogenous factors, particularly genetic determinants, in shaping individual risk for substance use and misuse (107, 108). As such, future social epidemiologic research has much to gain by considering not only how social factors may influence substance use in isolation but also how social factors may modify relations between endogenous variables and substance use behavior. Key steps in addressing such questions are reliable cataloging of the social factors associated with the different stages of substance use and formulation and testing of hypotheses that explain relations between social factors and endogenous variables.

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