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ALCOHOL IS NOT THE GATEWAY TO HARD DRUG ABUSE

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Much prior research has found that alcohol and/or tobacco use in early adolescence typically precedes marijuana use which typically precedes any hard drug use and abuse. This finding has been often misinterpreted as suggesting that use of alcohol somehow "causes" subsequent hard drug abuse. This perspective has lead to the simplistic policy position that preventing alcohol use among youths will eventually solve the broader problem of substance abuse. This paper reviews the ample evidence which refutes this claim and encourages those involved with policy development not to oversimplify the challenges and problems facing youths.

Introduction

Does use of alcohol by youths lead them to abuse hard drugs such as cocaine, crack and heroin? This question is ambiguous because the phrase "leads to" has two distinct meanings: precedes and causes. A wealth of studies document that initial use of alcohol often occurs in adolescence while use of illicit drugs typically starts in the later teens. In this narrow temporal sense, use of alcohol often precedes any use of illicit drugs. On the other hand, policy statements concerning alcohol and drug abuse prevention frequently employ the phrase "leads to" to suggest that use of alcohol effectively "causes" subsequent hard drug abuse. These statements often mistakenly refer to the gateway theory to establish the "scientific" credibility of their claim.

Kandel (1978) whose seminal work is widely acknowledged for pioneering research on the gateway theory suggests that the process leading to the possible abuse of hard drugs typically follows a series of stages from non-use to use of alcohol and/or tobacco, then to marijuana and lastly to hard drugs. Most importantly, individuals who do not use substances at one stage rarely initiate use

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of any of the substances associated with later stages. Much subsequent research has confirmed this general sequence (Andrews et al. 1991; Blaze-Temple and Lo 1992; Brook et al. 1982; Donovan and Jessor 1983; Elliott et al. 1989; Fleming et al. 1989; Hays and Ellickson 1991; Kandel et al. 1992; Welte and Barnes 1985). Because of their role in early stages of this process leading to hard drug abuse, alcohol, tobacco and marijuana came to be known as *gateway drugs*.

It is important to identify whether use of alcohol in adolescence somehow causes subsequent hard drug abuse or simply identifies some youths who are at higher risk of becoming hard drug abusers. The more naive political rhetoric has implied the former while the scientific literature has concentrated on the latter. This paper disputes the contention that alcohol use causes hard drug abuse. It concludes by recommending more appropriate prevention policies and by identifying important directions for future research.

Kandel's Original Model

Denise Kandel based her stages theory on findings from her reading of several longitudinal studies of development including her own (Kandel 1978;Yamaguchi and Kandel 1984). Her study followed a representative sample of 1,325 New York State public secondary school students recruited in 1971. The analysis examined the variation in the sequence of initiation for the following categories of substances: 1) alcohol, 2) cigarettes, 3) marijuana, 4) illicit drugs such as cocaine and heroin, and 5) prescribed psychoactive drugs such as tranquilizers or stimulants. Her study considered only those substances an individual reported having used at least 10 times. Various modified Guttman scales were examined by first proposing a series of rules thought to characterize the use of which substances typically preceded others, and then identifying which substance use histories conformed to these rules. The following rules summarize the substance use sequences characterizing the progression of 87% of male respondents:

Typical Sequence of Substances Used by Male Respondents:

- Alcohol preceded marijuana
- Alcohol and marijuana preceded other illicit drugs
- Alcohol, cigarettes, and marijuana preceded prescribed psychoactive drugs

The following rules summarize the substance use sequences characterizing the progression of 86% of female respondents:

Typical Sequence of Substances Used by Female Respondents:

- Either alcohol or cigarettes preceded marijuana
- Alcohol, cigarettes and marijuana preceded other illicit drugs
- Alcohol and either cigarettes or marijuana preceded prescribed psychoactive drugs

Kandel explicitly rejected the set of rules corresponding to the gateway model because it described a smaller proportion (82% for male respondents, and 79% for female respondents).

The Oft-Cited Gateway Sequence of Substance Use:

- Alcohol preceded marijuana
- Alcohol, cigarettes and marijuana preceded other illicit drugs
- Alcohol, cigarettes and marijuana also preceded prescribed psychoactive drugs

Although this study suggested a particular temporal sequence of substances was used by most respondents, it is important to note that 10 to 15% of the respondents followed a sequence not specified by the gateway model. Yamaguchi and Kandel (1984:671) drew the following conclusions:

> These findings advance our understanding of sequential patterns of drug involvement beyond that gained from earlier analyses based on adolescents. The sequence of involvement into drugs progresses from the use of at least one legal drug, alcohol and/or cigarettes, to marijuana; and from marijuana to other illicit drugs, and/or to prescribed psychoactive drugs...
>
> The existence of sequential stages of progression, however, does not necessarily imply causal linkages among different drugs since the observed sequences could simply reflect the association of each class of drugs with different ages of initiation and/or individual attributes rather than the specific effect of the use of one class of drug on the use of another. Furthermore, it is important to keep in mind that although a clear developmental sequence in drug involvement has been identified, use of a drug at a particular stage does not invariably lead to the use of other drugs higher up in the sequence. Many youths stop at a particular stage and do not progress further. In addition, the particular sequence of progression that has been identified may be determined partly by secular trends. This can only be ascertained by studies of different cohorts and different cultures. . . .

Thus, Yamaguchi and Kandel are careful not to jump from the identification of a typical sequence to the claim that alcohol use somehow causes subsequent hard drug abuse.

The Gateway and Stepping Stone Metaphors

Homespun metaphors are meant to help researchers, policy analysts, policy activists and politicians summarize and visualize the implications of an extensive and sometimes dry stack of research findings. Use of the wrong metaphor,

however, can potentially lead to ineffective public policies. The "gateway" and "stepping stone" metaphors have been widely used to describe youthful substance use progression. While the distinction between the gateway and stepping stone metaphors may at first appear somewhat subtle, the logical implications of each leads to profoundly different policy recommendations.

Both metaphors fundamentally assume that children start with a healthy drug-free lifestyle and that through a series of events they may end up developing an unhealthy, drug-addicted lifestyle. The *stepping stone metaphor* suggests that youthful substance use is like a pathway leading up a steep hillside, paved with large stepping stones. Youths progress up this pathway one step at a time, perhaps unable to see what awaits them. The policy implication is that substance use is a dangerous path that starts with a single step, adolescent alcohol use. A straightforward extension of this metaphor suggests that once an individual starts on this path, the final outcome is unavoidable. Thus, the only effective policy is to get the individual to return to the beginning of the path and the healthy lifestyle once exercised.

The *gateway metaphor* is much less alarmist. It suggests that youthful substance use, and life itself, is like a series of large pastures. Children are born into a world enclosed by many norms governing behavior. They can romp, play, and graze within this bounded world and maintain an active, healthy, lifestyle. At the edge of the field is a gate which represents the initiation of substance use. This first gate leads to another less-restricted pasture. In particular, youths who dwell therein use alcohol and perhaps tobacco. Use of alcohol/tobacco in this metaphor does not represent a tenuous intermediate stage, like it does in the stepping stone metaphor. Children who pass through the gate can enjoy this new pasture and even maintain an otherwise healthy, productive lifestyle, despite the fact that this pasture is rutted with the dangers that irresponsible use of alcohol/tobacco can bring.

The gateway metaphor also suggests that children who tire of alcohol/tobacco can pass right back through the first gate to the relatively safer life of abstention. There is a second gate, however, at the end of the second field that leads to the use of marijuana. Some, though not all, alcohol/tobacco users will choose to pass through this gate into the third pasture. Once through, some of these marijuana users will choose to pass through the third and final gate which leads to hard drug use and abuse.

In the 1970s, perhaps as a direct result of Denise Kandel's work, the gateway metaphor came to replace the stepping stone metaphor as being more consistent with research findings. Kandel expressed her aversion to the heavy-handed stepping stone metaphor (Kandel et al. 1992:453-454):

> The notion of stages in drug behavior does not imply that these stages are either obligatory or universal such that all adolescents must progress through each in turn, as has been proposed by Piaget or Kohlberg for stages in moral development. The use of a particular drug does not invariably lead to the use of other drugs higher up in the sequence. The model is not meant to be a variant of the controversial "stepping stone" theory of drug

> addiction in which use of marijuana was assumed to lead inexorably to the use of other illicit "hard" drugs, especially heroin (Goode 1972). Rather, the phases in drug behavior are facilitative. Entry into a particular stage is a common and perhaps even a necessary although not a sufficient prerequisite for entry into the next higher stage. Many youths stop at a particular stage without progressing any further. Most youths eventually stop using most of the drugs in adulthood.

In essence, the stepping-stone metaphor implies that the use of alcohol/tobacco is both a necessary and a sufficient precursor to hard drug use. The gateway metaphor implies that it is a necessary but not a sufficient precursor. The following analysis is designed to show that it is neither a necessary nor a sufficient precursor. It is simply one possible indicator of increased risk. From this perspective, both the stepping-stone and gateway metaphors are inappropriate.

A more appropriate metaphor would be that youthful alcohol, tobacco and marijuana use can serve as markers identifying youths at an increased risk of hard drug use. (The term marker is widely used in this way in genetics as well as other fields.) The image in this case is a network of roadways with signs. Some of the roadways lead to hard drug use, some lead to a variety of adult lifestyles that do not include hard drug use. Along one route to hard drug use, there is a set of signs matching the widely observed gateway sequence. However, along other routes also leading to hard drug use, the order of signs differs.

Statements of Government Policy

The Center for Substance Abuse Prevention (CSAP, part of the Department of Health and Human Services and formerly the Office of Substance Abuse Prevention) coordinates the Nation's programs targeting adolescent alcohol and substance abuse (Jansen 1992). Their policy statements are informed by detailed and careful analyses of the broad scientific literature on etiology of substance use. Funkhouser et al. (1992), a CSAP publication, suggests that early use of alcohol and other substances can be influenced by a variety of factors inherent to individuals and to the physical, cultural, social, and political environments the individual faces. The report contextualizes findings about the gateway model as follows (Funkhouser et al. 1992:34-35):

> A stage model of drug use for primary prevention seems to suggest that avoiding or delaying experimentation with tobacco could reduce later more serious involvement (Kandel 1984; Newcomb and Bentler 1988); prevention programs targeting different drugs might be most successfully presented at different stages of development (Polich et al. 1984). Most of OSAP's mass media efforts focus on preventing use of "gateway" drugs at early ages in an attempt to reduce the likelihood of developing alcohol and other drug problems and multi-drug use patterns.

Not all government policy statements take such an even-handed, carefully developed stance. A statement of the New York State Office of Alcoholism and Substance Abuse Services set its sights on adolescent alcohol use as follows (Harding 1993:9):

> Alcohol is the **gateway drug** (original emphasis) for New York State's young people. Unless alcohol is used first, there is very little use of any other drug, including cigarettes and over-the-counter drugs. New York State Youth, regardless of age, gender, and race, follow a definite pattern of progression from alcohol to marijuana to other illicit drug use.

Similarly, the Indiana Prevention Resource Center (1995) claims:

> These gateway drugs serve as almost essential precursors to the use of other drugs, . . . tobacco and alcohol prevention programs also are important as a means of preventing use of other drugs. Prevention of cocaine and heroin use begins with preventing tobacco use!

President Clinton in his forward to the Nation's drug policy statement admonishes (ONDCP, 1997:iii):

> We must renew our commitment to the drug prevention strategies that deter first-time drug use and halt the progression from alcohol and tobacco use to illicit drugs.

Citing Johnston et al. (1996), the document goes on to indicate that the proportion of high school seniors reporting having used marijuana in the last thirty days nearly doubled, rising from its recent low of 12% in 1992 back up to 22% in 1996 and that the proportion who reported smoking cigarettes daily increased from 17% in 1992 up to 22% in 1996. From the perspective of the gateway model, this increase does not bode well. Indeed, the report cautions that "We must act now to prevent a future drug epidemic" (ONDCP 1997:23).

In summary, some government policies recognize the multiplicity of factors which may lead to hard drug abuse. Others imply that preventing adolescent use of alcohol in and of itself can prevent subsequent hard drug abuse.

The Nature of Causality

This paper examines the extent to which youthful alcohol use can be said to cause subsequent hard drug abuse. Some research suggests that the link may be biochemical (Nash 1997). These studies argue that all of these substances affect the production or uptake of dopamine which transmits pleasure signals in the brain. Thus, alcohol use might precondition a youth's brain for use of more powerful substances. On the other hand, research indicates that this pleasure center is activated by a wide variety of indulgences including coffee, chocolate, gambling, and sex in addition to alcohol, tobacco, cocaine, and heroin. Thus, this

neurological research does not indicate that any one substance is an essential precursor. Quite the opposite, the research suggests that an individual's pathway to hard drug abuse could start with a wide variety of substances or perhaps even various pleasurable behaviors.

This paper examines whether the epidemiological literature supports the idea that youthful alcohol use causes subsequent hard drug abuse. Logically, to *prove* that one behavior causes another, the rules of scientific inquiry require demonstrating that a) individuals who exhibit the cause also exhibit the effect, b) the cause precedes the effect, and c) the supposed cause and effect are not both the result of some other, third factor (Singleton et al. 1993:81-87). First, the possible cause and effect must be associated. Individuals who exhibit the cause should be much more likely to also exhibit the effect. In other words, use of alcohol and abuse of hard drugs need to be strongly correlated.

However, a simple correlation is not enough to establish that alcohol use causes hard drug abuse. Second, the possible cause must precede the possible effect. It must be the case that the vast majority of individuals start use of alcohol prior to first use of hard drugs. If it were the other way around, and hard drug use frequently occurs before use of alcohol, one might try to argue that hard drug abuse causes alcohol use.

Third, the possible cause and possible effect can not both be determined by some third factor, in which case the observed association between them would be said to be non-causal or spurious. For example, individuals differ with regard to the importance placed on seeking thrills. Thrill-seeking individuals may tend to use alcohol as well as hard drugs but at different stages of life. In this example, the thrill-seeking nature may be said to cause both the alcohol and hard drug use. Moreover, preventing such youths from obtaining alcohol would not necessarily decrease their risk of subsequent hard drug abuse.

Evidence contrary to any one of the three conditions for establishing causality would disaffirm the overly bold claim that youthful alcohol use is the primary cause of subsequent hard drug abuse. This section presents ample empirical evidence contradicting each.

Association

Experimentation with alcohol is common among youths, yet few individuals become hard drug abusers. This indicates that youthful alcohol use is not always associated with subsequent hard drug abuse. Moreover, this lack of perfect association strongly suggests the existence of other factors involved in progressing to hard drug abuse. Clearly, other factors in combination with youthful alcohol use may be associated with subsequent hard drug abuse or protective factors may effectively shield the majority of youthful alcohol users from subsequent hard drug abuse.

Kandel's original study presents strong evidence that alcohol use does not inexorably lead to hard drug abuse. In a follow-up interview at age 24-25, nearly all (99%) of her respondents reported having used alcohol (Kandel and Logan 1984). A somewhat smaller percentage reported having used marijuana (72%). Far fewer reported having used cocaine (30%), and hardly any reported having used heroin (3%). The study did not indicate the proportion who had used cocaine

or heroin on a regular basis or had problems which could justify describing their habits as abuse.

National survey data also strongly suggest that progression is not inexorable. Each year since 1975, the Monitoring The Future Program has surveyed a nationally representative sample of high school students about their substance use (Johnston et al. 1995a). In 1991, Monitoring the Future was extended to include eighth and 10th graders. Substance use among eighth graders in 1991 and 12th graders in 1995 was examined as representing behaviors by members of the same birth cohort at different stages in their lives.[1] In 1991, most (70%) eighth graders reported having used alcohol at some point in their life, many (44%) had smoked cigarettes and a substantial proportion (18%) had used inhalants (Johnston et al. 1995b). Only 19% of these eighth graders reported having ever used any illicit drug.

By 1995, relatively few 12th graders reported regular use of illicit drugs. Only 6% reported having ever used cocaine, and far fewer (0.2%) reported using any form of cocaine (either snorted or injected as powder or smoked as crack) on a daily basis. Only 42% reported having ever tried marijuana, the hypothesized "step" or "gate" between use of alcohol and use of hard drugs. Few (about 10%) reported having used any illicit drug other than marijuana in the last 30 days. In short, the vast majority of adolescent alcohol users had not progressed to regular hard drug abuse as high school seniors.

Another argument against association is that the sequence of substances used varies over time and across locations. If hard drug use involved only the use of heroin, one could try to argue for a possible neuropharmacological link between alcohol and heroin (both are depressants). However, the popularity of any particular hard drug varies dramatically over time and across locations. Several researchers have suggested that a drug's popularity tends to follow a pattern of rising and then ebbing (Becker 1967; Chaiken 1993; Golub and Johnson 1996, 1997b; Hamid 1992; Johnson and Manwar 1991; Johnston 1991; Musto 1987, 1989). Johnson and Manwar (1991)—based on their long-term ethnographic experience in New York City, and their reading of mass media and scholarly literature—suggested that New York City experienced a succession of drug eras including periods of widespread marijuana use (1965-79), heroin injection (1963-73), cocaine snorting (1975-1984), cocaine freebasing (1980-84), and crack smoking (1985-1991+). Moreover, a recent analysis suggests that the timing of the current Crack Era varied widely across the country (Golub and Johnson 1997b).

If cultural influences partially determine which hard drugs teens and young adults tend to use, then perhaps cultural determinants also influence the gateway sequence. In this regard, the next section on precedence examines variation in which substances serve as part of the gateway.

Precedence

Most studies on developmental pathways have primarily employed a prospective longitudinal design with samples from general populations. In such studies, youths are typically recruited from public schools or their homes and followed over a number of years reporting information about changes in

substance use as they occur or at relatively short time intervals. Typically, so few of the participants become hard drug users as to preclude specific analysis of their sequential use of substances. Consequently, the developmental pathways identified with samples from general populations primarily reflect substance use patterns of less serious users and may potentially mask different pathways followed by those who became hard drug abusers.

Several recent studies which focused on the paths followed by those individuals who became hard drug users and abusers found that a substantial proportion of them reported having used marijuana prior to any alcohol use (Mackesy-Amiti et al. 1997; Golub and Johnson 1994, 1997a). Golub and Johnson (1994) examined the reported sequence of substances used by 994 hard drug abusers and sellers recruited from inner-city New York in 1988-89; most of these individuals were daily crack abusers. Each respondent reported the first year in which they used each of various substances. For this analysis, responses were categorized as having used alcohol, marijuana and/or hard drugs (cocaine, crack, and IV drugs) in the first year of any substance use. (Note: respondents were not asked about use of tobacco or inhalants which precluded inclusion of these substances in this analysis.) A substantial proportion of the responses were coded as ties, because the respondent reported using more than one category of substances.

Overall, 28% reported having used only alcohol in the first year of use, 52% reported having used alcohol and either marijuana or hard drugs in the first year. Thus, it can be inferred that somewhere between 28% and 52% started their substance use progression with alcohol. Conversely, perhaps most (48% to 72%) of the respondents reported having started with marijuana or hard drugs supporting the idea that alcohol might be just one possible marker of a pathway to hard drug abuse, and that other substances such as tobacco, marijuana and inhalants can serve as a first step.

Additionally, the study found that alcohol's role as the first step to substance use declined over time. Many respondents born between 1953 and 1957 reported having started with alcohol; 35% reported exclusive use of alcohol in the first year of substance use and 58% reported any use. Of those respondents born 15 years later, between 1968 and 1973, only 19% reported exclusive use of alcohol in the first year and 44% reported any use. Members of the latter birth cohort were much more likely (56% to 81%) to have reported starting substance use with marijuana or hard drugs, directly.

Non-spuriousness

Extensive research identifies numerous individual and environmental factors associated with hard drug abuse, other than use of alcohol in adolescence (Funkhouser et al. 1992), suggesting numerous possible "causes" of substance abuse, including problem behavior theory (alcohol and drug use share a common origin with other problem behaviors such as poor school performance, early sexual activity and criminal behavior), multiple risk factor theory (substance-related problems are a function of many problems experienced by teenagers), the social development model (social bonds to family and school reduce likelihood of substance use), social learning theory (substance use is a learned behavior

subject to both reinforcement and punishment), the role development model (positive role models and feedback for conventional behavior can reduce likelihood of substance abuse), and self-derogation theory (negative social interactions lead to doubts about a persons' worth which can result in deviant behavior). Any of these, singly or in combination, might be the true underlying cause of both alcohol use among adolescents and hard drug abuse among young adults. This wealth of alternative possible explanations coupled with the weak precedence relationship suggest that the observed gateway sequence is a case of spurious association. Some of the same factors that motivated their use of alcohol as a youth also motivated their subsequent hard drug abuse.

Recommendations for Public Policy and Future Research

The epidemiological literature strongly indicates that alcohol use by youths does not cause subsequent hard drug abuse, at least not universally. While youths often follow the use of a common sequence of substances, use of alcohol or tobacco or marijuana at one stage does not imply a high probability that an individual will progress to the next substance or to hard drug abuse. Furthermore, this sequence is not immutable. "Which" substances fit "where" in this sequence can vary dramatically across subcultures.

This fact is particularly important in evaluating recent trends in youthful substance use. Marijuana use has increased in the 1990s. According to the traditional gateway model, this increase suggests that a new epidemic of hard drug use should be imminent. However, some ethnographic observations suggest that marijuana use has supplanted the use of harder drugs like crack among high-risk, inner-city populations (Sifaneck and Kaplan 1996; Sifaneck and Small 1997). In which case, the prognosis for the future is much more optimistic. Further research is clearly needed to understand the fuller significance of this recent marijuana upsurge.

The public policy rhetoric which suggests that combating substance abuse by trying to prevent youths from using alcohol, the gateway, may be greatly misguided. This is not to suggest that youthful alcohol use, which under most circumstances is illegal for those under age 21, is not an important problem. It does, however, caution against oversimplifying the many problems of youths which might be associated with hard drug abuse. An effective program probably requires a more comprehensive approach.

Simply toning down the rhetoric, on the other hand, will not make the problems of hard drug abuse and alcoholism go away. Persistent problems require extended research into both the causes of the problem and into the effectiveness of possible responses. Additional research is clearly needed regarding the specific pathways followed by those individuals who become hard drug abusers; the significance and importance of various substances used in adolescence including alcohol, marijuana, tobacco, and inhalants; and how the sequence of substances varies across locations and over time. Such information will help identify the markers for youths who are at increased risk for subsequent drug abuse and perhaps allow for more effective early interventions. Additionally, prevention analysts should continue to develop experimental programs for drug abuse prevention based upon a variety of theories for the etiology of drug abuse. The

development, implementation and subsequent evaluation of these programs represent our best hope for reducing persistent problems such as alcoholism and hard drug abuse.

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Notes

[1]The Monitoring the Future surveys are performed in the spring, and many school systems have a late December cutoff for entering kindergarten. Thus, persons born in 1977 would likely have been in kindergarten in the spring of 1983. These persons would be aged 14, on average, and in the eighth grade in the spring of 1991, and aged 18, on average, and in the 12th grade in the spring of 1995.

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