

Adolescent Social Networks: Friendship Cliques, Social Isolates, and Drug Use Risk

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Orientation toward peers and immersion in friendships are defining features of adolescence (Brown, 1989; 1990; Coleman, 1980; Douvan & Adelson, 1966). Yet adolescent friendships are not expressed in a single way. Among the many simple forms friendships can take are best friendships between a pair of adolescents, friendships involving peers other than the best friend, and friendship groups formed of a tight cluster of more than two friends. Some adolescents have wide ranging friendships where they intermix with many peers, while others have relatively few friendships. Taken together, these friendship patterns form the social network that binds adolescents into an overall matrix of peer relationships. The friendship patterns evident in adolescents' social networks have important implications for adolescent behavior, including problem behaviors such as drug use, delinquency, and sexual behavior. Through friendships, adolescents learn about what others are doing, anticipate accepted and expected behaviors, figure out how to present themselves, and find partners for trying out new behaviors.

The diversity and importance of adolescent friendships to understanding adolescent behavior is well known to teachers. Knowing which adolescents hang out together, for example, or which adolescents are at the fringes of involvement with their peers provides insights into their behavior. Like keen teacher observers, some researchers have studied adolescent friendships and behaviors by blending into the school environment and watching adolescents interact (Ball, 1981; Cusick, 1973; Eder, 1985). More recently, researchers have used a method for studying adolescent friendships called social network analysis (Ennett & Bauman, 1993; Urberg, Degirmencioglu, Tolson, & Hallidaya-Scher, 1995; Shrum & Cheek, 1987).

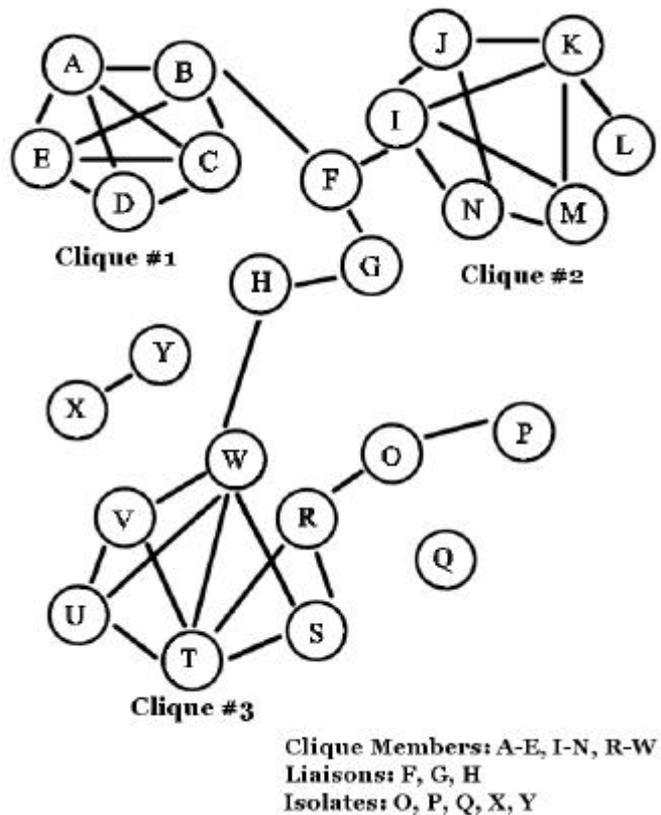
Social network analysis is a way of using information provided by adolescents about their friends to map friendships. In general, social network analysis uses the aggregated data on the relationships reported by individuals in the same social system (e.g., for adolescents, the friendships among students in the same school) to identify groups and other relationship patterns. Network analysis identifies relationship patterns through analysis of the relationships that are present and absent between the individuals in the network. A key attribute of network analysis is that it makes clear that adolescent friendships are differentiated into various patterns rather than one pattern that fits all adolescents. This method of studying friendship is a major development for systematically describing the diversity in adolescent friendships.

The most familiar friendship pattern captured by social network analysis, and the one generally thought to characterize adolescence, is the friendship group or clique. A clique is a small group of at least three adolescents whose primary friendships are with each other. Although most adolescents have a best friend, best friendship pairs are usually embedded in a friendship clique instead of standing alone. Classic observational studies have highlighted the ubiquity and importance of adolescent cliques (Dunphy, 1963; Hollingshead, 1949; Thrasher, 1927; Whyte, 1967). While friendship cliques are prominent in adolescence and

widely recognized as typifying adolescent peer relationships, it is important to note (as also evident in observational studies) that not all adolescents belong to a clique.

Two other primary friendship patterns are identified by social network analysis. One is a pattern of friendships whereby an adolescent maintains several friendships without being in a particular friendship clique. Adolescents who intermix in this way are called liaisons because their friendships provide cross-cutting ties to various groups of adolescents. The other pattern is a social isolate, an adolescent who has relatively few friendships with others. While most adolescents interact with a number of peers, social isolates do not. Still, they are part of the overall social network of adolescents.

These three predominating patterns of friendship within a social network -- cliques, liaisons, and isolates -- are illustrated in the following figure.



Theoretical Importance of Adolescent Social Network Patterns to Behavior

Many researchers who study adolescent drug use attach special importance to peers as a source of influence and support for drug-taking behaviors (Flay, d'Avernas, Best, Kersell, & Ryan, 1983; Hawkins, Catalano, & Miller, 1992; Newcomb & Bentler, 1989; Oetting & Beauvais, 1986; Oetting & Donnermayer, 1998). The centrality of peers to adolescent drug use is based largely on the consistent finding that adolescents and their friends have similar drug-using behaviors. That is, adolescents who use drugs are friends with other adolescents who use drugs and those who do not use drugs are friends with other non-users (Bauman & Fisher, 1986; Huba & Bentler, 1980; Kandel, 1978a).

The similarity in drug use between adolescents and their friends has been largely attributed to the influence of peers (Bauman and Ennett, 1996). In fact, peer influence on drug use is at the core of most theories of adolescent drug risk. Even though there is widespread belief that adolescents pressure their peers to engage in problem behaviors, several studies have shown that similarity in adolescent drug use also is due to adolescents selecting others as friends with similar behavior to their own (Cohen, 1977; Engels, Knibbe, Drop, & de Haan, 1997; Fisher & Bauman, 1988; Kandel, 1978b). Hence, friends who use drugs are similar not just because of the influence of one friend on the other but because they have chosen each other as friends. The importance of this finding, which does not often receive sufficient attention when the role of peers in adolescent drug use is considered, is discussed later.

Despite the centrality of peers to adolescent drug use, there have been very few studies that have made use of social network analysis to study drug use or to study the role of peer influence within friendships. The potential significance of using social network analysis for these purposes is made clear in two ways. First, this approach allows peer groups (cliques) to be identified and studied. Actual groups of adolescents have rarely been the direct focus of previous studies. Without measuring groups, it is impossible to compare the drug use of group members and non-members. This information is needed to confidently conclude that drug use is strongly linked to membership in peer groups. Second, in addition to identifying the relative influence of cliques on behavior, social network analysis allows for the identification of friendship patterns (liaisons and isolates) and the study of the implications of these friendship patterns for drug use behavior.

One reason for studying the relationship of various friendship patterns to adolescent drug use is suggested by the likelihood that these forms affect how adolescents communicate and interact with each other. If friendship patterns directly influence the nature and extent of adolescent social interactions and hence the accessibility and flow of information about behavioral standards from one adolescent to another, then clique members, liaisons, and social isolates are likely to differ in their drug use norms and behaviors. Another reason for studying friendship patterns is the likelihood that they reflect friendship choices that may be based in part on adolescents' drug using behavior.

Consider the social significance of belonging to a clique. These adolescents spend more time with each other than with adolescents who are not members of the group. They have frequent opportunities to share information, demonstrate values, and participate in behaviors that are readily apparent to the small group of members and reinforced by each other. Hence, adolescents in any single clique tend to be alike in their behaviors. This results, as described above, not just from adolescents influencing or reinforcing each other's behavior in a similar direction, but because they have chosen to be friends with others like themselves in the first place. The tighter and closer the bonds between the adolescents in a clique, the more alike they are expected to be.

Many researchers view adolescent cliques as being crucial to the formation of drug habits, and argue that cliques help shape attitudes and beliefs about drugs and provide the social context for using drugs (Oetting & Beauvais, 1986). Through interactions with clique members, adolescents are believed to gain access to drugs and learn how to use them. By the same reasoning, however, adolescent cliques could be oriented away from drug use, with the members reinforcing each other in a pro-social rather than a deviant direction. In either case, this theory of adolescent drug use is consistent with the presumed regulatory power of cliques to solidify a common standard of behavior for the group.

The peer interactions of liaisons are such that their friendships are spread more widely across adolescents belonging to different cliques rather than with the adolescents in a single

clique. Hence, liaisons have access to a potentially larger array of behavioral standards and sources of information about behavior than clique members and are less likely to resemble a single friendship group. The greater diversity within their friendships could reflect a greater range of behaviors acceptable to them and their peers.

In contrast to both clique members and liaisons, social isolates interact much less with their peers, giving them less access to firsthand information from their peers. Because isolates have less direct interaction with their peers, their behavioral norms may be based on their guesses about what constitutes acceptable behaviors rather than on actual experience of peers' behaviors and values. Some researchers have suggested that isolates, or group outsiders, shape their behavior to match desired friends in the hopes of gaining acceptance by peers and winning entry into a friendship group (Aloise-Young, Graham, & Hansen, 1994).

The implication for variation in communication and reinforcement of behaviors across differing friendship patterns suggests that drug use habits might vary from clique to clique. Furthermore, there may be differences based on the type of social network role a person occupies, as a clique member, a liaison, or a social isolate. The purpose of our research has been to provide descriptive information about adolescent social networks and to examine the relationship of network characteristics to adolescent behavior so as to better understand how adolescent friendships might help shape behavior. We have focused on one common type of adolescent health risk — cigarette smoking. Before describing our research, we describe the basic approach to network analysis.

The How-To of Social Network Analysis

As related above, social network analysis is a method for identifying adolescent friendship patterns based on information provided by adolescents about their friends. Typically, adolescents in the same school are asked to name their closest friends. The names are recorded for each adolescent in the school. Unlike younger children whose friendships are usually demarcated by classrooms, adolescents' friendships may extend across the entire school. By gathering friendship information from all the adolescents in the same grade at a school, most friendships are captured. The basic information is a listing of friendship ties or links between adolescents in the school, as illustrated in the table that follows.

Note that in the example list, the first person in the pair is the source of friendship information. Hence, Cindi Adams named Sally Cook, Tanya Brown, and Mary Ellen Jones as friends. Sally Cook named Cindi Adams as a friend, but Tanya Brown did not name Cindi. The friendship tie between Cindi Adams and Sally Cook is reciprocated because both named each other as a friend. The friendship tie between Cindi Adams and Tanya Brown is not reciprocated because Tanya did not name Cindi as a friend. The friendship ties can be thought of as forming a large matrix of who is friends with whom in the social network.

Through social network analysis, the friendship ties are sorted to identify adolescents who overlap in naming each other as friends and those who have friendships in common with each other. Relatively isolated individuals or pairs are also identified. Each adolescent is ultimately identified as belonging to a particular clique, as filling the liaison pattern of friendships, or as a social isolate. As important in identifying these friendship patterns as who named whom as friend is who is not named. Because of the large number of friendship ties generated by adolescents within an entire school, computer assistance is needed to analyze the overall patterns. A number of network analysis software programs are available for this purpose, and because of their increasing availability, social network methods provide a growing approach to studying adolescent friendships.

Example Friendship List for Social Network Analysis

Adolescent Interviewed	Friend Named by Adolescent
Cindi Adams	Sally Cook
Cindi Adams	Tanya Brown
Cindi Adams	Mary Ellen Jones
Tanya Brown	Kelly Smith
Tanya Brown	Ashlee Dean
Sally Cook	Cindi Adams
Sally Cook	Mary Ellen Jones
Ashlee Dean	Kelly Smith
Ashlee Dean	Sandy Edwards

Social Network Study of Adolescent Cigarette Smoking

Our research has focused on adolescent cigarette smoking because peer relationships have been a prominent feature in considerations of why adolescents smoke. We undertook a social network study to identify adolescent friendship patterns and examine their role in relatively established smoking behavior (Ennett & Bauman, 1993; 1996). We wanted to know whether adolescent smokers clustered in cliques or were more likely to fit the liaison or social isolate friendship pattern (Ennett, Bauman, & Koch, 1994). We also wanted to examine the extent to which the similarity between friends in their cigarette smoking behavior resulted from peer influence and from friendship choice (Ennett & Bauman, 1994).

To conduct this research, we reanalyzed data collected from adolescents in the early 1980s using social network analysis methods. Cigarette smoking rates among adolescents have declined only modestly, if at all, since the data were collected. The adolescents were high school students in five schools in a moderately populated southeastern county of the United States. The county was selected because of its similarity to the United States on many social and demographic indicators, such as rates of high school completion and median family annual income.

The adolescents were interviewed two times: first, around the beginning of the ninth grade, when they were approximately 14 years old, and second, around the beginning of the tenth grade. There was a total of 1,092 adolescents for the first interview (Round 1), of whom 926 completed the second interview (Round 2). Half (50 %) were female and the majority were white (84%) with most of the remaining students being African-American.

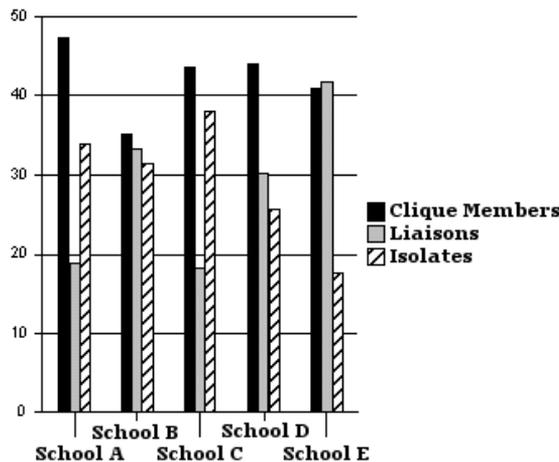
The adolescents were interviewed in their homes about their smoking behavior and they also provided the names of up to three of their best friends. Even though the adolescents were not limited to naming friends from school, approximately 95% of their friendships were with adolescents in the same school. At Round 1, almost half of the adolescents named three best friends (41%), with fewer naming two friends (32%) or one friend (17%). Only 10% of adolescents named no friends. Slightly less than one-half of the friendships (43%) were reciprocated. Because almost all eligible students in each school were interviewed, friendship information for the entire school was available making social network analysis possible. We conducted a separate network analysis for each of the five study schools, using the NEGOPY network analysis software (Richards & Rice, 1981). This resulted in information that

identified every adolescent as either a member of a particular clique, a liaison, or a social isolate.

We defined cigarette smoking based on adolescents' answers to questions about their smoking and on the presence of carbon monoxide in breath samples, which is an indicator of smoking. Adolescents who answered "yes" to the question, "Do you smoke cigarettes now?" and who also said that they had smoked one or more cigarettes in their lifetime were defined as current smokers. In addition, all adolescents with a sufficiently high level of carbon monoxide in their breath sample to indicate recent smoking were classified as current smokers. Across the five schools, approximately 15% of adolescents were identified as current smokers, with the percentage within schools ranging from about 10% to 20%.

Social Network Characteristics

Clique members, liaisons, and isolates were substantially represented at all five schools, as shown in the next figure. At all schools except one (School E), the proportion of adolescents who were clique members was greater than either liaisons or isolates, and at every school, the combined percentage of adolescents involved with their peers as either clique members or liaisons greatly exceeded the percentage of isolated adolescents. At four of the schools, girls were more likely to be clique members than boys, while boys were more likely to be isolates. There was no difference among white and African-American youth in the proportions of clique members, liaisons, or isolates.



Across schools, we identified 87 separate cliques. The majority of cliques had from 3 to 10 members, with an average clique size of approximately 5 members. These size characteristics are similar to those others have found (e.g., Brown, 1989; Coleman, 1981; Dunphy, 1963; Hollingshead, 1949). As other studies also have shown, the cliques tended to be made up of either all girls or all boys, and all white or all African-American youth.

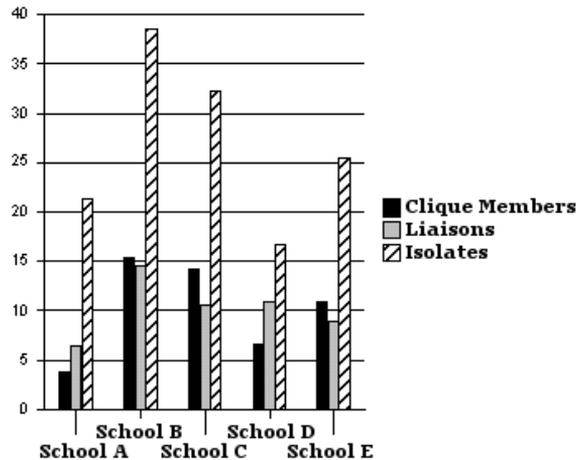
Differences in Cigarette Smoking across Friendship Patterns

As shown in the figure that follows, within each school substantially higher percentages of isolates were current smokers than either clique members or liaisons, and the differences were statistically significant at four of the five schools. Whereas the percentage of clique members who were smokers ranged from about 4% to 16% across schools, it ranged from about 17% to almost 40% among isolates, representing as much as a five-fold increase in the percentage of smokers who were isolates compared with clique members. Differences in

current smoking between clique members and liaisons were slight. The high rate of smoking among isolates is particularly noteworthy because it contrasts with the common belief that smoking is a peer group phenomenon.

Similarity of Cigarette Smoking Behavior within Cliques

As expected, the majority of cliques were made up of nonsmokers as expected because the majority of adolescents do not smoke. However, we wanted to know whether clique members who smoked and those who did not smoke were clustered in different cliques, beyond what would be expected given the low prevalence of smoking among clique members overall. We found that adolescent clique members who smoked indeed tended to associate with each other in the same cliques. This resulted in a few cliques being characterized by smoking, while the overwhelming majority of cliques were made up entirely or mostly of nonsmokers. This finding suggests that peer groups may contribute more to nonsmoking than to smoking, which differs from the common assumption that smoking is a consequence of peer group affiliation.



PROPORTION OF CURRENT SMOKERS BY FRIENDSHIP PATTERNS BY SCHOOL (N=1092)

Contribution of Influence and Selection to Clique Smoking Behavior

We used data on smoking behavior and friendship patterns from the two rounds of adolescent interviews to investigate whether peer influence, peer selection, or both influence and selection contributed to similarity of smoking behavior (either predominantly non-smoking or smoking) among the members of a clique. To study influence, we examined whether non-smoking adolescents in a clique with smokers were more likely to become smokers than non-smoking adolescents in a clique with other non-smokers. To study selection, we examined whether non-smokers were more likely to join non-smoking than smoking cliques and similarly whether smokers were more apt to join smoking rather than non-smoking cliques.

We found that both influence and selection processes contributed to the similarity in smoking behavior within cliques. That is, adolescents in the same clique were alike in their smoking behavior either because they joined a clique where others had similar behavior to their own or because they were influenced by their fellow clique members to change their behavior to match the clique. Across cliques, the two processes contributed about equally to clique similarity in members' smoking.

Implications for Practice

Our research on adolescent cigarette smoking using social network methods has yielded three primary conclusions. First, adolescents' friendships vary in the form they take. Many adolescents in our study belonged to a friendship clique, while others had close friendships that were not confined to a single clique. A significant minority were social isolates who were much less involved with their peers. Second, social isolation is correlated with cigarette smoking. Isolates in our study were far more likely to be current smokers than were adolescents who interacted extensively with their peers, either as clique members or liaisons. Third, similarity between friends in their smoking behavior is not due simply to peer influence. We found that friends' smoking similarity was due as much to adolescents' friendship choices as to the influence of friends to change behavior.

Each of these conclusions has implications for how we understand the role of adolescent friendships in cigarette use and for smoking prevention efforts. It is important to note that although we discuss our findings in relationship to cigarette smoking, the findings may also apply to other drugs, such as alcohol and marijuana, as well as to behaviors such as violence and premature sexual activity.

Although popular wisdom suggests that we should be most concerned about drug use among adolescents who are extensively involved with their peers, our findings suggest the opposite. We found that peer involvement was more likely to be associated in a protective direction against adolescent smoking: The vast majority of adolescents who were involved with their peers as either clique members or liaisons were nonsmokers. In contrast, social network isolation was associated with risk: Those adolescents with the fewest friendships were most likely to be smokers.

Understanding why social isolates are more likely to be smokers is needed to know how best to structure prevention efforts. We offer three possible explanations and their implications for prevention.

First, social isolation might cause cigarette smoking. For example, social isolation could produce stress, depression, or loneliness that, in turn, leads to smoking. Efforts to help isolated adolescents develop social skills needed to join and function in cliques could help them avoid drug use. Indeed, some of the success of current drug use prevention efforts may be due to their emphasis on helping adolescents develop social competencies (e.g., Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995).

As a second explanation, perhaps smoking causes social isolation. Because of smoking, adolescent smokers might have a more difficult time gaining acceptance from friends. Perhaps, as some researchers have suggested, they smoke because they think this will win friendships from others. Our results suggest, however, that smoking makes them less likely to be selected as friends. Prevention efforts might focus on reshaping adolescents' beliefs about the prevalence and acceptability of smoking among their peers. Several studies have shown that adolescents tend to overestimate both how many of their peers use drugs and the acceptability of drug use by their peers, and prevention programs that focus on normative education and establishing conventional peer norms have shown some success (Hansen & Graham, 1991).

A third explanation for the higher prevalence of smoking among social isolates is that perhaps social isolation and smoking are not directly related to each other, but both result from some common cause such as underlying psychological factors or tendencies toward violence or deviance. In this case, prevention efforts should be focused on ameliorating the underlying processes since these are the causal agents.

It is important to note that while our findings implicate social isolation as conferring smoking risk, we do not conclude from this that peer groups and friendships are unimportant

to smoking. Instead, we conclude that friendships may be an extremely important contributor to the maintenance of nonsmoking. Peers may be a positive ally in drug use prevention efforts. Our findings suggest that greater emphasis should be placed on helping adolescents develop and nurture their interactions with their peers as a deterrent to drug use. Reinforcement of group norms that value not using drugs could help decrease this behavior among adolescents.

Our finding that selection processes helped account for the similarity in cigarette smoking within friendship cliques also has implications for prevention efforts. The rationale underlying most current drug use prevention programs is that social influences, and peer influences in particular, are key to adolescent drug use. Most programs at least implicitly consider peers to be detrimental to the development of youth drug use and focus on teaching adolescents how to recognize and resist peer pressure. Recognition that peer influence on adolescent drug use may be less important than commonly believed suggests that these strategies may not live up to their promise. Consideration of the role of selection in friends' behavior argues, as indicated above, for programs that focus efforts elsewhere than on negative peer influences.

In sum, our research, like that of many other studies, has shown that friendships are a major feature of adolescents' lives and reflect their norms about drug use. What we found that contrasts with many other studies is that for most adolescents, the norms expressed within those friendships act against the use of drugs. We also found that peer influence is a smaller part of the explanation for adolescents' drug use than commonly believed. The overall message for prevention efforts may be that friendships are better seen as an asset than a threat to adolescent drug use. Our results suggest that it may be more beneficial to target factors associated with social isolation and teach adolescents skills for making friends with non-drug users than to focus prevention efforts on teaching adolescents how to resist peer pressures to use drugs.

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