

# Social Network Influences on Adolescent Substance Use: An Introduction<sup>1</sup>

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Studies have shown that an individual adolescent's substance use is associated with, and perhaps causally linked with, substance use by their friends. A number of different hypotheses regarding the relation between social networks and adolescent substance use have been tested. In the case of smoking, for example:

- Having a best friend who smokes is associated with smoking (Urberg, *et al.*, 1997);
- Having smoking friends is associated with smoking (Alexander, *et al.*, 2001; Botvin, *et al.*, 1993; Flay *et al.*, 1994; Unger *et al.*, 1999; Urberg, *et al.*, 1991);
- Network position is associated with smoking (Alexander *et al.*, 2001; Ennett and Baumann, 1993); and
- Group membership is associated with smoking (Aloise-Young, *et al.*, 1994; Ennett and Baumann, 1993).

These studies have used sociometric techniques (Scott, 2000; Wasserman and Faust, 1994) involving some matrix manipulation. These smoking studies parallel empirical analysis conducted on social network influences on the diffusion of innovations (Burt, 1987; Valente, 1995), treating smoking as a behavior that diffuses through the population. From a network perspective then, the question becomes: What affects behavior more: network position or being surrounded by friends who influence, either overtly or by example, the uptake of (deviant) behavior?

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The answer of course, is both. Positions matter and sometimes this leads to persuasive influence by friends, and sometimes the (perceived) influence of friends leads to behaviors by people in certain positions. These processes are dynamic and contextual and situational factors that affect individual and communal behaviors and attitudes need to be included. The process of smoking uptake, and perhaps other substance use issues, is quite complex, but progress is being made.

This special issue of *Connections* presents five peer-reviewed papers that examine how adolescent social networks influence substance use behavior. Each paper acknowledges the multiple levels and factors that influence behavior starting with the subjects' own predisposition and including peer, family, school, community, social and policy as well as situational and contextual factors. No study can address, or measure, all of these levels, however, so each takes a different slice of analysis to present evidence on how social networks can and do influence substance use.

The substances studied in these articles include smoking, alcohol, marijuana, crack and injection drug use. The use of these substances can be studied singularly (e.g., what factors predict smoking initiation), or in a composite manner (e.g., what factors affect the use of any substance). It is also possible to compare predictors of substances (e.g., do social networks influence smoking more than marijuana use). All of these approaches are used here. Generalizations about the effects of social networks on substance use can and should be qualified, noting the magnitude of effects on which behaviors (i.e., smoking, drinking, or any substance). It may be that network effects are stronger for some behaviors rather than others, but there is no compelling evidence for this.

Not surprising, the papers cover different age ranges. Adolescence is typically thought of as the teen years, a transition time between childhood and adulthood. But this transition period is long, and starts at 12 or 13 years of age, and extends to 18 or in some cases 20 years old. During these years, adolescents spend a majority of their time in school, a place where much socialization and identity formation occurs. Consequently, three of these papers report data collected in schools, a natural setting conducive to social network analysis. The other two papers use data collected in community settings, and not surprisingly, the data come from older adolescents.

The first paper, by Gaughan, uses the Add Health data (Bearman, Jones and Udry) to show that adolescents are more likely to drink alcohol if their best friend drinks alcohol. Social influences on drinking are not unidirectional, but rather the process is one of mutual influence. Person A does not drink because B influenced him to drink, rather A and B drink together. Further, Gaughan shows that there are multiple, direct individual-level variables that influence alcohol consumption such as the family context, religiosity, age, ethnicity, school problems and school alienation.

The second paper, by Rice, Donohew and Clayton, presents data from three cohorts of junior and high school students. Complete network data were collected by asking students to name three friends in their same grade. This study shows that sensation-seeking and peers' drug use seem to be the primary influences on one's drug use within a given time period. Authors also compared generalized estimates of friends' substance use with that derived from the specific sociometric data. They find significant but weak correlations between the measures, concluding that generalized estimates of peer influence may have poor validity.

The third paper, by Pearson and West, reports data collected from 152 students over a three year period from 8th to 10th grade. Network data were generated by asking students to name up to 6 friends along with information about things they did with those friends. Subjects were classified as

group members, peripherals and isolates and whether they engaged in risk taking by consuming substances. These six states are then analyzed using Markov methods to estimate the probability a student transits from one state to another. The data show that students transition from group non risk-taking to group risk-taking over time. Authors also report estimates of how long students stay in each state, showing that group risk taking is a relatively stable state.

The fourth paper, by Flom Friedman, Neaigus and Sandoval, reports data collected among 18-24 year olds interviewed at homes and at outreach locations. The study design included a targeted sample of respondents who used cocaine, heroin, crack or injected drugs. Results showed that female crack smokers and female drug injectors were more likely than female non-users to have sexual network partners who were older, of a different race/ethnicity, and from another NY borough. For females, doing drugs was associated having sexual partners that crossed boundaries, perhaps putting them at greater risk to infection and providing bridges from one population to another.

The fifth and final paper, by Clair and others, presents a research note on the reliability of ego-centric network data collected among young adult drug users 16-24 years old, recruited at youth centers. Respondents were invited to name up to 15 members of their personal social networks. Results show that aggregate network indicators are relatively reliable (e.g., people who report many friends do so consistently). Reliability was also present at the micro-level, closer, stronger ties were more likely to be recalled at both time points.

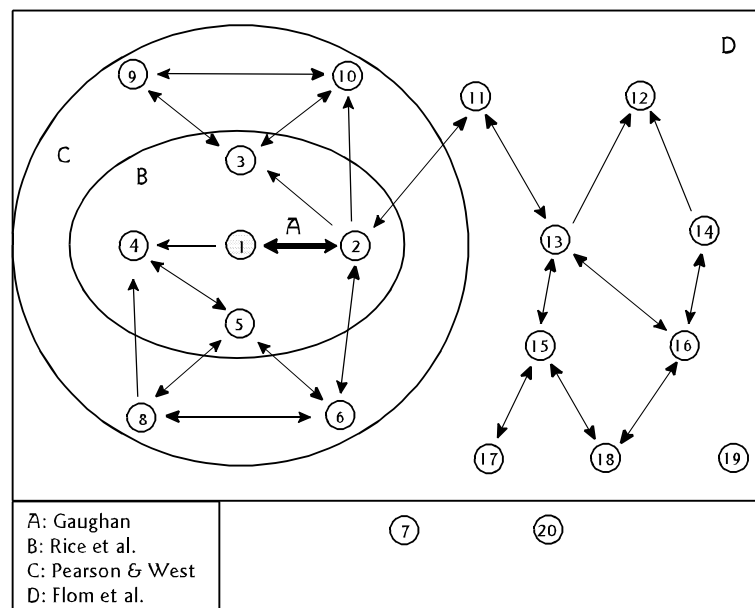


Figure 1 shows a small hypothetical network to illustrate the levels of analysis used in each paper. Gaughan focuses on the dyad (A, the tie between 1 and 2) while Rice and others include information from the personal network of immediate ties (B, 1's links with 2, 3, 4 and 5). Pearson and West construct groups (C, 1 thru 10, excluding 7) and study whether group membership and the risk taking of those groups influences transitions to substance use. Finally Flom and others (D) analyze boundary spanning, or linkages between groups as a risk factor. In this simple network, then, one can see the many different approaches that can be used to study social network influences on substance use.

To further complicate matters, these and other studies often make simplifying assumptions to manage the data. Ties are symmetrized, strengths reduced to binary indicators, groups defined as 50% or more communication within them and so on. In addition, network influences probably interact with individual level factors such as risk taking, sensation seeking, depression and others. These simplifications are necessary, but their implications for the science of social network effects are often not known.

We find in these results, and other studies, that social networks matter. Adolescents select friends like themselves, those friends influence their behavior, and they often engage in risky behavior together. Not so long ago, social network studies were content to show a correlation between network properties and behavior. Today, as these papers attest, studies have controlled for selectivity effects, used longitudinal (panel) data, and shown that social network factors can and do put adolescents at risk for substance use.

No one theory or approach is adequate to studying these influences. In response, the National Institute on Drug Abuse, and other NIH institutes have launched a number of transdisciplinary initiatives. The Transdisciplinary Tobacco Use Centers (TTURC) and the Transdisciplinary Prevention Research Centers (TPRC) being two notable examples. Transdisciplinarity is evident in these papers. These scholars use mathematical formulations to translate social, psychological, and communication theories into meaningful public health investigations. The end result is a well informed contribution to the causes and consequences of substance abuse among adolescents.

These papers were reviewed by two of the leading lights in social network research among adolescents, Professor James Moody (Ohio State University) and Professor Susan Ennett (University of North Carolina, Chapel Hill). Professor Moody has studied adolescent friendship networks from a structural point of view (Moody, 2001) and also studied how friendship social structure influences weapon carrying behavior and suicide (Bearman and Moody, in press). Professor Ennett has studied the impact of adolescent social networks on tobacco use (Ennett and Baumann, 1993; 1994) and has conducted an evaluation of Project DARE (Ennett, et al, 1994). I, and the authors, thank these reviewers for their time and the improvements they have made to this special issue.

Demonstrating that social networks influence substance use is, of course, only half the equation. For public health reasons, we need to translate these findings into effective interventions to prevent substance use, help those who already abuse substances to reduce or quit them, and minimize the harm that can come from risky behavior. At USC (University of Southern California), we have taken a small step in this direction in a recent study showing that social network information can be used to structure the delivery of a tobacco prevention program in schools (Valente *et al.*, in press). It is only a preliminary step, and only one possible way to use network data in interventions. As you read through the following papers, you might be able to envision other network-based interventions and certainly other interesting hypotheses regarding the effects of social networks on adolescent substance use.

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