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Introduction: The Social Network Research Paradigm

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On August 19-20, 1993, the National Institute on Drug Abuse (NIDA) held its first meeting to explore the social network research paradigm and its application to the study of drug use and human immunodeficiency virus (HIV) transmission. The meeting was jointly sponsored by NIDA's Community Research Branch (in the Division of Epidemiology and Prevention Research) and Clinical Medicine Branch (in the Division of Clinical and Services Research) and included participants from the United States, Puerto Rico, and Australia. By the conclusion of the meeting, it was evident that the study of drug user networks was a promising theoretical and methodological complement to the more heavily relied upon and empirically established paradigm that focuses on individual risk behaviors. Network analysis offers a unique opportunity to examine nonrandom patterns of risk behaviors and HIV transmission, the potential of HIV spread, and opportunities for developing and implementing strategies to prevent drug use and the transmission of disease, including drug treatment linkages to nondrug-using networks.

Presentations at the technical review meeting examined the intertwined epidemics of drug abuse and acquired immunodeficiency syndrome (AIDS), with attention to HIV transmission in the context of a variety of networks—networks of drug injectors, sex workers, siblings and other relatives, and sexual partners or significant others. The studies reviewed at the meeting indicated that network characteristics did indeed affect behavioral practice as well as the probability of viral transmission. For example, seroincidence is affected by such structural characteristics of networks as their basis of affiliation, their density (the proportion of direct ties among network members out of all possible ties), and their reachability (proportion of network members connected by indirect as well as direct paths). Mixing strategies also affect seroincidence, as migration or other outgroup contacts constitute bridges to other networks, where viral infection may or may not be already seeded. What is more, network membership characteristics (e.g., an actor's centrality [an indexed number of his or her aggregate ties within a network]) and network norms (e.g., drug injection frequency, sexual solicitation,

abstinence) appeared to influence the adoption of individual risk behaviors. Finally, data presented at the technical review meeting demonstrated that network-oriented interventions aimed at diffusing information about HIV and at changing transactional patterns have been successful at introducing behavioral change among network members, reducing high-risk behaviors, accelerating readiness for treatment, and limiting the spread of HIV.

Many of the presenters to NIDA's technical review have contributed the chapters contained in this research monograph, including a summary review that reflects the discussions among investigators that took place at the technical review meeting. NIDA staff is enthusiastic about publishing these chapters and hopes that this monograph will stimulate greater interest and involvement in network research related to drug abuse and HIV infection.

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Social Networks in Disease Transmission: The Colorado Springs Study

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INTRODUCTION

Colorado Springs, a community of 400,000 located 65 miles south of Denver, has reported 740 occurrences of human immunodeficiency virus (HIV) through 1992. The number of HIV-positive cases, the number of acquired immunodeficiency syndrome (AIDS) cases, and the number of AIDS deaths have been fairly constant since 1986 (Potterat et al. 1993). More than 60 percent of infected persons have resided in Colorado Springs for less than a year. Intensive case investigation and partner notification have failed to reveal significant endogenous transmission. Yet a substantial, well-described nexus of prostitutes, persons who use injectable drugs, and their associates—all of whom practice behaviors that can transmit HIV—exists in Colorado Springs. Unlike the major epicenters, for which the question is why so much transmission is occurring, the question of concern in Colorado Springs is why there is so little transmission. With this concern in mind, a study of people who might transmit HIV by heterosexual or drug-related routes was initiated, and an attempt was made to add a social network perspective to traditional epidemiologic approaches (Woodhouse et al. 1994). This chapter uses network-analytic methods to examine the relative prominence of persons in this setting and its possible implications for HIV transmission.

METHODS

Study Design

This study of prostitutes, the paying and nonpaying partners of prostitutes, persons who use injectable drugs, and the sexual partners of drug users, was begun in Colorado Springs in 1988. Participants, all presumably at high risk of acquiring and transmitting HIV and other