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The Formation of a Socioeconomic Health Disparity: The Case of Cocaine Use during the 1980s and 1990s*

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Abstract

Despite the substantial and prolonged sociological interest in health disparities, much remains unknown about the processes that initiate them. To investigate this topic, we focus on the case study of cocaine use, for which a socioeconomic disparity emerged across all age groups in a short period of time around 1990. We examine whether the newly-formed disparity represents a selective remnant of previous users or, instead, a selective recruitment of new users. To evaluate these two potential processes we use latent class regression on a nationally representative cohort with repeated measures of past-year cocaine use before and after 1990. Results support the “remnant” hypothesis and show that the newly-formed disparity resulted primarily because people in the lower social strata were less likely to have a trajectory of cocaine use with a sharp drop in use after 1990. These results point to the “remnant” concept as a way to bring together disparity analysis of very different and diverse health outcomes.

Sociologists have long been interested in health disparities across socioeconomic strata, but little is known about why or how these disparities form over historical time. Theoretical analysis by Link and Phelan (1995) highlights the importance of this issue by showing that the formation of new health disparities in the United States is quite common and plays an important role in the perpetuation of health disparities in the United States. For example, the major socioeconomic health disparities of today—in heart disease, cancer, and stroke (National Center for Health Statistics CDC Public Health Service 1998)—emerged to replace the major health disparities of the early 19th century—in tuberculosis, pneumonia, and diarrhea (Gordis 2004). Left unchecked, socioeconomic health disparities will most likely continue in the future because they will form in new, as yet undetermined, health outcomes.

The observation that socioeconomic health disparities are continually forming in new outcomes and diminishing in others underscores the importance of analyzing what sets them in motion in the first place. At least two reasons make this an important topic. First, investigation into their initiation focuses sociological inquiry on the “upstream” processes at work (Link and Phelan 1995), which would be an important counterbalance to current research trends that increasingly focus on proximate mechanisms closer to the individual.

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Second, information on the influences that initiate health disparities offers a new angle for health policy and interventions aimed at the long-term reduction of health disparities.

Cocaine use offers a rare case study to test competing predictions about the process of disparity formation, and it is strategic for at least two reasons. First, a socioeconomic disparity formed recently—around the year 1990—at a time when large, nationally representative samples are available to test competing explanations. Detailed representative data drawn at the time that a disparity forms are often unavailable. Second, recent work shows that the disparity in cocaine use across socioeconomic status was a “historical period” effect that affected people of all ages within a very short period of time around the year 1990 (Miech, Chilcoat, and Harder 2005). Consequently, analysis of a cohort followed before and after 1990, no matter what its stage of adulthood, offers the potential to examine the processes that led to the creation of a health disparity within a cohort as it aged.

We examine two different explanations for the formation of the disparity in cocaine use across socioeconomic strata, which we refer to as the “remnant” and the “recruitment” hypotheses. Both posit that socioeconomic disparities form when a health-related outcome or behavior becomes culturally redefined as unhealthy, as cocaine did in the late 1980s. According to the “remnant” hypothesis, the new, unsavory reputation of cocaine led to the formation of a disparity across socioeconomic strata because people in the lower social strata were relatively less responsive and less likely to stop cocaine use. In contrast, the “recruitment” hypothesis posits that a disparity formed because the new, unsavory reputation led to lower demand and consequent price reductions, which served to recruit new users in the lower socioeconomic strata who could not previously afford the drug.

An Abrupt Change in the Social Distribution and Reputation of Cocaine Use

Around the year 1990 cocaine use abruptly became concentrated in the lower socioeconomic strata. Yearly cross-sectional collection of data from high school students in the Monitoring the Future survey allows analysis of time trends in socioeconomic status and cocaine use. Prior to 1990 the prevalence of cocaine use was actually higher among adolescents with higher socioeconomic status as measured by parental education. But by the 1990s this trend reversed and the rate of adolescent cocaine use became higher among families with lower socioeconomic status (Johnston, O’Malley, and Bachman 1999). This finding among adolescents was replicated (Miech and Chilcoat 2005) in the National Longitudinal Survey of Youth 1979 and its sister component, the Young Adult Survey, which together showed a shift in parental education and adolescent cocaine use across the 1980s and 1990s.

Recent work extends analysis of the socioeconomic trend in cocaine use among adolescents to adults, and results indicate that the socioeconomic shift in cocaine use was a “historical period” effect that cut across all age groups around the year 1990. Miech et al. (2005) examined the National Household Survey on Drug Abuse, which is a series of nationally representative, cross-sectional surveys of illegal drug use in the United States that have been ongoing since 1979. They found that an abrupt change in the socioeconomic distribution of cocaine use was present for all ages analyzed, which included the age groups 18–23, 24–29, and 30–35. This finding indicates that any cohort in this age range that was followed before

and after 1990 should be subject to the macrosocial influences that led to changes in the profiles of cocaine users.

This disparity in cocaine use across socioeconomic strata cannot readily be explained away as a consequence of other developments in cocaine use that were taking place at the same time. The emergence of the socioeconomic disparity is present among both whites and blacks (Miech et al. 2005). Therefore, it occurred independently of any shift during this time period to relatively greater cocaine use among minorities, who on average have lower socioeconomic status than whites. In addition, the emergence of the socioeconomic disparity was present both in analyses that included “crack” cocaine use as part of the definition of cocaine use, as well as in analyses focusing on powder cocaine use only (Miech et al. 2005).

The disparity in cocaine use formed at a time when the reputation of cocaine changed from glamorous to unsavory. It can be somewhat difficult in today’s environment—in which cocaine and the cocaine trade are associated with violence, blighted neighborhoods, and desperation—to view cocaine through the lens of the 1970s and early 1980s, when it was perceived by many as an innovative, recreational drug. The prohibitively high price of cocaine contributed to its status as a glamour drug used more by individuals in the higher socioeconomic strata (Agar 2003). It was not uncommon for articles in popular magazines before the 1980s to depict cocaine as a “safe” drug used by the elite; for example, a *Newsweek* feature entitled “The Cocaine Scene” depicted powerful people in evening clothes “doing” lines, and compared cocaine to Dom Perignon and caviar (Jonnes 1996). During the mid-1970s in the United States, both cocaine and marijuana were viewed by many to be relatively benign, and the two substances were often compared to make the argument that both should be legalized (Musto 1999). The Ford White House, guided by Director Robert Dupont of the National Institute on Drug Abuse, issued a white paper that stated, “Cocaine is not physically addictive. ... Cocaine, as currently used, usually does not result in serious consequences such as crime, hospital emergency room admissions, or death” (Domestic Council Drug Abuse Task Force 1975).

This glamorous reputation changed abruptly in the 1980s and early 1990s. In just a short period of time cocaine use became associated with crime and violence in the public eye (Agar 2003; Jonnes 1996). The cocaine-related death in 1986 of Len Bias, who died the day after the Boston Celtics picked him second overall in the NBA basketball draft, was the first of numerous high-profile incidents that began tarnishing cocaine’s luster. Other factors that further contributed to the decline in cocaine’s reputation include a political campaign that forcefully stigmatized illegal drug use (headed by Nancy Reagan and the “Just Say No” campaign, see Musto 2002), the growing prevalence of inexpensive and highly addicting “crack” cocaine (Hamid 1992), and an increased supply of powder cocaine that resulted in lower prices and increased purity (Office of the National Drug Control Policy 2003). Whatever the reasons, by the mid-1990s, cocaine had been redefined as dangerous and unhealthy.

Different Theoretical Explanations

Two hypotheses, which we term the “remnant” and the “recruitment” hypotheses, may potentially explain the emergence of the socioeconomic disparity in cocaine use during this time period when its cultural reputation changed. On the one hand, the disparity may represent a remnant of previous cocaine users. The word “remnant” is defined as “what is left over” (Guralnik 1970), and in this case we use it to refer to the remaining people who continued to use cocaine after it had become culturally redefined as unhealthy and dangerous through macrosocial processes. A socioeconomic disparity resulted, according to the “remnant” hypothesis, because people in the lower social strata were relatively less likely to desist from cocaine use during the 1980s and 1990s when the reputation of cocaine lost its luster.

The idea of socioeconomic health disparities as a remnant of larger social forces traces back to at least the work of Dohrenwend et al. (1992) and Gruenberg (1961) who developed the idea that health disparities can in part represent a “residue.” The central idea is that disparities are analogous to the carving of a statue, in which the final result is shaped by the selective chipping away of material. For example, Dohrenwend and Gruenberg use the “residual” concept as part of a potential explanation for the socioeconomic disparity in schizophrenia. They posit that over historical time the schizophrenia disparity results in part from a process in which people in lineages with schizophrenia experience little or no upward social mobility, while those without schizophrenia achieve relatively much higher social mobility both within and across generations. Thus the disparity is formed in part by the people who do *not* have schizophrenia, just as a sculpture is shaped by the material that is not present.

In this article, we propose a “remnant” perspective that builds on the “residual” concept. We hypothesize that a remnant socioeconomic disparity can result if people in the lower socioeconomic strata are relatively less responsive to changing health beliefs, and are consequently less likely to alter health behaviors that have become culturally redefined as unhealthy. In keeping with the traditional use of the “residual” concept, existing disparities are shaped in part by the actions of people who do not exhibit the health behavior or outcome of interest—in this case, people who are not in the lower socioeconomic strata and who have desisted from cocaine use. This “remnant” hypothesis is unique because it posits that selection out of a health behavior, and not selection out of the lower socioeconomic strata, is the driving force that leaves behind a socioeconomic disparity.

The alternative to the “remnant” hypothesis of this study is the “recruitment” hypothesis, which posits that the socioeconomic disparity in cocaine use resulted from the recruitment of new cocaine users in the lower socioeconomic strata. Any time that a behavior or product is newly defined as unhealthy, it is expected that its associated price will fall because of diminished overall demand. Falling prices will be expected to develop a new market among the people who had wanted to adopt a behavior or product but could not previously afford it. It is expected that falling prices will attract relatively more lower as compared to upper status recruits as a larger portion of people in the lower, as compared to the upper, social strata are constrained by high prices. The appeal of a health behavior such as cocaine use

may be especially strong if it has vestiges of prestige and glamour as cocaine had in the early 1980s, and people in the lower social strata may believe that by engaging in the behavior they can gain status in the eyes of others (Veblen [1899] 1991).

Cocaine use is potentially a good fit with this “recruitment” hypothesis. The historical record documents that the price of cocaine did indeed fall, quite dramatically, during the late 1980s and early 1990s. During this time period the packaging of cocaine in the form of “crack” aided in the reduction of the cost of cocaine to its lowest price, relative to the industrial hourly wage, in U.S. history (Musto 1991). Furthermore, limited evidence from the period supports the creation of a new market among people with lower status in the mid- and late 1980s. A report from that time period from the Epidemiology Work Group of the National Institute on Drug Abuse reported, “Once considered an ‘upper class’ drug, cocaine use has crossed social class lines and is now becoming popular among all segments of society” (Kozel 1984). In their book, *The Corner*, Simon and Burns (1997) use anecdotal evidence to claim that, “When coke hit Baltimore in the mid-1980s it went beyond the existing addict population, gathering a new market share ...” (p. 62). While it is no doubt true that new users below the upper social strata came to use cocaine in the late 1980s and 1990s, it remains to be determined if it was this new wave of users that was the driving force in the formation of the socioeconomic disparity at the national level.

Trajectories of Cocaine Use

One way to judge the relative plausibility of these two explanations is to examine trajectories of cocaine use at the time the disparity formed, and Figure 1 summarizes these trajectories. The term “trajectory” refers to individual patterns of cocaine use as indicated by repeated measures over time. The solid line in Figure 1 depicts a trajectory of cocaine desistence around 1990, and the dashed line depicts a trajectory of new cocaine incidence.

In the “remnant” explanation of disparity formation a greater prevalence of an incidence trajectory in the lower as compared to the upper social strata does not play a central role and is not necessary. A health disparity can result entirely because desistence trajectories are more common in the upper as compared to the lower social strata. In contrast, the “recruitment” hypothesis posits that socioeconomic disparities form as a result of a greater number of new incidence trajectories. Both differential incidence and desistence may be taking place simultaneously, in which case it is important to assess their relative influence.

Examination of the individual-level trajectories involved in the formation of a health disparity previously has not been possible for two main reasons. First, it is exceedingly rare to have nationally representative, prospective data with repeated measures on a specific health-related behavior both before and after a socioeconomic disparity forms. The collection of such data requires a substantial amount of serendipity because, at the start of a survey, it is not known when and for what outcomes a socioeconomic disparity will form. Second, only in recent decades has statistical software become available that is accessible to model trajectories of dichotomous outcomes such as past-year cocaine use.

METHODS

Sample

The data source for this study is the National Longitudinal Survey of Youth 1979 (NLSY79), a panel study of young adults who were first interviewed in 1979 when they were aged 14–22; respondents were then interviewed annually until 1994, after which they were interviewed every other year, with the most recent release of data from interviews conducted in 2004. Detailed descriptions of the sample are available elsewhere (U.S. Department of Labor 2000). The analysis of this study focuses on the five years in which the survey included questions on cocaine use—1984, 1988, 1992, 1994, and 1998.

The data consist of a main core sample as well as supplemental samples of black respondents; Hispanic respondents; nonblack, non-Hispanic economically disadvantaged respondents; and respondents in the U.S. military. The analysis does not use information from the nonblack, non-Hispanic economically disadvantaged subsample, nor does it use information from the military subsample; both of these supplemental samples were discontinued before the last survey wave used in this study and therefore do not provide complete information on past-year cocaine use for five waves. Out of the population of 9,304 who were in the sub-samples of interest for this study and interviewed in 1984, 6,676 provided complete information on the cocaine measure for each of the five years it was included in the panel survey, a response rate of 72 percent over a 14 year period. All analyses use the analytic weights provided in the data for analysis of the 1998 survey wave.

Measures

The main measure of this study is self-reported past-year use of powder cocaine, which is coded 1 for respondents who reported using cocaine in the year before the survey and 0 otherwise. In 1984 and 1988 questions about cocaine did not distinguish between powder cocaine and “crack” cocaine, which was not generally available on U.S. streets before the 1990s. Responses to cocaine questions in 1984 and 1988 consequently referred to powder cocaine use only. In the survey waves after 1988 the NLSY79 asked separate questions about powder cocaine and “crack” cocaine use. The main analyses use only the information on powder cocaine use, for which the data contain equivalent, repeated measures across five time points. Parallel analyses discussed in the results section consider whether use of information on “crack” cocaine after 1988 lead to different substantive conclusions.

The variable *low education* is coded 1 for respondents who reported 11 or fewer years of education at the 1984 survey wave and 0 for all others. The youngest respondents were age 19 in the 1984 survey wave, and therefore it is not feasible to use measures of education beyond high school because the data are right-censored. The variable *female* is coded 1 for females and 0 for males. Information on race and ethnicity comes from self-reports. The variable *Hispanic* is coded 1 for Hispanic respondents and 0 for all others. The variable *black* is coded 1 for African American respondents who were not Hispanic and 0 for all others. The variable *younger half of sample* is coded 1 for the approximately 50 percent of the sample that was age 19–22 in 1984 and coded 0 for the remainder of the sample that was

age 23–27. This age variable is a control to account for the fact that the older half of the sample will “age out” of cocaine use sooner than the younger half.

Method

The analysis uses latent class analysis and latent class regression to identify both classes of cocaine use across the five waves of data and also the factors that predict membership in these classes. In brief, the analysis is conceptually similar to a factor analysis and consists of two steps. The analysis uses five dichotomous indicators—past-year cocaine use at each of five waves—and first examines whether these indicators best describe two, three, or four latent classes. These classes will describe trajectories of cocaine use over adulthood. After identifying the optimal number of classes, the analysis then uses latent class regression to estimate the extent to which selected demographic factors are associated with a greater probability of membership in one class as compared to the others.

Latent class analysis is an analytic technique that describes groups of patterns among dichotomous items. Latent class analysis differs from factor analysis because it involves categorical, not continuous, indicators. The latent class analysis model also differs from factor analysis because it hypothesizes the existence of underlying categorical groups rather than continuous latent variables. The results of a latent class analysis model include *item probabilities*, which are the probabilities of endorsing an indicator given membership in a particular class, a statistic similar in function to factor loading in factor analysis. The results also include *class sizes*, which are estimates of the proportion of the sample that falls into each class (McCutcheon 1987).

With the five repeated measurements of past-year cocaine use in this study, we are able to identify latent class analyses models with up to five trajectories (Goodman 1974). If the study had only four time points, then the analysis could not estimate models with more than two trajectories. Four time points is not enough information to identify a three-class model, even though the degrees of freedom would be positive (Goodman 1974).

Model selection for latent class analysis is informed by both theory and the “bayesian information criterion” (BIC), using the sample size adjustment suggested by Sclove (1987). Specifically, the BIC statistic used in this analysis is:

$$\text{BIC} = -2\log L(\theta) + p \log((n+2)/24)$$

where $L(\theta)$ is the regular maximized log likelihood from maximum likelihood estimation, p is the total number of free parameters, and n is the sample size. This model fit statistic performed best in a recent simulation study that compared it with seven alternatives (Yang 2006).

Latent class regression is an extension of latent class analysis by which latent classes are regressed on covariates in the same step in which the measurement model is run (Bandeem-Roche et al. 1997). The results indicate how class prevalence varies as a function of the covariates. The model assumes conditional independence of indicators (i.e., measured items are uncorrelated with each other after accounting for class membership) and nondifferential

measurement (i.e., covariates are uncorrelated with measured items after accounting for class membership). We performed latent class modeling using Mplus software (Muthén and Muthén 1998).

RESULTS

Descriptive Statistics

Table 1 presents descriptive statistics of the sample and trends in the association of demographic characteristics with past-year cocaine use from 1984 to 1998. An increasing association with cocaine use over the 1980s and 1990s was apparent across education, race, and age. Specifically, respondents with lower education were slightly less likely to report past-year cocaine use at the baseline, 1984 survey, but were more than two times more likely to report it by 1998. This increasing association was monotonic, with a sharp jump between the 1988 and 1992 survey waves, a finding consistent with results of analyses from other nationally representative samples (Miech et al. 2005). Over the 1980s and 1990s black respondents were also increasingly more likely to report past-year cocaine use in comparison to respondents of other race-ethnicities. At the first wave black respondents were twice as likely *not* to report past-year cocaine use in comparison to non-black members, but by the final wave they were more likely to report cocaine use. Finally, over the 1980s and 1990s, respondents in the younger half of the sample were increasingly more likely to report past-year cocaine use; at the baseline, 1984 wave they were equally likely to report cocaine use, but by the last wave in 1998, their odds of cocaine use were about 73 percent higher than those of older sample members. The older half of the sample experienced the sharp drop-off in cocaine use that comes with age sooner than the younger half.

No steady change is readily apparent in the association of cocaine use with Hispanic ethnicity and sex over the 1980s and 1990s. Hispanic ethnicity was generally unrelated to past-year cocaine use over the five surveys, as indicated by an odds ratio near one. In general, women were about half as likely to use cocaine as men during the 1980s and 1990s, and they were slightly less likely to use cocaine at the last wave in comparison to the first.

Latent Class Analysis

Table 2 reports results from analyses to examine the number of “classes,” or cocaine use trajectories, that best fit the observed data. We estimated three latent class models—one with two classes, one with three classes, and one with four classes—and examined which model had the best fit with the data, as indicated by both substantive interpretation of the results and the sample-size adjusted BIC statistic. As expected, the largest class in each model was a “non-using” class in which the probability of cocaine use at each wave was near zero. Probabilities at extreme values close to zero or one can present difficulties in the maximum-likelihood estimation of latent class analysis and regression models, and present a high risk that the estimating algorithm will get “stuck” at 0 or 1, resulting in nonconvergence of the model. Prior knowledge that a large “non-using” class would have near-zero probability of cocaine use at each wave allowed us to constrain one class in each model to have equal probabilities across all indicators, to which we assigned starting values with probabilities

close to zero. This constraint allowed convergence for the two, three, and four class models, and, as expected, resulted in a large “non-using” class for all models.

The three class model had the best fit with the observed data. The sample-size adjusted BIC allows comparison of non-nested models and has a simple interpretation in which the lowest value across models indicates the best fit. The three class model had a sample size-adjusted BIC value of 12,637, which was lower than the value for the two and four class models, which were 12,881 and 12,651 respectively.

The difference in the BIC statistic for the three and four class models was not large, and we therefore examined the estimates closely. The four class model is the only model that estimates a trajectory of substantially increased cocaine use after 1990. Specifically, it predicts a class in which the probability of cocaine use jumps from .123 in 1988 to a near fourfold increase of .486 in 1992. However, at no survey year does the estimate of cocaine use significantly differ from 0. Furthermore, in analyses not shown, we found that this class was unstable and that slight model changes led to very different results, in part because of the small class size of 1.34 percent. These considerations, in addition to a relatively poorer value on the sample-size adjusted BIC statistic, led us to reject this model in favor of the three class model.

Figure 2 graphically presents the results of the three class model. Respondents in the largest of the three classes have a probability of cocaine use at each wave that is near zero; the estimated probability is .04. This class of respondents made up approximately 74 percent of the sample, and we refer to it as the “non-users” trajectory. Respondents in the second largest class had a substantial probability of cocaine use in the 1980s (.41 in 1984, and .34 in 1988), and almost zero in the 1990s. This class of respondents made up approximately 22 percent of the sample, and we refer to it as the “stopped use by the 1990s” trajectory. Finally, respondents in the smallest class had a substantial probability of cocaine use at all waves, and we refer to respondents in this class, which made up 4 percent of the sample, as the “chronic users” trajectory.

Further analysis (not shown) indicated that for the three class model the constraint of having one class with all equal probabilities across all indicators was a better and more parsimonious model in comparison to a three class model without this constraint. We estimated a three class model with no constraints that estimated separate probabilities for every wave of every class. As expected, this model estimated one class with probabilities near zero for every wave, and the indicator probabilities for the other classes were nearly identical to those in the constrained model. The value of the BIC statistic for this unconstrained model was 12,659, indicating that it was a worse fit with the observed data in comparison to the model with the constraint.

The analysis also included parallel models in which past-year use of “crack” counted as cocaine use in the years 1994 and 1998, the only years that included questions about “crack” cocaine (results not shown). These results led to the same substantive conclusions. Specifically, the three class model was a better fit with the data than the two and four class

models, as indicated by the sample-size adjusted BIC. In addition, the four class model was not stable.

Latent Class Regression

The analysis next used latent class regression to evaluate the extent to which demographic characteristics were associated with greater probability of membership across classes. Of central interest for the research question of this study are the predictors of membership in the “stopped use by 1990s” trajectory. In 1984 members of this group were equally likely to use cocaine in comparison to those in the chronic users group, as shown graphically in Figure 2 by near-equal probabilities of cocaine use for both groups in 1984. Factors that differentiate the “stopped use by the 1990s” trajectory from the “chronic users” trajectory are the factors that allowed individuals to respond to macrosocial change and desist from cocaine use after it became redefined as undesirable around the year 1990.

Table 3 presents results from the latent class regression estimating predictors of membership in the different cocaine use trajectories. As expected, lower educational status differentiated types of cocaine trajectories. Among those who reported cocaine use, those with lower educational status were about twice as likely to be in the “chronic users” trajectory in comparison to the “stopped by the 1990s” trajectory. The other class comparisons for educational attainment in Table 3 show that it was an increased likelihood to be in the “chronic users” trajectory that solely accounted for differences among cocaine users and non-users across educational status. This finding accounted for the increased association of lower education and cocaine use across the 1980s and 1990s; over time, the percentage of cocaine users who were chronic users steadily increased, and consequently so too did the proportion of users who had lower educational status.

Race also differentiated types of cocaine trajectories. African Americans were less likely than respondents of other races to be members of the “stopped use by 1990s” trajectory. They were about half as likely as respondents of other races to be in this category as compared to “nonusers” (odds ratio = .49) and about half as likely as compared to “chronic users” (odds ratio = $1 / 2.36 = .43$).

Age significantly predicted cocaine trajectories. Among cocaine users, those in the younger half of the sample were about twice as likely to be in the “chronic users” trajectory compared to the “stopped by the 1990s” trajectory. The other class comparisons for age in Table 3 show that it was an increased likelihood to be in the “chronic users” trajectory that primarily accounted for the increased association of age with cocaine use; over time, the percentage of cocaine users who were chronic users steadily increased, and so too did the proportion of younger users.

Hispanic ethnicity did not significantly distinguish trajectory membership. The results for sex indicate that females had a lower mean prevalence of cocaine use. Compared to non-users, women were significantly less likely to be in the “chronic” or “stopped by 1990s” groups, but of those who used cocaine, sex did not differentiate between these two groups.

DISCUSSION

In this study we examine the formation of a disparity in cocaine use within a cohort as it aged. The analysis is strategic for three reasons. First, the data follow a panel before and after 1990, the year when the disparity in cocaine use across socioeconomic status abruptly emerged across all age groups in adolescence and adulthood. Second, the data are nationally representative and therefore generalizable to the U.S. population. Third, the data contain assessment of past-year cocaine use at five different time points, which provides the power to estimate up to four trajectories of cocaine use with latent class analysis.

The results support the “remnant” hypothesis and indicate that a socioeconomic disparity in cocaine use formed around the year 1990 primarily because people who were not in the lower socioeconomic strata were better able to change their behavior and stop using cocaine. We found little support for the alternative, “recruitment” hypothesis, which posits that the disparity formed because of a sudden influx of cocaine users from the lower social strata. Our results indicate that any group of new users after 1990 was too small to detect. Below we discuss these results in more detail, although we first note four limitations of this study.

Limitations

One limitation of the study is that the age range of the sample makes this analysis less likely to detect a trajectory of new cocaine incidence. In the year 1990 the cohort was aged 25–32, ages when new initiation of cocaine use is usually in decline (Chen and Kandel 1995). However, it is important to note that sudden desistence from long-term, chronic use of cocaine or any other illegal drug is also uncommon because behavioral and biological patterns engrained by years of illegal drug use carry a momentum that is difficult to counteract (Carter and Tiffany 1999; Crits-Christoph et al. 2007; O’Brien 2005). Consequently, the decreased likelihood of detecting trajectories of new incidence of cocaine use is counterbalanced by a decreased likelihood of detecting trajectories of sudden desistence.

A second limitation is that the analysis is limited to people who responded to all five surveys that contain measures of cocaine use. This “listwise deletion” process could potentially introduce bias into the analysis, especially to the extent that nonresponse is related to cocaine use. However, attrition analysis (not shown) indicated that people who reported cocaine use at the baseline survey in 1984 were no more likely to drop out of the survey than those who did not report cocaine use. Ultimately, the finding of an abrupt shift in the socioeconomic distribution of cocaine use around the year 1990 in these data—a finding consistent with other nationally representative surveys—suggests that the main finding that this study set out to explain was present and not obviated by potential biases.

A third limitation is that information on cocaine use is based on self-report, which tends to underestimate true prevalence. The results of this study that support a higher rate of cocaine use among people with low education could potentially stem from biases in misreporting error if denials of actual cocaine use are less likely among people in the lower versus higher social strata. However, available evidence consistently supports the opposite bias, and points to a higher rate of cocaine use denial among high school dropouts in comparison to those

with more education (Fendrich and Vaughn 1994). Consequently, the results of this study are conservative, and if biases of cocaine self-report were absent, then the socioeconomic disparity in cocaine use would be even more pronounced because more people with low education would indicate cocaine use. Further, this self-report bias is not expected to alter this study's conclusions about the relative plausibility of the "remnant" versus "recruitment" hypotheses. Elimination of the self-report bias would be expected to raise the prevalence of all cocaine use trajectories but not their relative distribution.

A final limitation is that the analysis is not able to distinguish recreational users from those with cocaine dependency. Accurate assessment of dependency would require a battery of questions to assess limitations in personal and social functioning that stem from cocaine use (such as the Composite International Diagnostic Interview Schedule (CIDI); see Cottler, Robins, and Helzer 1989), and such questions were not included in these data. Such information, if available, could potentially demonstrate that cocaine dependency came to play a role in the current socioeconomic disparity in cocaine use when it emerged around the year 1990. If so, an important area for future research would be the investigation of how socioeconomic status shapes the prevention and successful treatment of cocaine dependency, along with other related mechanisms involved in the socioeconomic cocaine disparity. More generally, studies such as this one will hopefully motivate future research to investigate how individual and biological factors such as dependency come into play in the first place as a result of social factors.

Health Disparities and Trajectory Analysis

Historical trends in attitudes toward cocaine use around the year 1990 and an accompanying socioeconomic shift in cocaine's use led us to expect a "historical period" effect in trajectories of cocaine use. This effect may have theoretically manifested in numerous possible trajectories, such as a "chronic" trajectory with a bump downward around 1990 or trajectories with new incidence after 1990. We used latent class analysis to specify the trajectories at work, a methodology that has the advantage of identifying trajectories solely on the basis of the data, independent of our theoretical speculations. The analysis shows that the historical period effect operated primarily through one specific trajectory: a "stopped by the 1990s" trajectory characterized by a high probability of use before 1990 and a near-zero probability afterwards. Historical influences led a substantial portion of the population to simply stop cold their cocaine use around 1990.

The "stopped by the 1990s" trajectory was the driving force behind the formation of the socioeconomic disparity in cocaine use. Of those who ever used cocaine—those in the "chronic users" or "stopped by the 1990s" trajectories—individuals in the lower social strata were more than twice as likely to be chronic users. Consequently, as people outside the lower social strata were successful in cocaine desistance when cocaine use fell out of favor in the 1990s, the pool of people who continued to use cocaine in the 1990s were disproportionately of lower socioeconomic status.

This disparity across socioeconomic strata occurred independently of other shifts in cocaine use that were taking place at the same time. The "stopped by the 1990s" trajectory also played a substantial role in the exacerbation or formation of disparities by race and gender.

As with individuals in the lower socioeconomic strata, African Americans who used cocaine were also less likely to have a “stopped by the 1990s” trajectory, and they were more likely to end up as “chronic users.” Consequently, the probability of cocaine use for African Americans as compared to whites increased over the course of the survey. Whereas African Americans as compared to whites were only about half as likely to use cocaine in the early 1980s, by the last survey wave in 1998, their probability was slightly higher because of their relatively greater likelihood to be chronic as compared to short-term users.

The “stopped by 1990s” trajectory also led to an increase in the probability that men would use cocaine as compared to women. Men who used cocaine over the course of the survey were substantially more likely to be “chronic users” than to follow the trajectory of “stopped by the 1990s.” As a consequence, men’s higher probability of cocaine use in comparison to women increased from about 63 percent in 1984 to 143 percent in 1998.

Future Directions

This case study of cocaine demonstrates three strengths that the “remnant” perspective brings to the analysis of health disparities that warrant further examination on additional outcomes. The first is the insight that socioeconomic disparities will emerge in health behaviors that develop a reputation as unhealthy, and that this prediction can be made without knowledge of an outcome’s specific risk factors and determinants. The changing reputation of cocaine led to more desistence in the upper social strata, and a socioeconomic disparity subsequently emerged. The theoretical rationale for this prediction did not require knowledge of outcome-specific links between socioeconomic status and health, and could be readily extended to other outcomes for which we have witnessed changes in reputation.

The power of this insight is that it holds the potential to bring together disparity analyses of disparate health behaviors and outcomes. Unifying socioeconomic disparities in diverse outcomes under a common theoretical lens has been difficult, in part because different outcomes have independent literatures and the outcomes may at first appear unrelated. For example, it may seem that analysis of disparities in cocaine use have little to do with disparities in other outcomes such as sedentary lifestyle or quality of nutritional intake. However, disparities that formed as a result of a “remnant” process could be pulled together for analysis under this common theme, and their combined analysis holds the potential to specify social processes and mechanisms that are generalizable. The possibility for generalizable findings comes from the fact that the emphasis in these analyses would not be on outcome-specific determinants, but rather on the group of people who have in common desistence from a health outcome as a consequence of its negative reputation. Just as a sculpture is formed by the pieces that are missing, these disparity analyses could focus on the people who contribute to a disparity by *not* engaging in a health outcome.

The “remnant” perspective not only has the potential to bring together analyses of different health outcomes, but also can contribute to in-depth analysis of specific outcomes and their outcome-specific predictors. A second strength of the perspective is that it highlights how the influence of risk factors on health outcomes may come to differ at different socioeconomic levels. In the case of cocaine use, the social distribution of its risk factors was largely similar across socioeconomic strata before 1990, but afterward these risk factors

became relatively less influential for those in the upper social strata. To the extent that this process is generalizable to other outcomes, it draws attention to the upstream factors that shape the effectiveness of risk factors across social strata.

A final strength of the “remnant” perspective is that it helps bring the concept of time into analyses of health disparities, a key goal of recent theoretical development in the field (Link and Phelan 1995). The word “remnant” evokes the image of health disparities as the aftermath of larger processes, and it inherently raises the question of how these formative processes unfold over time. This type of question is a departure from the common approach in sociology and public health that operates on the assumption of a static, unchanging environment and leaves unacknowledged and unexplained changes in health disparities and their mechanisms over time. This lack of explanation is a major gap in the field, in light of the fact that it is by changing to new health outcomes that health disparities have remained so persistent over the past century. Future work along the lines of the “remnant” perspective offers one approach through which to address this gap and to identify the upstream, potentially generalizable processes that explain how disparities continually form in new and diverse outcomes over time.

The larger, upstream processes that create health disparities are inherently social, and most likely operate at levels higher than the individual. People in the upper social strata may receive health benefits unwittingly without any overt action on their part. For example, they may buy more modern and expensive cars without fully understanding or appreciating the advances in safety technology from which they will benefit. Another example is that after 1990 peer networks may have been more disapproving of cocaine use in the upper as compared to the lower social strata so that risk factors for cocaine use in the upper social strata were rendered less influential because of reasons related to social acceptance rather than health per se. Specifying larger social forces offers the opportunity to extend the sociological literature on health disparities into new areas and to inform current efforts to reduce and, ideally, eliminate health disparities in the long run.

Conclusion

This case study of cocaine use in the 1980s and 1990s provides evidence for the conceptualization of socioeconomic disparities as the result of a “remnant” process in which people in the lower social strata are less likely to desist from health behaviors that become culturally redefined as unhealthy. This result focuses attention on people outside the lower social strata who shape health disparities by *not* engaging in the health outcome of interest. An extension of “remnant” analysis of health disparities to include health outcomes other than cocaine offers the opportunity to develop a generalizable body of knowledge that will both advance sociological inquiry and inform interventions and policies aimed at the lasting reduction of socioeconomic health disparities.

Biography

Richard Miech is chair of the Department of Health and Behavioral Sciences at the University of Colorado Denver. Dr. Miech’s research focuses on socioeconomic health disparities that have emerged in recent decades, such as disparities in cocaine use and

adolescent obesity. His ultimate goal is to be able to identify disparities that are expected to emerge or grow in the near future, and to develop policies and interventions to redress these disparities in their infancy.

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FIGURE 1.
Two Possible Trajectories of Individual Cocaine Use in the 1980s and 1990s. An Unequal Distribution of these Trajectories across Socioeconomic Strata Led to the Disparity in Cocaine Use that Formed in 1990

FIGURE 2.
Trajectories of Cocaine Use in the NLSY79 Sample

TABLE 1
Demographic Distribution of Sample and Bivariate Odds Ratios for Past-Year Cocaine Use by Year of Survey*

Variable	% overall sample	Bivariate Odds Ratio for Cocaine Use (Standard Errors in Parentheses)				
		1984	1988	1992	1994	1998
Covariates						
Low Education	14.54 (.43)	.978 [.975-.982]	1.25 [1.24-1.25]	1.94 [1.93-1.94]	2.02 [2.01-2.03]	2.52 [2.51-2.54]
Black	13.11 (.41)	.532 [.530-.534]	.724 [.721-.727]	1.09 [1.08-1.10]	1.53 [1.53-1.54]	1.22 [1.21-1.23]
Hispanic	5.87 (.29)	.914 [.909-.919]	.904 [.899-.909]	.853 [.846-.861]	1.04 [1.03-1.05]	1.09 [1.07-1.10]
Female	50.83 (.61)	.610 [.608-.611]	.573 [.571-.574]	.539 [.537-.541]	.529 [.527-.532]	.412 [.410-.415]
Younger Half of Sample	48.47 (.48)	1.027 [1.024-1.029]	1.510 [1.506-1.514]	1.607 [1.600-1.614]	1.572 [1.565-1.579]	1.728 [1.719-1.738]
Mean Age of Sample		22.65 (.028)	27.13 (.028)	31.06 (.028)	33.10 (.028)	36.92 (.028)
Percent Past-Year Use		11.15 (.39)	10.34 (.37)	3.60 (.23)	2.96 (.21)	2.05 (.17)

* Standard errors are in parentheses and confidence intervals of odds ratios are in brackets.

TABLE 2

Probabilities of Past-Year Cocaine Use by Survey Year for Two, Three, and Four Trajectory Models (Standard Errors of Estimates in Parentheses), Results from Latent Class Analyses

<i>Survey year</i>	2 class model		3 class model ^c			4 class model		
	"Non-Users" class 1 ^a	"Aging Out" class 2	"Non-Users" class 1 ^a	"Stopped by 1990s" class 2	"Chronic Users" class 3	"Non-Users" class 1 ^a	"Stopped by 1990s" class 2	"Chronic Users" class 3
1984	.001 (.001)	.453* (.020)	.004* (.001)	.410* (.026)	.498* (.041)	.002 (.002)	.400* (.027)	.632* (.117)
1988	.001 (.001)	.420* (.020)	.004* (.001)	.341* (.022)	.679* (.046)	.002 (.002)	.335* (.023)	.842* (.049)
1992	.001 (.001)	.146* (.011)	.004* (.001)	.022 (.018)	.728* (.085)	.002 (.002)	.033* (.013)	.790* (.082)
1994	.001 (.001)	.120* (.009)	.004* (.001)	.036* (.012)	.491* (.065)	.002 (.002)	.040* (.009)	.532* (.064)
1998	.001 (.001)	.083* (.007)	.004* (.001)	.036* (.08)	.261* (.040)	.002 (.002)	.038* (.007)	.256* (.044)
Class Size	75.44%	24.56%	74.32%	21.80%	3.88%	72.54%	23.49%	2.63%
BIC ^b	12881			12637			12651	

* probability estimate differs from 0 at p level < .01

^a All probabilities in this class constrained to be equal.

^b The sample-size adjusted BIC statistic of model fit (see text). Lower BIC estimates indicate better fit.

^c Figure 2 graphically portrays this model.

TABLE 3

Latent Class Regression Contrasts for Trajectories of Cocaine Use. Results are Odds Ratios, with Confidence Intervals in Parentheses

Null trajectory	“Chronic Users” vs. “Stopped by 1990s”	“Chronic Users” vs. “Non-Users”	“Stopped by 1990s” vs. “Non-Users”
Predictors			
Low Education	2.24 ** (1.78–2.82)	2.41 ** (2.04–2.84)	1.08 ** (.92–1.25)
Black	2.36 ** (1.66–3.35)	1.15 (.93–1.44)	.49 ** (.39–.61)
Hispanic	.93 (.60–1.43)	.78 (.55–1.11)	.84 (.69–1.03)
Female	.69 * (.57–.83)	.40 ** (.35–.47)	.59 ** (.53–.64)
Younger Half of Sample	1.71 ** (1.65–1.77)	1.90 ** (1.60–2.26)	1.11 * (1.02–1.22)

* $p < .05$;

** $p < .01$