Temporal trends in injection drug use among Black and White adult residents of US metropolitan areas (1992-2002)

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Background

- No adequate data exist on the prevalence of injection drug use (IDU) in different racial/ethnic groups over time in US geographic areas
  - No registry of injectors in the US
  - The National Survey of Drug Use and Health's ability to enumerate injectors is limited
    - Under-coverage of populations with high injecting prevalence
    - Under-reporting of IDU
    - The severity of both limitations varies across racial/ethnic groups
- Standard estimation methods (e.g., capture-recapture) are not feasible to implement in multiple geographic areas

Background

This lack of data on IDU prevalence impairs:

- Capacity to interpret trends in IDU-related health outcomes
  - Example: surveillance data on the number of newly-diagnosed cases of IDU-related HIV infection
- Research on the structural determinants of IDU
- Planning efforts for drug-related health services

Purposes of Current Study

- To estimate IDU prevalence among Non-Hispanic Black and White adult residents of large US metropolitan statistical areas between 1992-2002
- To describe temporal and spatial variation in these trajectories

Sample

- Unit of analysis
  - Metropolitan statistical area (MSA)
- Inclusion criterion
  - MSA population ≥500,000 in 1993
- 96 MSAs met this criterion
  - Located in 38 states and Washington, DC
  - Home to 64% of the US population in 2000
- Missing data on 1 MSA
  - N = 95

Formula for calculating racial/ethnic-specific IDU prevalence

Formula:

$$\frac{a_{ij} * b_{ij}}{c_{ij}}$$

Where

a_{ij} = total number of injectors in MSA *i* and year *j* (from Brady et al, submitted)

b_{ij} = proportion of injectors who are in a given racial/ethnic group in MSA *i* and year *j*

c_{ij} = total number of adults who are in a given racial/ethnic group in MSA *i* and year *j* (from US Census)

Stage 1: Estimating the proportion of injectors in each racial/ethnic group in each MSA and year

- Calculated the proportion of injectors who were Non-Hispanic Black or White in each of 3 databases
  - SAMHSA's Treatment Entry Database (TEDS)
  - CDC's HIV Counseling & Testing Services database (CTS)
  - CDC's AIDS Public Information Database (APID)
    - Adjusted APID-based estimates for local HIV seroprevalence
    - Imputed APID estimates for HAART era (1998-2002)

Stage 2: Estimating the proportion of injectors in each racial/ethnic group in each MSA and year

- Averaged resulting database-specific estimates to create a single estimate of the proportion of injectors who were Black and who were White for each MSA and year (the "Index" proportion)

Validation

- Validated prevalence estimates by correlating them cross-sectionally with each of two theoretically-related constructs:
  - Racial/ethnic-specific prevalence of mortality related to consumption of opioids, cocaine, and psychostimulants/amphetamines
  - Racial/ethnic-specific prevalence of mortality associated with hepatitis C virus infection (limited to 1995 – 2002)

Descriptive Analysis: Model Building

- Used hierarchical linear modeling to describe variations in racial/ethnic-specific IDU prevalence estimates over time and across MSAs
  - Study year ranges from 0 –10
  - Tested different expressions of time
  - Identified outliers and non-normal residuals → removed 2 MSAs for analyses of Black IDU prevalence

Table 1. Unconditional Growth Model: Injecting Prevalence per 10,000 Black Adults in 93 Large US MSAs (1992-2002)[1]

Fixed Effects	**Coefficient (SE)**	**p-value**
Initial Status	272.00	<0.0001
Instantaneous rate of change	-11.17	<0.0001
Curvature/acceleration	0.35	0.04
Random Effects	**Variance Components (SE)**	**p-value**
In initial status	24,672.00	<0.0001
In instantaneous rate of change	510.06	<0.0001
In curvature/acceleration	2.56	<0.0001

1. Excluded MSAs: Salt Lake City and San Francisco

Figure 1. Model-based average IDU prevalence per 10,000 Black adult residents of large US MSAs, 1992-2002

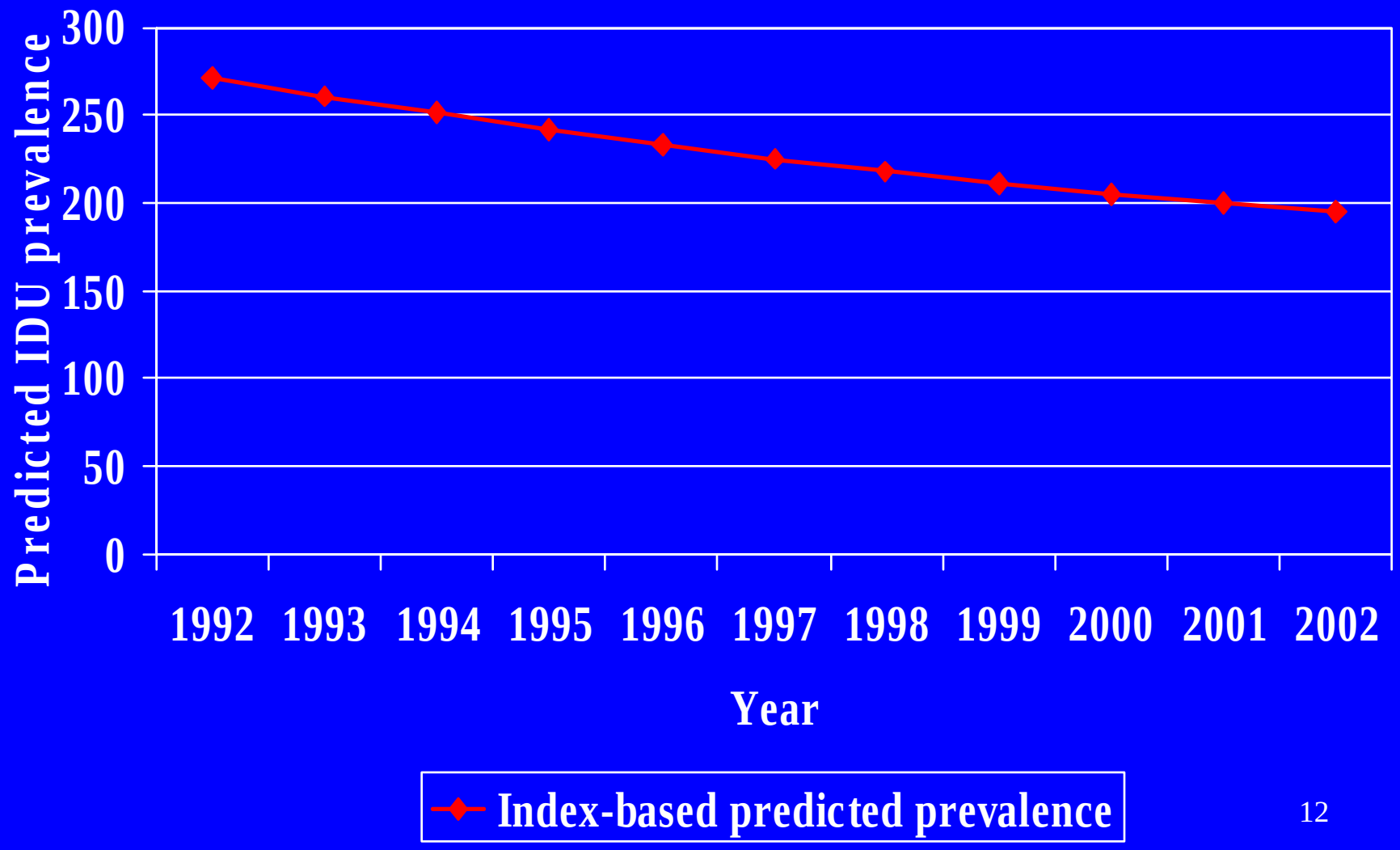
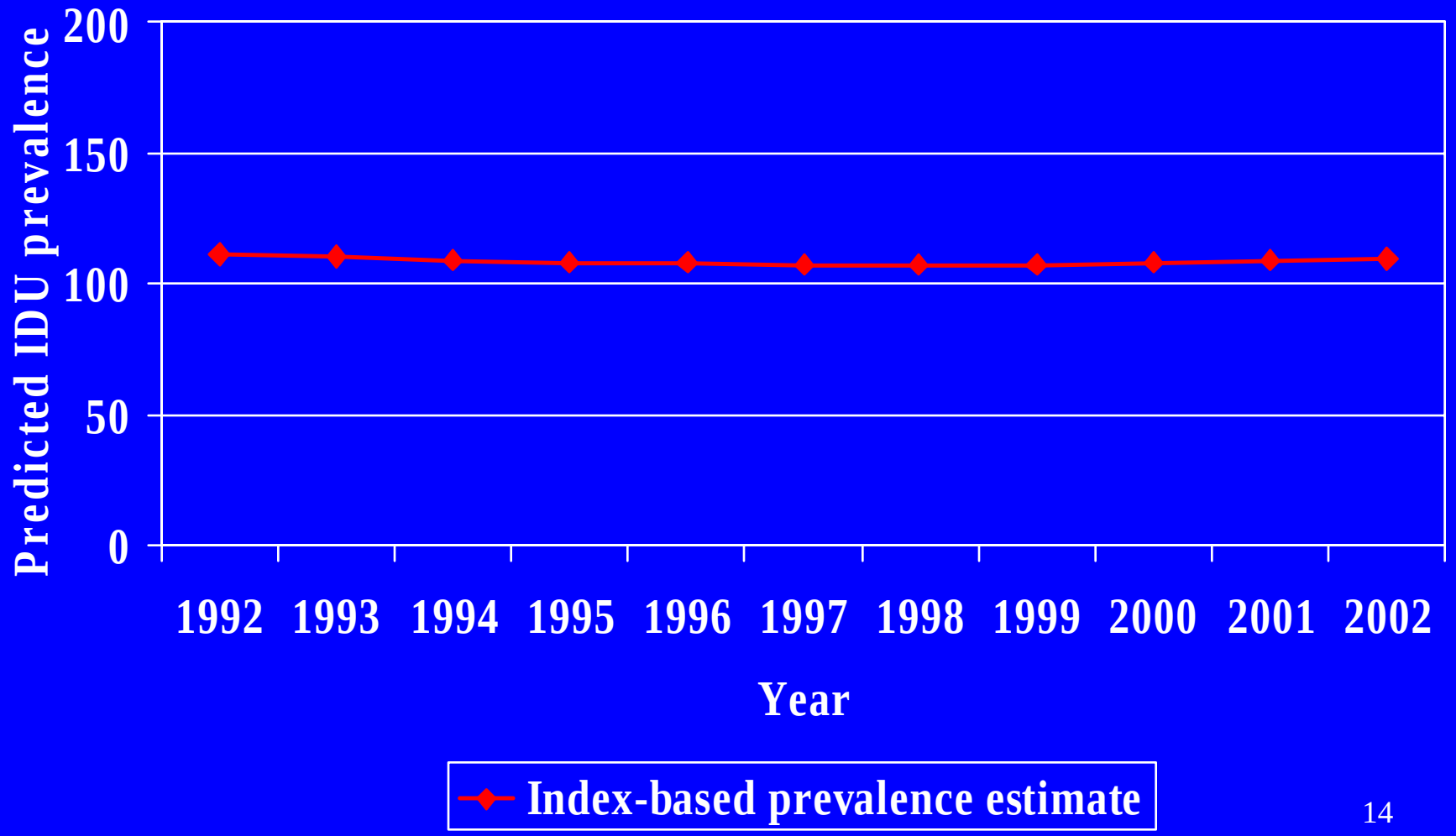


Table 2. Unconditional Growth Model: Injecting Prevalence per 10,000 White Adults in 95 US MSAs (1992-2002)

Fixed Effects	**Coefficient (SE)**	**p-value**
Initial Status	111.50	<0.0001
Instantaneous rate of change	-1.47	0.01
Curvature/acceleration	0.13	0.04
Random Effects	**Variance Components (SE)**	**p-value**
In initial status	6,387.26	<0.0001
In instantaneous rate of change	51.16	<0.0001
In curvature/acceleration	0.32	<0.0001

Figure 2. Model-based average IDU prevalence per 10,000 White adult residents of large US MSAs, 1992-2002



Validation of prevalence estimates

- Cross-sectional correlations for Black IDU prevalence estimates
  - with prevalence of drug-related mortality:
    - range for r: 0.25 – 0.48
  - with prevalence of HCV mortality:
    - range for r: 0.32 – 0.54
- Cross-sectional correlations for White IDU prevalence estimates
  - with prevalence of drug-related mortality:
    - range for r: 0.43 – 0.77
  - with prevalence of HCV mortality:
    - range for r: 0.62 – 0.67

Limitations

- Each database introduced specific limitations:
  - TEDS: re-admissions counted as new cases
  - CTS: no need to get tested after test HIV+
  - APID: data points imputed for HAART era
- In addition, the Index IDU prevalence estimates have the following limitations
  - They cannot capture variation within racial/ethnic groups (e.g., by social class, gender, sexual orientation, age)
  - Groups who were not covered by TEDS, CTS, or APID may differ from those who were

Discussion

- These data provide a basis for interpreting surveillance data on drug-related harms
  - Declines in the number of newly diagnosed cases of injection-related HIV among Black adults may be shaped, in part, by declining IDU prevalence in this population

Discussion

- Possible determinants of diverging trends in IDU prevalence among Black and White adults
  - Duration of injection: Several processes removed active injectors from communities, and affected Black injectors disproportionately
    - Mortality from drug-related causes (particularly AIDS)
    - Escalating enforcement of drug-related laws
  - Incidence: Reports that injection initiation is declining among Black users, and may be increasing among White users

Discussion

- Past research suggests that several structural factors may also shape temporal and spatial variations in IDU prevalence, including:
  - Socioeconomic deprivation
  - Racial/ethnic discrimination and inequalities in socioeconomic status

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Figure 2. Model-based average IDU prevalence per 10,000 Black adult residents of large US MSAs, 1992-2002, as calculated using database-specific methods and the index

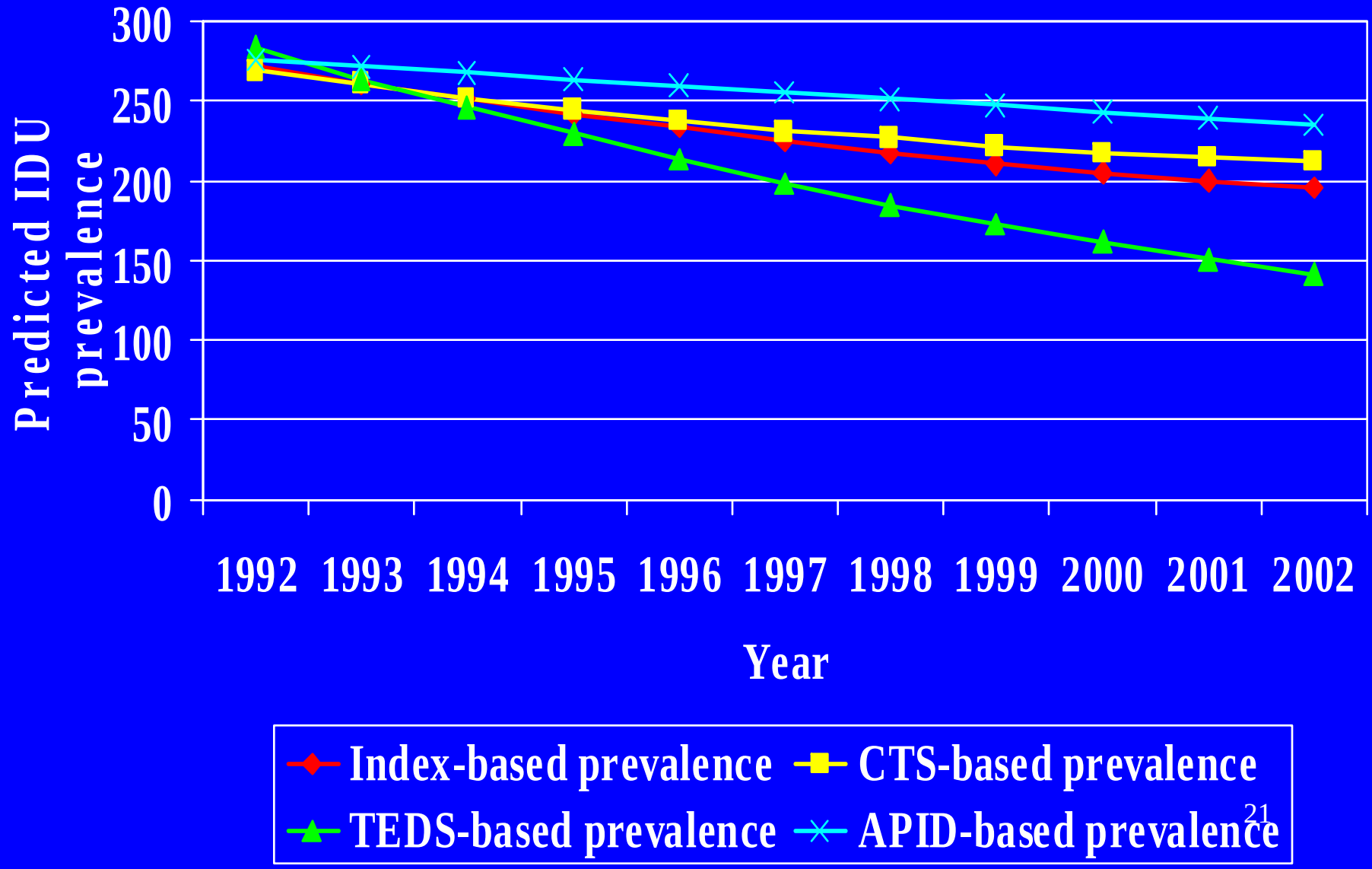

Figure 4. Model-based average IDU prevalence per 10,000 White adult residents of large US MSAs, 1992-2002, as calculated using database-specific methods and the index