

Exploring Gender and Ethnoracial Differences and Trends in Methamphetamine Treatment

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ABSTRACT

INTRODUCTION: Given the significant rise in methamphetamine use and related mortality in the United States, it is critical to explore differences in treatment trends with particular attention to women and ethnoracial groups in hard-hit areas like Los Angeles County.

METHODS: We analyzed a large sample across 4 waves: 2011 (105 programs, 10 895 clients), 2013 (104 programs, 17 865 clients), 2015 (96 programs, 16 584 clients), and 2017 (82 programs, 15 388 clients). We completed a comparative analysis to identify differences across subgroups and a trend analysis of treatment episodes by gender and ethnoracial group to differentiate users of methamphetamine and users of other drugs.

RESULTS: Treatment clients using methamphetamine increased over time for each gender and race. There were also significant differences across age groups. Women comprised a greater proportion of treatment episodes involving methamphetamine use (43.3%) compared to all other drugs combined (33.6%). Latinas represented 45.5% of methadone-related admissions. Compared with other drug users, methamphetamine users had a lower successful treatment completion rate and were served by programs with less financial and culturally responsive capacity.

CONCLUSIONS: Findings highlight a sharp increase in treatment admissions for methamphetamine users of all gender and ethnocultural groups. Women, especially Latinas, saw the most significant increases, with a widening gender gap over time. All subgroups of methamphetamine users had a lower treatment completion rate compared with users of other drugs, and critical differences existed in the programs where they received services.

KEYWORDS: Methamphetamine use, substance use disorder treatment, Latinas, health care disparities

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Introduction

Although national attention has been focused on the opioid epidemic, the co-occurring epidemic of methamphetamine is increasingly concerning in many respects.¹ Large-scale data suggest that methamphetamine use and overdose rates have skyrocketed during the last decade.^{2–8} The rising use of methamphetamine and related overdose rates and mortality may be explained in part by the increasing availability, potency, and relative affordability of methamphetamine.^{7,9–11} Also contributing to the rise in mortality is the increase in riskier methods of methamphetamine use patterns and diversification of use to populations with greater sociodemographic and mental health risk profiles.¹ Despite the alarming national rate of methamphetamine use, hard-hit regions are receiving limited attention.

The Southwest region has historically reported high rates of methamphetamine use, yet use is increasing in the Northeast and certain parts of the Midwest.^{1,4,5,9,10,12–14} Young adults,^{6,15}

men,^{3,4,16–18} and those of low socioeconomic status^{1,14,18,19} have historically been associated with higher rates of methamphetamine use. Although these rates have been increasing, trend comparison using national surveys (eg, National Survey on Drug Use and Health—NSDUH) is inconclusive due to changes in the methodology.^{20,21} of these surveys. However, regional studies show significant increases in methamphetamine use rates in urban ethnoracial groups,^{1,4,10,22} women,^{6,10} and middle-aged, and older adults.^{10,22} Overall, age groups linked to higher rates of methamphetamine use are 25 to 34, 35 to 49, and 50 and older.^{23,24} Large-scale national studies have found that individuals identifying as Black or African American have experienced some of the biggest relative increases in rates of methamphetamine use and overdose.^{1,4} Similarly, the rates of noninjection methamphetamine use more than doubled in individuals identifying as Latino or Hispanic between 2015 and 2019, and the rates of methamphetamine-involved overdose deaths have continually increased by an average of 20.9%



each year in Latina women and 24.8% each year in Latino men from 2011 to 2018.^{1,4}

The consequences of increases in methamphetamine use in Black and Latino individuals may be compounded by poorer substance use disorder (SUD) treatment outcomes that have been documented in these groups.²⁵⁻²⁹ Yet there is limited knowledge of trends of methamphetamine treatment rates, particularly among women and individuals who identify as members of an ethnoracial minority group. This study helps fill this gap by using large-scale data from 4 waves of diverse users of methamphetamine who received treatment in 1 of the hardest-hit areas in the nation, California's Los Angeles County, through 3 goals: (a) exploring trends in methamphetamine treatment receipt compared to those involving other drugs, (b) exploring treatment completion rates by gender and ethnoracial groups, and (c) exploring differences in treatment program characteristics for users of methamphetamine compared to other drugs.

Conceptual Framework

To explore gender and ethnoracial differences in rates of treatment receipt and treatment characteristics, we relied on Kilbourne et al's³⁰ conceptual framework of disparities research, which proposes a multistage process to (a) detect health care disparities in a vulnerable population, (b) understand client and provider factors that affect disparities,³¹⁻³³ (c) identify program factors associated with reduction of these disparities while accounting for individual differences.³⁰ Consistent with the National Institute for Health and Clinical Excellence's conceptual framework for public health,³³ we examined these disparities at the individual and organizational levels.

Methods

Data and sample

We relied on client administrative data from the Los Angeles County Participant Reporting System (LACPRS) and other datasets.^{26,34} The data came from a parent study funded by the National Institute on Drug Abuse (R33 DA03563401), which merged 4 waves of administrative client records (LACPRS data from 2011 to 2017) with program surveys (Integrated Substance Abuse Treatment to End Disparities data from 2011, 2013, 2015, and 2017). We had a 92% response rate in the administration of the online program survey, which included standardized measures on service delivery, organizational capacity, cultural competence, and others. For a full description of measures, please refer to Guerrero et al³⁴

The sample included managers (directors and supervisors) of treatment programs whose services were primarily SUD treatment and who served communities with more than 80% of Latino or African American residents in Los Angeles County. These multiyear, multilevel (program, client) cross-sectional data on 63 845 clients aged 10 to 95 served by 180 unique SUD treatment programs were analyzed to identify trends in methamphetamine use by race and gender. The sample consisted of

4 waves: 2011 (105 programs, 10 895 clients: 4130 female and 6765 male); 2013 (104 programs, 17 865 clients: 6560 female and 11 305 male); 2015 (96 programs, 16 584 clients: 6063 female and 10 521 male); and 2017 (82 programs, 15 388 clients: 5699 female and 9689 male). We replaced about 20% of programs that dropped out across waves. We followed a random sample replacement approach to ensure the representativeness of this sample of SUD treatment programs in ethnoracial communities in Los Angeles County.

Measures

Dependent variables. Methamphetamine use was defined as clients who reported at intake that methamphetamine was either their primary or secondary drug of choice or reason for their treatment admission. After selecting all primary and secondary users of methamphetamine, we compared their treatment episode with all other users whose primary and secondary drug of choice was not methamphetamine in the same episode. Treatment completion was defined as completion status based on LACPRS data records in which completion was measured via 3 main categories (completed treatment or recovery plan, left before completing treatment or recovery plan with progress or satisfactory progress, left before completing treatment or recovery plan with unsatisfactory progress). We selected the first category as successful treatment completion in the observed episode.

Independent variables. These variables were classified as client characteristics measured in the LACPRS survey and program characteristics measured on the Integrated Substance Abuse Treatment to End Disparities program survey.

Client characteristics. These variables included race and ethnicity (individuals self-identified as non-Latino White, non-Latino Black, Latino, and other), gender, age (subgroups), education, employment, Medi-Cal (California's Medicaid program) eligibility, ever diagnosed with a mental illness, homelessness status, and number of children under age 18 living in the home. Individual measures also included referral source (eg, self, criminal justice, health, social services). Program characteristics include Medi-Cal payment acceptance, degree of cultural competence (composite score of 6 subscales measuring different areas of competence engaging racial and ethnic minority communities), knowledge of communities, personal involvement, resources, and linkages, staff diversity, reaching out to communities, policies, and procedures), percentage of staff with graduate-level degrees, percentage of public funding from previous year, and whether the treatment facility is free-standing or part of a larger parent organization.

Analytic strategy

We used Kilbourne et al's³⁰ conceptual framework to (a) detect health disparities, (b) understand client and program factors

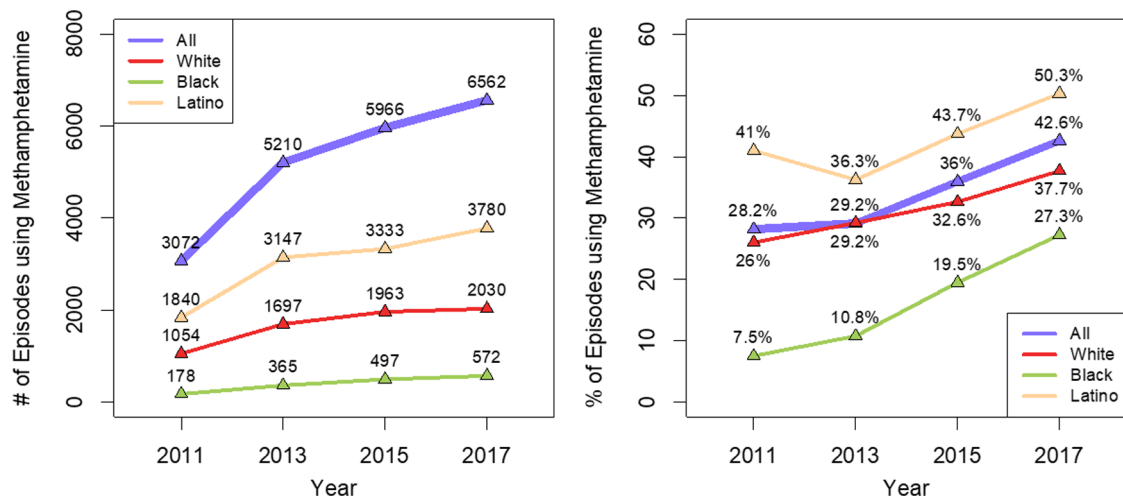


Figure 1. Line chart of number of episodes using methamphetamine by year and race (left) and percentage of episodes using methamphetamine by year and race (right). *P*-values for (a) linearity tests for White, Black, and Latino (left): 0.074, 0.018, and 0.070, respectively; (b) equality of linear slopes (left): White versus Black=0.091, White versus Latino=0.191, and Black versus Latino=0.032; (c) linearity tests for White, Black, and Latino (right): 0.007, 0.015, and 0.221, respectively; and (d) equality of linear slopes (right): White versus Black=0.016, White versus Latino=0.880, and Black versus Latino=0.182.

that affect disparities, and (c) seek to reduce disparities by identifying relevant programmatic approaches. Initially, we conducted trend analyses by ethnoracial group and gender for methamphetamine and other drug users in episodes between 2011 and 2017 to detect health disparities. We examined statistically significant differences in the linearity and equality of slopes. We used line charts of the number and percentage of episodes involving individuals who used methamphetamine by year, race and age group.

To understand factors affecting disparities over time, we conducted a comparative analysis with the combined sample of type of drug use over time by reporting counts and percentages for categorical variables and means and standard deviations for continuous variables based on whether the primary or secondary drug was methamphetamine compared to other drugs combined. We conducted chi-square tests for categorical variables and 2-sample *t*-tests for continuous variables. Our unit of analysis was treatment episodes over different years. Because the episodes were unidentified, we could not determine duplication of the same individual in different years. But we controlled for reported number of prior treatment episodes, which was less than 2. Our interpretation of results was based on treatment episodes rather than individuals, even when most individuals had only 1 treatment episode over time. Finally, we used findings from these analyses to identify strategies for reducing health disparities.

Results

Trend analysis

The line charts of number and percentage of episodes involving individuals who used methamphetamine by year and race are presented in Figure 1. The number of episodes involving methamphetamine users increased over time both overall and

for each racial and ethnic group. The overall count increased from 3072 to 6562, with an overall annual average increase of 37.9%. The number of methamphetamine treatment episodes and related annual increase differed by racial and ethnic groups from 2011 to 2017: non-Hispanic Whites grew from 1054 to 2030 (30.9%); African Americans and Blacks grew from 178 to 572 (73.8%); and Latinos grew from 1840 to 3780 (35.1%).

The percentages of methamphetamine users overall and in each racial and ethnic group also increased, as shown on the right of Figure 1. The increasing trend by year is clearest for Black episodes (7.5%, 10.8%, 19.5%, and 27.3%, by year). The percentage of methamphetamine users decreased slightly from 2011 to 2013 for Latino episodes. Regardless, all 4 groups (overall, White, Black, and Latino) increased at a statistically significant level ($P < .001$) based on the Cochran–Armitage test. Stratified by gender instead of race as shown in Figure 2, the increasing trend of percentage of episodes for methamphetamine users overall and for each gender group was also statistically significant ($P < .001$). Figure 3 shows significant differences in methamphetamine use treatment episodes across age groups. More than 80% of individuals entering treatment from 2011 to 2017 were between the ages of 18 and 50.

Comparative analysis: users of methamphetamine and other drugs over time

The comparative analysis of methamphetamine and other drug users is presented in Table 1. The number of treatment episodes involving methamphetamine users increased over time (3072, 5210, 5966, and 6562, by year), whereas the number of treatment episodes involving individuals using other drugs did not show an increasing trend. Among Latinos, the percentage of episodes involving methamphetamine users compared to users of other drugs was much higher (59.1% vs 41.0%, respectively;

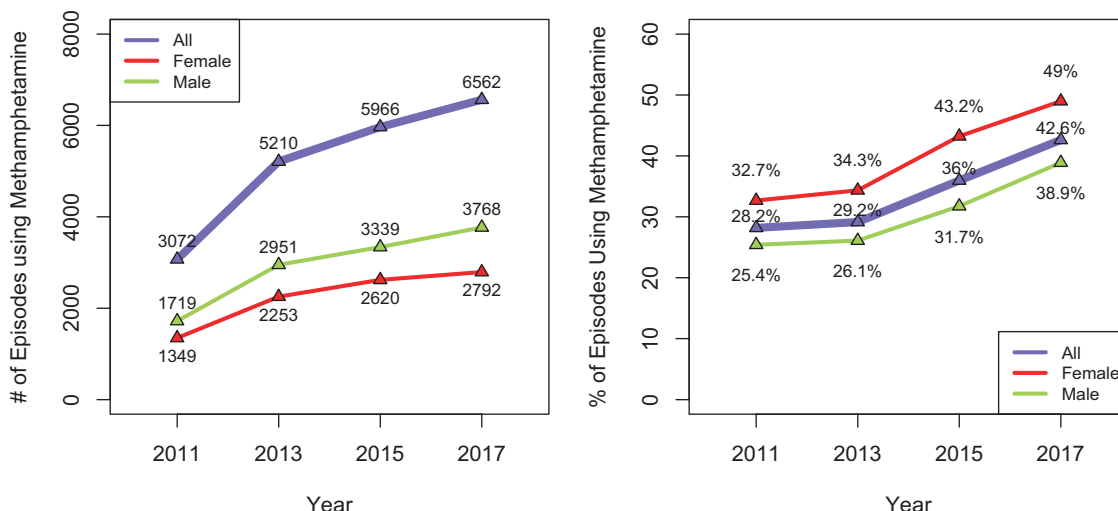


Figure 2. Line chart of number of episodes using methamphetamine by year and gender (left) and percentage of episodes using methamphetamine by year and gender (right). *P*-values for (a) linearity tests for female and male (left): 0.058 and 0.039, respectively; (b) equality of linear slopes (left): female versus male=0.333; (c) linearity tests for female and male (right): 0.028 and 0.049, respectively; and (d) equality of linear slopes (right): female versus male=0.449.

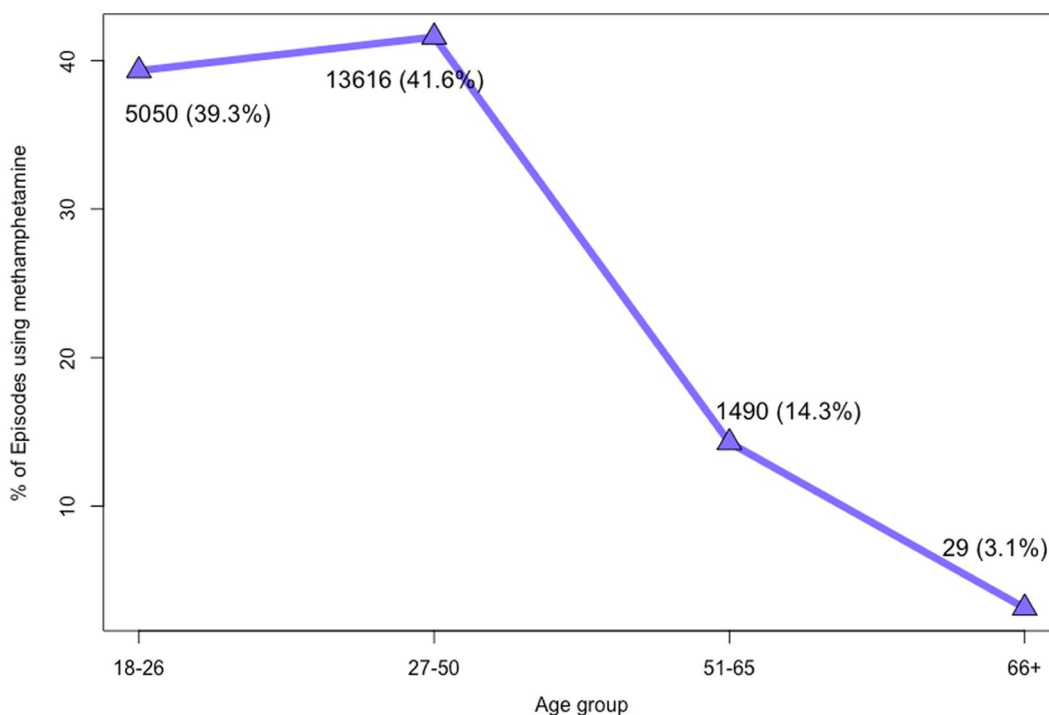


Figure 3. Line chart of number of episodes using methamphetamine by percentage of episodes using methamphetamine by age group. *P*-values for (a) linearity tests for age groups.

$P < .001$). The percentage of treatment episodes involving women was much higher for methamphetamine users than users of other drugs (43.4%vs 33.6%, $P < .001$).

Stratified by race, the representation of women among methamphetamine users compared to other drug users in treatment episodes varied by ethnoracial group. For Whites and Latinos, the percentage of women was higher among methamphetamine users than other drug users (40.6% vs 34.3%,

$P < .001$, and 45.5% vs 28.7%, $P < .001$, respectively). This contrasts with treatment episodes involving Black clients, where the percentage of women was lower among methamphetamine users compared to other drug users (39.1%vs 42.1%, $P < .05$).

Compared to treatment episodes involving other drug users, episodes involving methamphetamine users had other differences in demographic characteristics. Methamphetamine users

Table 1. Comparative analysis of treatment episodes reporting methamphetamine or other drug use at admission.

	METHAMPHETAMINES (N=20 810)	OTHER DRUGS (N=39 956)
<i>Client characteristics</i>		
Year***		
2011	3072 (14.8%)	7828 (19.6%)
2013	5210 (25.0%)	12663 (31.7%)
2015	5966 (28.7%)	10629 (26.6%)
2017	6562 (31.5%)	8836 (22.1%)
Race***		
White	6744 (33.0%)	14510 (36.8%)
Black	1612 (7.9%)	8782 (22.2%)
Latino	12100 (59.1%)	16196 (41.0%)
Gender***		
Female	9014 (43.4%)	13438 (33.6%)
Male	11777 (56.6%)	26503 (66.4%)
Gender (White)***		
Female	2735 (40.6%)	4978 (34.3%)
Male	4007 (59.4%)	9526 (65.7%)
Gender (Black)*		
Female	627 (39.1%)	3694 (42.1%)
Male	978 (60.9%)	5084 (57.9%)
Gender (Latino)***		
Female	5499 (45.5%)	4652 (28.7%)
Male	6591 (54.5%)	11539 (71.3%)
Age***	33.7 (10.2)	38.0 (14.7)
Education (years)**	11.4 (2.7)	11.2 (2.6)
Employed at admission*	2802 (13.5%)	5651 (14.1%)
Referral source***		
Self	6965 (33.5%)	20872 (52.3%)
Community	2216 (10.7%)	4354 (10.9%)
Prop 36/drug court	4442 (21.4%)	3875 (9.7%)
Social services	7170 (34.5%)	10843 (27.2%)
Medical eligibility***	7546 (36.3%)	16605 (41.6%)
Mental illness	5820 (28.0%)	11172 (28.0%)
Homeless***	5498 (26.4%)	7324 (18.3%)
Treatment completion***		
Successful completion	4491 (32.5%)	10466 (39.6%)
Incompletion with progress	1959 (14.2%)	3892 (14.7%)
Incompletion	7384 (53.4%)	12074 (45.7%)

(Continued)

Table 1. (Continued)

	METHAMPHETAMINES (N=20810)	OTHER DRUGS (N=39956)
# Children under 18***	1.2 (1.6)	0.6 (1.2)
<i>Program characteristics</i>		
Medicaid***	16910 (83.9%)	34032 (87.2%)
Cultural competence***	26.3 (4.4)	27.0 (4.3)
% graduate staff***	17.3 (17.7)	19.8 (18.9)
% public funding***	68.5 (33.3)	65.5 (33.4)
Parental organization***	10357 (49.9%)	21667 (54.6%)

* $P < .05$. ** $P < .01$. *** $P < .001$.

were generally younger (mean age = 33.7 vs 38.0, $P < .001$); more likely to be referred from Proposition 36 or drug court (21.4% vs 9.7%, $P < .001$) or social services (34.5% vs 27.2%, $P < .001$); more likely to be homeless (26.4% vs 18.3%, $P < .001$); and less likely to be eligible for Medi-Cal (36.3% vs 41.6%, $P < .001$). Importantly, methamphetamine users were less likely to complete treatment compared with users of other drugs (32.5% vs 39.6%, $P < .001$).

Programs that served clients who use methamphetamine compared to other drugs also differed, wherein such programs were less likely to accept Medicaid payment (83.9% vs 87.2%, $P < .001$), had lower ratings on cultural competence ($P < .001$), and had a lower proportion of staff members with graduate degrees (17.3% vs 19.8%, $P < .001$). However, programs that provide treatment to methamphetamine users received a higher percentage of public funding (68.5% vs 65.5%, $P < .001$) and were less likely to have a parent organization (49.9% vs 54.6%, $P < .001$).

Discussion

In the current study, we explored patterns of methamphetamine use among individuals who entered SUD treatment in one of the nation's largest treatment systems. Findings show a significant increase in methamphetamine use from 2011 to 2017, consistent with national trends.²⁻⁸ Most of this increase was observed in individuals between the ages of 18 and 50. Noting that the population studied was already in treatment and that most users of methamphetamine do not access treatment,^{35,36} the numbers reported here are likely well below those found in epidemiological studies.^{37,38}

Critical findings regarding the profiles of users of methamphetamine and the treatment programs where they receive services highlight 2 key distinctions. First, among Latinos, a majority of those in treatment are methamphetamine users. Certainly, Latinos are the largest population in Los Angeles County, yet their higher representation as methamphetamine users is novel. Second distinction, among women especially, methamphetamine use was more common among Latinas than among non-Latinas. These Latinas in methamphetamine

treatment were relatively younger, more frequently referred via the criminal justice system, less likely to have Medi-Cal eligibility, more likely to be homeless, had more children, and had lower rates of treatment completion, compared to other groups.

The trend analysis showed a significant increase in treatment receipt overall, but with clear variations across gender and ethn racial groups. The number of episodes involving methamphetamine users increased across years for all groups, but it was the most pronounced among African Americans, followed by Latinos. Women, particularly Latinas, also showed an increasing trend over time. These findings have implications for these minority groups regarding access to drug markets, socialization of drug use, and access to care.

The characteristics of programs where primary and secondary users of methamphetamine receive care varied a great deal. These programs seemed to have lower capacity to deliver care to women and individuals from ethn racial minority groups. These programs were less likely to accept Medi-Cal, delivered less culturally responsive care, had a lower proportion of graduate-level staff members, and relied more on public funding than programs serving clients who used other drugs as their primary and secondary choice.

Findings also reinforce the need to reduce health disparities by focusing on integrated, comprehensive services by gender and ethn racial group.³⁹ and consider age group as well. Research on integrated, comprehensive services showed that tailoring services to client needs contributes to improved health and social outcomes for both women and men, but especially women.⁴⁰⁻⁴² Further, tailored SUD treatment services have been shown to improve treatment outcomes across gender and ethn racial subgroups.⁴²⁻⁴⁴

Limitations

Our findings should be interpreted considering the limitations of the study. Although the data represent one of the nation's largest treatment systems, our sample only represents the racially and ethnically diverse populations of Los Angeles County. Client characteristics differ nationally and regionally.

The current analysis also focused on users of methamphetamine as their primary or secondary drug of choice, which includes using other drugs. Because the goal of our study was to establish a baseline understanding of trends and disparities among primary users of methamphetamine and these data did not identify use beyond a primary and secondary drug of choice, we did not consider polysubstance users for whom methamphetamine was not a primary or secondary choice or identify users of 3 or more drugs. Another limitation is that these data only covered 2011 to 2017, missing the latest peak in methamphetamine use in this region. However, as one of the first studies on users of methamphetamine in treatment, this research generated critical findings that establish a baseline understanding of the problem.

Future research should include a more recent period to determine the full development of the epidemic. Our study was also limited by the heterogeneity of the sample of clients and programs regarding certain details about clients (eg, stigma, help seeking, and stages of change) and programs (eg, expertise in treating methamphetamine use). Further, the data were limited regarding the availability of information about system-level factors (eg, funding, regulation, and service infrastructure) of critical importance to delivering methamphetamine treatment to individuals from different age groups. These robust findings, based on 4 years of data from Los Angeles County, are important because they suggest differences in the trends and engagement of individuals from different gender and ethnora-cial categories. More research on women who use methamphetamine, particularly young adult Latinas, is critical.

Conclusions

Overall, our findings highlight the importance of understanding individuals based on their drug of choice and subgroup differences. These differences can provide critical information for policymakers to prevent and intervene in targeted drug use and enhance treatment access and engagement. Women, particularly Latinas, require special attention, because their rates of methamphetamine use and treatment receipt have increased significantly.

Author Contributions

EG and HA reviewed the research literature, framed the scope of the paper and contributed to the statistical analysis and the writing of initial drafts. EG was the primary text author. TK, and JM provided additional literature review, suggestions for and critical review of statistical analysis, and support in writing the manuscript, including revisions. YK conducted the statistical analysis. All authors reviewed and approved the final draft.

REFERENCES

- Han B, Compton WM, Jones CM, Einstein EB, Volkow ND. Methamphetamine use, methamphetamine use disorder, and associated overdose deaths among US adults. *JAMA Psychiatry*. 2021;78:1329-1342.
- Bello JK, Hearing C, Salas J, Weinstock J, Linhorst D. Trends in substance use by gender among participants in a Jail-based substance use disorder treatment program: 1998–2016. *J Forensic Sci*. 2020;65:97-102.
- Bonk R, Miller RJ, Lanter J, Niblo C, Kemp J, Shelton J. Accidental overdose deaths in Oklahoma, 2002-2017: opioid and methamphetamine trends. *J Anal Toxicol*. 2020;44:672-678.
- Han B, Cotto J, Etz K, Einstein EB, Compton WM, Volkow ND. Methamphetamine overdose deaths in the US by sex and race and ethnicity. *JAMA Psychiatry*. 2021;78:564-567.
- Jalal H, Buchanich JM, Roberts MS, Balmert LC, Zhang K, Burke DS. Changing dynamics of the drug overdose epidemic in the United States, 1979-2016. *Science*. 2018;361:eaau1184.
- Jones CM, Underwood N, Compton WM. Increases in methamphetamine use among heroin treatment admissions in the United States, 2008-17. *Addiction*. 2020;115:347-353.
- Strickland JC, Havens JR, Stoops WW. A nationally representative analysis of "twin epidemics": rising rates of methamphetamine use among persons who use opioids. *Drug Alcohol Depend*. 2019;204:107592.
- Volkow N. Rising stimulant deaths show that we face more than just an opioid crisis. *Nora's Blog*. Published November 12, 2020. Accessed January 3, 2023. <https://www.drugabuse.gov/about-nida/noras-blog/2020/11/rising-stimulant-deaths-show-we-face-more-than-just-opioid-crisis>
- Daniulaityte R, Silverstein SM, Crawford TN, et al. Methamphetamine use and its correlates among individuals with opioid use disorder in a Midwestern U.S. City. *Subst Use Misuse*. 2020;55:1781-1789.
- Ellis MS, Kasper ZA, Cicero TJ. Twin epidemics: the surging rise of methamphetamine use in chronic opioid users. *Drug Alcohol Depend*. 2018;193:14-20.
- Maxwell JC. A new survey of methamphetamine users in treatment: who they are, why they like "meth," and why they need additional services. *Subst Use Misuse*. 2014;49:639-644.
- Crane HM, Nance RM, Whitney BM, et al. Drug and alcohol use among people living with HIV in care in the United States by geographic region. *AIDS Care*. 2021;33:1569-1576.
- Hedegaard H, Miniño AM, Warner M. Co-involvement of opioids in drug overdose deaths involving cocaine and psychostimulants. *NCHS Data Brief No*. 2021;406:1-8.
- Yen Li M, Alba GA, Mitton J, Bearnot B. Care-engaged individuals with polysubstance use in Northeastern US are undertreated for methamphetamine use disorder: a retrospective cohort study. *Addict Sci Clin Pract*. 2021;16:57.
- Yockey RA, King KA, Vidourek RA. Past-year methamphetamine use among US young adults: 2015-2018. *J Subst Use*. 2020;25:677-682.
- Coffin PO, Santos GM, Hern J, et al. Extended-release naltrexone for methamphetamine dependence among men who have sex with men: a randomized placebo-controlled trial. *Addiction*. 2018;113:268-278.
- Coffin PO, Santos GM, Hern J, Vittinghoff E, Walker JE, Matheson T, et al. Effects of mirtazapine for methamphetamine use disorder among cisgender men and transgender women who have sex with men: a placebo-controlled randomized clinical trial. *JAMA Psychiatry*. 2020;77:246-255.
- Palamar JJ, Han BH, Keyes KM. Trends in characteristics of individuals who use methamphetamine in the United States, 2015-2018. *Drug Alcohol Depend*. 2020;213:108089. doi:10.1016/j.drugalcdep.2020.108089
- Shearer RD, Howell BA, Bart G, Winkelman TNA. Substance use patterns and health profiles among US adults who use opioids, methamphetamine, or both, 2015-2018. *Drug Alcohol Depend*. 2020;214:108162.
- Substance Abuse and Mental Health Services Administration. *National Survey on Drug Use and Health: 2014 and 2015 Redesign Changes*. CBHSQ Methodology Report. Center for Behavioral Health Statistics and Quality; 2015.
- Knopf Alison. SAMHSA plans changes to NSDUH: DSM-5 updates. *Alcohol Drug Abuse Wkly*. 2019;31:4-5.
- Cano M. Drug overdose deaths among US Hispanics: trends (2000–2017) and recent patterns. *Subst Use Misuse*. 2020;55(13):2138-2147. doi:10.1080/10826084.2020.1793367
- Jones CM, Compton WM, Mustaqim D. Patterns and characteristics of methamphetamine use among adults – United States, 2015-2018. *MMWR Morb Mortal Wkly Rep*. 2020;69:317-323.
- Substance Abuse and Mental Health Services Administration. *Results From the 2018 National Survey on Drug Use and Health*. US Department of Health and Human Services, Substance Abuse and Mental Health Services Administration; 2019. <https://www.samhsa.gov/data/report/2018-nsduh-detailed-tables-externalicon>
- Guerrero EG, Marsh JC, Duan L, Oh C, Perron B, Lee B. Disparities in completion of substance abuse treatment between and within racial and ethnic groups. *Health Serv Res*. 2013;48:1450-1467.
- Marsh JC, Amaro H, Kong Y, Khachikian T, Guerrero E. Gender disparities in access and retention in outpatient methadone treatment for opioid use disorder in low-income urban communities. *J Subst Abuse Treat*. 2021;127:108399.

27. Mennis J, Stahler GJ, El Magd SA, Baron DA. How long does it take to complete outpatient substance use disorder treatment? Disparities among Blacks, Hispanics, and Whites in the US. *Addict Behav.* 2019;93:158-165.
28. Saloner B, Lê Cook B. Blacks and Hispanics are less likely than Whites to complete addiction treatment, largely due to socioeconomic factors. *Health Aff.* 2013;32:135-145.
29. Stahler GJ, Mennis J. Treatment outcome disparities for opioid users: are there racial and ethnic differences in treatment completion across large US metropolitan areas? *Drug Alcohol Depend.* 2018;190:170-178.
30. Kilbourne AM, Switzer G, Hyman K, Crowley-Matoka M, Fine MJ. Advancing health disparities research within the health care system: A conceptual framework. *Am J Public Health.* 2006;96:2113-2121.
31. Guerrero EG, Marsh JC, Khachikian T, Amaro H, Vega WA. Disparities in Latino substance use, service use, and treatment: implications for culturally and evidence-based interventions under health care reform. *Drug Alcohol Depend.* 2013;133:805-813.
32. Guerrero EG. Enhancing access and retention in substance abuse treatment: the role of Medicaid payment acceptance and cultural competence. *Drug Alcohol Depend.* 2013;132:555-561.
33. Kelly MP, Stewart E, Morgan A, et al. A conceptual framework for public health: NICE's emerging approach. *Public Health.* 2009;123:e14-e20.
34. Guerrero E, Amaro H, Kong Y, Khachikian T, Marsh JC. Gender disparities in opioid treatment progress in methadone versus counseling. *Subst Abuse Treat Prev Policy.* 2021;16:52.
35. Brecht ML, Lovinger K, Herbeck DM, Urada D. Patterns of treatment utilization and methamphetamine use during first 10 years after methamphetamine initiation. *J Subst Abuse Treat.* 2013;44:548-556.
36. Coughlin LN, Zhang L, Bohnert ASB, Maust DT, Goldstick J, Lin LA. Patient characteristics and treatment utilization in fatal stimulant-involved overdoses in the United States Veterans Health Administration. *Addiction.* 2022;117:998-1008.
37. Courtney KE, Ray LA. Methamphetamine: an update on epidemiology, pharmacology, clinical phenomenology, and treatment literature. *Drug Alcohol Depend.* 2014;143:11-21.
38. Jones CM, Houry D, Han B, Baldwin G, Vivolo-Kantor A, Compton WM. Methamphetamine use in the United States: epidemiological update and implications for prevention, treatment, and harm reduction. *Ann NY Acad Sci.* 2022;1508:3-22.
39. Blanco C, Wiley TRA, Lloyd JJ, Lopez MF, Volkow ND. America's opioid crisis: the need for an integrated public health approach. *Transl Psychiatry.* 2020;10:167.
40. Andrews CM, Marsh JC, Shin HC. The impact of comprehensive services in substance abuse treatment for women with a history of intimate partner violence. *Violence Against Women.* 2011;17:550-567.
41. Lin YA, Hedeker D, Ryan JP, Marsh JC. Longitudinal analysis of need-service matching for substance-involved parents in the child welfare system. *Child Youth Serv Rev.* 2020;114:105006.
42. Marsh JC, Cao D, Guerrero E, Shin HC. Need-service matching in substance abuse treatment: racial/ethnic differences. *Eval Prog Plann.* 2009;32:43-51.
43. Marsh JC. What do women want? Women want services tailored to their needs. *Addiction.* 2018;113:999-1000.
44. Marsh JC, Cao D, D'Aunno T. Gender differences in the impact of comprehensive services in substance abuse treatment. *J Subst Abuse Treat.* 2004;27:289-300.