Addictive Behaviors Reports 17 (2023) 100492

Contents lists available at ScienceDirect

Addictive Behaviors Reports

journal homepage: www.elsevier.com/locate/abrep

Short Communication

Sex-related differences in the prevalence of substance use disorders, treatment, and overdose among parents with young children

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ARTICLE INFO

Keywords:
Substance use disorder
Opioid use disorder
Sex
Gender
Parents

ABSTRACT

Introduction: Risk factors and treatment rates for substance use disorders (SUDs) differ by sex. Females often have greater childcare and household responsibilities than males, which may inhibit SUD treatment. We examined how SUD, medication for opioid use disorder (MOUD) receipt, and overdose rates differ by sex among parents with young children (<5 years).

Methods: Using deidentified national administrative healthcare data from Optum's Clinformatics® Data Mart Database version 8.1 (2007–2021), we identified parents aged 26–64 continuously enrolled in commercial insurance for ≥ 30 days and linked to ≥ 1 dependent child < 5 years from January 1, 2016-February 29, 2020. We used generalized estimating equations to estimate the average predicted prevalence of SUD diagnosis, MOUD receipt after opioid use disorder (OUD) diagnosis, and overdose by parent sex in any month, adjusting for age, race/ethnicity, state of residence, enrollment month, and mental health conditions.

Results: From 2016 to 2020, there were 2,241,795 parents with a dependent child < 5 years, including 1,155,252 (51.5%) females and 1,086,543 (48.5%) males. Male parents had a higher average predicted prevalence of an SUD diagnosis (11.1% [11, 11.16]) than female parents (5.5% [5.48, 5.58]). Among parents with OUD, the average predicted prevalence of receiving MOUD was 27.4% [26.1, 28.63] among male and 19.7% [18.34, 21.04] among female parents, with no difference in overdose rates by sex.

Conclusion: Female parents are less likely to be diagnosed with an SUD or receive MOUD than male parents. Removing policies that criminalize parental SUD and addressing childcare-related barriers may improve SUD identification and treatment.

1. Introduction

In 2019, 4.8 million parents in the United States (U.S.) self-reported a substance use disorder (SUD), including half a million with opioid use disorder (OUD) (Clemans-Cope et al., 2019). Parenting adults may have a lower likelihood of SUD treatment engagement than non-parenting adults, due to stigma, fear of child welfare involvement, and lack of childcare services (Ashley et al., 2003; Feder et al., 2018; Greenfield et al., 2007; Stewart et al., 2007; Stringer and Baker, 2018; Taylor, 2010). Parents of children younger than 5 years old may be less likely to engage in SUD treatment because young children require intensive care (Scheidell et al., 2022). Due to gender norms, women assume greater childcare and household responsibilities (Vlassoff, 2007) than men. Limited data exist regarding gender differences in SUD outcomes among parents. The purpose of this study is to examine gender differences in the prevalence of SUDs, MOUD receipt, and overdose rates among parents of young children.

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https://doi.org/10.1016/j.abrep.2023.100492
Received 5 December 2022; Received in revised form 31 March 2023; Accepted 22 April 2023
Available online 28 April 2023

2. Methods

2.1. Data

We used national administrative healthcare data from Optum's Clinformatics® Data Mart Database version 8.1 (2007–2020) to conduct a retrospective cohort study of parents enrolled in commercial health plans with at least one dependent child younger than 5 years. These data consist of deidentified information on member demographics, enrollment, inpatient and outpatient medical services, and outpatient pharmacy claims from approximately 68 million unique individuals. This study followed the STROBE reporting checklist of items for observational studies (Von Elm et al., 2007). The University of Pittsburgh Institutional Review Board considered this study exempt because it used deidentified data.

2.2. Participants and procedures

We included biological and non-biological parents ages 26–64 with at least one dependent child younger than 5 years. We identified parents and their dependent children as those who shared the same subscriber number (family ID) associated with an employer-sponsored health insurance plan. Dependent children include adopted or biological children. Domestic partners may also be eligible dependents, depending on state or local policies (Ash and Lee Badgett, 2006). We did not have information in our data about the family or household that could be used to verify parental or child status, nor could we identify the marital or partnered status of adults included.

Because we examined sex differences in outcomes observed in any enrolled month, individuals linked to the same family ID had to be continuously enrolled in health insurance for at least 30 continuous days between January 1, 2016, and February 29, 2020. Parents < 26 years old were excluded because they can remain on their parents' health insurance plans until age 26. We identified hospital deliveries using ICD-10 and procedure codes. In cases where there were 3 or more adults ages 26–64 of the same sex linked to the same family ID, we excluded all adults and children with this family ID because we could not verify which individuals had primary parenting responsibilities using claims data. Steps for creating the cohort appear in **Supplementary material, Figure S1.**

2.3. Exposure and outcomes

We examined sex differences in 4 binary outcomes in any enrolled month: 1) any SUD diagnosis overall, 2) any SUD diagnosis by common SUD type, 3) any MOUD received among parents with an OUD diagnosis, and 4) any opioid overdose event among parents with an OUD diagnosis receiving MOUD. SUD diagnoses included having at least 1 diagnosis for opioids, alcohol, tobacco, methamphetamine, cannabis, cocaine, sedatives, hallucinogens, inhalants, or psychoactive substances. We included nonfatal and fatal opioid overdoses in any month. We identified SUDs and overdose using ICD-10 codes from outpatient, inpatient, or ED claims (see **Supplementary material, Table S1**) during the study period. We defined MOUD as buprenorphine, naltrexone, and/or methadone. We identified buprenorphine and/or naltrexone as any prescription fill for either medication in the pharmacy claims using National Drug Codes (National Quality Forum, 2019). A complete list of National Drug Codes can be provided upon request. We identified methadone use as having either procedure codes H0020 (any methadone administration and/or service) and/or J1230 (injection of methadone up to 10 mg) in inpatient or outpatient claims (AAPC (2023a); (AAPC, 2023b)).

As insurance data lack gender, we used the sex indicator available: "female" or "male".

2.4. Covariates

Covariates included age, race (White, Black, Asian, Other), ethnicity (Hispanic), state of residence, enrollment month, and diagnosis of a mental health condition (anxiety disorders, depression, bipolar disorders, psychotic disorders, or post-traumatic stress disorder). Diagnoses of mental health conditions were identified from inpatient, outpatient, and ED claims using ICD-10 codes (see **Supplemental material, Table S1**).

2.5. Statistical analysis

First, we calculated unadjusted characteristics for the sample stratified by parent sex. Second, we used generalized estimating equations, clustering at the individual-month level to account for repeated observations within individuals (Ballinger, 2004), to examine differences in each outcome including parent sex as a main effect. We used predictive margins to report average predicted prevalence and confidence intervals for female and male parents. We adjusted all models for age, race/ethnicity, state of residence, enrollment month, and diagnosis of a mental health condition and performed statistical analyses using Stata version 17. We assumed a Type 1 error rate of 0.05.

3. Results

3.1. Descriptive characteristics

There were 2,241,795 commercially insured parents of young children between 2016 and 2020, including 1,155,252 (51.5%) females and 1,086,543 (48.5%) males **(see Supplemental material, Table S2)**. The sample included individuals with similar mean ages for males and females (36.6 and 36.9 years, respectively). More than half of the parents identified as White (55.3% of females, 58% of males), with similar percentages of Black (7.2% of females, 6.2% of males), Asian (8.7% of females, 8.5% of males), Hispanic (12.1% of females, 11.5% of males), and missing (16.8% of females, 15.7% of males) parents by sex. Female parents had a higher unadjusted prevalence of any mental health diagnosis (38.7%) than males (21.2%). Compared with males, females had a higher unadjusted prevalence of an anxiety disorder (19.8% vs. 11.2%), depression (12.1% vs. 6%), bipolar disorders (5.2% vs. 3.1%), psychotic disorders (0.3% vs. 0.2%), and post-traumatic stress disorder (1.2% vs. 0.7%).

3.2. Average predicted prevalence of SUD diagnosis, MOUD receipt, and overdose rates by sex

Table 1 shows the unadjusted and average predicted prevalence of any SUD diagnosis, overall and by SUD types. Male parents had a higher unadjusted prevalence of any SUD than female parents (8.4% vs. 5.1%). Compared with females, males had a higher unadjusted prevalence of tobacco use disorder (6.5% vs. 4.0%), alcohol use disorder (1.7% vs. 0.7%), opioid use disorder (0.7% vs. 0.5%), and cannabis use disorder (0.6% vs. 0.4%). The unadjusted prevalence for the full list of SUDs by sex appears in the **supplemental material, Table S2**. After adjusting for covariates, 11.1% [11, 11.16] of males were predicted to have an SUD diagnosis, on average, compared with 5.5% [5.48, 5.58] of females. Compared to females, males had a higher average predicted prevalence of tobacco use disorder (8.5% [8.39, 8.53] vs. 4.3% [4.29, 4.38]), alcohol use disorder (2.5% [2.5, 2.58] vs. 0.8% [0.77, 0.81]), opioid use disorder (0.9% [0.85, 0.91] vs. 0.4% [0.42, 0.45]), and cannabis use disorder (1% [0.93, 0.98] vs. 0.4% [0.39, 0.42]).

Among parents diagnosed with OUD, males had a higher unadjusted prevalence of receiving MOUD than females (26% vs. 21.3%; Table 1). After adjusting for covariates, the average predicted prevalence of receiving any MOUD after OUD diagnosis for males was 27.4% [26.1, 28.63] and 19.7% [18.34, 21.04] for females. Fig. 1 shows the average

Table 1
Average predicted prevalence and unadjusted prevalence of any SUD diagnosis and any MOUD (%) parents by sex.

Outcome	Average predicted prevalence[a] (%) [95% CI]		Unadjusted prevalence (N, %)	
	Female parent	Male parent	Female parent	Male parent
Any SUD diagnosis	5.53 [5.48, 5.58]	11.08 [11, 11.16]	59,420 (5.14)	91,578 (8.43)
Tobacco use disorder	4.33 [4.29, 4.38]	8.46 [8.39, 8.53]	46,343 (4.01)	70,748 (6.51)
Alcohol use disorder	0.79 [0.77, 0.81]	2.54 [2.5, 2.58]	8252 (0.71)	18,832 (1.73)
Opioid use disorder	0.44 [0.42, 0.45]	0.88 [0.85, 0.91]	5190 (0.45)	7450 (0.69)
Cannabis use disorder	0.41 [0.39, 0.42]	0.96 [0.93, 0.98]	4953 (0.43)	6833 (0.63)
Any MOUD received after OUD diagnosis	19.69 [18.34, 21.04]	27.37 [26.1, 28.63]	1398 (21.31)	2600 (26.04)

Abbreviations: SUD = substance use disorder; MOUD = medication for opioid use disorder; OUD = opioid use disorder; CI = confidence interval.

[a] Adjusts for age, race/ethnicity, state of residence, enrollment month, and any diagnosis of a mental health condition (including anxiety disorder, depression, bipolar disorders, psychotic disorders, or post-traumatic stress disorder).

predicted prevalence of overdose per 10,000 parents by MOUD receipt and sex. The average predicted prevalence of overdose was higher among parents with no MOUD (11.5 [9.25, 13.76] for females; 13.9 [11.67, 16.11] for males) than those who received MOUD (6.1 [2.74, 9.48] for females; 5.4 [2.6, 8.19] for males). We did not find any significant difference in the average predicted prevalence of overdose by sex among those receiving MOUD.

We also estimated the average predicted prevalence of each outcome by race and ethnicity (see **Supplemental material, Tables S3-S6**). Black parents had the highest prevalence of any SUD diagnosis (7.39 [7.17, 7.6] for females; 13.34 [13.01, 13.68] for males) than other parents. White parents had the highest prevalence of MOUD receipt (21.11 [19.56, 22.66] for females; 29.14 [27.71, 30.58] for males) after OUD diagnosis.

4. Discussion

In this study of commercially insured parents of children younger than age 5 years, we found that male parents had a higher likelihood of any SUD diagnosis than female parents. Among parents with OUD, male parents had a higher likelihood of MOUD receipt than female parents. This is the first study to examine sex differences in SUD diagnosis, MOUD receipt, and overdose among parents with young children. These results are consistent with those of previous studies on all adults, which found similar sex differences in SUD diagnosis and MOUD receipt (Clemans-Cope et al., 2019; Larochelle et al., 2018; Levine et al., 2015; Ma et al., 2019; Sordo et al., 2017).

We found that overdose risk was significantly lower with vs. without MOUD receipt among all parents, which underscores the effectiveness of medication treatment for reducing overdose risk, and the importance of initiating MOUD for parents. We did not find significant differences in the likelihood of overdose by sex among parents previously diagnosed with OUD and received any MOUD in any month, which aligns with prior studies that did not find any significant differences in the probability of overdose by sex when adults are engaged in substance use treatment (Greenfield et al., 2007).

Several reasons might explain why female parents had a lower likelihood of SUD diagnosis and MOUD receipt than males. First, female parents with SUD may face additional stigma than male parents because they are perceived to be violating traditional gender norms of mothers as nurturing caregivers, and labeled as "bad mothers" who place their children in harm's way (Ettorre, 2007; Stringer and Baker, 2018). Parents more often report stigma as a barrier to accessing SUD treatment than non-parents, with female parents reporting the greatest stigma compared with male parents or non-parents (Stringer and Baker, 2018). Parental substance use may also lead to incarceration or loss of parental rights (Weber et al., 2021). In 2019, almost a third of child removal cases cited parental substance use as the reason for removed custody (U.S. Department of Health and Human Services, 2020).

Second, female parents are more often the primary child caregivers and take on more household responsibilities than male parents,

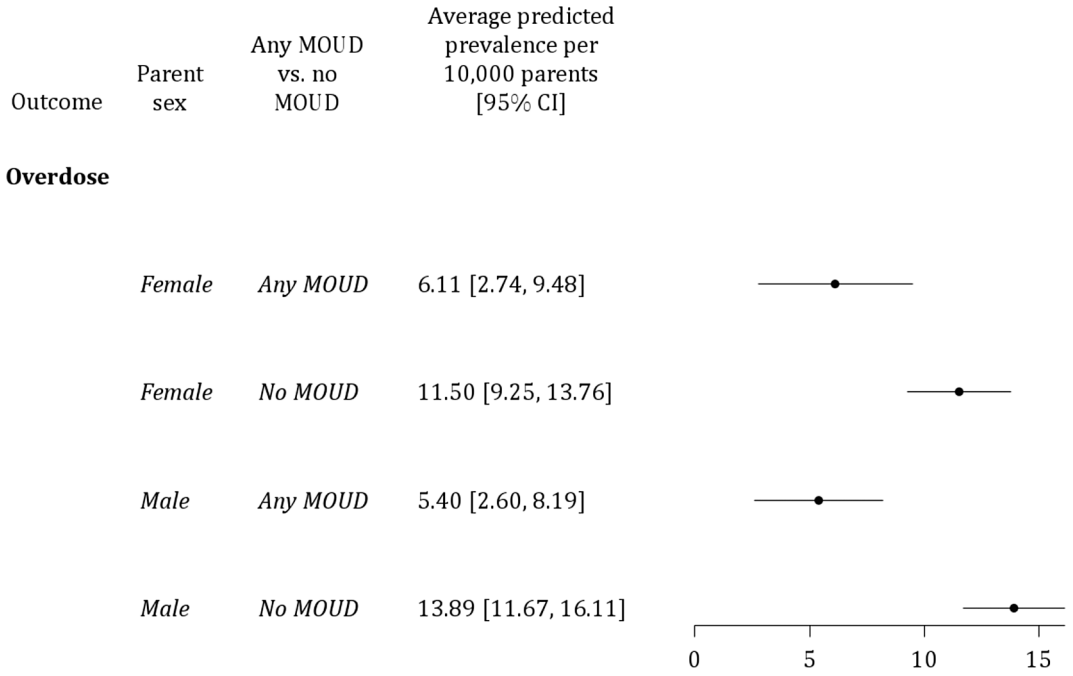

Fig. 1. Average predicted prevalence of overdose per 10,000 parents with OUD by MOUD receipt type and sex Abbreviations: OUD, opioid use disorder; MOUD, medication for opioid use disorder.

restricting the time and resources needed to engage in SUD treatment (Frazer et al., 2019; Huhn and Dunn, 2020; Seay et al., 2017). A systematic review identified lack of childcare as one of the most common barriers to SUD treatment among female parents (Barnett et al., 2021). SUD treatment programs that offer childcare services have a positive association with continuation of treatment (Greenfield et al., 2007; Sun, 2006).

Third, females have a higher likelihood than males of experiencing intimate partner violence (IPV), which represents another barrier to seeking and engaging in SUD treatment (Boeri et al., 2021; Pallatino et al., 2021). A nationally representative study of individuals entering SUD treatment found that almost half of the females and 10% of the males reported lifetime victimization by an intimate partner (Schneider et al., 2009). Females who reported IPV had a higher likelihood of SUD treatment discontinuation compared with those who did not experience IPV (Lipsky et al., 2010).

This study has limitations. We could not identify single parents in the data because parents may each be enrolled in separate health insurance plans. If we observed only one parent in the household, this could be a single parent or the other parent is in a different health insurance plan outside of our dataset. Therefore, we were not able to stratify our results by partnered or marital status. We cannot measure overdoses that occurred outside of acute, outpatient, or ED facilities (e.g., home, prisons, or jails) (Palmer et al., 2015; Palumbo et al., 2020), resulting in an underestimated prevalence of SUD diagnosis, MOUD receipt, and overdose. Because our sample only includes adults enrolled in commercial insurance, our results may not be generalizable to Medicaid enrollees or other populations. We could not distinguish between biological and non-biological parents of young children or observe parents and children covered under different insurance plans (e.g., parents in commercial insurance and children in the Children's Health Insurance Program). Our study population did not include foster parents (as foster children have Medicaid enrollment (Bullinger and Meinhofer, 2021)). This limitation prevented us from comparing SUD diagnoses, MOUD receipt, and overdose between parents and similar adults who were not parents.

5. Conclusion

We found substantial sex differences in the prevalence of SUD diagnosis and MOUD receipt among commercially insured parents of young children in the U.S. Female parents, compared with male parents, have a lower likelihood of SUD diagnosis and treatment. Future studies should explore how possible explanatory factors (e.g., childcare services) contribute to this observed sex difference (Adams et al., 2021; Harris et al., 2022; Lipsky et al., 2010; Victor et al., 2021). Repealing policies that criminalize the disclosure of parental SUD or define this condition as abuse might also increase SUD identification and treatment in this population.

Funding source

This work was supported by the National Institute on Drug Abuse [R01DA045675-03S1]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

CRediT authorship contribution statement

Yitong (Alice) Gao: Data curation, Formal analysis, Methodology, Project administration, Validation, Visualization, Writing – original draft. **Elizabeth E. Krans:** Funding acquisition, Investigation, Project administration, Resources, Validation, Writing – review & editing. **Qingwen Chen:** Formal analysis, Methodology, Project administration, Software, Supervision, Validation, Writing – review & editing. **Scott D. Rothenberger:** Formal analysis, Methodology, Project administration, Supervision, Validation, Writing – review & editing. **Kara Zivin:** Validation, Writing – review & editing. **Marian P. Jarlenski:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.abrep.2023.100492.

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