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## Identifying gender differences in risk profiles and in opioid treatment outcomes in Los Angeles County

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### Abstract

Policies and programs that aim to minimize wait time to enter opioid use disorder (OUD) treatment and maximize retention respond to potential differences in female and male clients' risk profiles. We conducted multigroup latent class analysis using significant individual risk factors. Our sample included 13,453 opioid treatment episodes from 135 unique substance use disorder treatment programs in Los Angeles County, California, in four waves: 2011 (66 programs, 1035 clients), 2013 (77 programs, 3671 clients), 2015 (75 programs, 4625 clients), and 2017 (69 programs, 4106 clients). Groups at risk of waiting longer included clients who were female, had mental health issues, received medication for OUD, had criminal justice involvement, received mandated referrals, had children in child protective services, and had caretaker responsibilities. All clients with children in protective services were likely to wait longer than those not in protective services, but women waited longer. Findings highlight that: (a) women and men in OUD treatment have significant health and social problems; (b) female and male clients have distinct risk profiles; and (c) targeted services responding to risk profiles may improve treatment access and engagement. Findings have implications for health policy and program evaluation and planning in the delivery of treatment services considering gendered risk factors.

### Keywords

Los Angeles County; Gender; Opioid use disorder treatment; Health care disparities; Wait time; Retention

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## 1. Introduction

In 2020, more than 93,000 people died from substance use overdoses in the United States (Volkow, 2021). This is the highest rate of overdose deaths ever reported and a 30 % increase from the previous year (Volkow, 2021). In Los Angeles County, opioid overdose continues to escalate, leading to increased hospitalizations and mortality rates (Centers for Disease Control and Prevention, 2021; Los Angeles County Department of Public Health, 2021). From 2011 to 2017, there were 464 opioid-related deaths per year in Los Angeles County (Los Angeles County Department of Public Health, 2021). The rate of opioid use has been generally higher in Los Angeles County (4.7 %) than the national average (4.3 %; Substance Abuse and Mental Health Services Administration, 2015).

There have been significant increases in public health system investments to enhance access to opioid use disorder (OUD) treatment (Biden, 2020). Yet access continues to be one of the major challenges for those with OUD, particularly for racial and ethnic minorities and women (Grella et al., 2000, 2009; Marsh et al., 2009, 2021). To improve access to care for these vulnerable groups, it is critical to identify the risk profiles of clients with OUD seeking treatment in the most populous county in the United States. This understanding may improve evaluation and program planning to redesign this system of care.

The extant literature suggests that the most critical individual risk factors for treatment engagement of urban women with OUD include five categories: poor physical health; poor mental health (Green et al., 2002; Greenfield et al., 2007); criminal justice involvement (Brady & Ashley, 2005; Messina et al., 2006); violence and conflict (Maina et al., 2021; Ogden et al., 2022; Vigna-Taglianti et al., 2016); and parenting responsibilities (Balcazar & Qian, 2000; Fals-Stewart et al., 2005; Nishimoto & Roberts, 2001; Trepper et al., 2000). This exploratory study examined how these five conceptually driven categories of risk factors are associated with wait time to enter treatment and retention or duration in treatment. Using administrative and survey data to inform measures of risk factors in OUD treatment is critical for evaluation and program planning. Finally, identifying to what extent risk factors among men and women in OUD treatment play a role in outcomes, such as wait time and retention, is critical to inform health policy and treatment practices for vulnerable populations.

## 2. Background literature on risk factors

### 2.1. Health

Women are more likely to come into substance use disorder (SUD) treatment with more health and social problems than men and benefit more when receiving services targeting specific problems (Andrews, 2011; Marsh et al., 2000, 2004). In OUD treatment, women report more health issues compared with men (Amaro et al., 2007; Huhn & Dunn, 2017; Keogh, 2006; McHugh et al., 2013), including chronic pain (Keogh, 2006). When women receive comprehensive services addressing their health issues, they are likely to stay in SUD treatment longer and reduce substance use after discharge (Andrews et al., 2011; Marsh & Smith, 2011).

## 2.2. Mental health

According to the Substance Abuse and Mental Health Services Administration (2020), more than two thirds of women with SUDs have comorbid mental illnesses. It is well established that women with SUDs are more likely than their male counterparts to have certain comorbid mental health issues—specifically, mood disorders (e.g., depression, bipolar) and stress-related disorders (e.g., posttraumatic stress disorder; Grella et al., 2009; Hellem et al., 2015; McHugh et al., 2013). Moreover, women with SUDs tend to face more severe mental health issues and greater impairment of their daily functioning (McHugh et al., 2013; Wu et al., 2010). Even in the general population, women seek mental health treatment at higher rates than men (Terlizzi & Norris, 2021).

## 2.3. Criminal justice involvement

Another aspect affecting women's and men's risk factors in OUD treatment is their involvement in the criminal justice system (Messina et al., 2006). Effectively delivering OUD treatment for women and men involved in the criminal justice system is critical to improve recovery efforts (Volkow, 2019). The findings on associations between criminal justice involvement and SUD treatment outcomes, such as initiation, engagement, and completion, have been mixed (Dunigan et al., 2014; Johnson & Tran, 2020; Kiluk et al., 2015; Sahker et al., 2015). However, studies consistently have reported high rates of mandatory detoxification and exceptionally low access to medication for OUD (MOUD) among justice-involved individuals (Krawczyk et al., 2017; Malta et al., 2019; Matusow et al., 2013), although access to MOUD for prisoners has increased during the recent COVID-19 pandemic (Dadiomov et al., 2022). When it comes to women with SUDs in the criminal justice system, gender-responsive treatment has been found to be effective in reducing both drug use and criminal activity (Messina et al., 2010, 2014; Prendergast et al., 2011).

## 2.4. Violence and conflict

Women are more likely to experience physical and sexual violence, leading to poorer treatment outcomes as compared with men (Levine et al., 2015; Vigna-Taglianti et al., 2016). They are also more likely to report partner violence compared with men, which poses a challenge to initiating and engaging in OUD treatment (Huhn & Dunn, 2020). Empirical evidence supports the use of trauma-informed care in SUD treatment for improved results (Amaro et al., 2007; Messina et al., 2014; Saxena et al., 2014).

## 2.5. Family structure and parenting responsibilities

Family structure and parenting responsibilities are important aspects to consider with regard to OUD treatment and engagement. For instance, women with OUD are more likely to have family conflict related to parental responsibilities, interpersonal relationships, and childcare (Amaro et al., 2007), with a significant barrier to treatment being lack of childcare and family support (Grella et al., 2006). Previous literature has suggested that providing women with support for their families and children is correlated with long-term positive impact in treatment and outcomes of OUD—i.e., increasing developmental and behavioral needs of women in treatment (Normile et al., 2018).

In the current study, we sought to answer two research questions: (a) To what extent are the risk factor profiles of women different from those of men? (b) To what extent are risk profiles by gender associated with wait time and retention? These two outcome measures are among the most significant measures of treatment access and engagement. We relied on latent class analysis (LCA) to build clusters of clients with OUD for each group and then explore their association with treatment wait time and retention using negative binomial and multinomial logistic regression models to assess the association with key treatment outcomes.

### 3. Methods

#### 3.1. Data and sample

We relied on client administrative data from the Los Angeles County Participant Reporting System (LACPRS). The data came from a parent study funded by [redacted for review]. In the parent study, we merged four waves of administrative client records with program surveys (2011, 2013, 2015, and 2017). The sample included treatment programs that primarily provided SUD treatment and served communities with more than 80 % Latino or African American residents in Los Angeles County. We determined the analytic sample of the current study using only programs serving clients with OUD in the parent study, which included 34 (25.2 %) SUD programs that offered outpatient counseling services to clients with OUD (no medication) and 101 (74.8 %) programs that offered methadone with an expected but not documented minimal level of counseling. These two types of programs are the most common types of OUD treatment programs in Los Angeles County, serving more than 95 % of all clients entering publicly funded OUD treatment.

Multiyear cross-sectional data on 13,453 clients aged 12 or older served by 135 unique SUD treatment programs were analyzed (LACPRS 2011–2017). The sample consisted of four waves: 2011 (68 programs, 1035 clients; 358 female, 677 male), 2013 (79 programs, 3686 clients; 1076 female, 2610 male), 2015 (76 programs, 4626 clients; 1406 female, 3220 male), and 2017 (70 programs, 4106 clients; 1290 female, 2816 male). The organizational sample included 34 (25.2 %) SUD programs that offered outpatient counseling services to clients with OUD and 101 (74.8 %) methadone treatment programs. We only included clients who were discharged during each selected year and received counseling or methadone.

Less than 5 % of clients receiving publicly funded treatment received buprenorphine or naltrexone. We did not include those clients in the analytic sample. We focused on methadone, the most common OUD treatment available and one of the most cost-effective MOUDs. The two groups we considered (counseling and methadone) are mutually exclusive because clients reported at discharge and counselors indicated in the discharge system whether client received exclusively counseling or primarily methadone.

#### 3.2. Measures

Our measures were collected at intake by a counselor for each treatment program in LACPRS, a system that includes epidemiological and clinical measures used in public

health studies (Cousins et al., 2016; Guerrero et al., 2013). Our treatment outcome measures included wait time and retention. Wait time, a measure of treatment access, was defined as the number of days spent on a waiting list before being admitted to a treatment program. Retention was defined as the number of days spent in treatment (i.e., treatment duration). These outcomes measures have been used in several studies across datasets, time periods, and treatment systems (Campbell et al., 2019; Guerrero et al., 2013; Marsh et al., 2021). We selected from more than 100 health and service measures in the LACPRS dataset. Measures that fit the following five risk categories were included.

**3.2.1. Health**—We considered four dichotomous variables (1 = *yes*, 0 = *no*), collected at admission to treatment, falling into this category: physical health problems in past 30 days, tuberculosis diagnosis, hepatitis C diagnosis, and emergency room visit in past 30 days for physical health problem.

**3.2.2. Mental health**—Four factors from this category were included (1 = *yes*, 0 = *no*): ever diagnosed with mental illness, in outpatient care for mental health needs in past 30 days, stayed for more than 24 h in a hospital or psychiatric facility for mental health needs in past 30 days, and ever prescribed medication for mental health needs.

**3.2.3. Criminal justice involvement**—Five factors in this category were considered (1 = *yes*, 0 = *no*): mandated referral including Proposition 36, drug court, DUI, or DWI; criminal justice involvement; arrested in past 30 days; in jail in past 30 days; and having an open case with child protective services.

**3.2.4. Violence and conflict**—Four binary factors were identified in this category (1 = *yes*, 0 = *no*): residing with partner who used alcohol and or drugs in past 30 days, having serious conflict with family in past 30 days, physically abused in past 30 days, and sexually abused in past 30 days.

**3.2.5. Family structure and parenting responsibilities**—Four count factors were included in this category: number of children aged 17 or younger, number of children enrolled in treatment services with client, number of children placed elsewhere for protection, and number of children with parental rights terminated. We ensured that each measure represented a mutually exclusive category.

### 3.3. Analytic approach

Our analytic approach consisted of four iterative steps: (1) multigroup LCA to identify the latent class of each risk factor, (2) multilevel negative binomial regression between latent risk factor and outcomes, (3) between-group analysis for men versus women to identify disparities in risk factors and outcomes, and (4) within-group analysis based on gender to identify relationships between risk and outcome in women and in men.

Because we had four waves of LACPRS data and there may be heterogeneity across them, we conducted multigroup LCA with wave specified as group. For each category of factors, we fit the multigroup LCA for two to five classes and determined the optimal class size using the Bayesian information criterion. After building latent classes for each category,

we relied on two multilevel negative binomial regressions to examine their association with wait time (days) and retention (duration in days). We considered between-group analysis of men and women and studied the effect modification of gender on the associations between latent classes, one by one, with the two outcomes, wait time and retention. Then we further conducted a within-group analysis, i.e., stratifying the data by gender and then fitting multilevel negative binomial regressions for men and women, separately. Finally, to identify the interaction between risk profiles and gender, we examine moderated relationships between each risk factor in three stepwise regression models with wait time and retention as outcomes.

## 4. Results

A comparative analysis of basic client and program characteristics by gender was presented in Table 1 to show our measures. Many factors were statistically significantly different by gender including year, age, race/ethnicity, education, employment status, mental health issues, age and days using primary drug, Medi-Cal eligibility and receiving MOUD treatment. Gender differences were also identified in wait time and retention.

### 4.1. Step 1: LCA of risk factors

In the first step of the analysis, we conducted a multigroup LCA to identify the latent class of each risk factor listed in Table 1. Profiles of the first four categories of latent classes are presented in Table 2. The profile of the last category of latent classes is presented in Fig. 1. Additional information on model fit available upon request.

**4.1.1. Health**—Using the Bayesian information criterion, we found three optimal classes: Class 1 had low risk in all categories, Class 2 represented high risk of physical health problems and an emergency room visit in the past 30 days for physical health problems, and Class 3 had high risk of tuberculosis and hepatitis C and moderate risk of physical health problems. The prevalence of low-risk class was highest (70.8 %).

**4.1.2. Mental health**—The optimal number of classes from the multigroup LCA was also three. Class 1 had the relatively lowest risk of all factors; Class 2 had high risk of needing outpatient emergency services and a hospital or psychiatric facility stay and moderate risk of being diagnosed with mental illness and prescribed medications for mental health needs in past 30 days; and Class 3 had high risk of being diagnosed with mental illness and prescribed medications for mental health needs in past 30 days. The most and least prevalent classes were Class 1 and Class 3, respectively.

**4.1.3. Criminal justice involvement**—The optimal number of latent classes was four. Class 1 had the lowest risk for all variables; Class 2 had high risk of mandated referral and criminal justice involvement; Class 3 had high risk of being arrested and jailed in the past 30 days and moderate risk of mandated referral and criminal justice involvement; and Class 4 had high risk of having an open case with child protective services. The prevalence of the low-risk class was highest (89.1 %).



**4.1.4. Violence and conflict**—The optimal number of latent classes was two. Class 1 had the lower risk of all factors compared with Class 2. The prevalence of Class 1 and Class 2 was 82.3 % and 17.7 %, respectively.

**4.1.5. Family structure and parenting responsibilities**—Because variables in this category were counts, item response probabilities of each latent class based on count are presented in Fig. 1. The optimal number of latent classes was also two. Class 2 was more likely to have higher counts in all factors compared with Class 1. The prevalence of Class 1 and Class 2 was 95.7 % and 4.3 %, respectively.

## 4.2. Step 2: Gender comparison

In the second step of the analysis, we conducted a comparative analysis for men versus women to identify disparities in risk factors and outcomes. These chi-square and t-test analyses, presented in Table 3, showed statistically significant differences based on gender in latent classes. Women had lower risk than men in health, mental health, and criminal justice involvement classes. But women had higher risk of family violence or conflict and family structure and parenting responsibilities. In relation to outcomes, the comparative analysis showed that women waited more days on average than men to enter treatment (0.535 vs. 0.330); however, women stayed longer in treatment than men (59.44 vs. 54.65).

## 4.3. Step 3: Between-group analysis for men versus women in risk factors and outcomes

In Step 3 of the analysis, we conducted three regression models to identify gender disparities in outcomes. These regressions are presented in Table 4. The model denoted as “Wait Time 1” shows female clients (IRR (incidence rate ratio) = 2.191,  $p < .001$ ) and clients in the class of mental illness and receiving MOUD (IRR = 3.110,  $p < .001$ ), arrest and jail (IRR = 3.315,  $p < .012$ ), mandated referral and criminal justice involvement (IRR = 5.330,  $p < .053$ ), and child protective services (IRR = 7.083,  $p < .01$ ) were more likely to wait longer than their counterparts. However, female clients in the latent class of mental illness and receiving MOUD were more likely to wait less than their counterparts (IRR = 0.190,  $p < .001$ ).

The model denoted as “Wait Time 2” shows that female clients in the class of having children in protective services were more likely to wait longer than their counterparts (IRR = 5.254,  $p < .052$ ). The model denoted as “Wait Time 3” shows that female clients (IRR = 1.894,  $p < .001$ ) and clients in the latent class of arrest and jail (IRR = 4.657,  $p < .001$ ), mandated referral and criminal justice involvement (IRR = 6.558,  $p < .013$ ), child protective services (IRR = 8.080,  $p < .01$ ), and family structure and parenting responsibilities (IRR = 6.983,  $p < .001$ ) were more likely to wait longer. However, female clients in the class of family structure and parenting responsibilities were more likely to wait less than their counterparts (IRR = 0.329,  $p < .001$ ). In all three models for wait time, clients in the class of high risk of family structure and parenting responsibilities were more likely to wait longer than their counterparts (Model 1: IRR = 4.257,  $p < .001$ ; Model 2: IRR = 4.091,  $p < .001$ ; Model 3: IRR = 6.983,  $p < .001$ ).

Female clients were more likely to stay in treatment longer than male clients (IRR = 1.096,  $p < .011$ ). But female clients in the class of violence and conflict had shorter treatment duration on average than their counterparts (IRR = 0.792,  $p < .051$ ).

#### 4.4. Step 4: Within-group analysis for men versus women in risk profiles and wait time and retention

In Step 4 of the analysis, we conducted within-group analyses based on gender to identify relationships between risk and outcome in women and men. The within-group (female clients) analysis is presented in Table 4. Female clients in the class of mental illness and receiving MOUD were more likely to wait less than their counterparts (IRR = 0.696,  $p > .052$ ), whereas male clients in the class of mental illness and receiving MOUD were more likely to wait longer than their counterparts (IRR = 3.025,  $p < .001$ ). All clients in the class of having children in protective services were more likely to wait longer than their counterparts. Female clients waited relatively longer than male clients (IRR = 10.755,  $p < .052$  vs. IRR = 3.194,  $p > .053$ ). All clients in the class of family structure and parenting responsibilities waited longer than their counterparts. Male clients waited relatively longer than female clients (IRR = 5.019,  $p < .001$  vs. IRR = 2.976,  $p < .052$ ). In the retention models, all clients experiencing violence and conflict stayed in treatment less than their counterparts. Female clients stayed relatively fewer days than male clients (IRR = 0.806,  $p < .052$  vs. IRR = 0.996,  $p > .051$ ).

## 5. Discussion

In this exploratory study, we developed gender-based risk profiles and evaluated their relationship with wait time and retention among clients with OUD. We studied risk factors in five areas highlighted by the extant literature: health, mental health, criminal justice involvement, violence and conflict, and family structure and parenting responsibilities. We relied on data from one of the largest OUD treatment systems in the United States to examine the extent to which our conceptually driven risk profiles fit women differently than men and the extent to which these profiles were associated with wait time and retention.

We found three core results: (a) women and men in OUD treatment had significant health and social problems; (b) gender differences existed, i.e., women and men had distinct risk profiles; and (c) targeted services or responding to risk profiles would likely improve wait time and retention in OUD treatment. In the five risk categories we examined, two to four classes generally represented all profiles based on risk associated with health, mental health, criminal justice involvement, violence and conflict, and family structure and parenting responsibilities.

Women and men in OUD treatment showed significant health and social problems that require attention. The extant literature shows that individuals with OUD suffer from co-occurring conditions, such as physical and mental health issues that require coordinated care (McHugh et al., 2013). Women report higher rates of health and mental health issues (Amaro et al., 2007; Huhn & Dunn, 2017; Keogh, 2006; McHugh et al., 2013). However, in our sample, women had lower risk than men of being in health, mental health, and criminal justice latent classes. Women's higher risks involved violence or conflict and family



structure and parenting responsibilities. Still, women benefit from receipt of comprehensive services to address co-occurring health and social conditions (Marsh et al., 2000, 2004). It is critical to develop program capacity to deliver co-occurring primary, mental health, social services, and OUD treatment services.

The targeted services and risk profiles examined as independent variables in the regression analysis played a role in client wait time and retention between and within gender groups. Women with mental health issues and receiving MOUD accessed treatment faster than men. This finding is consistent with the literature that highlights higher rates of mental health service needs among women (Marsh et al., 2000; 2004) and higher access to care (Marsh et al., 2000; 2004; Guerrero et al., 2021). Surprisingly, women with children in child protective services waited longer than men. Responding to men with mental health and OUD service needs and women with children in protective care continues to be a challenge.

Identifying the key aspects of family structure and parenting responsibilities that play a role in clients waiting longer than their counterparts is critical. The extant literature highlights the challenges that parents face to manage childcare and other responsibilities to be able to engage in counseling (Marsh & Smith, 2005; Ryan et al., 2006; Smith & Marsh, 2002). It also documents the limited support that OUD treatment programs provide to reduce this challenge for parents. Culturally responsive programs observed higher wait time, potentially signaling the effect of high demand for those programs (Marsh et al., 2021).

Finally, the determinant of staying in treatment was predominant for all clients who experienced violence, regardless of gender. This finding has important implications for trauma-informed care. The extant literature highlights the vulnerability of individuals with a history of trauma and their limited engagement in psychological services (Priester et al., 2016; Stanojlović & Davidson, 2021a, 2021b). This finding expands our understanding of co-occurring conditions that may play a role in OUD treatment engagement.

Overall, findings have significant implications for health policy and OUD treatment practices. Findings may inform health policy that highlights the diversity of clients receiving OUD treatment and the need to tailor care to women based on their risk factors, including history of trauma, mental health issues, and childcare.

Implications for program practices include assessing for domestic and other types of past, current, or potential violence and how this condition challenges client recovery. Findings also reinforce the need for evaluation and program planning around integrated and comprehensive services for both women and men (Blanco et al., 2020). Research on integrated, comprehensive services shows that tailoring services to client needs contributes to improved health and social outcomes for women and men, but especially for women (Cao et al., 2011; Marsh et al., 2009; Lin et al., 2020). Further, in the OUD system of care where MOUD along with integrated health and social services is the standard of care, recent research indicates that both medication and service integration are related to improved outcomes (Shin & Marsh, 2022).

These findings are important because it is necessary to understand the main characteristics of clients that may play a role in entering and staying in treatment. Beyond disparities based

on race, ethnicity, and gender, the profiles evaluated in this paper advance our understanding of the profiles of factors relevant to designing care in real-world treatment systems.

### 5.1. Limitations

Although this study analyzed one of the largest and most diverse sample of individuals receiving treatment in the United States, at least five limitations should be considered. First, our outcomes were limited to participation in the reported treatment programs and considered only discharged clients within a year of entering OUD treatment, which represents most clients (> 95 %). Second, we built the risk framework from existing measures, and our administrative dataset was not developed to assess risk factors. It is important to note that this is one of the first studies to explore risk factors in the extant literature in a real-world treatment system, in which we captured risk factors that represent some of the most vulnerable groups in OUD treatment (women and individuals who identify as African American or Latino).

Third, we could not evaluate program effects over time because program closures and mergers did not allow us to have a longitudinal dataset. As a result, only 38 programs participated across our four waves of data, with more than 30 % of programs closing at each wave. We controlled for the unbalanced and multilevel data and analyzed a sample that represented the SUD treatment system in minority communities at different years. A fourth limitation was that the multilevel data structure was only accounted for by considering the variance–covariance matrix in the same program. Finally, findings are only generalizable to publicly funded SUD treatment programs accepting opioid-using clients in communities with large Latino and African American populations, which applies to more than 7 million residents in Los Angeles County.

## 6. Conclusion

As leaders in the field sound the alarm about the continuing toll of overdose deaths (Volkow, 2021), it is critical to use these and other profiles for policy development and program planning to better serve vulnerable populations. Interpretation of our findings need to consider their limitations, particularly of the data analyzed. However, this empirical examination of client risk profiles using administrative data from a real-world treatment system is critical to inform effective health policy development. This work provides a baseline understanding of the characteristics of clients who are at risk of opioid overdose at real-world health care settings, a national concern, that can inform treatment practices.

### 6.1. Lessons learned

We learned about the importance of identifying the characteristics of individuals at high risk of treatment dropout. Researchers, treatment providers, and policy makers would benefit from using the evaluation process in this study to effectively implement policies and practices that increase treatment engagement.

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**Tenie Khachikian** received her PhD in Psychology at the University of California, Merced, in 2018. She has an M.S.W. in Social Work from the University of Southern California and her B.A. in Sociology from the University of California, Los Angeles. She has a background and experience in examining sociocultural factors particularly focused on health disparities and culturally responsive interventions. She has contributed to several federally funded studies that focus on improving health outcomes for racial and ethnic minority populations.

**Erick G. Guerrero** completed his doctoral degree at the University of Chicago in 2009 and received tenure as Associate Professor at the University of Southern California in 2016. He has a background in clinical psychology and organizational behavior. As a clinician, he has provided mental health and addiction counseling for the past 23 years. He has published more than seventy-five peer-reviewed manuscripts and three books on racial/ethnic and gender disparities and the implementation of evidence-based practices in healthcare. Funded by the U.S. National Institutes of Health, he is currently co-leading four research studies to respond to the COVID-19 and opioid overdose public health crises.

## Abbreviations:

<b>OD</b>	opioid use disorder
<b>LA</b>	Los Angeles

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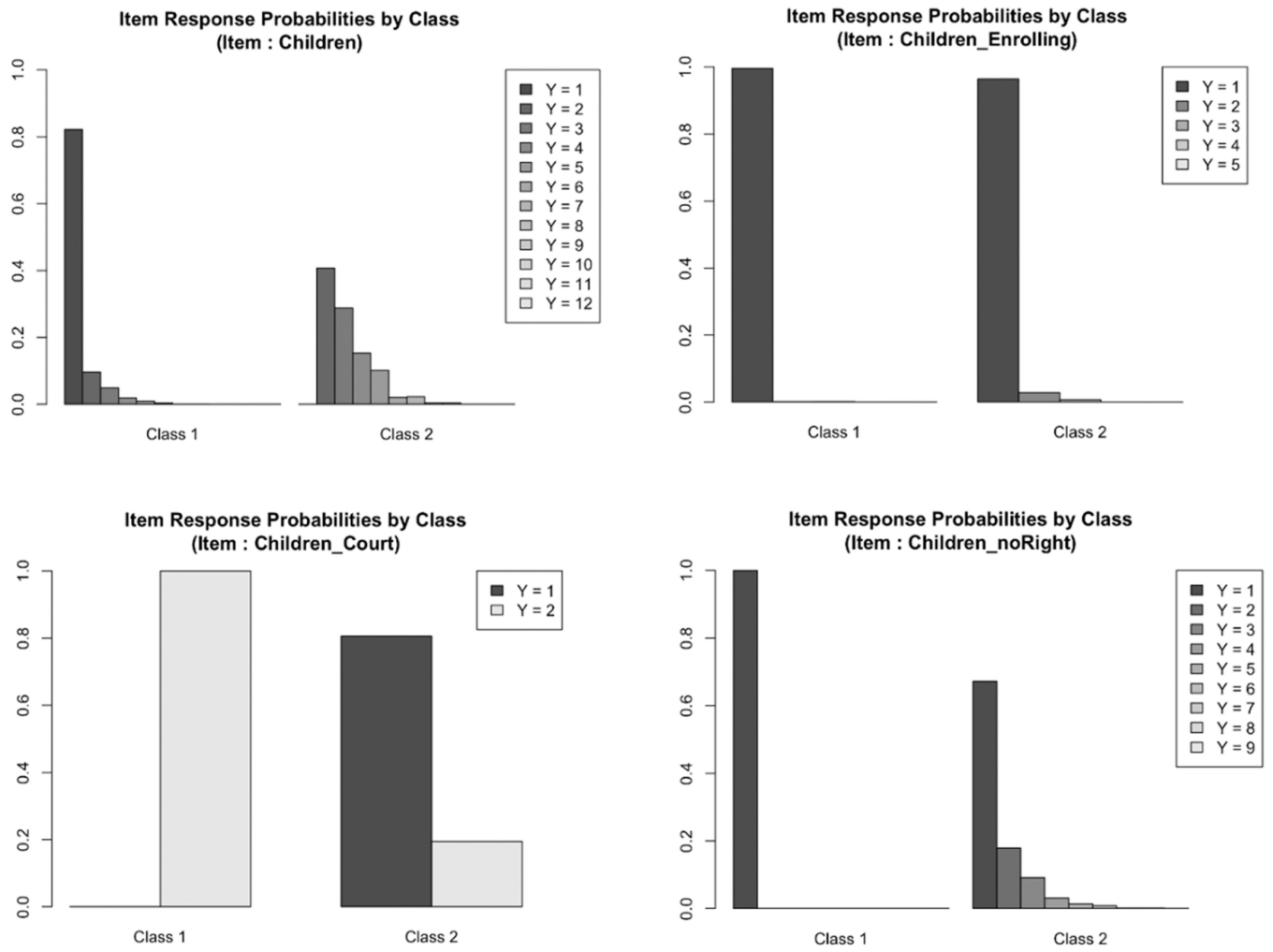
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**Fig. 1.** Item response probabilities by class for the category of childcare.

**Table 1**

Comparative analysis by gender.

	<b>Female</b> ( <i>n</i> = 4130) <i>M (SD) or n (%)</i>	<b>Male</b> ( <i>n</i> = 9323) <i>M (SD) or n (%)</i>
<i>Client characteristics</i>		
Year		
2011 **	677 (7.3 %)	358 (8.7 %)
2013 *	2610 (28.0 %)	1076 (26.1 %)
2015	3220 (34.5 %)	1406 (34.0 %)
2017	2816 (30.2 %)	1290 (31.2 %)
Age ***	40.418 (12.748)	42.606 (13.564)
Race and ethnicity Non-Hispanic		
White ***	2074 (50.6 %)	3904 (42.3 %)
Hispanic ***	1401 (34.2 %)	4063 (44.0 %)
Non-Hispanic Black *	444 (10.8 %)	891 (9.6 %)
Other	184 (4.5 %)	381 (4.1 %)
Education (years) ***	11.609 (2.867)	11.353 (2.868)
Employed ***	585 (14.2 %)	2099 (22.5 %)
Homeless	553 (13.4 %)	1270 (12.6 %)
Mental health issues ***	1344 (32.5 %)	1598 (17.1 %)
Children younger than 18	0.529 (1.052)	0.331 (0.858)
Age using primary drug ***	23.407 (9.190)	22.204 (8.331)
Days using primary drug ***	19.898 (12.930)	21.753 (12.095)
Medi-Cal eligible ***	2503 (60.6 %)	5180 (55.6 %)
Prior episodes in treatment	2.775 (4.180)	2.749 (4.447)
MOUD ***	3325 (80.5 %)	7844 (84.1 %)
<i>Program characteristics</i>		
Degree of cultural competence	24.553 (4.104)	24.657 (4.188)
<i>Dependent variables</i>		
Wait time (days) **	0.535 (4.712)	0.330 (3.305)
Treatment duration (days) *	59.442 (81.826)	54.654 (76.647)

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .

**Table 2**

Item response probabilities by class for the first four categories of variables.

Class	Prevalence										
	Item response probabilities										
	Physical health problems	Tuberculosis	Hepatitis C	Emergency room	Mental health outpatient	Hospital or psychiatric facility	Medication for mental health	Mandated referral	Criminal	Jail	Children court
Low risk	0.7076	0.0713	0.0115	0.2149	0.0196	0.0521	0.4102	0.0039	0.0030	0.0001	0.0000
High risk and acute	0.0620	0.9942	0.0521	0.4102	1.0000	0.2304	0.5628	0.7923	0.4834	0.4642	0.0000
Moderate risk and infectious diseases	0.2304	0.2154	0.1167	0.5628	0.0194			0.0657	0.0085	0.9537	0.0000
Low risk	0.8743	0.1227	0.0039	0.0030	0.0001						
High risk and engaged in care	0.0149	0.7494	0.7923	0.4834	0.4642						
High risk and MOUD	0.1108	0.9048	0.0657	0.0085	0.9537						
Low risk	0.8910	0.0006	0.0617	0.0043	0.0041						
High risk and mandated and criminal justice involvement	0.0582	0.6498	1.0000	0.0315	0.1032						
High risk and recently arrested and in jail	0.0278	0.2394	0.5065	0.9883	1.0000						
Moderate risk and child protective services	0.0230	0.0161	0.2651	0.0459	0.0373						
Low risk	0.8227	0.0634	0.0001	0.0000	0.0000						
Family with SUD and conflict	0.1773	0.3519	0.2046	0.0620	0.0473						

**Table 3**

Comparative analysis of latent classes by gender.

	<b>Female</b> ( <i>n</i> = 4130) <i>M</i> ( <i>SD</i> ) or <i>n</i> (%)	<b>Male</b> ( <i>n</i> = 9323) <i>M</i> ( <i>SD</i> ) or <i>n</i> (%)
Latent class: health		
Low risk ***	3546 (85.9 %)	8231 (88.3 %)
Physical health and emergency room visit for physical health ***	365 (8.8 %)	491 (5.3 %)
Tuberculosis and hepatitis C *	219 (5.3 %)	601 (5.3 %)
Latent class: mental health		
Low risk ***	3373 (81.7 %)	8466 (90.8 %)
Emergency services and psychiatric facility stay **	64 (1.6 %)	89 (1.0 %)
Mental illness and medication ***	693 (16.8 %)	768 (8.2 %)
Latent class: criminal justice involvement		
Low risk *	3814 (92.4 %)	8509 (91.3 %)
High risk mandated and criminal ***	143 (3.5 %)	521 (5.6 %)
High risk recently arrested and in jail	106 (2.6 %)	270 (2.9 %)
Moderate risk child protective services ***	67 (1.6 %)	23 (0.3 %)
Latent class: violence and conflict ***		
Low risk	3598 (87.1 %)	8648 (92.8 %)
High risk	532 (12.9 %)	675 (7.2 %)
Latent class: Family structure and parenting responsibilities ***		
Low risk	3796 (91.9 %)	9157 (98.2 %)
High risk	334 (8.1 %)	166 (1.8 %)

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .

**Table 4**  
Multi-level negative binomial regression on latent classes and treatment duration within women and men.

	Wait time (female)			Wait time (male)			Retention (female)			Retention (male)		
	IRR	95 % CI	IRR	95 % CI	IRR	95 % CI	IRR	95 % CI	IRR	95 % CI	IRR	95 % CI
<i>Client characteristics</i>												
Year	0.972	0.562, 1.680	0.916	0.603, 1.391	0.814***	0.752, 0.882	0.781***	0.701, 0.870				
Age	1.007	0.973, 1.041	0.985	0.959, 1.012	1.010***	1.005, 1.015	1.008***	1.004, 1.013				
<i>Race and ethnicity<sup>a</sup></i>												
Black	0.275	0.065, 1.157	0.476*	0.248, 0.913	0.760***	0.652, 0.887	0.878	0.745, 1.036				
Latino	0.700	0.185, 2.648	0.332	0.056, 1.960	0.766	0.543, 1.079	1.137	0.837, 1.544				
Other	0.613	0.152, 2.477	0.434*	0.212, 0.888	0.966	0.778, 1.200	0.889	0.738, 1.071				
Education (years)	1.076	0.962, 1.203	1.041	0.970, 1.118	0.995	0.968, 1.024	1.009	0.993, 1.025				
Employed	0.286***	0.180, 0.455	1.183	0.827, 1.692	0.884	0.723, 1.080	1.127	0.975, 1.303				
Homeless	1.438	0.637, 3.244	0.995	0.619, 1.600	0.813*	0.666, 0.993	0.927	0.791, 1.086				
Age using primary drug	0.966	0.916, 1.018	1.015	0.993, 1.037	0.985***	0.979, 0.991	0.992*	0.984, 1.000				
Days using primary drug	1.064**	1.024, 1.105	1.006	0.980, 1.031	0.980***	0.971, 0.988	0.977***	0.971, 0.983				
Medi-Cal eligible	0.401*	0.180, 0.893	0.295**	0.132, 0.660	1.125	0.860, 1.472	1.357***	1.137, 1.620				
Prior treatment episodes	1.019	0.951, 1.091	1.040	0.953, 1.135	1.001	0.970, 1.033	0.988	0.955, 1.022				
Medication-assisted treatment	0.046**	0.007, 0.319	0.231*	0.055, 0.972	0.975	0.676, 1.405	1.030	0.683, 1.552				
<i>Program characteristics</i>												
Degree of culture competence	1.111	0.951, 1.298	1.161*	1.035, 1.301	0.987	0.956, 1.020	0.996	0.967, 1.025				
<i>Latent class: health</i>												
Physical health and emergency room visit for physical health	2.144	0.579, 7.937	1.323	0.508, 3.450	1.037	0.758, 1.418	0.879	0.694, 1.114				
Tuberculosis and hepatitis C	1.607	0.687, 3.758	0.810	0.535, 1.225	1.075	0.823, 1.405	0.946	0.814, 1.101				
<i>Latent class: mental health</i>												
Emergency services and psychiatric facility stay	3.950	0.369, 42.254	0.699	0.278, 1.755	0.785	0.482, 1.281	1.104	0.722, 1.686				
Mental illness and medication	0.696	0.361, 1.342	3.025***	1.687, 5.421	1.080	0.926, 1.258	0.893	0.761, 1.049				
<i>Latent class: criminal justice involvement</i>												
Arrest and jail	4.250*	1.097, 16.460	2.076	0.404, 10.663	0.858	0.604, 1.219	0.971	0.352, 2.677				



	Wait time (female)		Wait time (male)		Retention (female)		Retention (male)	
	IRR	95 % CI	IRR	95 % CI	IRR	95 % CI	IRR	95 % CI
Mandated referral and criminal justice involvement	4.234	0.710, 25.265	2.732	0.265, 28.184	0.773	0.490, 1.221	0.820	0.308, 2.181
Child protective services	10.755*	1.500, 77.093	3.194	0.330, 30.955	0.809	0.516, 1.271	1.044	0.383, 2.845
Latent class: violence and conflict								
High risk	0.793	0.381, 1.654	1.217	0.757, 1.956	0.806*	0.663, 0.980	0.996	0.790, 1.256
Latent class: Family structure and parenting responsibilities								
High risk	2.976*	1.152, 7.686	5.019***	2.892, 8.710	0.937	0.746, 1.176	1.021	0.721, 1.445
Log alpha	3.791	3.364, 4.219	3.882	3.473, 4.292	0.368	0.312, 0.424	0.359	0.303, 0.415
Observations (treatment episodes)	2804		6398		1793		4157	

Note. CI: confidence interval; IRR: incidence rate ratio.

<sup>a</sup>White as reference.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .