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A latent class analysis of tailored substance use treatment programs: Implications for treating syndemic conditions facing sexual and gender minority populations

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Abstract

Background: Syndemics (i.e., multiple, co-occurring, and synergistic conditions) contribute to elevated substance use among sexual and gender minority (SGM) people relative to heterosexual, cisgender people. Research suggests that syndemic-informed and SGM-tailored treatments are effective in substance use treatment among SGM people. However, few studies have examined 1) the proportion of substance use treatment facilities offering syndemic-informed, SGM-tailored treatment programming; and 2) the availability and accessibility of syndemic-informed, SGM-tailored treatment programs across the U.S.

Methods: We used the 2020 National Survey of Substance Abuse Treatment Services (N-SSATS) dataset to perform a latent class analysis examining whether substance use treatment facilities' tailored treatment programs cluster together to form distinct classes indicating whether facilities offer syndemic-informed and SGM-tailored programming. We then used multinomial logistic regression to examine associations between class membership and facility availability and accessibility.

Results: Analyses revealed four classes of substance use treatment facilities' tailored programs. Facilities with syndemic-informed and SGM-tailored treatment programs compared to facilities with no tailored programs were more likely to be in the Northeast compared to the Midwest and

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Conflict of Interest

No conflict declared.

South; to offer payment assistance versus not offer payment assistance; and to be private, for-profit facilities versus public or non-profit facilities.

Conclusions: This study's findings identify the need for more facilities with syndemic-informed and SGM-tailored treatment, particularly in the Midwestern and Southern U.S. regions. Facilities offering syndemic-informed and SGM-tailored treatment might present accessibility barriers for low-income SGM people, as they were more likely to be private, for-profit facilities; however, they were more likely to offer payment assistance.

Keywords

Substance use; Sexual minority; Gender minority; Syndemic theory; Treatment facilities

1. Introduction

Sexual and gender minority (SGM) people are substantially more likely than heterosexual, cisgender people to report alcohol and other drug use disorders (Connolly and Gilchrist, 2020; Drabble et al., 2018; Marshal et al., 2008). For instance, relative to heterosexual adults, sexual minority adults are 1.8–2 times as likely to report any past-year substance use disorder and up to 2.4 times as likely to report any lifetime substance use disorder (Kerridge et al., 2017). Relative to cisgender people, gender minority people (e.g., transgender, genderqueer) report 3.6 times the prevalence of any substance use disorder (Hughto et al., 2021). These documented disparities may be due, in part, to minority stress, including distal minority stress (e.g., anti-SGM discrimination, victimization) and proximal minority stress (e.g., internalized homophobia, internalized transphobia; Brooks, 1981; Meyer, 2003). SGM people are also more likely to report higher violence and posttraumatic stress disorder (PTSD) than heterosexual, cisgender people (Conron et al., 2010; Drabble et al., 2020; Hughes et al., 2010; Edwards et al., 2015; Roberts et al., 2010; Scheer et al., 2020). Beyond known disparities among singularly reported mental and behavioral health conditions, SGM people are also more likely than heterosexual, cisgender people to report multiple conditions concurrently (Evans-Polce et al., 2020).

1.1. Syndemic-Informed and SGM-Tailored Substance Use Treatment

Co-occurring conditions among SGM people may be understood within a syndemic framework, which posits that co-occurring conditions synergistically increase the overall health burden among socially disadvantaged individuals (Singer, 1994). A syndemic represents an interaction between two or more health concerns, environmental factors, or social conditions (Singer et al., 2017). For instance, comorbid substance use and PTSD not only interact as potentially maladaptive coping processes (e.g., drinking to cope with PTSD symptoms; Dworkin et al., 2021), but are also exacerbated by environmental disadvantages (e.g., homelessness; Hao et al., 2021), societal stressors (Helminen et al., 2021), and SGM-specific stressors, such as social exclusion and prejudice (Bandermann and Szymanski, 2014; Coulter et al., 2015).

Several studies have examined syndemics among SGM people, particularly to inform treatment of syndemic conditions (Brennan et al., 2012; Coulter et al., 2015; Logie et al.,

2017; Parsons et al., 2012; Scheer and Pachankis, 2019; Valentine et al., 2015). For example, studies have shown that the presence of multiple syndemic conditions contributes to worse health outcomes (Brennan et al., 2012; Parsons et al., 2012; Scheer and Pachankis, 2019). Findings underscore the importance of transdiagnostic treatment approaches that target syndemic conditions among SGM people, rather than treating single conditions separately (Fletcher and Reback, 2015; LoSchiavo et al., 2021; Martinez et al., 2019; Pachankis, 2015). For instance, a recent study found that a cognitive-behavioral intervention targeting co-occurring PTSD symptoms and sexual-risk behavior among sexual minority men led to better outcomes than targeting sexual risk behavior alone (O'Cleirigh et al., 2019). In addition, a recent meta-analysis of multifaceted treatment programs, relative to various control groups (e.g., waitlist, treatment as usual, single-component treatment programs), demonstrated that multifaceted treatment programs targeting syndemic conditions more effectively reduced substance use and sexual-risk behavior, improved mental health, and increased medication adherence among sexual minority men (Pantalone et al., 2020).

Transdiagnostic treatment programs also show promising efficacy for addressing SGM-specific drivers of syndemic conditions. For example, SGM-tailored treatments targeting SGM-specific stressors (e.g., family rejection, internalized stigma) and protective factors (e.g., SGM community engagement; Craig et al., 2012; Logie et al., 2015; Pachankis et al., 2020) demonstrated consistent reductions in smoking, alcohol use, and other drug use among SGM people (Pachankis et al., 2015, 2020; Schwinn et al., 2015; Vogel et al., 2020). Thus, in addition to targeting syndemic conditions (e.g., substance use, PTSD symptoms), treatment programs that address SGM-specific stressors may be well-suited for SGM people's presenting concerns. However, whether substance use treatment facilities are equipped to address SGM people's syndemic conditions and SGM-specific stressors remains unknown.

An effective way to understand whether substance use treatment facilities are equipped to address SGM people's syndemic conditions is by using a person-centered (or in this case, facility-centered) method. Latent class analysis (LCA; Lanza and Rhoades, 2013) is an analytic approach that assumes heterogeneity exists and can be used to identify latent classes of substance use treatment facilities that cluster together based on facility characteristics. For instance, there could be a latent class of treatment facilities characterized by offering tailored programs for SGM-specific care, co-occurring mental health and substance use concerns, trauma, and HIV/AIDS (e.g., a "Syndemic-Informed and SGM-Tailored Programs" class), whereas another latent class of facilities might offer tailored programs for trauma only (e.g., a "Trauma-Specific Programs" class). In this example, the first class of facilities may be better equipped to treat SGM people with syndemic conditions as it is characterized by offering tailored treatment for both syndemic conditions and SGM-specific care. Beyond simply identifying whether facilities may be equipped to treat SGM people's syndemic conditions, an LCA approach is also effective in understanding whether latent classes may be associated with availability (e.g., dispersion across the U.S.) and accessibility (e.g., ability to access treatment programs) of syndemic-informed and SGM-tailored treatment programs.

1.2. Availability and Accessibility of Substance Use Treatment Programs for SGM People

Studies documenting the availability and accessibility of syndemic-informed and SGM-tailored treatment programs are sparse. Of the few existing studies (Cochran et al., 2007; Qeadan et al., 2021; Williams and Fish, 2020), all have relied on variable-centered approaches. For example, in a study of substance use treatment facilities in the US, Williams and Fish (2020) found that facilities offering SGM-tailored programming were more likely to be private for-profit than private non-profit or public (e.g., local, state, or federal government facilities. Qeadan and colleagues (2021) found that facilities located in the West, compared to the Northeast, were more likely to have SGM-tailored programs. These studies are limited because variable-centered approaches are not able to examine whether facilities' tailored programming offerings cluster together to form latent classes (e.g., a "Syndemic-Informed and SGM-Tailored Programs" class), and whether these latent classes may be associated with availability and accessibility. Using a facility-centered approach would assist in identifying whether one or more "Syndemic-Informed and SGM-Tailored Programs" classes exist, and subsequently, the availability and accessibility of these latent classes of facilities. This information is important in understanding whether classes of facilities that are equipped to treat SGM people with syndemic conditions are also available and accessible to SGM people.

In the present study we sought to examine (a) whether tailored treatment programs offered at substance use treatment facilities across the U.S. cluster together around syndemic-informed and SGM-tailored treatment programs (i.e., a syndemic-informed and SGM-tailored latent class); and (b) associations between latent classes of substance use treatment facilities and U.S. location, payment assistance options, and facility type.

2. Material and methods

2.1. Data source and sample

Data are from the 2020 National Survey of Substance Abuse Treatment Services (N-SSATS) conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA). The N-SSATS collects information on characteristics of substance use treatment centers across the U.S., such as services offered, location, facility type, and payment assistance options. Data were collected from March to December 2020 for the 2020 N-SSATS, with a response rate of 90.2% (SAMSHA, 2021). Of the 16,066 facilities included in the dataset, 22 did not report data on tailored intervention programs and were excluded, resulting in an analytic sample size of 16,022 facilities.

2.2. Measures

2.2.1. Tailored programs—Substance use treatment facilities' tailored programs were assessed with the question, "For which client categories does this facility at this location offer a substance use treatment program or group specifically tailored for clients in that category?" Response options included: SGM-tailored programming, HIV/AIDS, co-occurring mental health and substance use concerns, co-occurring pain and substance use, sexual abuse, domestic violence/interpersonal violence, and trauma. These seven response options were used as indicators for the LCA.

2.2.2. Region—Region was assessed using the state in which the substance use treatment facility was located. Facilities were coded as Northeast, Midwest, South, or West based on Census Bureau designations of U.S. regions. Facilities outside of these designations (e.g., Puerto Rico) were coded as 'other.'.

2.2.3. Payment assistance—Payment assistance was assessed with one question asking whether substance use treatment facilities use sliding fee scales, one question asking whether facilities offer treatment at no charge or for a minimal payment for those who cannot afford to pay, and one question asking whether substance use treatment is free for all clients. Facilities that provided an affirmative response to any of these questions were coded as offering payment assistance (1) vs no payment assistance (0).

2.2.4. Facility type—Facility type was assessed with a question asking whether the substance use treatment facility was operated by: (a) a private for-profit operation; (b) a private non-profit organization; (c) state government; (d) local, county, or community government; (e) tribal government; or (f) federal government. Response options (c) through (e) were combined into a non-federal government category.

2.3. Data analysis

Descriptive statistics were conducted in IBM SPSS Statistics (Version 27). Seven types of tailored programs were entered into LatentGOLD, version 5.1 to conduct the LCA. LatentGOLD uses the three-step latent class analytic approach to prevent measurement bias by correcting for classification error (Bakk et al., 2013). We fit 1- to 8-class models and assessed the local independence assumption for each model by examining bivariate residuals among each pair of indicators (Vermunt and Magidson, 2016). Residual correlations were included in models that violated the local independence assumption.

The most optimally fitting model was chosen by selecting the model with relatively low model fit statistics (i.e., Log Likelihood, Akaike Information Criteria [AIC], Bayesian Information Criteria [BIC], sample-size-adjusted BIC [aBIC]), relatively high entropy, relatively few free parameters, and smallest class size > 5% of the sample (Lanza and Rhoades, 2013; Weller et al., 2020). Next, to examine correlates of latent class membership, we conducted multinomial logistic regression using the bias-adjusted maximum likelihood approach, which is recommended when variables are covariates or categorical dependent variables (Vermunt and Magidson, 2016). Specifically, we examined whether U.S. region, facility type, and payment assistance options were associated with latent classes.

3. Results

Characteristics of the facilities, including tailored treatment programming, location, payment assistance, and facility type are displayed in Table 1.

3.1. Model selection and class description

Model fit indices are displayed in Table 2. Fit indices, including the AIC, BIC, and aBIC decreased from one-class to seven-class models. The four-class solution was selected as the optimally fitting solution based on the following: (a) AIC, BIC, and aBIC was lower in the

four-class solution relative to the one- through three-class solutions; (b) entropy was higher in the four-class solution relative to the six- through eight-class solutions; (c) the four-class solution contained relatively few free parameters compared to the five- through eight-class solutions; and (d) size of the smallest class was > 5% in the four-class solution, whereas it was < 5% in the five- through eight-class solutions. Tables 3, 4.

Class 1 was the largest latent class (45.5% of facilities) characterized by low probabilities of offering any tailored programming ("No Tailored Programs" Class). Class 2 (23.1%) was characterized by high probabilities of tailored programs for clients with co-occurring mental health/substance use concerns ("Comorbid Mental Health/Substance Use Tailored Programs" Class). Class 3 (17.6%) was characterized by high probabilities across all types of tailored programs, and it was the only class to be characterized by a high probability of SGM-tailored programming ("Syndemic-Informed and SGM-Tailored Programs" Class). Class 4 (13.7%) was characterized by high probabilities of tailored programs for clients with co-occurring mental health/substance use concerns, history of sexual abuse, intimate partner violence/domestic violence, and trauma ("Comorbid Mental Health/Substance Use and Trauma-Specific Tailored Programs" Class).

3.2. Latent class associations with availability and accessibility

U.S. region, payment assistance, and facility type were all associated with class membership. Within this section, results will be described for Classes 2 through 4 relative to Class 1, the “No Tailored Programs” class. For the “Comorbid Mental Health/Substance Use Concerns Tailored Programs” latent class (Class 2), relative to the “No Tailored Programs” class, facilities were less likely to be in the Midwest (AOR = 0.59, 95% CI = 0.51–0.69), South (AOR = 0.67, 95% CI = 0.57–0.78), West (AOR = 0.81, 95%CI = 0.70–0.95), and other regions (AOR = 0.50, 95% CI = 0.25–0.99) compared to the Northeast. Facilities in this class were more likely to offer payment assistance options (AOR = 1.71, 95% CI = 1.51–1.92) relative to the “No Tailored Programs” class. Regarding facility type, facilities in this class, relative to the “No Tailored Programs” class, were less likely to be private for-profit facilities (AOR = 0.59, 95% CI = 0.52–0.67) than private non-profit facilities.

For the “Syndemic-Informed and SGM-Tailored Programs” latent class (Class 3), facilities were less likely to be in the Midwest (AOR = 0.50, 95% CI = 0.43–0.59) and South (AOR = 0.84, 95% CI = 0.73–0.97) compared to the Northeast. Facilities in this class were more likely to offer payment assistance options (AOR = 1.77, 95% CI = 1.58–1.99). Facilities in this class were also more likely to be private for-profit facilities (AOR = 1.52, 95% CI = 1.36–1.70) and less likely to be state, local, county, community, or tribal (i.e., non-federal) government facilities (AOR = 0.58, 95% CI = 0.46–0.73) than private non-profit facilities. Facilities in this class were just as likely as private non-profit facilities to be federal government facilities (AOR = 1.04, 95% CI = 0.68–1.58).

For the “Comorbid Mental Health/Substance Use Concerns and Trauma-Specific Tailored Programs” latent class (Class 4), facilities were less likely to be in the Midwest (AOR = 0.62, 95% CI = 0.52–0.74) and South (AOR = 0.78, 95% CI = 0.66–0.93), and more likely to be in the West (AOR = 1.26, 95% CI = 1.07–1.48) compared to the Northeast. Facilities in this class were more likely to offer payment assistance options (AOR = 1.43, 95% CI =

1.25–1.63). Regarding facility type, facilities in this class were less likely to be state, local, county, community, or tribal (i.e., non-federal) government facilities (AOR = 0.75, 95% CI = 0.60–0.94), and more likely to be federal government facilities (AOR = 1.64, 95% CI = 1.15–2.36) than private non-profit facilities.

4. Discussion

We examined whether substance use treatment facilities' tailored programs cluster together and whether class membership is characterized by syndemic-informed and SGM-tailored treatment programs. Using this facility-centered analytic approach, a four-class solution revealed only one relatively small latent class (17.6% of facilities) that was characterized by high probabilities of offering both syndemic-informed and SGM-tailored programming. Facilities in the "Syndemic-Informed and SGM-Tailored Programs" class were underrepresented in the Midwestern and the Southern regions of the U.S., were more likely to be private, for-profit facilities, and were also more likely to offer payment assistance options.

In terms of service availability, fewer facilities in the "Syndemic-Informed and SGM-Tailored Programs" class were in the Midwest and South relative to the Northeast. Although this study demonstrated that the number of overall substance use treatment facilities is greater in the Midwest and South than in the Northeast, the Midwest and South cover a larger geographic territory and have a higher proportion of medically underserved areas relative to the Northeast (Health Resources and Services Administration, 2021). Underserved areas are less likely to have specialty care (e.g., syndemic-informed and SGM-tailored substance use treatment; Anon, 2020), which may explain why facilities in the "Syndemic-Informed and SGM-Tailored Programs" class are less likely to be in the Midwest and South relative to the Northeast.

In addition, facilities in the "Syndemic-Informed and SGM-Tailored Programs" class may be less likely to be in the Midwest and South relative to the Northeast because these areas tend to have less public support for SGM rights (Twenge and Blake, 2021), and prior research indicates that policy is generally responsive to public opinion (Lax and Phillips, 2009). Indeed, relative to the Northeast, the Midwest and South have higher concentrations of anti-SGM state-level policies (Anon, 2020). Consequently, less public support for SGM rights and more hostile policy environments could disincentivize providing SGM-tailored programming at substance use treatment facilities in these areas. Findings in the literature underscore associations between hostile policy environments (e.g., lack of support for same-sex marriage, lack of sexual-orientation-related nondiscrimination statutes) and greater substance use and worse substance use outcomes among SGM people in the Midwest and South (Greene et al., 2021; Hatzenbuehler et al., 2010, 2017). Research has also demonstrated that policy-level improvements are associated with improvements in individual-level substance use outcomes (Everett et al., 2016). Such findings highlight the importance of SGM-affirmative policies and the expansion of syndemic-informed and SGM-tailored substance use treatment programming in these regions. Legislative bodies could partially address the lack of syndemic-informed and SGM-tailored treatment by requiring these types of services. Additionally, if policies require SGM-based insurance protections

and reimbursements, facilities might be incentivized to provide SGM-tailored treatment regardless of their location and type.

Latent class membership was also associated with accessibility. For the "Syndemic-Informed and SGM-Tailored Programs" class, associations with accessibility were mixed. Compared to private non-profit facilities, facilities in this class were more likely to be private for-profit and less likely to be non-federal (i.e., state, local, county, community, or tribal) government facilities. These findings suggest that substance use treatment may be less accessible among clients from low-income backgrounds relative to those with more financial means, as previous research has demonstrated that private for-profit, relative to private non-profit, facilities often serve higher-income clients (Pollack and Armstrong, 2009; Wheeler et al., 1992; Wheeler and Nahra, 2000). However, the "Syndemic-Informed and SGM-Tailored Programs" class was also *more* likely than the "No Tailored Programs" class to offer payment assistance options, which may be indicative of greater accessibility. However, research indicates that when private for-profit substance use treatment facilities serve clients who are unable to pay for services, treatment options may be limited or of shorter duration (Nahra et al., 2009). As such, even if payment assistance options are available, substance use treatment may not be equitable for those who use such options, particularly since a long length of substance use treatment is often associated with better outcomes (Greenfield et al., 2004; Staiger et al., 2020; Teesson et al., 2008).

4.1. Limitations and future directions

Results should be considered in light of several limitations. These data are cross-sectional, which precludes causal inferences about associations among facility characteristics, availability, and accessibility. A longitudinal approach could examine whether combinations of facilities' tailored program offerings change over time, and whether these changes are prospectively associated with availability and accessibility. Longitudinal studies could also incorporate additional variables, such as policy changes, to understand whether these variables are associated with increases in syndemic-informed and SGM-tailored programming (Cascalheira et al., 2022). Different research designs and analytic approaches, such as qualitative research, could improve understanding of how SGM clients experience syndemic-informed and SGM-tailored programming relative to non-syndemic-informed and non-SGM-tailored treatment programs.

Another limitation of this study was the use of self-report data, which raises questions related to social desirability and/or facility personnel's understanding of the questions about tailored treatment programming. For SGM-tailored treatment programs specifically, previous research has indicated that SGM-tailored treatment programs vary widely and may report services that are actually not available (Cochran et al., 2007). For instance, using data from the 2002 N-SSATS database, Cochran et al. (2007) contacted the 911 facilities claiming to offer SGM-tailored treatment and found that only 7.4% offered such services. Although question specificity improved from the 2002–2019 N-SSATS survey (SAMHSA, 2019), the extent to which self-report bias continues to inflate the actual availability of SGM-tailored programming remains unclear (Ji, 2021).

Although we examined whether facilities offered both syndemic-informed and SGM-tailored treatment programming, even programs that reported both may not offer both together as a comprehensive treatment program. Thus, SGM people seeking substance use treatment might participate in multiple treatment programs. Further, this study did not permit examination of treatment programming, availability, and accessibility for specific SGM subgroups (e.g., sexual minority women). Scheer et al. (2022a),(2022b) found that when working with sexual minority women, it is important to attend to gender identity and expression, and to focus on gender-based stress in treatment. Beyond tailoring treatment for specific SGM subgroups, it may be important to tailor treatment to SGM people with multiply marginalized identities (e. g., racial/ethnic minority SGM people). For instance, Babor et al. (2007) found that young, Black, and low-income sexual minority women who engage in heavy episodic drinking may benefit from increased access to brief behavioral and mental health interventions (e.g., Screening, Brief Intervention, and Referral to Treatment) and with identity-affirming providers (Scheer et al., 2022a,2022b). Future research should continue examining factors related to substance use treatment availability and accessibility specifically for racial/ethnic minority SGM people.

Additional limitations to this study were related to construct measurement. Availability and accessibility in this study were based on facility location by U.S. region, facility type, and the availability of payment assistance options. However, even if facilities with syndemic-informed and SGM-tailored programming became widely available across U.S. regions and became financially accessible, additional treatment access barriers for SGM people may persist. It will be important for future research to consider greater specificity than regional-level availability (e.g., city-level availability). For example, a recent systematic review found SGM people tend to be more concentrated in regions with greater healthcare resources (Lee et al., 2018). However, *within* high-resource regions, SGM people may be more concentrated in cities that have fewer resources (Lee et al., 2018), indicating that treatment availability may continue to be a concern for SGM people even if improvements are made in regional facility availability. SGM people also often report sexual orientation-based stigma from treatment providers when seeking substance use treatment (Cochran, Peavy, and Cauce, 2007; Drabble and Eliason, 2012; Lyons et al., 2015; Scheer et al., 2022a,2022b). Thus, in addition to considering logistical availability and accessibility concerns, it is important to address other potential barriers, such as substance use treatment providers' abilities to provide SGM-affirming care.

5. Conclusion

Despite the efficacy of syndemic-informed and SGM-tailored treatment interventions, less than a sixth of substance use treatment facilities report offering both syndemic-informed and SGM-tailored substance use treatment options. Facilities that are equipped to provide syndemic-informed and SGM-tailored treatment are not equally distributed across the U.S. and are particularly underrepresented in the Midwest and the Southern regions of the U.S. Additionally, these facilities are more likely to be private, for-profit, suggesting that effective syndemic-informed and SGM-tailored substance use treatment may be unaffordable for SGM people facing challenging environmental disadvantages. Accordingly, results of this study highlight the need for more facilities with syndemic-informed and SGM-tailored

treatment in general, and in particular in the Midwest and the Southern regions of the U.S. In addition, facilities funded by non-profit mechanisms or government agencies should be encouraged to increase syndemic-informed and SGM-tailored treatment offerings.

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Table 1

Frequencies of Study Variables Among Substance Use Providers (N-SSATS 2020).

	Total sample (*N* = 16,022)	
	n	***%***
Types of Tailored Programs		
SGM clients	3901	24.3
Clients with co-occurring mental and substance use disorders	8907	55.6
Clients with co-occurring pain and substance use	3499	21.8
Clients with HIV or AIDS	3366	21.0
Clients who have experienced sexual abuse	4780	29.8
Clients who have experienced IPV/DV	4752	29.7
Clients who have experienced trauma	7269	45.4
Offers Payment Assistance		
Yes	10,846	67.7
No	4862	30.3
Missing	314	2.0
Types of Facilities		
Private non-profit organization	7985	49.8
Private for-profit organization	6513	40.7
Non-federal government	1202	7.5
Federal government	322	2.0
U.S. Region		
Northeast	2947	18.4
Midwest	3795	23.7
South	4739	29.6
West	4430	27.6
Other	111	0.7

Note: Non-federal government facilities included those that are operated by state, local, county, community, or tribal governments. Payment assistance refers to facilities that offer a sliding fee scale, a no payment option/minimal payment option, and/or free services to all substance use treatment clients.

Table 2

Model Fit Indices and Model Comparison Statistics for Mixture Modeling of Tailored Programs for Substance Use Treatment.

Number of classes	Log Likelihood	Bayesian Information Criterion	Akaike Information Criterion	Sample-Size Adjusted Bayesian Information Criterion	Number of Free Parameters	Entropy	Smallest Class Size (%)
1	−67086	134240	134186	134218	7	N/A	100
2	−41902	84036	83852	83960	24	0.99	29.9
3	−41946	84135	83943	84056	25	0.79	20.9
4[a]	−41776	83863	83617	83761	32	0.76	13.7
5	−41768	83914	83615	83790	39	0.77	1.8
6	−41721	83897	83536	83747	47	0.73	2.1
7	−41706	83946	83523	83771	55	0.75	1.7
8	−41664	83939	83454	83738	63	0.68	2.1

Note.

[a]Model selected as providing the best fit, as demonstrated by the relatively small Akaike Information Criterion, Bayesian Information Criterion, relatively high entropy, and relatively few parameters while keeping class size above 5%. Models 2 through 4 included bivariate residuals (i.e., addition of residual associations [local dependencies]) due to violation of the local independence assumption for LCA. Each criterion is based upon the Log-Likelihood.

Table 3

Probabilities of Tailored Program Offerings Across 4 Latent Classes for Substance Use Treatment Facilities (N = 16,022).

Tailored Programs	Class 1 No Tailored Programs *n* = 7290 (45.5%)	Class 2 Comorbid MH/SU Programs *n* = 3715 (23.1%)	Class 3 Syndemic-Informed and SGM-Tailored Programs *n* = 2804 (17.6%)	Class 4 Comorbid MH/SU and Trauma-Specific Programs *n* = 2195 (13.7%)
SGM	0.01	0.10	**0.93**	0.37
Co-occurring MH/SU concerns	0.15	**0.83**	**0.99**	**0.87**
Co-occurring pain/SU concerns	0.01	0.18	**0.80**	0.23
HIV/AIDS	0.01	0.07	**0.88**	0.24
Sexual abuse	0.001	0.01	**0.996**	**0.88**
IPV/DV	0.02	0.09	**0.99**	**0.69**
Trauma	0.03	0.56	**0.996**	**0.96**

Note. SGM = sexual and gender minorities; MH = mental health; SU = substance use; IPV = intimate partner violence; DV = domestic violence. Boldface type indicates probabilities > 0.60.

Table 4

Multinomial Logistic Regression Model of Correlates of Latent Classes for Substance Use Treatment.

	Class 2 ("Comorbid MH/SU Programs"; *n* = 3715; 23.1%)		Class 3 ("Syndemic-Informed and SGM-Tailored Programs"; *n* = 2804; 17.6%)		Class 4 ("Comorbid MH/SU and Trauma-Specific Programs"; *n* = 2195; 13.7%)	
	AOR	**(95% CI)**	**AOR**	**(95% CI)**	**AOR**	**(95% CI)**
U.S. region						
Northeast	*ref*		*ref*		*ref*	
Midwest	**0.59**	(0.51, 0.69)	**0.50**	(0.43, 0.59)	**0.62**	(0.52, 0.74)
South	**0.67**	(0.57, 0.78)	**0.84**	(0.73, 0.97)	**0.78**	(0.66, 0.93)
West	**0.81**	(0.70, 0.95)	1.05	(0.91, 1.22)	**1.26**	(1.07, 1.48)
Other	**0.50**	(0.25, 0.99)	1.10	(0.62, 1.92)	0.99	(0.52, 1.87)
Offers Pay Assistance						
No	*ref*		*ref*		*ref*	
Yes	**1.71**	(1.51, 1.95)	**1.77**	(1.58, 1.99)	**1.43**	(1.25, 1.63)
Type of Organization						
Private Non-Profit	*ref*		*ref*		*ref*	
Private For-Profit	**0.59**	(0.52, 0.67)	**1.52**	(1.36, 1.70)	0.95	(0.83, 1.08)
Non-Federal Government	0.92	(0.76, 1.10)	**0.58**	(0.46, 0.73)	**0.75**	(0.60, 0.94)
Federal Government	1.40	(0.98, 1.99)	1.04	(0.68, 1.58)	**1.64**	(1.15, 2.36)

Note. MH = mental health; SU = substance use; AOR = adjusted odds ratio; CI = confidence interval; ref = reference group. Boldface type indicates a significant AOR. Omitted (reference) category is Class 1 ("No Tailored Programs"; *n* = 7290; 45.5%), which was characterized by low probabilities of offering any tailored programs. Class 2 ("Comorbid MH/SU Programs") was characterized by high probabilities of offering programs for clients with comorbid mental health/substance use concerns; Class 3 ("Syndemic-Informed and SGM-Tailored Programs") was characterized by high probabilities of offering all types of tailored programming, and was the only class characterized by high probability of offering SGM-tailored programming; Class 4 ("Comorbid MH/SU and Trauma-Specific Programs") was characterized by offering tailored programs for clients with comorbid mental health/substance use concerns and clients with a history of sexual abuse, intimate partner violence or domestic violence, and/or other trauma. All models utilized the bias-adjusted maximum likelihood approach.