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Publication Date

DOI

Defining and Predicting High Cost Utilization in Children's Outpatient Mental Health Services

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Abstract

Little is known about high-cost service users in the context of youth outpatient mental health, despite the fact that they account for a large proportion of overall mental healthcare expenditures. A nuanced understanding of these users is critical to develop and implement tailored services, as well as to inform relevant policies. This study aims to characterize high-cost service users by examining demographic factors, diagnoses, and service type use. Administrative service use data were extracted from a large County Department of Behavioral Health Services database. Latent profile analyses suggest a four-profile solution primarily distinguished by youth age and diagnostic complexity. Study findings have implications for defining high-cost service users and key targets for efforts aiming to improve outcomes for these youth.

Keywords

Public mental health services; Youth; High-cost users; Pattern-oriented approach

Mental health conditions are the fifth leading cause of non-fatal disease worldwide (Whiteford et al. 2013). As many as 20% of youth experience one or more mental health conditions (Kessler et al. 2005), resulting in poor functional, vocational, educational, and health outcomes, including further mental health and medical issues (Jaycox et al. 2009). Youth mental health conditions have a deleterious public health impact through the large cost to individuals, families, communities, and health care systems (U.S. Department of Health and Human Services 2001). The cost-saving benefits of children receiving appropriate, effective, and evidence-based care in community-based mental health settings has been well documented (Dopp et al. 2017; Dopp et al. 2019). Despite these potential long-term benefits, there are significant disparities in access to outpatient mental health care, especially evidence-based care (Whitney and Peterson 2019). Related, the associated costs

of providing mental health care are not equally distributed among those who need mental health treatment. In particular, some children receive a large amount of services, resulting in high costs, and others receive very few services. It is critical to understand the characteristics of children who receive a large amount of outpatient services to better identify and target populations that may benefit from particular services, thereby preventing ongoing or increased costly service use (e.g., inpatient, crisis services). Therefore, the objective of this study is to define and characterize the profiles of high-cost users of children's outpatient mental health services.

Mental health treatment incurs substantial costs to public healthcare systems (Graham et al. 2017; Lee et al. 2017), and accounts for the largest proportion of healthcare spending for children and adolescents (Roehrig 2016; Soni 2015). Within mental health care for youth, outpatient mental health care consists of the largest proportion of costs, accounting for 60% of youth mental health expenditures (RAND 2001). Health care expenditures, including mental health care spending, are not equally distributed among children. Rather, a large proportion of spending is concentrated among a small group of individuals, referred to as "high-cost service users" (Cohen and Yu 2012; Mirel and Carper 2011). In 2016, 5% of patients (adults and children) accounted for 50% of all health care expenditures in the United States (Mitchell 2016). A disproportionate number of high-cost healthcare adult users are Medicaid-enrolled (Wammes et al. 2018) and mental health conditions are prevalent among high-cost Medicaid-enrolled patients (Powers and Chaguturu 2016; Wammes et al. 2018). Thus, the target population for this study is high-cost, Medicaid-eligible users of youth outpatient mental health services.

Despite consensus regarding the importance and impact of treating high-cost users, precisely what constitutes a "high-cost service user" and the methodology for identifying and examining these individuals warrants attention. The literature examining high-cost service users has applied a variety of definitions, ranging from a focus on gross estimates of service receipt time to cost of services and diagnosis-based models (Robst 2012; Wammes et al. 2018). In addition, the process of defining these groups has largely been informed by theoretically-based and not empirically based methods, and analyses have largely depended on descriptive or regression-based approaches. A more precise and pragmatic characterization of these groups may be generated by using empirical cluster analysis techniques, such as latent class or profile analysis, to segment service users into subgroups based on similar characteristics. These methods have been increasingly used to characterize health care service patterns, but there has been limited application of these techniques within the domain of mental health (Hastings et al. 2012; Lee et al. 2016; Whitson et al. 2016).

There is also a need to examine distinct user characteristics and outpatient service type (e.g., individual therapy, case management, medication support) patterns that underlie high-cost mental health service use among youth consumers. The available literature suggests that high-cost service use may be associated with sociodemographic characteristics and specific psychiatric diagnoses. Findings based on adult mental health consumer patterns indicate that male gender, residing in a low-income neighborhood, and presenting with more than one mental health condition are associated with greater mental health service utilization (De Oliveira et al. 2016; Lee et al. 2017; Zulman et al. 2015). In one of the only studies

specifically examining high-cost youth mental health service utilization, Jerrell (1998) observed that trauma-related, externalizing or depressive disorders, and specific types of outpatient services such as case management were associated with higher costs of care; findings also showed a higher percentage of non-white youth in the high-cost versus low-cost user groups. Broadening the scope beyond high-cost users, work conducted by Alexandre (2009) and Alexandre et al. (2008) indicated distinct diagnostic profiles (e.g., depression, general anxiety) and health funding coverage (specifically Medicaid) as key predictors of increased youth outpatient mental health service use. While these studies suggest that sociodemographic, diagnostic and funding characteristics are associated with mental health service use, this study aims to conduct a more nuanced examination of this costly mental health care group.

Better characterization of high-cost service users is critical to inform policy and healthcare initiatives aimed at improving the quality of health care for youth with mental health care needs (Berwick et al. 2019; Prince et al. 2007). This includes initiatives aiming to improve the adoption, implementation and sustained delivery of evidence-based practices (EBPs) in community service systems. These initiatives are consistent with the objective of implementation science to integrate EBPs into routine care settings using evidence-informed implementation strategies. EBPs have the potential to result in better outcomes, shortened treatment duration as well as reduced rate of entering a higher level of care and, when coupled with implementation strategies, are known to be cost effective in community-based settings serving youth (Dopp et al. 2017, 2019; Grimes et al. 2011). Additionally, the specific focus on outpatient users aids enhancement to their outpatient services and helps prevent entry into costly inpatient and crisis services. Further characterization of the profiles of these youth can enable more targeted implementation for this high priority population. This may then contribute to increased effectiveness during their translation to community settings and associated cost savings to the mental health service system. In addition to informing implementation efforts, the use of administrative claims data to examine key concepts such as cost and help characterize service users can offer immense value to healthcare initiatives. Specifically, these data help inform not only statewide policy planning efforts but also local jurisdictions needing to make decisions regarding service funding and models of service provision and monitoring. The present study utilizes cluster analytic techniques to examine administrative mental health claims data in an effort to define and characterize high-cost service utilizers of youth outpatient mental health services. This is in service of informing efforts to improve service effective service delivery, including targeted services delivery, in children's mental health settings. To this end, the objectives of the current study are to:

1. Describe the service use patterns and associated costs for youth outpatient mental health treatment in a publicly-funded county behavioral health system.

2. Define and characterize high-cost service users in publicly-funded youth mental health outpatient services.

3. Identify predictors of high-cost outpatient service use.

Methods

Procedure

Data were drawn from a large Southern California County Department of Behavioral Health Services administrative claims database during fiscal year 2017–2018. County approval to extract and analyze de-identified claims data was obtained (Protocol # 181678).

Participants

The sample included 6663 youth who received at least one outpatient episode of care in a county-funded outpatient mental health setting between July 2017 and June 2018. An episode of care was defined as all outpatient services received from intake to discharge. Youth were seen across a variety of outpatient settings (e.g., outpatient clinics, home-based services) for a multitude of presenting problems. The sample was 53.5% male, and the mean age was 10.65 years old ($SD = 4.88$). The sample was predominantly Hispanic/Latinx (62.3%) or Caucasian/White (20.7%). Depressive Disorders (35.1%), Anxiety Disorders (14.9%) and Adjustment Disorders (13.4%) were the most frequent primary diagnoses (i.e., most severe or impactful diagnoses) as reported by the treating provider. In total, these data capture 7836 episodes for 6663 youth, with 916 (13.7%) youth having more than one episode. See Table 1 for additional child demographic and diagnostic characteristics.

Data Source/Measures

Administrative Service Use Data—Data were furnished from administrative outpatient services use data. The outcome variable of interest—total cost per episode of care for each youth—was calculated from these administrative services data. For the purposes of this project, cost referred to the total amount billed for services. To account for the small proportion of youth who had multiple episodes of care during one fiscal year, the costs per episode were aggregated to create a youth-level variable representing the summative total of cost per episodes for each youth. In addition to information related to service receipt, data also contained information regarding youth age, gender, race/ethnicity, psychiatric diagnosis, involvement in any sector of care beyond county mental health (e.g., Child Welfare, Juvenile Justice), and history of inpatient hospitalization.

Data Analyses

The first two objectives were to define and characterize high-cost service users within this sample of youth outpatient mental health consumers. A series of latent profile analysis (LPA) models were run using the Generalized Structural Equation Model Estimation in Stata Version 15 (StataCorp 2017), with one continuous indicator of cost of service utilization included in each class solution tested. The following covariates were included in the LPA model: child age, gender, race/ethnicity, dichotomous indicator of being involved in more than one sector of care and having more than one mental health diagnosis recorded as well as a categorical variable indicating the type of mental health diagnosis. Each pattern solution was compared using model fit indices (Akaike information criterion [AIC], Bayesian information criterion [BIC], entropy values) until an appropriate number of patterns was decided according to empirical and theoretical interpretations regarding simultaneously

considering and interpreting multiple indices of fit (e.g., tendency for AIC to overestimate and BIC to underestimate class number; Foti et al. 2012; Morin et al. 2011). The optimal class solution was decided based on: (1) the lowest value AIC and BIC and highest entropy compared to other model solutions; (2) sufficiently populated classes (i.e., no less than 5% of the sample resides in a given class); and (3) high probability of correct classification and low probability of inclusion in other classes. Once an optimal class solution was determined, the individual classes were characterized with respect to the child sociodemographic and diagnostic characteristics that defined each group. A comparison between these profiles and other definitions of high-cost service users was also conducted. These alternative definitions included falling within the top 5% of sample in terms of expenditures and a history of inpatient hospitalization.

The final objective was to predict high-cost service use based on the class solutions from the first objective. Multinomial logistic regression was used to predict various profile solutions based off likelihood of receiving various types of outpatient services, including: individual-, group-, or family-based psychotherapy, assessment, collateral or case management services, medication support and whether or not the individual was involved in more than one sector of care.

Results

Aim 1: Describe the Service Use Patterns and Associated Costs for Publicly-Funded Youth Mental Health Outpatient Services

The mean total cost per episode for the sample was $2673 (SD = $2748). The average number of service encounters per episode was 14.36 (SD = 15.98). Average cost of various service types per episode was $1079 (SD = $1276) for psychotherapy, $683 (SD = $498) for assessment, $227 (SD = $498) for collateral, $161 (SD = $793) for case management, and $186 (SD = $522) for medication support.

Aim 2: Define and Characterize High-Cost Service Users Using Latent Profile Analysis

In accordance with recommended decision criteria for determining latent patterns (e.g., Foti et al. 2012; Morin et al. 2011), our data best supported a four-pattern solution (see Table 2). Specifically, the model fit indices for the four-pattern solution demonstrated lower AIC and BIC values and higher entropy than the three-pattern solution. Each of the four profiles was sufficiently populated (i.e., each profile had 5% of the sample size), which was not the case for the five-profile solution. Further, the four-solution produced conceptually meaningful configurations of outpatient mental health cost groups. See Table 3 for descriptive information about the four-profile solution and Fig. 1 for graphical depiction of each profile type.

The next step involved classifying and describing these profiles, including whether the profile was "low-" or "high-" cost. In making these determinations, the description "low-cost" was used when the average cost for the profile was considerably lower than the average cost for other profiles as well as the full sample. Similarly, "high-cost" was assigned

when the average cost for the profile was higher than other profiles as well as the full sample.

Profile 1 was labeled *low-cost unidiagnostic preschool youth* (n = 1115; 16.81% of the sample) because youth were generally of preschool or younger age (Marginal Mean [MM] = 3.17 years old), with very low probability of being diagnosed with more than one mental health condition (Marginal Probability [MP] = 0.04), and moderate probability of being a diagnosis of adjustment disorder (MP = 0.41). In terms of race/ethnicity, there was highest probability of being Hispanic/Latinx (MP = 0.55), followed by Caucasian (MP = 0.23), or African American (MP = 0.11). The cost per episode for this group was generally lower (MM = $1722) compared to the mean cost for the full sample, supporting the characterization as low-cost.

Profile 2 was labeled *high-cost school-aged youth* (n = 2338; 35.35% of the sample) because youth were generally of school-age (MM = 8.70 years), with moderate probability of having more than one mental health condition (MP = 0.37), and moderate to low probability of being diagnosed with Attention-Deficit/Hyperactivity Disorder (MP = 0.23), adjustment disorder (MP = 0.19), anxiety (MP = 0.16), or Oppositional Defiant Disorder (MP = 0.15). There was highest probability of being Hispanic/Latinx (MP = 0.63), followed by Caucasian (MP = 0.22). The cost per episode for this group was higher (MM = $2819) than the mean of the full sample, thereby supporting the characterization as high-cost.

The third profile was the largest, and was labeled *high-cost diagnostically complex adolescents* (n = 2769; 41.75% of the sample) because the youth were generally adolescents (MP = 14.88 years), with a high probability of having more than one mental health diagnosis (MP = 0.65), and moderate probability of being diagnosed with depression (MP = 0.53). There was highest probability of being Hispanic/Latinx (MP = 0.61) followed by Caucasian (MP = 0.21), respectively. The cost per episode for this group was high (MM = $2804), compared to the mean.

The fourth profile was labeled *low-cost unidiagnostic adolescents* (n = 411; 6.20% of the sample) because it was generally comprised of adolescents (MM = 13.42 years), with extremely low probability of having more than one mental health diagnosis (MP = 0.04), and high probability of primarily being diagnosed with depression (MP = 0.76). There was high probability of being Hispanic/Latinx (MP = 0.79). The cost for this group (MM = $2197) was lower than the mean of the sample.

Finally, we compared the overlap between clients within our two "high-cost" profiles and youth that met criteria for alternative definitions of "high-cost service users"—specifically, falling within the top 5% of the sample for total expenditures and a history of inpatient hospitalization (see Table 4). Half of the youth in the top 5% of the sample for total expenditures fell into either of our high-cost profiles. Similarly, there was significant overlap between youth with a history of inpatient hospitalization and the *high-cost diagnostically complex adolescents* profile. Whereas there is significant overlap between definitions of high-cost users, identification using our LPA method provided additional information regarding specific characterizations of users falling within the high-cost group.

Aim 3: Examine How Service Type Use Predicts Classification

A multinomial logistic regression was run to examining how the types of services used predicts classification into these four identified profiles. The outcome was membership in one of the four identified profiles, with *high-cost adolescents* (largest group) serving as the reference category (see Table 5). Results indicate that compared to the *high-cost adolescent* group, youth receiving individual therapy or case management were significantly less likely to belong to the *low-cost younger youth* and *high-cost school-age* groups; youth receiving group therapy were significantly more likely to be in the *low-cost younger youth* group. Youth receiving family therapy were more likely to belong to any other group whereas those receiving assessment or medication management services were less likely compared to *high-cost adolescents*. Those involved in another sector of care were significantly more likely to be in the *low-cost younger youth* but significantly less likely to be in the *low-cost adolescent groups* compared to *high-cost adolescents* group. The average number of services per episode for the *low-cost younger* group was almost half (M = 6.39; SD = 9.75) that of *high-cost adolescents* (M = 12.94; SD = 13.88). The average number of services per episode for the *high-cost school-aged youth* (M = 14.94; SD = 14.31) and *low-cost adolescents* (M = 10.16; SD = 8.86) was roughly equivalent to the *high-cost adolescent* group.

Discussion

In making decisions regarding the allocation of scarce resources within public mental health systems it is critical to understand how individual characteristics are linked to service use consumption. Youth who receive high levels of outpatient services represent a unique population, and it is important to fully understand this population to best serve them. In examining the patterns related to the cost of youth outpatient mental health service use, this paper identified four profiles of youth: (1) low-cost unidiagnostic preschool youth (16.81% of the sample), (2) high-cost school-aged youth (35.35% of the sample), (3) high-cost diagnostically complex adolescents (41.75% of the sample), and (4) low-cost unidiagnostic adolescents (6.20% of the sample). Our multinomial logistic regression models also suggest a distinct pattern of service use across user group profiles. Overall, our results suggest a higher likelihood of being in the *high-cost adolescents* profile group; there was a lower likelihood of being in the *high-cost school-aged youth* profile group for those receiving family therapy and assessment services, but lower likelihood among youth receiving individual therapy and medication management, compared to *high-cost school-aged youth*. Across all profiles, there was equal representation of racial/ethnic groups, with highest likelihood of being Hispanic of Latinx followed by Caucasian. This is representative of the general population of youth served in this large County Department of Behavioral Health Services.

Little research to date has examined characteristics of high-cost service users in the mental health domain, with the majority of the existing work focusing on adults. Our current work extends the few previous studies exploring costs of mental health service use in youth. Consistent with prior findings, our current results point to an association between high-cost mental health service use and distinct diagnostic profiles, specifically depression and externalizing disorders (Alexandre 2009; Alexandre et al. 2008; Jerrell 1998). The equal

representation of racial/ethnic groups across profiles is also important to consider, especially in light of conflicting findings regarding the influence of race or ethnicity on service costs and utilization. Jerrell (1998) observed a higher percentage of non-white youth in the high-cost user group compared to low- or medium-cost groups. Importantly, the Jerrell study examined non-publicly or non-Medicaid funded mental health services. This is in contrast to our current sample consisting publicly and/or Medical funded outpatient services, which may account for the divergence in findings. Subsequent work noting a differential influence of race/ethnicity on mental health service use and volume by funding status also support this notion (Alexandre 2009; Alexandre et al. 2008). Overall, the current findings build upon previous work and highlight the importance of considering key youth characteristics such as age and diagnostic complexity in understanding high-cost youth mental health users.

Our results offer key implications for improving services for high-cost service using youth. The increased specificity in characterizing this population supports the potential utility of harnessing resources for identification and targeted services for youth that may require more services. This classification may be particularly meaningful for the treatment of high-cost users, who tend to be diagnostically complex and/or involved in multiple sectors of care. Knowing this, clinicians treating those with more than one diagnosis may strive to provide youth with additional supports or tailor specific treatments to maximize the positive effects of the intervention. This includes individualized types of treatment offered, as well as the dose and intensity of treatment. More frequent sessions or longer periods of treatment may be required to best address the complex presentations common among these youth. As many of these youth are involved in more than one sector of care, collaborative care across service settings may also be key to more effective treatment of this high priority and impactful population. Reflective of the region from which these data were drawn, high rates of Hispanic or Latinx youth was observed across all profile groups, underscoring the importance of incorporating culturally sensitive treatments and interventions.

In addition to implications regarding the importance of targeting efforts towards specific service types, the observed differences in the clinical characteristics of youth in each profile also has important implications for training in and delivery of the specific types of *evidence-based treatment types* for the high-cost users groups identified. For the group of diagnostically complex adolescents, the majority of which have depression and are more likely to receive individual therapy, this may include a focus on EBPs for depression. Better yet, this may include transdiagnostic treatments targeting multiple mental health disorders (e.g., Unified Protocol for Transdiagnostic Treatment of Emotional Disorders; Barlow et al. 2017; David and Farchione 2011) or those addressing key transdiagnostic mechanisms or risk factors for various mental health conditions (e.g., rumination-focused cognitive behavioral therapy; Watkins 2015). Additionally, these targeted efforts may be especially important given data suggesting that the presence of co-occurring mental health conditions are known barriers to EBP implementation for community providers (Chandler et al. 2004). For high-cost school-aged youth with ADHD who receive more family-based services, promoting treatment plans incorporating parent training as well as medication management may be the most effective, which is consistent with current best practice recommendations (Subcommitte on Attention-Deficit/Hyperactivity Disorder 2011; Van der Oord et al. 2008). Fortunately, many of the current EBPs for depression and ADHD can be feasibly delivered

within an average of 12–14 sessions. Given that the average number of sessions per episode observed for both high-cost user profiles was approximately 14, these treatment protocols could be a good fit for this service context. These findings speak to the need for clinical training efforts aiming to equip clinicians with the skills to effectively treat these distinct high-cost user groups.

Precise characterization of high-cost service youth may inform implementation of measurement feedback systems consisting of feasible measures of treatment progress administered concurrently with treatment (Bickman 2008). Such systems can provide timely clinical feedback to providers to maximize key service outcomes and have been described as necessary for effective treatment in youth mental health treatment (Bickman 2008; Kelley and Bickman 2009). Guidelines or recommendations for types of services (e.g., medication, case management) to consider based of a client's specific presenting issues or diagnostic profiles as well as recommendations for ways to adjust or further update treatment plans based off client treatment progress could be integrated into this system to better support outcomes. Importantly, the use of such systems can help assure the effectiveness of EBPs translated into community settings, including both increased cost-effectiveness and well as clinical effectiveness (e.g., improved functioning, shorter treatment durations), thereby preventing entry into higher levels of care (Bickman 2008).

Our results also speak to key policy implications worthy of consideration, including tailored service recommendations surrounding treatment monitoring and EBP implementation support to facilitate delivery of effective services. This could include broader policy recommendations emphasizing delivery of individually-based EBPs for diagnostically complex adolescents, those emphasizing family-based EBPs and medication management for school-aged youth as well as those ensuring training in and delivery of EBPs that have been adapted or developed for various cultural or ethnic groups. It is also important to consider that there are naturally costs incurred by and billed for service delivery and the additional costs necessary to support EBP implementation presents challenges for administrators and policy makers. However, data suggest that benefits of EBP implementation translate across levels of service settings, including at the client, programmatic or administrative and the broader societal and public health level, that exceed the costs (Dopp et al. 2019; Grimes et al. 2011; Nakamura et al. 2011). Additionally, our data suggest that it might be fruitful to consider bolstering dedicated funds for provider training and fidelity monitoring of EBPs that target the presenting problems and demographic characteristics of high service users to prevent or offset subsequent up-stream costs of more intensive, acute care services.

Finally and in addition to key treatment targets for reducing the financial burden of serving vulnerable population, our results also speak to how to define and identify "high-cost" service users. Specifically, findings suggest the utility of empirically segmenting users into subgroups to enable more pragmatic identification and characterization of "high-cost" users. Consistent with the literature (De Oliveira et al. 2016; Jerrell 1998), high-cost or high-service utilizers tended to be diagnostically complex. Importantly, there was significant overlap between our high-cost sample and those defined as such using more traditional definitional methods, including the top five percent of cost and whether an individual had a

history of inpatient hospitalization. However, our results with high-cost users provides slightly more nuanced definition of "high-cost" users, suggesting that these youth tended to consist of two groups: high-cost adolescents with multiple mental health conditions, including a primary diagnosis of depression and school-aged youth with a primary diagnosis of ADHD. As outlined above, the distinction between these groups has important treatment implications which would likely have been overlooked using traditional definitions or characterization methods. Together, these findings suggest that the use of using cluster analyses to identify and define this high priority group is not only reliable with other methods while also provides needed nuance critical to inform treatment efforts.

Several limitations in this study should be noted. The current sample was restricted to youth who completed at least one episode of outpatient care and only 1 year of administrative claims data were available, so longitudinal analysis beyond 1 year were not possible and causality cannot be examined. Our primary outcome variable refers to charges billed for services, which is an imperfect measure of true service costs given the contextual variations influencing billing charges (e.g., local reimbursement rates, variability in provider time estimates). As such, it is unclear how the current results would generalize to other contexts. In addition, youth clinical outcome data were not available. Because of this, it was not possible to evaluate whether the high-cost users had more severe symptom presentation or functional impairment. Diagnostic complexity served as a proxy for this, but in the future it would be helpful to include youth outcome data to better understand these groups. Mental health diagnoses were reported by clinicians in routine, community-based mental health care. We are were not able to confirm clinician-reported diagnoses using structured, research-based or expert diagnostic processes so it is possible that the youth's diagnoses may differ if more rigorous diagnostic practices were employed. Finally, the current work focuses primarily on cost of outpatient mental health services and cannot speak inpatient or residential services, which are often considered the main driver of service costs. However, better understanding of high cost outpatient service users and methods to improve the effectiveness of treatment for this group is important in order to prevent the use of inpatient or residential services and the resulting cost to the system.

This study demonstrates the utility of characterizing high cost outpatient mental health service users to provide targeted and tailored treatment for youth. The findings of this study and our corresponding recommendations have clear implications for mental health policy and clinical strategies aimed at improving the efficiency of outpatient service provision in children's mental health services.
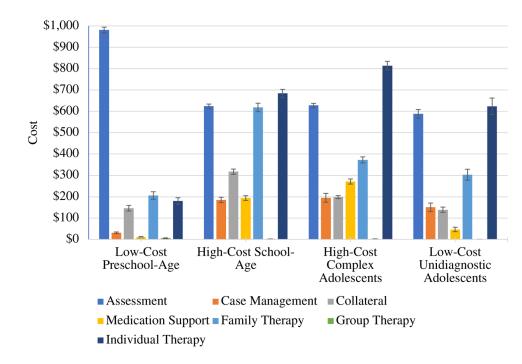
Acknowledgments

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Fig. 1.
Graphical depiction of mean service type cost for 4-profile cost solution

Table 1

Child demographic characteristics

	M (SD) or n (%)
Age (years)	10.65 (4.88)
Gender (male)	3547 (53.48%)
Race/ethnicity	
Hispanic or Latinx	4133 (62.31%)
Caucasian/White	1374 (20.71%)
African American	576 (8.68%)
Asian/Pacific Islander	201 (3.03%)
American Indian/Alaska Native	43 (.65%)
Unknown/other	306 (4.61%)
Primary MH diagnosis	
Depressive disorders	2063 (35.11%)
Anxiety disorders	878 (14.94%)
Adjustment disorders	785 (13.36%)
Attention-deficit/hyperactivity disorder	634 (10.79%)
Oppositional or conduct disorders	602 (10.25%)
Trauma-related disorders	483 (8.22%)
Bipolar disorders	134 (2.28%)
Psychotic disorders	58 (.99%)
Other/excluded disorders	238 (4.05%)
More than 1 MH diagnosis (Yes)	2487 (37.49%)
Involved in 1 + service sector	1222 (18.42)
Number of services within an episode	14.36 (15.98)

Table 2

Model fit statistics for pattern structures

Models	Cost		
	AIC	**BIC**	**Entropy**
Two-profile	206,640.00	206,891.60	0.754
Three-profile	206,260.40	206,614.00	0.631
Four-profile	205,717.30	206,172.90	0.754
Five-profile	207,473.20	207,765.60	0.901

Table 3

Descriptive information for four-profile solution for mental health cost groups

Latent class marginal mean (SE) or marginal probability (SE)	Low-cost unidiagnostic preschool youth (Profile 1)	High-cost school-aged youth (Profile 2)	High-cost diagnostically complex adolescents (Profile 3)	Low-cost unidiagnostic adolescents (Profile 4)
Age in years	3.17 (0.10)	8.70 (0.10)	14.88 (0.06)	13.42 (0.48)
Race/ethnicity				
Hispanic or Latinx	0.55	0.63	0.61	0.79
Caucasian/White	0.23	0.22	0.21	0.08
African American	0.11	0.09	0.09	<0.01
Asian/Pacific Islander	0.05	0.02	0.04	0.04
Am. Indian/Alaska Native	0.01	<0.01 (<0.01)	0.01	0.01
Unknown/other	0.05	0.03	0.04	0.08
Primary MH diagnosis				
Depressive disorders	<0.01 (0.01)	0.15 (0.01)	0.53 (0.01)	0.76 (<0.01)
Anxiety disorders	0.13 (0.02)	0.16 (0.01)	0.13 (0.01)	0.24 (<0.01)
Adjustment disorders	0.41 (0.03)	0.19 (0.01)	0.05 (<0.01)	<0.01 (<0.01)
Attention-deficit/hyperactivity disorder	0.08 (0.02)	0.23 (0.01)	0.03 (<0.01)	<0.01 (<0.01)
Oppositional or conduct disorders	0.10 (0.02)	0.15 (0.01)	0.08 (0.01)	<0.01 (<0.01)
Trauma-related disorders	0.08 (0.01)	0.08 (0.01)	0.10 (0.01)	<0.01 (<0.01)
Bipolar disorders	<0.01 (<0.01)	0.02 (<0.01)	0.04 (<0.01)	<0.01 (<0.01)
Psychotic disorders	<0.01 (<0.01)	<0.01 (<0.01)	0.02 (<0.01)	<0.01 (<0.01)
Other/excluded disorders	0.19 (0.02)	0.02 (<0.01)	0.02 (<0.01)	<0.01 (<0.01)
1 + MH diagnosis (Yes)	0.04 (0.01)	0.37 (0.01)	0.64 (0.01)	0.04 (0.01)
Total cost	$1722 (89)	$2927 (65)	$2804 (55)	$2197 (234)
Latent class marginal probability	0.17 (0.01)	0.37 (0.01)	0.64 (0.03)	0.07 (0.03)

Table 4

Overlap between predicted profile membership between cost and service minutes

	Top 5% of cost (N = 333)	History of inpatient (N = 435)
Low-cost unidiagnostic preschool-age (N = 1115)	12	0
High-cost school-age (N = 2338)	155	40
High-cost diagnostically complex adolescents (N = 2769)	164	378
Low-cost unidiagnostic adolescents (N = 411)	2	17

Table 5

Multinomial logistic regression models predicting cost

	Low-cost younger youth			High-cost school-aged			Low-cost adolescents		
	logOR	SE	OR	logOR	SE	OR	logOR	SE	OR
Individual therapy	−2.11 **	0.11	0.12	−.65 **	0.07	0.52	−.17	0.13	0.84
Group therapy	1.84 **	0.35	6.31	−.01	0.26	0.99	−.94	1.02	0.39
Family therapy	0.18 +	0.10	1.20	0.74 **	0.06	2.10	0.37 **	0.16	1.44
Assessment	2.88 **	0.25	17.74	0.28 **	0.09	1.32	0.30 +	0.16	1.35
Case management	−.89 **	0.10	0.41	−.12 +	0.06	0.89	0.04	0.12	1.04
Collateral	−.07	0.11	0.93	0.52 **	0.07	1.69	<−.01	0.13	1.00
Medication support	−3.25 **	0.24	0.03	−.76 **	0.07	0.47	−1.84 **	0.19	0.16
Other sector involvement	1.44 **	0.11	4.21	0.02	0.08	1.02	−1.09 **	0.24	0.34

Profile 3 is the referent group; *logOR* multinomial logistic regression coefficient; *SE* standard error; *OR* Odds Ratio

**
$p < 0.01$

*
$p < 0.05$

+
$p < 0.10$