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Profiles of Systems Involvement in a Sample of High-Risk Urban Adolescents with Unmet Treatment Needs

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Abstract

This study examined profiles of involvement in four systems (education, child welfare, legal, and treatment) in a sample of 253 high-risk urban adolescents with unmet behavioral health needs. Self-report data were collected on multiple dimensions of involvement within each system, demographics, and DSM-IV diagnoses. Latent class analysis revealed four profiles: Education System: Academic and Disciplinary, Education System: Academic Only, Legal/Juvenile Justice Involved, and Multiple Systems/Child Welfare. Profiles differed based on gender and psychiatric diagnoses. Boys were overrepresented in Education System: Academic and Disciplinary and Legal/Juvenile Justice Involved, and girls were overrepresented in Multiple Systems/Child Welfare. The two education system focused classes were characterized by depressive disorders and ADHD. Youth in Legal/Juvenile Justice Involved and Multiple Systems/Child Welfare were characterized by conduct disorder and substance abuse. Implications for assessment and treatment planning for high-risk youth and for the organization of community-based behavioral health services are discussed.

Keywords

adolescent; service systems; mental health

1. Introduction

Adolescents in need of behavioral health services often have long histories of multiple problems including mental health, substance use, delinquency and criminal behavior, education and learning problems, and family relationship difficulties. Many of these adolescents are involved, to varying degrees, in the service sectors that manage these problems, including most typically the special education, legal, child welfare, and mental

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health treatment systems. Over time, at-risk youth tend to be involved with multiple systems, either concurrently or sequentially (Garland, Hough, Landsverk, & Brown, 2001; Glisson & Green, 2006), and may receive mental health or substance use services within more than one service sector (Farmer, Burns, Phillips, Angold, & Costello, 2003). Involvement in multiple systems is associated with high rates of comorbid psychiatric diagnoses, competing demands from multiple agencies, and a lack of integrated care across systems, all of which complicate the effective planning and delivery of services to this complex population (Aarons, Brown, Garland, & Hough, 2004). Efficient organization and delivery of needed services depends upon detailed knowledge about the patterns of behavioral health needs and multi-system involvement of the target population (Cook & Kilmer, 2010; Walker, Koroloff, & Bruns, 2010). To begin to meet this need, the current study describes profiles of systems involvement and behavioral health problems in a sample of urban adolescents with identified behavioral health needs, but not currently receiving mental health services.

Studies examining patterns of systems involvement and behavioral health problems in adolescents have largely drawn from three sampling pools: clinical samples of adolescents enrolled in mental health treatment, youth involved in government systems, and regional samples of community youth. Approximately one quarter of adolescents in mental health treatment are also involved with the juvenile justice (Cauffman, Scholle, Mulvey, & Kelleher, 2005) and/or child welfare systems (Yeh et al., 2002), and also have widespread educational problems and receipt of school-based services (Hazen, Hough, Landsverk, & Wood, 2004; Yeh et al., 2002). High rates of psychiatric diagnoses have been documented among adolescents active in the juvenile justice (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002) and child welfare systems (Landsverk, Garland, & Leslie, 2002). Unmet need is also high in these samples, as only 16% of juvenile detainees (Teplin, Abram, McClelland, Washburn, & Pikus, 2005) and 12% of child welfare involved youth (Burns et al., 2004) received needed mental health services. A city-wide study of youth enrolled in public care sectors in San Diego found that public sectors were mostly serving youth with ADHD and disruptive behavior disorders (Garland, Hough, McCabe, Yeh, Wood, & Aarons, 2001), and that youth with substance use disorders had the highest levels of unmet need for services (Garland, Aarons, Brown, Wood, & Hough, 2003). Limited data from community samples of adolescents also point to high rates of co-occurring substance use and mental health disorders (Kandel et al., 1999) and unmet need for behavioral health services (Leaf et al., 1996; Angold, Costello, & Erklani, 1999). Community adolescents who are receiving services commonly receive them from more than one service sector (Farmer et al., 2003).

The current study examined profiles of involvement in four systems (education, legal, child welfare, and treatment) in a sample of urban high-risk adolescents participating in a naturalistic study of routine care for adolescent behavioral health problems. This study adopted an innovative sampling strategy in which adolescents with behavioral health needs were recruited directly from a network of community-based referral sources (e.g., high schools, family agencies, youth programs), rather than drawn from mental health clinics (e.g., Yeh et al., 2002) or public care sectors (Garland et al., 2001). Thus, this sample represents a true “unmet need” sample, whereby referred adolescents were judged by referral sources to be exhibiting behavioral problems appropriate for outpatient services, but no adolescent was currently receiving services to address those problems. Approximately 20% of the sample was system-referred (6% juvenile justice, 2% child welfare, and 11% from community agencies serving distressed families). While approximately 30% of the sample had received some treatment for mental health or substance abuse problems in the past year, at the time of study entry, none of the adolescents were enrolled in any form of behavioral treatment but nearly all had a DSM-IV diagnosis, thus they were considered to have unmet treatment needs.

The current study extends the existing knowledge base on multi-system involvement among high-risk teens in three important ways. First, it used a community-referred sample of adolescents with identified behavioral health needs but not currently enrolled in treatment. Second, the sample included a large number of girls, allowing for the examination of gender differences in profiles of systems involvement. Studies have demonstrated gender differences in service utilization within various sectors of care, such that girls tend to be overrepresented in the mental health sector, while boys are overrepresented in special education, substance abuse treatment, and juvenile justice (Maschi, Schwalbe, Morgen, Gibson, & Violette, 2009). The child welfare system has a more balanced gender distribution (Garland et al., 2001). Gender differences in reasons for referral to services have also been found, with girls more likely to be referred for family issues, victimization/abuse, health issues, and anxiety/depression and boys more likely to be referred for drug problems, school behavior problems, and delinquency (Maschi et al., 2009). However, little information exists on gender differences among teens in patterns of service use across multiple service sectors. Finally, analyses included a broad range of indicators of involvement within each system to provide a multidimensional picture of systems involvement and service needs. Thus, analyses can directly inform the organization of a multi-system approach to behavioral health care for high-risk adolescents.

2. Methods

2.1 Sample

The study sample consisted of 253 adolescents and caregivers (82% biological mother, 6% grandmother, 12% other) who participated in an initial family-based behavioral assessment interview as part of the larger research study. Adolescents were primarily male (55%), Hispanic (58%) and African American (22%), and averaged 15.7 years of age ($SD = 1.4$). Households were headed by single parents (58%), two parents (30%), or grandparents (11%). Among caregivers, 61% graduated high school, 57% worked full- or part-time, and 59% earned less than \$15K per year. Families were referred to the larger study from high schools (77%), community agencies serving distressed families (some with child welfare system involvement) (11%), the juvenile justice system (6%), the child welfare system (2%), and other sources (4%). Other sample characteristics are described in Tables 1 and 2 as part of the main study analyses.

2.2 Referral and Interview Procedures

Participants were drawn from the screening phase of a naturalistic study of community-based care for adolescent behavioral health problems. Recruitment procedures were designed to identify adolescents with untreated mental health or substance use disorders and enroll them in available treatment services. To recruit adolescents with unmet treatment needs, research staff developed a referral network of high schools, family service agencies, and youth programs in inner-city areas within a large northeastern city. Staff made regular on-site visits and phone calls to referral partners to maintain communication about current and potential cases. Study inclusion criteria included (1) target adolescent between 12–18 years old; (2) adolescent lived with an adult family member who acted as primary caregiver; (3) adolescent was observed or suspected by referral source to have significant behavioral problems that impaired functioning; (4) adolescent problems were deemed beyond the scope of routine services available at the referral site (e.g., guidance/counseling services in schools, case management in family service agencies); (5) adolescent was not currently enrolled in behavioral treatment. Referrals were made to research staff during site visits and also by phone and confidential email. Staff then contacted referred families by phone and offered them an opportunity to participate in a home-based family research interview to assess the reason for study referral and discuss current developmental challenges.

Interviews were conducted primarily in the family's homes, but also in other locations upon request; caregivers and teens were interviewed separately. Assessment measures consisted of structured clinical interviews and audio computer-assisted interviews, and were administered in English or Spanish, depending on the family's preference. Caregivers and teens each received \$35 in vouchers for completing the interview. After interview completion, interested families were linked to appropriate community-based services.

A total of 528 families had been referred to the project at the time this study was conducted, of which 331 (63%) were successfully contacted by phone and offered an interview. Of these, 253 consented to participate and completed an interview, whereas 78 (24%) refused due to disinterest (72%), lack of time (9%), and various other reasons (19%).

2.3 Measures: Systems Involvement

Indicators of past year involvement in the four service systems (education, legal, child welfare, and treatment) were assessed using the Comprehensive Addiction Severity Index for Adolescents (CASI-A: Myers, Stewart, & Brown, 1998) and the Services Assessment for Children and Adolescents (SACA: Hoagwood et al., 2000). The CASI-A is a semi-structured clinical interview that yields information about the severity of risk factors, concomitant symptoms, and consequences of substance use in seven domains of adolescent functioning: substance use, education, employment/leisure time, peer relationships, family relationships, legal involvement, and mental health. The CASI-A has demonstrated strong reliability and validity with clinical chart reviews of adolescents receiving inpatient psychiatric or substance abuse treatment (Myers et al., 1998) and with established diagnostic interviews such as the CIDI and DISC (Whitmore, Mikulich, Thompson, Riggs, Aarons, & Crowley, 1997). Concurrent validity is further grounded in studies of treatment-seeking adolescents (Thomas, Deas, & Grindlinger, 2003) and drug users with comorbid delinquency and depressive symptoms (Riggs et al., 1995). The SACA is a structured interview designed to assess youth's past and current use of inpatient, outpatient, and school-based mental health services based on parents' report. The SACA parent version has demonstrated strong validity and test-retest reliability (Hoagwood et al., 2000; Horwitz et al., 2001), as well as interrater reliability between parent and child reports of service use (Stiffman et al., 2000).

2.3.1 Education System—Involvement in the education system was defined by 6 dichotomous (yes/no) variables drawn from the CASI education module. Adolescents and caregivers reported on whether the adolescent had an individualized education plan or attended special education classes in the past year (IEP). A positive response by either adolescent or caregiver was counted as positive for this item. All other variables were reported by the adolescent only. Adolescents were asked if they met regularly with a school psychologist, guidance counselor, or social worker (educational intervention). Adolescents also reported on whether they regularly skipped class/school or arrived late/left early (attendance problems), had detentions or violated school rules (detentions/rule violations), were suspended or expelled (suspended/expelled), and had failing grades or difficulty learning/paying attention (academic problems).

2.3.2 Legal System—Legal system involvement was defined by 6 dichotomous (yes/no) variables from the CASI legal module. Adolescents reported on whether they had committed a crime in the past year, been picked up by the police, been charged with a crime, or convicted of a crime. Adolescent reports of having a restraining order filed against them and having been taken to family court or for a PINS petition were combined into a single variable representing court involvement. Both adolescents and caregivers reported on whether the adolescent had been held overnight in jail and whether the adolescent had been

on probation or parole in the past year. Again, a positive response by either adolescent or caregiver was counted as positive for these items.

2.3.3 Child Welfare System—Child welfare system involvement was obtained via caregiver report on five dichotomous (yes/no) items on the CASI. Note that these items pertained to all children in the family, not just the target adolescent, and covered only the previous six months. Caregivers reported whether they were investigated by a child welfare agency, attended family court regarding a child welfare case, had a child removed from the home, were supervised by a child welfare agency, and were mandated to participate in child welfare services.

2.3.4 Treatment System—Adolescent and caregiver involvement in the treatment system was assessed via caregiver report on the SACA. Caregivers reported on whether the adolescent had received outpatient and inpatient services for emotional or behavioral problems in the past year. Additionally, caregivers reported on whether they themselves had received any supportive services in the past year to help them deal with their child's emotional and behavioral problems and/or whether they had received substance abuse treatment services. Adolescent outpatient services included receipt of services from an outpatient mental health clinic, private professional, in-home provider, family doctor, or a nurse practitioner. Receipt of outpatient alcohol or drug use services was also included. Adolescent inpatient services included overnight stays at a psychiatric or medical unit in a hospital, residential treatment center, group home, or foster home (if indicated for the treatment of emotional/behavioral problems). Caregiver services included parental receipt of services from an outpatient mental health clinic, private professional, in-home provider, family doctor, nurse practitioner, self-help group, child care provider, respite care provider, parenting group, and any outpatient or inpatient alcohol or drug treatment services. Due to low numbers of adolescents and caregivers who received any single type of treatment, we collapsed treatment types into the three broad categories described above and coded them dichotomously (yes/no) to indicate whether any services were received in each category in the past year. Note that while adolescents may have received treatment services at some time during the past year, adolescents who were enrolled in treatment at the time of the study were excluded from participating.

2.4 Measures: Psychiatric Diagnoses

DSM-IV diagnoses were assessed using the Mini International Neuropsychiatric Interview (MINI) (Version 5.0) (Sheehan et al., 1998). The MINI is a brief structured diagnostic interview that assesses DSM-IV diagnoses in adolescent and adult populations. The MINI has demonstrated solid interrater and test-retest reliability on two international samples of psychiatric and non-psychiatric patients (Lecrubier et al., 1997), and has shown excellent convergent validity with both the SCID and the CIDI (Sheehan et al., 1998; Lecrubier et al., 1997; Sheehan et al., 1997). The MINI is specifically designed to be administered to treatment-seeking populations by lay interviewers. The following MINI modules were included in the current study: major depressive disorder and dysthymia (combined into a single “depressive disorder” category); generalized anxiety disorder and post traumatic stress disorder (combined into a single “anxiety disorder” category); alcohol abuse/dependence and substance abuse/dependence (combined into a single “substance use disorder” category); conduct disorder (CD); oppositional defiant disorder (ODD); attention-deficit/hyperactivity disorder (ADHD) inattentive type; and ADHD combined type (includes symptoms of both inattention and hyperactivity). Adolescent and caregiver reports were collected for CD, ODD, and ADHD, and a positive diagnosis reported by either source was considered indicative of the disorder. Diagnoses of depressive, anxiety, and substance use disorders were based on adolescent reports only.

2.5 Data Analysis

Given existing knowledge of gender differences in patterns of systems involvement and psychiatric diagnoses (Maschi et al., 2009; Roberts, Roberts, & Xing, 2007), preliminary analyses included examination of gender differences on all indicators of systems involvement and DSM-IV diagnoses using chi-square tests. Next, latent class analysis (LCA: McCutcheon, 1987) was used to define subgroups of adolescents with similar profiles of past-year involvement in the four systems (education, legal, child welfare, and treatment).

¹ LCA has been previously used in both normative and clinical adolescent samples to develop typologies of individuals based on patterns of behaviors and psychiatric symptoms (e.g., Chung & Martin, 2001; Reboussin, Song, Shrestha, Lohman, & Wolfson, 2006; Rindskopf, 2006). In this study, LCA was conducted on multiple indicators of system-specific problem behaviors (i.e., truancy, criminal behavior), as well as actions taken and services received within each system (i.e., IEP, arrested, investigated by child welfare). The resulting latent classes thus provide information on multiple dimensions of cross-system involvement among high-risk adolescents, including problematic behaviors, system response, and unmet need for services. The central assumption of LCA is that correlations among the observed indicators can be explained by a set of underlying latent classes plus error (Muthen, 2004). Model parameters estimated in LCA include conditional latent class probabilities, which refer to the average probabilities of endorsing each response category of each observed indicator, given membership in a particular latent class. These probabilities are analogous to factor loadings in factor analysis and are used to define and label the latent classes.

LCA models were specified using Mplus version 5.21 (Muthen & Muthen, 1998–2009). For all models, multiple sets of random starting values were used to prevent local solutions and to maximize model stability (Muthen, 2004). Beginning with a two-class model, successive models were fit with an increasing number of classes until the best-fitting model was found. Model fit was evaluated on the basis of the log-likelihood value, AIC, BIC, and the Lo-Mendell-Rubin test (Nylund, Asparouhov, & Muthen, 2007). Entropy, a summary index of classification quality, was also considered when evaluating model fit, with values closer to 1.0 indicating better fit. Following selection of the best fitting model, individuals were assigned to classes based on their highest conditional probability of membership. Then, differences among the latent classes on demographic characteristics and DSM-IV diagnoses were examined using chi-square tests. These analyses were conducted to provide information on demographic, behavioral, and diagnostic characteristics of adolescents within each latent class. This post-hoc method of examining correlates of class membership is limited because it does not account for the uncertainty inherent in latent class membership (Muthen, 2004). However, previous studies have used similar methods (e.g., Grant, Scherer, Neuman, Todorov, Price, & Bucholz, 2006; Reboussin et al., 2006), and given the high classification quality of the LCA model (see section 3.2), such bias is likely to be minimized. As a final step in the analyses, latent classes were compared on DSM-IV diagnoses separately for boys and girls to examine gender-specific patterns in the relations among systems involvement and diagnostic characteristics.

3. Results

3.1 Gender Differences in Latent Class Indicators and DSM-IV Diagnoses

Gender differences on systems involvement indicators and DSM-IV diagnoses were examined using chi-square tests (see Table 1). Boys were more likely than girls to have been

¹We attempted to run separate LCAs for boys and girls, however due to the sample size, the LCA for girls did not converge. Thus, a single LCA was conducted on the entire sample and gender differences in class membership were examined post-hoc.

charged with a crime ($\chi^2(1) = 5.9, p < .05$), held overnight in jail ($\chi^2(1) = 4.6, p < .05$), and to have experienced detentions or rule violations at school ($\chi^2(1) = 5.0, p < .05$). Girls were more likely than boys to have school attendance problems ($\chi^2(1) = 4.3, p < .05$) and several indicators of child welfare system involvement including investigation ($\chi^2(1) = 10.2, p < .001$), family court attendance ($\chi^2(1) = 4.8, p < .05$), supervision ($\chi^2(1) = 8.7, p < .01$), and child welfare service mandates ($\chi^2(1) = 3.8, p < .05$). Regarding diagnoses, girls had significantly higher rates of depressive disorders ($\chi^2(1) = 15.3, p < .001$), anxiety disorders ($\chi^2(1) = 18.2, p < .001$), and oppositional defiant disorder ($\chi^2(1) = 4.6, p < .05$). Rates of substance use disorders and conduct disorder did not differ by gender. Finally, girls were more likely than boys to have multiple diagnoses ($\chi^2(2) = 7.9, p < .05$). Overall, these data indicate that levels of psychiatric and behavioral problems among girls were equal to or higher than those among boys.

3.2 Latent Class Analysis of Systems Involvement Variables

LCA was conducted on the 21 indicators of systems involvement. Two-, three-, four-, and five-class models were run, and, based on a combination of statistical and substantive criteria, the four-class model was selected as providing the best fit to the data. The four-class model had a lower LL (1818.425) and AIC (3802.849) than both the three-class (LL = 1860.323; AIC = 3844.646) and two-class models (LL = 1942.293; AIC = 3966.587). Although the BIC for the four-class model (4096.120) was slightly higher than that for the three-class model (4063.716), the four-class model was supported by the LMR test and was more substantively interpretable than the three-class model. Classification quality for the four-class model was adequate, with an entropy value of .86 and average probabilities of .98, .96, .87, and .95 for each of the four classes respectively. Estimated conditional probabilities for each of the four classes are displayed in Table 2.

Class 1, named “Education System: Academic and Disciplinary,” was the largest class (N = 101; 40% of the sample), consisting of adolescents whose systems involvement was mostly confined to the education system, but was characterized by high levels of both academic and disciplinary problems. Among members of this class, 80% had academic problems, 60% had attendance problems, and 55% had been suspended or expelled in the past year. This class had the highest rates of detentions and rule violations (65%) and educational interventions (51%) compared to the three other classes. Class 1 also had some legal involvement, with 38% picked up by the police in the past year; however, higher levels of legal involvement, such as being charged and convicted of a crime and held in jail, did not characterize Class 1. Child welfare system involvement was fairly limited in Class 1, with 12% reporting an investigation, but no further involvement. Finally, Class 1 had the lowest level of involvement with the treatment system of all the classes, with only 14% having received adolescent outpatient services, and only 2% caregiver services.

Class 2, “Education System: Academic Only” (N = 90; 36% of the sample), included adolescents whose systems involvement was primarily limited to academic problems (54%) and attendance problems (51%). Members of Class 2 had very low levels of school disciplinary problems (5% suspended/expelled; 0 detentions/rule violations), and child welfare system involvement (11% investigated), and almost no legal involvement. Additionally, Class 2 had a relatively low percentage of adolescents who received educational interventions (34%), but a higher percentage who had previously received outpatient treatment services (26%).

Class 3, “Legal/Juvenile Justice Involved” (N = 32; 13%), included those adolescents with the highest levels of legal system involvement. All of the adolescents in Class 3 had been picked up by the police and charged with a crime in the past year. Additionally, 43% were convicted of a crime, 70% spent a night in jail, and 48% were on probation or parole. Class

3 was also characterized by high levels of school disciplinary problems, similar to Class 1: 57% with attendance problems, 54% with rule violations, 60% suspended/expelled, and 57% with academic problems. Members of Class 3 received intervention through both the education system (44% educational intervention; 36% IEP) and the treatment system (22% adolescent outpatient services; 7% adolescent inpatient services; 10% caregiver services).

Class 4, named “Multiple Systems/Child Welfare” ($N = 30$; 12%), was the most severe class, including those individuals with high levels of involvement in all four systems. This class is distinguished from Class 3 by its high levels of child welfare system involvement. All members of Class 4 had been investigated by child welfare in the previous 6 months, and 85% had been under the supervision of a child welfare agency. Additionally, 30% had been to family court regarding a child welfare case, 10% had a child removed from the home, and 30% were court-ordered to participate in services from a child welfare agency. This class had the highest levels of school attendance problems (82%) and IEPs (44%), as well as similarly high levels of academic problems (67%). School behavior problems were lower in Class 4 than in Classes 1 and 3 (27% rule violations; 39% suspended/expelled), but are still concerning. Legal involvement was also high in Class 4, with 44% picked up by the police, 39% charged and/or convicted of a crime, 19% held in jail, and 22% on probation. Finally, Class 4 had the highest rates of engagement with the treatment system, with 43% having received adolescent outpatient services, 22% adolescent inpatient services, and 25% caregiver services.

3.3 Comparison of Latent Classes on Demographic and Diagnostic Characteristics

Demographic and diagnostic comparisons of the latent classes were conducted using chi square tests. Results are presented in Table 3. Gender significantly distinguished among the classes, with Classes 1 and 3 being mostly male, Class 4 mostly female, and Class 2 evenly split ($\chi^2(3) = 18.6, p < .001$). Effects of gender are explored in more detail in the following section. Classes were also distinguished by referral source ($\chi^2(3) = 29.0, p < .001$). System-referred adolescents included those referred by the juvenile justice system ($N = 16$), the child welfare system ($N = 5$), and community family agencies serving distressed families ($N = 28$). The majority of adolescents in Classes 1 and 2 were referred by schools, and Classes 3 and 4 were more evenly split between school-referred and system-referred adolescents. Each class contained a mix of system- and school-referred adolescents. No other significant demographic differences were found.

In terms of diagnoses, classes were distinguished by depressive disorders ($\chi^2(3) = 9.3, p < .05$), substance use disorders ($\chi^2(3) = 21.2, p < .001$), conduct disorder ($\chi^2(3) = 21.9, p < .001$), and ADHD combined type ($\chi^2(3) = 16.3, p < .01$). Specifically, Classes 1 and 2 had the highest rates of depressive diagnoses (41% and 44% respectively). Substance use disorders were most prevalent in Class 4 (55%), followed by Class 3 (39%), with lower levels in Classes 1 and 2. Surprisingly, conduct disorder was highest in Class 4 (70%), rather than in Class 3 which had the highest levels of criminal behavior. High levels of conduct disorder were also found in Classes 1 (55%) and 3 (53%). Rates of ADHD combined type were highest in Class 1 (38%), followed by Class 4 (30%). No class differences were found for anxiety, ODD, or ADHD inattentive type. However, it should be noted that rates of ODD were above 80% in all classes except for Class 2. No significant difference across classes was found for comorbidity, however the highest rate of multiple diagnoses was found in Class 4 (80%). In sum, the school-focused classes (1 and 2) were characterized by depressive disorders and ADHD, while the classes representing more extensive involvement in multiple systems (3 and 4) were characterized by substance use and conduct disorder.

3.4 Gender Differences on Diagnostic Comparisons of Latent Classes

Given the significant gender differences among the latent classes, we re-conducted the above diagnostic comparisons separately by gender to further explore potential gender differences in the diagnostic profiles of latent class membership. Results are presented in Table 4 for boys and Table 5 for girls. Among boys, the four latent classes were distinguished by the presence of depressive diagnoses ($\chi^2(3) = 10.7, p < .05$) and substance use disorders ($\chi^2(3) = 15.1, p < .01$). Depressed boys were more likely to be in Education System: Academic Only (42%) than in the other classes, and boys with substance use problems were more likely to be in Multiple Systems/Child Welfare (67%) or Legal/JJ Involved (42%). Among girls, classes were distinguished by substance use disorders ($\chi^2(3) = 15.1, p < .01$), conduct disorder ($\chi^2(3) = 20.3, p < .001$), ADHD combined type ($\chi^2(3) = 13.6, p < .01$), and comorbidity ($\chi^2(6) = 16.7, p < .05$). Substance use diagnoses were highest in Multiple Systems/Child Welfare (50%), similar to the pattern found for boys. Despite no overall gender differences in conduct disorder, girls in Multiple Systems/Child Welfare, Legal/JJ Involved, and Education System: Academic and Disciplinary had rates of conduct disorder similar to or higher than boys in the same classes. Interestingly, 95% of girls in Education System: Academic and Disciplinary had ODD, compared to only 74% of boys in the same class. Rates of ODD were also high among girls in the three other classes. ADHD combined type was most prevalent among girls in Education System: Academic and Disciplinary (49%) and Multiple Systems/Child Welfare (38%), and these rates were much higher than corresponding rates for boys. Finally, girls with multiple diagnoses were most likely to be in Education System: Academic and Disciplinary (87%) and Multiple Systems/Child Welfare (76%).

4. Discussion

This study aimed to define profiles of past-year systems involvement and behavioral health needs in a high-risk sample of adolescents not currently enrolled in the behavioral health treatment system. Overall rates of prior systems involvement and psychiatric diagnoses were high. Latent class analysis of multiple indicators of systems involvement revealed four profiles that differed based on gender and psychiatric diagnoses. Gender-specific patterns of psychiatric diagnoses across latent classes were also documented. Study findings have direct applicability to assessment and treatment planning for high-risk youth as well as the organization of community-based behavioral health services for adolescents.

4.1 Overall Sample Rates of Systems Involvement and Psychiatric Diagnoses

High levels of past-year involvement in each of the four systems (education, legal, child welfare, and treatment) were found overall in the study sample. Additionally, 91% had at least one psychiatric diagnosis and 66% had more than one diagnosis confirming a high need for behavioral health services. The most common diagnoses in the study sample were ODD (78%), ADHD (51% inattentive, 26% combined), and conduct disorder (47%). Rates of internalizing and substance use disorders were also concerning, with 38% diagnosed with a depressive disorder, 28% with an anxiety disorder, and 26% with substance abuse or dependence. Despite these high rates of DSM diagnoses, only 23% had received outpatient treatment in the past year, indicating a substantial level of unmet need for services. Rates of psychiatric diagnoses and unmet need for services in the study sample are higher than those documented in community samples of youth (Angold et al., 1999; Leaf et al., 1996; Roberts et al., 2007), and are more comparable to clinical and systems-involved samples (Garland et al., 2001; Karnik et al., 2009; Turner, Muck, Muck, Stephens, & Sukumar, 2004).

Gender differences in psychiatric diagnoses were somewhat consistent with previous literature, with higher rates of depression and anxiety in girls (Compas et al., 1997;

Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993), and more ADHD inattentive type in boys (Reid et al., 2000). Diagnostic comorbidity was also higher in girls, as expected (Lewinsohn et al., 1993). Surprisingly, ODD was more prevalent among girls than boys, as was ADHD combined type, and no gender differences were found for conduct disorder or substance use disorder. Epidemiological studies have typically found higher rates of disruptive behavior disorders and substance use disorders in boys compared to girls (Lewinsohn et al., 1993; Roberts et al., 2007). Additionally, ADHD diagnoses tend to be made more frequently in boys, particularly the combined and hyperactive subtypes (Reid et al., 2000; Quinn, 2005). Our findings suggest the need to assess and treat disruptive behavior disorders and substance use in adolescent girls as well as in boys, particularly in light of research suggesting that the long-term prognosis for female adolescents with conduct disorder may be even worse than that for males (Cauffman, 2008).

4.2 Systems Involvement Profiles

Four distinct profiles of systems involvement emerged in the current sample: Education System: Academic and Disciplinary, Education System: Academic Only, Legal/Juvenile Justice Involved, and Multiple Systems/Child Welfare. The profiles were defined based on multiple indicators of systems involvement and then further distinguished by gender and psychiatric diagnoses. Education System: Academic and Disciplinary was the largest class, comprised mostly of boys, and was characterized mostly by school disciplinary actions and academic problems. Members of this class also had some mild legal involvement, which was mostly limited to being picked up by the police, and minimal child welfare system involvement. This class had the lowest level of treatment system involvement, but the highest rates of educational interventions, suggesting that youth in this class may largely receive needed services through the school. These services are more likely to focus on education-related problems than on mental health problems, which is concerning given the high rates of psychiatric diagnoses in this class. The Educational System: Academic Only class included those adolescents whose systems involvement was largely limited to academic and attendance problems. Members of this class had relatively low levels of school disciplinary actions, and no contact with the legal and child welfare systems. Approximately 25% had received outpatient services in the past year, consistent with research showing that the education sector is one common point of entry into mental health services (Farmer et al., 2003). Overall, the systems involvement of adolescents in these two largest of the four classes is mostly confined to the education sector. Youth in these classes were distinguished by high rates of depressive disorders and ADHD inattentive type, and lower rates of conduct disorder and substance use disorders.

The remaining 2 classes include those youth who have crossed over into more extensive levels of systems involvement, particularly within the legal and child welfare systems. The Legal/Juvenile Justice Involved class included mostly boys with the highest levels of legal system involvement. All members of this class had been picked up by the police and charged with a crime in the past year, the majority had spent time in jail, and nearly half were on probation. School-related behavior problems and disciplinary actions, such as truancy, suspension, and expulsion were also high in this class. Adolescents in this class received intervention through both the education and treatment systems. The Multiple Systems/Child Welfare class was the most severe class, with high levels of involvement in all four systems. Youth in this class were distinguished largely by the highest levels of child welfare system involvement; all had been subject to investigation and most were under child welfare system supervision in the past six months. Members of this class were also high on school attendance and academic problems, as well as legal system involvement. There is noted overlap between the legal and child welfare systems in the literature. Child maltreatment is a common precursor to delinquent behavior, and severe delinquent behavior

often results in oversight or placements by child welfare professionals, so these systems are inherently linked (Barth & Jonson-Reid, 2000; Glisson & Green, 2006). Interestingly, adolescents in the two most severe classes were divided along gender lines with boys mostly falling into the Legal/JJ class and girls into the Multiple Systems/Child Welfare class. Criminal behavior and associated legal system involvement is traditionally higher among adolescent boys than girls, though in recent years larger numbers of girls have been found in the JJ system (Cauffman, 2008). Parenting and family disruptions are more strongly linked with delinquency among girls than boys (Keller, Catalano, Haggerty, & Fleming, 2002), and the association between victimization and offending is higher among females (Cauffman, 2008), which may partially explain the higher co-occurrence of legal and child welfare system involvement among girls in this sample. The Multiple Systems class also had the highest rates of past year receipt of treatment services for both adolescent and caregiver. Both the legal and child welfare systems have been thought of as gateways into mental health services for some families, partially due to court mandates to obtain services and partially due to the unfortunate fact that for many families, contact with these systems represents the first recognition of need for services (Glisson & Green, 2006; Johnson, Cho, Fendrich, Graf, Kelly-Wilson, & Pickup, 2004). In terms of diagnoses, substance use and conduct disorder were prevalent among adolescents in both of the more severe classes. This is not surprising, as substance use and delinquency often go hand in hand (Loeber & Keenan, 1994), and high rates of substance use and conduct disorders have been documented in both samples of juvenile justice involved (Karnik et al., 2009) and child welfare system involved youth (Courtney & Terao, 2006).

4.3 Gender Differences in Psychiatric Diagnoses Across Profiles

Several interesting gender differences in patterns of psychiatric diagnoses within the four classes were found. It is surprising that depressive disorders seemed to play a greater role in distinguishing the classes for boys and conduct disorder for girls, given the well-established higher prevalence of depression in girls and conduct disorder in boys (Lewinsohn et al., 1993; Roberts et al., 2007). Moreover, depression was highest among boys in the Education System: Academic Only class, a class that is mostly female, and conduct disorder was highest among girls in the Education System: Academic and Disciplinary class, a class that is mostly male. These data suggest that there may be a small number of depressed boys with academic problems and a small number of conduct disordered girls who are acting out in school, and that these adolescents may be unrecognized by mental health professionals due to their somewhat unusual profiles. This may be of particular concern for the girls in the Education System: Academic and Disciplinary class, who, with their high rates of conduct disorder and school behavior problems combined with low rates of mental health services, may be well on their way to higher levels of legal system involvement without appropriate intervention. Learning difficulties and truancy have been associated with delinquency and later JJ system involvement (Bright & Jonson-Reid, 2008), and these educational factors may be especially predictive of delinquency in girls (Bender, 2010). Girls in this class also had high rates of ADHD and comorbidity, both of which are associated with more severe and persistent deviant behavior (Loeber & Keenan, 1994).

4.4 Implications of Findings

Taken together, study findings have several important implications for the assessment and referral of high-risk adolescents as well as the organization of community based behavioral health services. Findings confirm that high-risk adolescents with identified treatment needs are a heterogeneous group, differing in terms of previous service system involvement and diagnostic and clinical characteristics. Thus, “one size fits all” approaches to referral and treatment are not likely to be effective. Adolescents with different profiles are likely to have different treatment needs, and understanding these differences will aid in tailoring services

to meet the specific needs of high-risk youth (Liao, Manteuffel, Paulic, & Sondheimer, 2001). Additionally, despite high levels of prior involvement in multiple service systems, the majority of adolescents in this sample continued to have unmet treatment needs. Rates of involvement with the treatment system were overwhelmingly low in all four classes, suggesting that service systems need to be more accurate and efficient in identifying and referring youth who come to their attention for behavioral health services (Raghavan, Inoue, Ettner, Hamilton, & Landsverk, 2010). Improved coordination and integration of care across service systems would aid in this endeavor (Farmer et al., 2003). Finally, study findings regarding gender suggest that there may be gender-specific profiles of behavioral health needs and that gender is an important variable that should be considered in assessment and referral for services, as well as in the design of behavioral health services. Two particular profiles emerged in this study that were somewhat unexpected and may merit additional attention: boys with depressive diagnoses in the Education System: Academic Only class, and girls with conduct disorder in the Education System: Academic and Disciplinary class. Adolescents with these profiles may benefit from early intervention to prevent their progression to more serious levels of delinquency and consequent legal system involvement.

4.5 Study Limitations

The findings of this study must be considered in light of several limitations. First, data were collected at a single point in time, precluding the examination of change over time in systems involvement. Second, the assignment of individuals to latent classes based on conditional probability values is a limitation because it does not account for error in classification. However, this method has been used in previous studies and is further justified by the high classification quality obtained in the LCA model. Third, separate latent class analyses by gender would have been preferable to gain a fuller understanding of gender differences in profiles of systems involvement. However, the sample size within gender groups was too small to conduct these analyses. Fourth, while this study aimed to provide a comprehensive profile of multiple systems involvement and service needs, the study focused solely on behavioral health needs and did not include an assessment of physical health needs or involvement in the primary care system. Finally, due to the eligibility criteria of the larger research study from which the sample was drawn, we excluded adolescents who were currently engaged in mental health or substance abuse treatment. Much of the existing literature on cross-systems involvement has focused on true clinical samples, and our study is among the first to examine these patterns in adolescents who are systems-involved but not receiving treatment services. Thus, the extent to which our findings generalize to other samples of this type is unknown. Replication of the latent classes in other samples is needed to increase confidence in the generalizability of derived profiles.

4.6 Conclusions

Despite its limitations, this study makes an important contribution to the as yet small body of literature on behavioral health needs among high-risk adolescents with treatment needs, but not involved in the behavioral health treatment system. Future research should examine the predictive validity of the four systems involvement profiles defined in this study to determine whether these profiles differentially predict engagement in treatment services as well as clinical and family outcomes. Additionally, studies should examine longitudinal trajectories of systems involvement to determine demographic and clinical characteristics that predict certain trajectories (Garland et al., 2001). This knowledge would further inform intervention planning and may allow for the prevention of entry into certain systems. For example, early identification of those adolescents most likely to progress from the special education system into the juvenile justice system would allow for the implementation of interventions early in their trajectory that may then prevent this progression from occurring.

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Research Highlights

- Four profiles of systems involvement were found in this high-risk adolescent sample.
- Profiles differed based on gender and DSM diagnoses.
- Depressed boys and conduct-disordered girls may require special attention.
- Findings confirm heterogeneity of high-risk adolescents with treatment needs.

Table 1

Gender differences on indicators of systems involvement and DSM-IV diagnoses for the full sample (N=253).

	Total	Males	Females
N	253	138	115
<u>Systems Involvement Indicators</u>			
IEP (E)	37%	40%	34%
Educational Intervention (E)	43%	41%	45%
Attendance problems* (E)	60%	54%	67%
Detentions/Rule violations* (E)	38%	44%	30%
Suspended/Expelled (E)	38%	42%	32%
Academic Problems (E)	67%	65%	70%
Picked up by police (L)	34%	39%	28%
Charged with crime* (L)	17%	22%	11%
Convicted of crime (L)	7%	9%	4%
Overnight in jail* (L)	13%	17%	8%
Probation/parole (L)	10%	12%	8%
Court involvement (L)	4%	3%	5%
Investigated by CWS ^{I**} (C)	23%	15%	33%
Family Court re: CWS case* (C)	4%	2%	7%
Child removed (C)	1%	0%	3%
Supervised by CWS ^{**} (C)	11%	6%	18%
CWS services* (C)	4%	2%	7%
Adolescent outpatient treatment (T)	23%	21%	25%
Adolescent inpatient treatment (T)	6%	5%	7%
Caregiver services (T)	11%	8%	14%
<u>DSM-IV Diagnoses</u>			
Depressive disorder (MDD and/or dysthymia) ^{***}	38%	27%	50%
Anxiety disorder (PTSD and/or GAD) ^{***}	28%	17%	41%
Substance use disorder	26%	25%	27%
Conduct disorder	47%	46%	48%
Oppositional defiant disorder [*]	78%	73%	84%
ADHD Inattentive type	51%	53%	48%
ADHD Combined type	26%	22%	31%
Comorbidity [*]			
No diagnosis	9%	8%	10%
One diagnosis	25%	32%	17%
Two or more diagnoses	66%	60%	74%

Note.

*
 $p < .05$,**
 $p < .01$,

***

$p < .001$. DSM-IV diagnoses were collected during the screen interview using the *Mini International Neuropsychiatric Interview* (Sheehan et al., 1998). Calculation of the number of diagnoses (comorbidity) excluded the diagnosis of ODD due to the very high percentage of the sample (78%) diagnosed with ODD. Letters in parentheses next to each system involvement variable indicates which system category each variable belongs to: E = education; L=legal; C=child welfare; T=treatment.

¹ CWS = Child Welfare System.

Table 2

Estimated conditional probabilities by latent class for system involvement variables.

	Class 1 Education System: Academic & Disciplinary	Class 2 Education System: Academic Only	Class 3 Legal/JJ Involved	Class 4 Multiple Systems/Child Welfare
N	101	90	32	30
IEP	.378	.340	.360	.443
Educational Intervention	.506	.336	.442	.375
Attendance problems	.604	.508	.571	.815
Detentions/Rule violations	.649	.000	.540	.265
Suspended/Expelled	.548	.051	.604	.386
Academic Problems	.795	.542	.569	.665
Picked up by police	.376	.000	1.00	.439
Charged with crime	.026	.000	1.00	.258
Convicted of crime	.000	.000	.431	.127
Overnight in jail	.038	.000	.703	.193
Probation/parole	.010	.024	.478	.223
Court involvement	.011	.012	.208	.043
Investigated by CWS ¹	.133	.114	.067	1.00
Family Court re: CWS case	.000	.012	.000	.297
Child removed	.000	.000	.000	.098
Supervised by CWS	.000	.000	.000	.850
CWS services	.000	.000	.000	.294
Adolescent outpatient treatment	.143	.257	.220	.432
Adolescent inpatient treatment	.000	.057	.070	.220
Caregiver services	.024	.158	.095	.248

Note. Fit statistics for the four-class model were: log likelihood (LL) = 1818.425; AIC = 3802.849; BIC = 4096.120; LMR $p = .001$. The four-class model showed improved fit over the three-class model (LL = 1860.323; AIC = 3844.646; BIC = 4063.716; LMR $p = .000$). Models with more than four classes failed to converge.

¹ CWS = Child Welfare System.

Table 3

Comparisons of the four latent classes on demographic variables and DSM-IV diagnoses: Full Sample (N = 253).

	Class 1: Education System: Academic & Disciplinary	Class 2: Education System: Academic Only	Class 3: Legal/ JJ Involved	Class 4: Multiple Systems/Child Welfare	p-value
N	101	90	32	30	
Male gender	61%	48%	78%	30%	.000
Race					
African American	22%	24%	28%	10%	Ns
Hispanic	63%	54%	47%	64%	
Other	15%	23%	25%	27%	
Adolescent age					
12–14	26%	17%	19%	17%	Ns
15+	75%	83%	81%	83%	
Caregiver Education					
Less than High School	37%	41%	33%	44%	Ns
High School or more	63%	59%	67%	58%	
Caregiver Employed	56%	60%	68%	43%	Ns
Family Composition					
Two parents	30%	34%	36%	17%	Ns
Single parent	60%	54%	55%	70%	
Grandparent	10%	12%	10%	13%	
Referral Source					
School	87%	89%	57%	54%	.000
System	13%	11%	43%	46%	
Diagnosis					
Depressive dx	41%	44%	16%	30%	.03
Anxiety dx	25%	31%	22%	37%	Ns
Substance use dx	24%	15%	39%	55%	.000
CD	55%	28%	53%	70%	.000
ODD	82%	69%	88%	83%	.055
ADHD Inattentive	46%	61%	38%	53%	Ns

	Class 1: Education System: Academic & Disciplinary	Class 2: Education System: Academic Only	Class 3: Legal/ JJ Involved	Class 4: Multiple Systems/Child Welfare	p-value
ADHD Combined	38%	12%	22%	30%	.001
Comorbidity					Ns
No diagnosis	5%	14%	9%	3%	
One diagnosis	28%	23%	28%	17%	
Multiple diagnoses	67%	62%	63%	80%	

Table 4

Latent classes compared on DSM-IV diagnoses and comorbidity: Boys (N = 138).

	Class 1: Education System: Academic & Disciplinary	Class 2: Education System: Academic Only	Class 3: Legal/ JJ Involved	Class 4: Multiple Systems/Child Welfare	p-value
N	62	42	25	9	
Diagnosis					
Depressive dx	26%	42%	12%	0%	.01
Anxiety dx	12%	24%	20%	11%	Ns
Substance use dx	15%	22%	42%	67%	.002
CD	48%	33%	52%	67%	Ns
ODD	74%	62%	88%	78%	Ns
ADHD Inattentive	48%	64%	40%	67%	Ns
ADHD Combined	31%	12%	20%	11%	Ns
Comorbidity					
No diagnosis	8%	10%	4%	11%	Ns
One diagnosis	37%	29%	36%	0%	
Multiple diagnoses	55%	62%	60%	89%	

Table 5

Latent classes compared on DSM-IV diagnoses and comorbidity: Girls (N = 115).

	Class 1: Education System: Academic & Disciplinary	Class 2: Education System: Academic Only	Class 3: Legal/JJ Involved	Class 4: Multiple Systems/Child Welfare	p-value
N	39	48	7	21	
Diagnosis					
Depressive dx	64%	46%	29%	43%	Ns
Anxiety dx	46%	36%	29%	48%	Ns
Substance use dx	37%	9%	29%	50%	.002
CD	64%	23%	57%	71%	.000
ODD	95%	75%	86%	86%	.09
ADHD Inattentive	41%	57%	29%	48%	Ns
ADHD Combined	49%	13%	29%	38%	.003
Comorbidity					.01
No diagnosis	0%	19%	29%	0%	
One diagnosis	13%	19%	0%	24%	
Multiple diagnoses	87%	63%	71%	76%	