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PROBLEM PROFILES OF AT-RISK YOUTH IN TWO SERVICE PROGRAMS: A MULTI-GROUP, EXPLORATORY LATENT CLASS ANALYSIS

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Abstract

Baseline data collected in two brief intervention projects (BI-Court and Truancy Project) were used to assess similarities and differences in subgroups of at-risk youth. Classifications of these subgroups were based on their psychosocial characteristics (e.g., substance use). Multi-group latent class analysis (LCA) identified two BI-Court subgroups of youth, and three Truant subgroups. These classes can be viewed as differing along two dimensions, substance use involvement and emotional/behavioral issues. Equality tests of means across the latent classes for BI-Court and Truancy Project youths found significant differences that were consistent with their problem group classification. These findings highlight the importance of quality assessments and allocating appropriate services based on problem profiles of at-risk youth.

Introduction

It is well established that youths entering the juvenile justice system are experiencing multiple behavioral and emotional problems (e.g., Vaughn, Freedenthal, Jenson, & Howard, 2007; Teplin, Abram, McClelland, Mericle, Dulcan, & Washburn, 2006; Abram, Teplin,

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McClelland, & Dulcan, 2003; Cocozza & Skowyra, 2000; Dembo, Williams, Fagan, & Schmeidler, 1993). One domain of problems pertains to drug abuse. For example, Teplin et al. (2006) administered the Diagnostic Interview Schedule for Children (DISC) (Shaffer, Fisher et al., 1996) to youths entering the Cook County (Chicago) Detention Center. They found approximately half of the detainees (51% male, 47% female), had a DSM-IV substance use disorder. Marijuana use disorder was the most frequently identified substance use disorder, followed by alcohol use disorder, in each gender group. Additional research on these detainees (Abram et al., 2003) found a sizable comorbidity between having a substance use disorder and having an anxiety disorder (29%) and ADHD or behavioral disorder (62%). High rates of drug involvement has also been found among youths placed in diversion programs (Dembo, Wareham, Poythress, Cook, & Schmeidler, 2006); and among youths shortly after arrest (Dembo, Belenko, Childs, & Wareham, 2008).

Youths entering the juvenile justice system also experience psychological and psychiatric problems (Abram et al., 2003; Dembo & Schmeidler, 2003; Teplin et al., 2002; Wasserman et al., 2002). Considerable attention has focused primarily on conduct disorders, characterized by aggressiveness, property destruction, deceitfulness, or lack of regard for rules or laws, which is quite prevalent among juvenile offenders, especially among incarcerated youths (Lahey, Applegate, McBurnett, Biederman, Greenhill, Hynd, et. al, 1994; Wasserman, McReynolds, Ko, Katz, & Carpenter, 2005; Teplin et al., 2006). Until relatively recently, much less attention has been paid to ADHD and its relationship to delinquency and other psychosocial functioning problems among juvenile offenders. This is surprising, given the prevalence of this disorder among these youths. For example, Teplin et al. (2006) found prevalence for ADHD of 17% among male, and 21% among female, Cook County, Chicago detainees that they studied—with the highest prevalence occurring among non-Hispanic White detainees (21%; see also: Gordon & Moore, 2005). Further, a sizable comorbidity has been found between ADHD and affective disorders, substance use disorders, and anxiety disorders among juvenile offenders (Abram et al., 2003; Molina & Pelham Jr., 2003).

Behavioral impairments associated with ADHD in youths can complicate additional areas of functioning, including school, family, and peer relationships (Realmuto et al., 2009). For example, the inability to focus or sit still may lead to school failure, truancy, and dropping out (Stern, 2001). Furthermore, as reported by Winters and colleagues, (2009), impulsivity is an important component of ADHD among adolescents, resulting in an increased likelihood of engaging in problem behaviors such as drug use and risky sexual activities (e.g., having sexual intercourse without using a condom). Left untreated, problem behaviors associated with ADHD can persist beyond adolescence and extend into adulthood (Kessler & Üstün, 2004; Lara, Fayyad, de Graaf, Kessler, Aguilar-Gaxiola, Angermeyer, 2009; Stern, 2001). However, as Jensen, Martin, and Cantwell (1997) assert, research on ADHD among youths, its correlates and comorbidity, remains relatively unexplored.

The experience of major life stressors, such as exposure to violence, death of a loved one, or serious illness, has also been found to be prevalent among justice-involved youths, particularly females, and to have an adverse impact on developmental outcomes in the areas of delinquency, substance use, and emotional/psychological functioning—including PTSD (Robertson, Xu, & Stripling, 2010; Ariga, Uehara, Takeuchi, Ishige, Nakano, & Mikuni, 2008; Flouri & Kallis, 2007; Dixon, Howie, & Starling, 2005; Ruchkin, Schwab-Stone, Koposov, Vermeiren, & Steiner, 2002.). Ariga et al. (2007) found that experiencing traumatic events was common among the female detainees they studied in Japan, with the girls having a high prevalence of PTSD. Similar results were obtained in a study of detained female offenders in Australia (Dixon et al., 2005); among females detainees in Florida (Lederman, Dakof, Larrea, & Hua, 2004); and among male detainees in Russia (Ruchkin et

al., 2002). In her analyses of data on youth in the 1995 National Survey of Adolescents, Maschi (2006) also found a high prevalence of trauma among male youths reporting they engaged in violent offending in the past year. The results of this research underscore the importance of routinely assessing for trauma, along with other psychosocial problems, among juvenile offenders.

Problems Identified Among Truant Youths

Research on the psychosocial problems experienced by truant youths is not as advanced as comparable studies involving delinquent youth. However, in recent years, an understanding has been developing as to the multiple problems experienced by truant youths. According to Office of Juvenile Justice and Delinquency Prevention [OJJDP] (2001), hundreds of thousands of youths are truant each day. Many youths in America neither attend school regularly nor graduate from high school (Arnette, 1995; Baker, Sigmon & Nugent, 2001; Center for Labor Market Studies, 2009). There is a critical need to gain a comprehensive understanding of the problems experienced by truant youths so that effective interventions can be developed for them.

Truant youths often experience troubled family situations, failing grades, and psychosocial difficulties including drug use (Dembo & Turner, 1994; see also: Dembo, Ungaro, Briones-Robinson, Gulledge, Karas, et al., 2010). However, with relatively few exceptions (e.g., Henry & Huizinga, 2007; McCluskey, Bynum & Patchin, 2004), truancy has not received significant attention by criminologists. The limited number of available studies, involving selected samples of truant youths, indicate that truant youths are often experiencing serious interrelated problems in regard to a stressed family life (Baker et al., 2001; Kearney & Silverman, 1995), alcohol and other drug use (Baker et al., 2001; Dembo & Turner, 1994; Diebolt & Herlache, 1991), emotional/ psychological functioning (Diebolt & Herlache, 1991; Egger, Costello, & Angold, 2003; Kearney & Silverman, 1995), and educational functioning (e.g., low grades, high rates of being retained in the same grade or placed in remedial or special programs) (Dembo & Turner, 1994; Garry, 1996; Ingersoll & LeBoeuf, 1997). Research also suggests that truant youths are at considerable risk of continuing their troubled behavior in school and may enter the juvenile justice system (Garry, 1996; Ingersoll & LeBoeuf, 1997; Loeber & Farrington, 2000; Puzzanchera, Stahl, Finnegan, Tierney & Snyder, 2003). Reaching these youths before they become more seriously involved in drug use and other delinquent behavior provides an excellent opportunity to reduce the likelihood they will move into the juvenile justice system.

Baseline data collected in two recent studies (one completed and one ongoing), provided an exciting opportunity to examine similarities and differences in the psychosocial problem profiles of delinquent and truant youths. The first group of youths were participants in Brief Intervention projects involving two court diversion programs (BI-Court, see Dembo, Briones-Robinson, Gulledge, Karas, Winters, Belenko, et al., (in press)). This group involved youths arrested on a drug related charge (e.g., possession of marijuana), or a drug related offense (e.g., possession of drug paraphernalia), or who tested drug positive at the Hillsborough County Juvenile Assessment Center (HJAC), a centralized intake facility. Truant youths processed at the HJAC Truancy Intake Center (TIC), and truant youths assigned to a court-based diversion program, comprised the second group of youths involved in this study. Both studies used the same assessment instruments for the youths and their parents/guardians (Winters, 1992; Winters & Henly, 1993; Winters & Stinchfield, 2003). This provided a common set of information permitting the identification of potential subgroups of youths reflecting various psychosocial issues.

The present study sought to: (1) identify possible subgroups of BI-Court and Truant youths with similar or different constellations of psychosocial problems through the use of latent

class analysis (Hagenaars & McCutcheon, 2002), and (2) to assess the usefulness of this classification by comparing the subgroups on various covariates. The overarching goal of the study was to contribute to the developing literature regarding the multiple problems experienced by at-risk youth, which in turn, could inform future treatment efforts. Following a summary of our findings, we discuss their research and service delivery implications.

Method

Participants

The present study involves baseline data obtained from youths and their parents/ guardians collected in two studies: BI-Court (n=100) and Truant youths (n=131). As noted earlier, the first group included youth who were participants in Brief Intervention projects in two court diversion programs. Of the 240 Juvenile Drug Court and Juvenile Diversion Program (JDP) youth who were eligible for enrollment, 63% of families agreed to an initial in-home meeting. Of the families who agreed to an initial in-home meeting, 66% completed the baseline assessment. Comparisons of participating and non-participating youths in regard to gender, age, race and ethnicity found no significant differences between the two groups.

Truant youths processed at the HJAC-TIC, and truant youths assigned to the JDP, comprised a second group of 131 youths involved in this study. Of the 167 TIC processed youths and 69 truancy youths processed at the JDP, who were eligible for enrollment, 67% of families agreed to an initial in-home meeting. Of families who agreed to an initial in-home meeting, 86% completed the baseline assessment. Comparisons of participating and non-participating youths in regard to gender, age, race and ethnicity found no significant differences between these two groups.

All the youths were recruited into a NIDA funded, clinical trial accessing the efficacy of a brief intervention developed among middle school youths. The same data collection instruments were used in both studies, and involved in-depth interviews with the youths and their parents/guardians (usually the female caregiver). These instruments were the Adolescent Diagnostic Interview (ADI, Winters & Henly, 1993), and the Parent/Guardian ADI (Winters & Stinchfield, 2003). Voluntary urine specimens, probing the recent use of amphetamines, cocaine, opiates and marijuana, were also collected and analyzed. Ninety-six percent of the BI-Court youths, and 91% of Truant youths, provided these specimens. All study procedures were approved and monitored by the IRB at the Treatment Research Institute for the court diversion programs or the University of South Florida IRB for the truant study.

Key Measures

Delinquency—Based on the work of Elliott, Ageton, Huizinga, Knowles and Canter (1983), we measured the youths' delinquent behavior in the 12 months prior to their baseline interviews by asking how many times they engaged in each of 23 delinquent behaviors. Youths reporting an act 10 or more times were asked to indicate how often they participated in this behavior (i.e., once a month, once every two or three weeks, once a week, two to three times a week, once a day, or two to three times a day). Further, youths were asked to indicate their age when they first committed each delinquent behavior. Similar to Elliot et al. (1983), we developed five totals of numbers of offenses to serve as summary measures of delinquent involvement: general theft (e.g., petit theft, vehicle theft/joyriding, or burglary), crimes against persons (e.g., aggravated assault, fighting, robbery), index crimes (similar to UCR Index Part I offenses); drug sales; and total delinquency (i.e., the sum of the 23 delinquent activities).

Emotional/Psychological Problems—The youths' experience of emotional/ psychological problems was probed in two ways: 1. The youths were asked if they ever received services for an emotional or behavioral problem. 2. ADHD was assessed by four questions on the ADI mental health section keyed to DSM-IV criteria for this troubled behavior: (1) Do you often get complaints from parents/teachers that you don't listen to instructions or directions? (2) Do you frequently tend to act before thinking? (3) Do you often have difficulty waiting for your turn during games or when doing things with other people your age? (4) Do you often fidget and find it difficult to sit? As discussed in the results section, a confirmatory factor analysis was used to assess how well a single factor summarized the four ADHD items (Muthen & Muthen 1998–2010, version 6).

Parent Reports of Stressful/Traumatic Events Experienced by Youth or Other Family Member—The youths' parents/guardians were asked to indicate if the youth or their family ever experienced nine types of stressful/traumatic events: (1) unemployment of parent, (2) divorce of parents, (3) death of loved one, (4) serious illness, (5) victim of a violent crime, (6) eviction from house or apartment, (7) legal problem resulting in jail time or detention, (8) accidental injury requiring hospitalization, and (9) other traumatic event. As discussed in the results section, we developed a summary measure from these data.

Problem Substance Use—Two sources of information were used to assess youths' substance use involvement: (1) a question on the ADI asking if the youth ever had a problem with drug or alcohol abuse, and (2) for youths reporting alcohol, marijuana or other drug use, detailed questions for each drug used five of more times in their lives were asked regarding the extent, experiences, and consequences of use. For each drug, the responses were keyed to DSM-IV criteria for a substance use disorder, leading to a classification of each youth as having no diagnosis, a diagnosis of being an abuser, or dependent on the drug. Finally, the diagnostic results for the three categories of drugs (alcohol, marijuana and other drugs) were combined into an overall measure, based on their most serious diagnostic classification on any of the three drug categories: $0 =$ no diagnosis on any of the three categories of drugs, $1 =$ abuse on any of the drug categories, and $2 =$ dependence on any of the three categories of drugs.

Analysis Strategy

This study performed a multi-group latent class analysis (LCA) using Mplus version 6 (Muthén & Muthén 1998–2010). LCA is useful in a wide range of substantive areas involving cross sectional and longitudinal data (Clogg 1995; Hagenaars & McCutcheon 2002) to identify an underlying classification of entities (e.g., sub-types or latent classes of individuals) that are related to manifest indicators in probabilistic terms (Dayton, 1998). In particular, the latent class model is useful when studying a heterogeneous population. Our use of latent class analysis was exploratory in nature, and did not specify hypotheses relating to the values of the conditional or latent class probabilities.

The issue of class enumeration in mixture modeling, determining the appropriate number of latent classes for a study population, remains unresolved, so using multiple criteria aids in class enumeration (Nylund et al., 2007). The statistical criteria used to assess the number of classes were: (1) the classification table based on class probabilities for the most likely latent class membership by latent class, (2) the entropy score, (3) the Akaike Information Criterion (*AIC*), (4) the Bayesian Information Criterion (*BIC*), (5) the sample size adjusted BIC (*saBIC*), and (6) the model fit to the univariate and bivariate frequency tables (Lubke & Neale 2006; Ramaswamy et al., 1993; Akaike, 1987; Bozdogan, 1987). (Vuong-Lo-Mendell-Rubin likelihood ratio test [*LRT*] and Lo-Mendell-Rubin adjusted likelihood ratio test [*aLRT*]data are not available for mixture modeling with known class-training variables).

For the classification table, high diagonal values and low off-diagonal values indicate good classification quality (Muthén & Muthén 2001:372). The values of entropy range from 0 to 1, with scores closer to 1 indicating clearer classifications (Muthén & Muthén 2001:372). For *AIC*, *BIC*, and *saBIC*, lower scores—closer to zero—indicate a better fit of the model. For the fit of the model to the univariate and bivariate frequency tables, smaller standardized residuals between the observed and estimated (expected) probabilities indicate a better fit. Additionally, along with statistical criteria, the substantive meaningfulness of the latent class results is also important in deciding on the number of classes.

The following observed variables comprised the manifest indicators that were used in the latent class analyses: Continuous: (1) youth total self-reported delinquency reported in the 12 months prior to the baseline interview (log transformed), (2) youth ADHD factor score, and (3) parent/guardian reported number of stressful/traumatic events experienced by the youth or family. Categorical: (4) youth reported experiencing a substance abuse problem (0 = no, 1 = yes), (5) youth reported receiving services for emotional/behavioral problems (0 = no, 1 = yes), and (6) combined youth alcohol, marijuana, other drug DSM substance abuse/ dependence diagnosis (0 = none, 1 = abuse, 2 = dependence).

Results

Sample Characteristics

As shown in Table 1, most of the youths in each study were male, with no significant difference between the two study groups. Youths in the BI-Court study were significantly older (mean=15.6 years), than youths in the Truancy study (mean=14.7 years). There was no significant difference between the two study groups regarding race, with approximately 25% of youths in each group being African-American or Hispanic. Twenty-two percent of BI-Court youths and 14% of Truancy study youths were living with both their biological parents. On the other hand, a majority of the youths in each study group were living either with their biological mother alone or with their mother and another adult.

Substance Use Experiences and Urine Test Results

A large majority of youths in both study groups reported the use of tobacco, alcohol and marijuana. Of particular note, over 90% of youths in each study group reported using marijuana at least once. Further, 47% of BI-Court youths, and 51% of Truancy program youths, urine tested positive for marijuana. In both study groups, a majority of youths reporting the use of alcohol or marijuana indicated they had used each substance five or more times in their lifetime.

Several important differences were found in drug use between the two groups: (1) 86% of BI-Court youths, compared to 71% of Truancy program youths, who reported ever using marijuana, reported use of the drug five or more times; (2) 15% of BI-Court youths, compared to 6% of Truancy program youths, reported ever using cocaine; and (3) a larger percent of BI-Court youths (61%), compared to Truancy program youths (38%), met DSM-IV criteria for substance abuse. Relatedly, 39% of Truancy program youths versus 15% of BI-Court program youths were not diagnosed as having a substance use problem.

Psychosocial Description

Many youths in both groups reported problems experienced by their families (see Table 3); 48% of BI-Court youths, and 57% of truant youths reported a family member has an alcohol/other drug use problem. In addition, 34% of truant youth, compared to a significantly lower 15% of BI-Court youth, indicated a family member had a mental health problem.

Smaller proportions of the youths also reported they had experienced psychosocial problems; 27% of BI-Court youth and 18% of truant youth reported they ever had an alcohol/other drug problem; and, 15% of BI-Court youth and 11% of truant youth indicated they had received treatment for such a problem at least once in their lives. Further, 50% of truant youth and 40% of BI-Court youth indicated they had received services for emotional/ behavioral problems. These results highlight the sizable prevalence of these issues among both groups of youths.

Stress/Trauma Experiences

The youths' parents/guardians were asked to indicate if the youth or their family ever experienced nine different stressful/traumatic events. As Table 4 shows, large percentages of BI-Court and Truant youths/families had these experiences, with death of a loved one and divorce of parents being particularly prevalent. In addition, a sizable proportion of parents/ guardians in each group reported "other" stressful/traumatic experiences (e.g., youth being placed in foster care, not having a relationship with their father, fighting with brothers and sisters, losing the opportunity to obtain a driver's license, separation from their mother).

The Truant youth group had significantly more unemployment of parent, death of a loved one, and serious illness than the BI-Court group. Overall, averages of 2.20 and 3.14 stressful/traumatic experiences were reported by BI-Court and Truant youth parents/ guardians, respectively (F [1,231]=19.51, p<.001).

ADHD Behaviors

Four questions keyed to DSM-IV criteria for ADHD were included in the youth interviews. As Table 4 shows, Truant youths reported significantly larger percentages than BI-Court youths for all these issues except difficulty waiting your turn.

Confirmatory Factor Analysis of the ADHD Items

Multi-group, confirmatory factor analysis was used to assess how well a one factor model, involving each of the four ADHD items, fit the data across the BI-Court and Truant youth groups (Muthen & Muthen 1998–2010, version 6). Model specification involved equal factor loadings and thresholds across the two groups. Two fit indices, the comparative fit index (CFI) and the Tucker-Lewis index (TLI), were used to evaluate model fit. The typical range for both CFI and TLI is between 0 and 1, although the TLI may achieve values slightly greater than 1,with values greater than .90 indicating acceptable fit and values greater that .95 indicating good fit (Hu & Bentler, 1999). Two additional indices were used to evaluate the model fit to the data: (1) the root mean square error of approximation (RMSEA); RMSEA values of .05 or less indicate close model fit, and values between .05 and .08 indicate adequate fit (Brown & Cudeck, 1993). (2) the weighted root mean square residual (WRMR) for categorical variables; Yu and Muthén (2001) suggest WRMR <.90 indicate good models. Results indicated a very good fit for the single factor model (Chi-square= 1.82[6], p=0.94; CFI = 1.000, TLI = 1.077, RMSEA = 0.000, WRMR= .375), with standardized loadings of .515 or greater for each ADHD variable for the BI-Court and Truancy groups.

Summary Measures of ADHD and Stressful/Traumatic Experiences

ADHD—Development of a summary ADHD measure was informed by our confirmatory factor analysis results, suggesting equal contributions of all measures to the factor for each group. In order to facilitate comparison across the two groups, for each group, standard scores were obtained for each measure, nullifying any differences among means and standard deviations of the measures for the group. Then, for all subjects in each group, these

standard scores were summed into an overall score. Thus, the mean of the summary scores was zero for each group, despite the higher rate of these characteristics in the Truant youth group. The summary score indicated the extent of ADHD for each youth relative to the group.

Stressful/Traumatic Experiences—Since the proportion of some stressful/traumatic experience items differed between the BI-Court and Truant groups, separate summary scores were calculated to indicate relative stressful/traumatic experiences within each group in the same fashion as was done for ADHD.

Self-Reported Delinquency—Table 5 summarizes BI-Court and Truant youths' responses to questions probing their involvement in delinquent behavior in the 12 months before their baseline interviews. As can be seen, each group had high prevalence rates for their involvement in crimes against persons, general theft and total delinquency (a sum of the 23 delinquent behavior items). With the exception of drug sales, overall prevalence rates on the various summary measures were higher among Truant youths.

The range of responses to the items comprising the self-reported delinquency indices was large, ranging from no activity to hundreds (and, in a few cases, thousands). Due to nonnormality, analysis of the frequency data as an interval scale was not appropriate as a measure of delinquent involvement. Instead, a log (base 10) transformation was employed so that equal intervals on the transformed scale would represent equal differences in involvement. A raw score of 0.1 was assigned to youths reporting 0 offenses, so the transformed score was −1. This evaluates the difference between no offense and one offense as equal in importance as the difference between 1 offense and 10, 10 offenses and 100, or 100 offenses and 1000, each an increase of 1 unit of the transformed score.

All the correlations between the log transformed measure of total delinquency and the other log transformed delinquency measures were sizable and statistically significant for both groups (BI-Court youth: mean correlation = 0.66; Truant youth: mean correlation = 0.62). Importantly, the skew and kurtosis of the log transformed measure of total delinquency were dramatically lower than those of the untransformed measure (BI-Court: untransformed [skew=8.14, kurtosis=73.19], transformed [skew=-0.16; kurtosis=-0.42]; Truancy: untransformed [skew=5.96, kurtosis=42.16], transformed [skew=-0.62, kurtosis=-0.70]. Hence, we decided to use the log transformed measure of total delinquency in our analyses.

Relationships Among the Variables in the Latent Class Analysis—Preliminary examination of the Pearson and tetrachoric correlations among the continuous and binary indicators, respectively, included in the latent class analysis is presented in Table 6. Following conversion of the correlations to z-scores, these results highlight that significant relationships exist between 12 of the 15 pairs of variables for BI-Court youths, and 7 of the 15 pairs of variables for Truant youths. Most of the relationships were in the low to moderate range.

The correlations in Table 6 were converted to z-scores, and the z-scores compared across the BI-Court and Truant youth groups. Results indicated several correlations were significantly higher for BI-Court, than for Truant youths: (1) self-reported delinquency with youth emotional problems and youth alcohol/other drug diagnosis; (2) ADHD with youth reported alcohol/other drug problems, youth emotional problems, and youth alcohol/other drug diagnosis.

Latent Class Analysis Fit Indices—LCA models were estimated for a series of models ranging from one to three classes (a four-class solution could not be reliably estimated since

two classes had class membership less than 50). Based on the results reported in Table 7, a three-class solution was selected as best, since having the lowest values of all three statistics indicated that a three group solution best fit the data. Additional model fit information, discussed in the following section, also indicated the good quality of the three group solution.

Latent Class Analysis Results—The three class LCA results are shown in Table 8. The three classes identified in the data, which differ in important ways across the six variables included in the analyses, were termed as follows: Class 1—*Low delinquent-emotional problem youth* (n=67); Class 2—*Multiple problem youth* (n=109); and Class 3—*High delinquent-emotional problem youth* (n=55). The labels for these groups highlight their major distinguishing features, and identify important similarities and differences between the two study groups.

Viewed broadly, the three classes can be thought of as differing along two dimensions, substance use involvement and emotional/behavioral issues. Almost all *Multiple problem youth* had a diagnosis of alcohol or other drug use dependence or abuse. Thus, the youths without any substance use diagnosis were in the other two classes, which were clearly distinguished by low or high levels of delinquent-emotional problems: delinquency, ADHD, stress/trauma, and youth-reported emotional problems. In contrast, almost all substance dependent youths were in the *Multiple problem youth* class. Youths with a substance abuse diagnosis were majorities of both the *Low delinquent-emotional problem* and *Multiple problem* classes; the *High delinquent-emotional problem* class included a minority of such youths.

The *Low delinquent-emotional problem* class had much lower estimates of the emotional/ behavioral variables than the other two classes, implying that youths in that class with a substance abuse diagnosis were similar to those with no diagnosis in their difference from youths in the other two classes. Averaging the two groups in Table 6, the three-category drug diagnosis was positively correlated with the emotional/behavioral variables, suggesting that substance dependent youths have more problems than non-abusers. Nonetheless, the *Multiple problem* class, composed of youths with a substance dependence diagnosis in addition to those with an abuse diagnosis, did not have consistently more emotional/ behavioral problems than the *High delinquent-emotional problem* class, composed of youths without a diagnosis in addition to those with an abuse diagnosis. This implies that the youths with a substance abuse diagnosis in the *Multiple problem* class may have had fewer emotional/behavioral problems than youths with an abuse diagnosis in the *High delinquent-emotional problem* class. If so, the *High delinquent-emotional problem youth* class was composed of youths with no diagnosis or an abuse diagnosis who had the highest levels of emotional/behavioral problems. On the other hand, the *Multiple problem youth* class was composed of almost all youths with a dependence diagnosis, and also youths with an abuse diagnosis and moderate emotional/behavioral problems.

It is important to note that BI-Court, Juvenile Drug Court and Juvenile Diversion youth did not differ significantly on any of the six measures used in the latent class analysis. HJAC-TIC and JDP truant youths differed significantly on only one of the measures—JDP youth reported more stress/trauma (F [1,129]=4.25, p <.05) (A table reporting these results is available from the senior author upon request).

The classification table based on an individual's model-estimated (posterior) probabilities for most likely latent class membership indicated high values in the main diagonal (range=. 74 to .95), and low values in the off-diagonals (range=.05 to .17), suggesting that the three-class model produced relatively unambiguous classifications. Importantly, the three-class

model had a high entropy value of .843, which represents a quantification of classification uncertainty (as noted earlier, values closer to 1.00 indicate clearer classifications). (Due to space concerns, a table reporting these results has been omitted. A copy is available from the senior author upon request).

An examination of the bivariate residuals of the observed versus model-estimated values for the categorical indicators indicated a respectable fit to the data with all standardized residuals being nonsignificant (i.e., <1.5). Additionally, the nonsignificance of the bivariate standardized residuals supported the assumption of local independence for the categorical indicators in the latent class model. Local independence is important when trying to enumerate the correct class model, as the existence of local dependencies will artifactually increase the optimum number of classes extracted (Reboussin, Ip, & Wolfson, 2008). For the continuous variables, the local independence assumption was explored by introducing the observed variables as a latent factor in the LCA analysis. A less well-fitting model would suggest within-class conditional independence for all the model indicators. The latent factor model did not converge and had a non-positive definitive Fisher information matrix supporting within-class conditional independence for all the model indicators.

Table 9 displays the latent class transition probabilities (i.e., estimated membership rates) of the classes for each of the groups. Importantly, the BI-Court group had youth who were members of *only two* of the three latent classes, *Low delinquent-emotional problem* and *Multiple problem*. Both groups were involved with substances, as would be expected in the BI-Court sample. In the Truant youth group, both substance using classes were also represented, although the more moderate Low delinquent-emotional youth constituted a smaller proportion relative to the more heavily substance involved, multiple problem youth. Additionally, a third class, not present in the BI-Court sample, consisted of youth with more mental health, delinquent, and ADHD issues, and relatively less substance use, than the other latent classes. This third group comprised a sizable 42% of the Truant sample. In sum, Truant youth had more ADHD and mental health issues, and experienced more stressful/traumatic events, than BI-Court youth. In contrast, the BI-Court youth, overall, had more drug involvement than the Truant youth.

Comparisons of Demographic Factors, Urine Test Results for Marijuana and Parent/Guardian Reports of Youth Psychosocial Functioning Across the Latent Class Groups—The Mplus Auxiliary option (Muthén & Muthén, 1998–2007:454) of specifying variables, for which the equality of pairs of means across latent classes is tested using posterior probability-based multiple imputation, was used to compare the equality of means for the two BI-Court and three Truancy Project latent classes of youth in regard to demographic factors, UA marijuana test results, and caretaker responses to baseline interview questions relating to the youths' psychosocial functioning. The results are shown in Table 10. None of the classes showed significant differences ($ps > .05$) on three of the four demographic variables (i.e., gender, race [African-American], ethnicity [Hispanic], and family income). Classes did differ significantly ($ps < .05$) on age, with the BI-court youth being approximately a year older than the Truant youth. When parent/guardian reports were examined, using alcohol to get drunk or high was reported more frequently among Truant-Multiple problem youth, than among the BI-Court-Low delinquent-emotional youth and Truant, High delinquent-emotional problem youth. The use of marijuana was reported more frequently among the BI-Court-Multiple problem class than among the Truant-High delinquent class. With regard to services received, the Truant-Multiple problem class received more services for personal problems than did the BI-Court-Low delinquent-emotional and Truancy-Low delinquent-emotional classes. The BI-Court-Multiple problem class received more services for substance problems, than did the Truant-High delinquent class. Finally, the BI-Court-Multiple problem class received more medications for

behavioral or emotional problems than did the BI-Court-Low delinquent-emotional class; and the Truant-Multiple problem class received more such medication than the BI-Court-Low delinquent-emotional class.

Discussion

In regard to our study objectives, latent class analysis identified two subgroups among the at-risk, BI-Court youth, and three subgroups among Truant youth. As noted earlier, truant youth have more ADHD and mental health issues, and stressful/traumatic events, than BI-Court youth. BI-Court youth, overall, had more drug involvement, than the Truant youth. In many respects, the identified subgroups in the two programs were fairly similar. For example, both programs have Low delinquent-emotional and multiple problem youth subgroups (although BI-Court youths have less stress/trauma).

However, in contrast to BI-Court youth, a sizable proportion of Truant youth reflect delinquency-emotional problems. These results are somewhat counter intuitive, in that BI-Court youth, who have had contact with the juvenile justice system, might be expected to be experiencing more psychosocial difficulties. These findings are an important reminder of potential, serious functioning problems among truant youth.

Covariate comparisons highlighted the usefulness of the latent class analysis results. Comparisons of the various subgroups of youths on a variety of covariates, including their demographics, urine test results for marijuana, and parent/guardian reports of their psychosocial problems, found significant differences that were consistent with their problem group classification. These findings were discussed earlier.

Since BI-Court youths were approximately a year older, on average, than Truant youths, we examined further the age-ADHD relationship. Results indicated that, within each study group, there was a significant relationship between age and ADHD scores (BI-Court youths: $F(5,94)=2.42$, $p<.05$, Truant youths: $F(6,224)=4.73$, $p<.001$). In each study group, younger youths tended to have higher ADHD scores. However, the association between age and ADHD was low (Eta squared: (1) BI-Court youths, 0.114; (2) Truant youths, 0.113).

Our analysis strategy involved a rather novel use of latent class analysis. The use of latent class analysis to identify subgroups of youths involved in various community service programs, who reflect different constellations of psychosocial problems, can be useful to program administrative and clinical staff. First, such analyses can provide some evidence that the agency or program is serving its intended target population. Periodic assessments at key decision points would also permit the identification of emerging problems within subgroups of youths in need of specific services. These assessments are critical in informing the best allocation of treatment resources, which are becoming increasingly scarce. Second, subgroups of youths reflecting different constellations of psychosocial problems can lead to more informed referrals or treatment placement. For example, youths who exhibit lower risk may not require intensive mental health or substance abuse services, as will likely be the case for high risk youths. It is appreciated that the youth subgroups identified by latent class analysis are statistical constructs, rather than actual youths. Hence, the results of latent class analysis should be interpreted with this understanding.

Our results have several service delivery implications. As discussed previously, BI-Court youths are comprised of two major subgroups (see Table 9), which program staff should be made aware of in order for them to assess for, tailor, and implement more effective intervention services. The prevalence of multiple problem at-risk youth requires a more nuanced response—as they are at high-risk of further justice system involvement. High quality assessments are needed to inform effective service referral decisions. The focus of

the BI-Court program on youth substance use issues may present barriers to a nuanced intervention approach.

On the other hand, most Truant youth evidence problems in areas of delinquency-mental health (42%) or multiple problems (44%) (Table 9). It is important that routine psychosocial assessment be performed on these youths in order to identify and address potential mental health needs. As well, delinquency involvement among truant youths is an obvious concern, which needs to be addressed. Sound assessment is indispensable for these youths in order to identify problem areas, and to place them in intervention services appropriate to their psychosocial needs. Failure to remediate the problems truant youth experience will likely result in an increase in school-related difficulties and further involvement in the justice system. Such intervention efforts need to be holistic in nature, and address the personal, family, and environmental issues these youths are often present.

Given the large number of juvenile drug courts (King & Pasquarella, 2009), diversion programs (Siegel & Welsh, 2008), and truancy programs (Dembo & Gulledge, 2009) in the U.S., the findings of our study have considerable relevance to the field. It would be helpful to determine how our results relate to comparable research completed on these programs.

In this effort, it would be important to include additional domains of psychosocial functioning. For example, information on peer associations, family relationships, and school performance and behavior would help broaden our understanding of justice involved and truant youths. Such information could be expected to provide a more nuanced understanding of their service needs.

There are several limitations to our study. First, many truant youths involved in our study were taken into custody by law enforcement officers and brought to the TIC; hence, they may not be representative of truant youths who have not experienced law enforcement contact. Second, there is a need to determine if our findings replicate among truant youth and court-involved youth with different sociodemographic characteristics in other jurisdictions. Third, our results are based on cross-sectional data collected from baseline interviews, which preclude discussion of any cause-and-effect and longitudinal relationships among the psychosocial problem factors we have identified.

At the same time, our findings highlight: (1) the need for high quality assessments among court program and truant youths, (2) a more nuanced service approach in addressing the psychosocial needs of these youths, and (3) that treating truant youth as primarily management problems, reflecting a sanction oriented approach to truancy, fails to recognize and responsibly address significant psychosocial problems existing among many of these youths and their families. There is a serious need to direct more resources to strengthen service delivery for at-risk truant and diversion program youth and their families. Such an investment has considerable potential to direct their troubled lives in more prosocial directions, and at lower cost than having these youths' develop more serious, troubled behavior problems with their resulting, adverse consequences.

Acknowledgments

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Table 1

Sociodemographic Characteristics by Study Group

	BI-Court (n=100)	Truancy (n=131)
Variable		
Gender		
Female	25.0%	35.1%
Male	75.0%	64.9%
	100.0%	100.0%
	χ^2 (1)=2.72, p=n.s.	
Age		
11	-	1.5%
12	1.0%	3.1%
13	5.0%	9.9%
14	11.0%	25.2%
15	28.0%	38.2%
16	28.0%	16.0%
17	27.0%	6.1%
	100.0%	100.0%
	Mean= 15.58	Mean=14.68
	SD= 1.20	SD= 1.22
	χ^2(6)=32.30, p<.001	
Ethnicity/Race		
Asian	-	1.5%
African-American	23.0%	24.4%
Hispanic	25.0%	28.2%
Anglo	50.0%	38.9%
Other	2.0%	6.9%
	χ^2(5)=6.21, p=n.s.	
Who Youth Lives With		
Birth mother and father	22.0%	13.7%
Birth mother alone	27.0%	29.0%
Birth mother with stepfather or boyfriend	22.0%	22.9%
Birth mother with relative or friend	4.0%	17.6%
Birth father alone	4.0%	2.3%
Birth father with stepmother or girlfriend	2.0%	3.1%
Birth father with relative or friend	2.0%	0.8%
Adoptive parent(s)	2.0%	3.8%
Grandparent(s)	10.0%	3.8%
Other relative(s)	3.0%	3.1%
Other	2.0%	-

	BI-Court (n=100)	Truancy (n=131)
	100.0%	100.0%

$\chi^2(10)=19.29$, p=0.04
Fisher's Exact Test: p=0.02

Table 2

Youth Substance Use Experiences and Urine Test Results

Variable	BI-Court (n=96–100)	Truancy (n=119–131)
Used Tobacco	61.0%	66.4%
	$\chi^2(1)=0.72$, p=n.s.	
Ever Used Alcohol to the Point of Experiencing its Effects	57.0%	64.1%
	$\chi^2(1)=1.21$, p=n.s.	
Ever Used Alcohol Five or More Times to the Point of Experiencing its Effects	52.6% (n=57)	56.0% (n=84)
	$\chi^2(1)=0.15$, p=n.s.	
Ever Used Marijuana	98.0%	92.4%
	$\chi^2(1)=3.66$, p=0.06	
Ever Used Marijuana Five or More Times	85.7% (n=98)	71.1% (n=121)
	$\chi^2(1)=6.68$, p=n.s.	
Ever Used Barbiturates	16.0%	12.2%
	$\chi^2(1)=0.68$, p=n.s.	
Ever Used Cocaine	15.0%	6.1%
	$\chi^2(1)=5.00$, p<.05	
Ever Used Hallucinogens	10.0%	7.6%
	$\chi^2(1)=0.40$, p=n.s.	
Substance Use Diagnosis		
None	15.0%	38.9%
Abuse	61.0%	38.2%
Dependence	24.0%	22.9%
	$\chi^2(2)=17.55$, p<.001	
Positive Urine Test Result for Marijuana	46.9% (n=96)	51.3% (n=119)
	$\chi^2(1)=0.41$, p=n.s.	

Table 3

Psychosocial Characteristics by Study Group (Prevalence)-Youth Reported

	BI-Court (n=99–100)	Truancy (n=131)
Variable		
Family AOD Problem (% Yes)	48.0%	57.3%
	$\chi^2(1)=1.95$, p=n.s.	
Family Mental Health Problem (% Yes)	15.0%	33.6%
	$\chi^2(1)=10.30$, p<.001	
Youth Alcohol/Other Drug Problem (% Yes)	27.0%	17.6%
	$\chi^2(1)=2.98$, p=0.08	
Youth Alcohol/Other Drug Treatment (% Yes)	15.2%	10.7%
	$\chi^2(1)=1.02$, p=n.s.	
Youth Emotional Problem (% Yes)	40.0%	49.6%
	$\chi^2(1)=2.12$, p=n.s.	
Youth Sent to Live Away from Home Due to Problems with Behavior or Emotions (% Yes)	16.0%	22.9%
	$\chi^2(1)=1.69$, p=n.s.	

Table 4

Parent/Guardian Reported Youth/Family Stressful/Traumatic Events and Youth Reported ADHD Experiences by Study Group

Variable	BI-Court (n=99–100)	Truancy (n=131)
Stressful/Traumatic Event (% Yes-Ever)		
Unemployment of parent	19.2%	51.9%
	$\chi^2(1)=25.66$, p<.001	
Divorce of parents	38.4%	42.7%
	$\chi^2(1)=0.44$, p=n.s.	
Death of a loved one	43.0%	62.6%
	$\chi^2(1)=8.77$, p<.01	
Serious illness	15.2%	35.1%
	$\chi^2(1)=11.53$, p<.001	
Victim of violent crime	17.2%	20.6%
	$\chi^2(1)=0.43$, p=n.s.	
Eviction from home/apartment	10.1%	18.3%
	$\chi^2(1)=3.02$, p=0.08	
Legal problem resulting in jail time or detention	25.0%	26.7%
	$\chi^2(1)=0.09$, p=n.s.	
Accidental injury requiring hospitalization	8.1%	9.2%
	$\chi^2(1)=0.08$, p=n.s.	
Other stressful/traumatic event	45.4%	46.6%
	$\chi^2(1)=0.03$, p=n.s.	
Total number of stressful/traumatic events	Mean=2.20 SD=1.40	Mean=3.14 SD=1.73
	$F(1,231)=19.51$, p<.001	
ADHD Questions (% Yes-Ever)		
Do you often get complaints from parents/teachers that you don't listen to instructions of directions?	39.0%	64.1%
	$\chi^2(1)=14.38$, p<.001	
Do you frequently tend to act before thinking?	50.0%	73.3%
	$\chi^2(1)=13.22$, p<.001	
Do you often have difficulty waiting for your turn during games or when doing things with other people your age?	24.0%	31.3%
	$\chi^2(1)=1.49$, p=n.s.	
Do you often fidget and find it difficult to sit still?	31.0%	49.6%
	$\chi^2(1)=8.09$, p<.01	

Table 5

Self-Reported Delinquency in 12 Months Prior to Interview

BI-Court Youth (n=100)

Index/Behavior	0	1–4	5–29	30–54	55–99	100–199	200+	Total
Index Offenses	68%	19%	10%	3%	0%	0%	0%	100.0%
Crimes - persons	40%	38%	21%	1%	0%	0%	0%	100.0%
General Theft	49%	25%	18%	3%	4%	1%	0%	100.0%
Drug Sales	62%	16%	13%	5%	1%	2%	1%	100.0%
Total Delinquency	17%	29%	36%	4%	7%	4%	3%	100.0%

Truancy Project Youth (n=137)

Index/Behavior	0	1–4	5–29	30–54	55–99	100–199	200+	Total
Index Offenses	52%	30%	12%	3%	0%	2%	0%	100.0%
Crimes - persons	24%	32%	30%	5%	5%	3%	2%	100.0%
General Theft	26%	36%	28%	5%	2%	<1%	2%	100.0%
Drug Sales	66%	19%	9%	2%	2%	2%	<1%	100.0%
Total Delinquency	7%	17%	43%	14%	7%	7%	5%	100.0%

Table 6

Pearson and Tetrachoric Correlations between Self-Reported Delinquency, ADHD, Stress/Trauma (Pearson), and Youth Self-Reported Alcohol/Other Drug Problem, Emotional Problem, and Alcohol/Other Drug Diagnosis (BI-Court Youths Above Diagonal, Truancy Youth Below Diagonal)

Variable	Correlation					
	1	2	3	4	5	6
1. Delinquency	-	0.368***	0.111	0.386**	0.353***	0.524***
2. ADHD	0.241*	-	0.254*	0.430***	0.393***	0.365***
3. Stress/Trauma	0.045	0.154	-	0.154	0.316**	0.212*
4. Youth Alcohol/Other Drug Problem	0.127	0.156	0.251*	-	0.523***	0.476***
5. Youth Emotional Problem	0.074	0.130	0.250*	0.560***	-	0.252
6. Youth Alcohol/Other Drug Diagnosis	0.267**	−0.043	0.130	0.622***	0.260**	-

*
p<.05;

**
p<.01;

***
p<.001

Table 7

Latent Class Analysis Fit Statistics (N=231)

Model	Fit Indices		
	AIC	BIC	SSABIC
1-Class	4389.32	4427.19	4392.32
2-Class	4288.69	4357.54	4294.15
3-Class	4233.08	4332.91	4240.99

Note. AIC=Akaike Information Criterion, BIC=Bayesian Information Criterion, SSABIC=Sample Size Adjusted Bayesian Information Criterion. A four class solution could not be reliably estimated

Table 8

Latent Class Indicators for the Three Class Solution

		Class				
	Low-Delinquent-Emotional Problem (n = 67)		Multiple Problem (n = 109)		High Delinquent-Emotional Problem (n = 55)	
Indicator	Est	SE	Est	SE	Est	SE
Delinquency	0.091	.228	1.277***	.087	1.045***	.170
ADHD	−2.469	.252	0.660*	.304	1.697	2.077
Stress/Trauma	−1.599	.546	0.661	.498	0.662	.917
Youth AOD Problem	.020	.024	.448**	.187	0.000	NA
Youth Emotional Problem	.205**	.067	.632***	.136	.409***	.135
Youth AOD Diagnosis						
Abuse	.613***	.128	.519	.078	.243	.165
Dependence	.035	.038	.467***	.078	.017	.431

*
p<.05;

**
p<.01;

***
p<.001

Table 9

Latent Transition Probabilities Based on the Estimated Model

	Class		
	Low Delinquent-Emotional Problem	**Multiple Problem**	**High Delinquent-Emotional Problem**
Group	**(n = 67)**	**(n = 109)**	**(n = 55)**
BI-Court (n = 100)	.493	.507	.000
Truancy (n = 131)	.135	.443	.422
Total	.290	.472	.238

Table 10

Equality Tests of Estimated Means and Proportions between Classes

Comparison Variables	Latent Class				
	BI-LDEP (n = 49)	BI-MP (n = 51)	TR-LDEP (n = 17)	TR-MP (n = 61)	TR-HDELEP (n = 53)
Demographic					
Race (African American)	0.215	0.244	0.355	0.214	0.240
Ethnicity (Hispanic)	0.320	0.182	0.277	0.352	0.213
Gender (Male)	0.714	0.785	0.751	0.697	0.567
Age	15.65[ac]	15.51[bd]	15.28	14.81[bc]	14.36[ad]
Family Income	4.023	4.295	3.558	3.987	3.837
Marijuana Positive at Baseline	0.427	0.510	0.590	0.636	0.357
Parent/Guardian Report of:					
Youth ever used alcohol to the Point of getting drunk, high, or buzzed	0.214[a]	0.404	0.353	0.616[ab]	0.258[b]
Youth ever used marijuana	0.905	0.974[a]	0.822	0.843	0.752[a]
Youth ever received professional help/been in hospital for personal problems (not alcohol or other drug related)	0.359[a]	0.578	0.290[b]	0.700[ab]	0.495
Youth ever received professional help/been in hospital for alcohol/other drug related problems	0.089	0.289[a]	0.057	0.171	0.057[a]
Youth ever received special school services for attention/behavior/ learning/emotional problems	0.220	0.319	0.191	0.313	0.356
Youth ever received medication for management/treatment for attention/behavior/ learning or emotional problems	0.136[ab]	0.421[a]	0.134	0.411[b]	0.287

Note. Classes within a row with a common superscripted letter are significantly different at $p<.005$. BI-LDEP=Bi-Court, low delinquent-emotional problem; BI-MP=Bi-Court, multiple problem; TR-LDEP=Truant, low delinquent-emotional problem; TR-MP=Truant, multiple problem; TR-HDEP=Truant, high delinquent-emotional problem