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An Application of Latent Class Analysis to Needs Assessment in Juvenile Justice

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Structured needs assessment instruments aid in-service planning in the juvenile justice system. This article uses latent class analysis to classify juvenile offenders into categories or types based on need profiles using a sample of 542 youthful offenders. The study identified five profiles based on scores from a structured needs assessment instrument.

Keywords: *juvenile justice; structured decision making; needs assessment; delinquency*

At both the federal and state levels, contemporary juvenile justice policies promote the structured assessments of need for court-involved youths (Howell, 1995). These policies serve two purposes. First, structured needs assessment informs individual case planning decisions for youths. Ideally, such assessment helps to identify intervention targets to which evidence-based practices can be matched. Second, the aggregated findings of structured needs assessments inform program planning and resource allocation. Although both purposes are crucial for the functioning of the juvenile justice system, support for the latter has received less attention. Furthermore, to date, few studies have aggregated data from needs assessments with the purpose of developing findings to inform program planning and resource allocation.

This article demonstrates the utility of a person-centered analytic approach—specifically latent class analysis (LCA)—to the classification of juveniles into discrete need profiles. In applying this approach to needs assessment data from juvenile offenders, we present an innovative way of using needs data to inform juvenile justice policy and practice.

Needs Assessment of Juvenile Offenders

The widespread use of needs assessment in juvenile court jurisdictions corresponds to the adoption of the Comprehensive Strategy for Serious, Violent, and Chronic Juvenile

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Offenders by the U.S. Office of Juvenile Justice and Delinquency Prevention (OJJDP; Howell, 1995, 2003). The Comprehensive Strategy promoted structured decision making as a way to develop more equitable and efficient allocation of resources. In addition, this strategy supported the implementation of systems of graduated sanctions designed both to protect public safety and to divert some youths from institutional-based justice interventions into community-based rehabilitative programs when appropriate. When fully implemented, four kinds of assessments guide placement and intervention decisions: offense severity, offense history, actuarial risk assessment, and structured needs assessment. Whereas the first three assessment types inform decisions regarding sanction level (i.e., diversion, probation, or commitment), needs assessment alone informs intervention decisions aimed at rehabilitation.

The Comprehensive Strategy encouraged the development of needs assessment instruments throughout the United States. Many needs assessment instruments followed an approach first employed by adult criminal justice agencies and later recommended by OJJDP (Baird, 1984). This approach relies heavily on the experience of local professionals to identify relevant indicators of need and results in needs assessment instruments tailored to local conditions. Yet despite their jurisdiction-specific development, many similarities exist across these instruments. For example, an OJJDP comparison of nine needs assessment instruments (Howell, 1995) found that all instruments in the review included measures of substance abuse, family functioning or relationships, emotional stability, school attendance and behavior, and peer relationships. Most assessment tools also measured health/hygiene, intellectual ability or achievement, and learning disability.

In contrast, the actuarial approach guided the development of other needs assessment instruments such as the Youth Level of Service/Case Management Inventory (YLS/CMI) and the Joint Risk Matrix (JRM; Hoge & Andrews, 2003; Schwalbe, Fraser, & Day, 2007). These instruments differ from OJJDP-style needs assessment instruments in that item development and selection was guided by empirical predictive validity rather than by professional consensus. The YLS/CMI is an assessment of 42 risk factors in eight domains (offense history, family circumstances/parenting, education/employment, peer relations, substance abuse, leisure/recreation, personality/behavior, and attitudes/orientation). In contrast, the JRM is a brief instrument that measures three static risk factors (i.e., factors over which youths and their families have little control) and 11 dynamic risk factors (i.e., factors that are potentially malleable through intervention). Though structurally different, the YLS/CMI and JRM share a similar focus on factors that predict recidivism, and they differ fundamentally from consensus-based instruments that tend to incorporate a broader array of developmental risk factors.

Classification of Offender Needs

As previously discussed, few studies aggregate needs assessment data. In one exception, Kelly, Macy, and Mears (2005) reported on the need characteristics of juveniles referred to the Texas juvenile justice system (N = 2,100). Needs assessment in Texas is conducted as part of a joint risk/needs assessment process that uses OJJDP-model instruments. Kelly et al. (2005) found that the most commonly identified needs were “problems with parental

supervision" (47%) and "school attendance" (43%). Other needs with prevalence rates greater than 30% included "attendance at an alternative school or school drop out" (33%), "family relationship problems" (32%), and "substance abuse" (31%).

Barnoski (2004) reported similar findings in his large-scale examination of the characteristics of juvenile court-involved youth in Washington State. The study sample consisted of 20,339 assessments for 16,593 youths adjudicated in 1999. Data were collected using the Washington State Juvenile Court Pre-Screen Assessment, a 21-item instrument comprised of 10 measures of offending history and 11 measures of social history. The three most commonly identified indicators were peer delinquency (85%), school problems (78%), and poor parental rule enforcement (69%).

Although important in their own right, these studies do not describe patterns of needs across youths. That is, they do not describe how needs cluster together within groups of youths to form distinct need profiles. The question of how needs cluster across individuals is not trivial. Rather, its importance is highlighted by recent person-centered research that suggests need profiles provide a key to understanding the developmental outcomes of youths (Bergman & Magnusson, 1997; Von Eye & Bergman, 2003).

These sorts of person-centered analyses complement traditional variable-focused analyses (e.g., correlation, regression). Whereas variable-focused methods provide information about relationships among variables (e.g., use of psychoactive substances is correlated negatively with achievement in school), person-centered approaches describe the relationships of variables as they combine into profiles that define groups of similar people within a sample or population. To illustrate, consider an assessment instrument that includes items in three areas: school, mental health, and family relationships. When using this instrument with a sample of delinquent juveniles, a variable-centered analysis may indicate that need in these areas tends to vary so that mental health problems co-occur with both family relationship problems and school-based problems. In other words, these items are highly correlated. In contrast, a person-centered analysis may identify three distinct groups: (a) one group with high need in all areas; (b) one group with low mental health need, but high school-based and family-based needs; and, (c) a third group with low need in all areas.

Person-centered approaches are typological in that they identify types of youths for whom different causal mechanisms may be operating. For example, it is likely that the causal processes underlying the delinquency of juveniles will differ between those whose identified need is limited to school-related problems and those whose school-related problems cluster with other needs (e.g., poor parental supervision or association with gang-involved peers). To the extent that intervention should disrupt risk mechanisms (Masten & Coatsworth, 1998), it then follows that juvenile justice agencies should tailor sanctions and programmatic dispositions according to patterns of co-occurring needs.

However, identifying patterns of need, or developing a classification system based on need profiles, can be a daunting task. For example, a simple dichotomously scored 10-item structured needs assessment instrument yields up to 1,024 unique profiles. Fortunately, the juvenile courts have a long tradition of synthesis of complex information into parsimonious classification schemes. Historically, probation officers classify juveniles based on impression and subjective judgment (Schwalbe, 2004). The problem engendered by this approach is

that wide variation between judgments of different probation officers precludes meaningful aggregation for use in agency-wide or statewide decision-making processes. The development of structured needs assessment instruments can be thought of as a first step in correcting this problem. These instruments enable the jurisdiction-wide, systematic collection of data. Arguably, the next step is to describe the prevalence of a small, but meaningful, number of need profiles. This article demonstrates the use of such a classification strategy.

LCA classifies people according to types or classes based on scores on a set of "latent class indicators" (McLachlan & Peel, 2000). LCA is a parametric approach to classification in which a set of parameters, estimated by maximum likelihood, predicts class membership. The interpretation of population-based correlation coefficients distinguishes LCA from other parametric grouping techniques such as factor analysis (Bauer & Curran, 2004). Factor analysis is a parametric grouping technique in which variables are grouped into continuous latent factors based on correlation patterns among variables. Factor analysis assumes that unobserved latent variables cause observed variables; that is, observed variables can be expressed as a linear combination of latent factors. In contrast, LCA assumes that population-based correlations among variables are a by-product of variations in variable means among unobserved subgroups within the population. LCA identifies latent groups that vary in mean values on these observed variables. Whereas factor analysis describes study participants in terms of their levels on a continuous latent variable, LCA describes study participants in terms of their probability of group membership based on how closely individual variable levels correspond to group means.

LCA is also distinguished from other taxonomic techniques such as cluster analysis. Cluster analysis forms groups according to heuristic rules about the degree of similarity between cases (Aldenderfer & Blashfield, 1984). In some instances similarity is based on criteria related to correlations, whereas in other cases similarity is based on criteria related to distance measures (i.e., Euclidean or Maholanobis). In contrast, LCA estimates the probability of group membership based on maximum likelihood parameter estimates for (a) the proportion of cases in each class and (b) the mean level of observed variables within classes. These estimates hold the usual desirable properties of all maximum likelihood procedures (i.e., unbiased, efficient, normally distributed). On the other hand, cluster analysis is criticized for its inconsistency. Indeed, Cleland, Rothschild, and Haslam (2000) demonstrated in a Monte Carlo study that LCA provided more accurate classification than the traditional cluster analytic techniques.

In practice, LCA confirms diagnostic categories and develops new taxonomies in exploratory analyses. Researchers have employed LCA for settings and problems as diverse as mental health (Breslau, Reboussin, Anthony, & Storr, 2005), substance abusers among Native Americans (Whitesell et al., 2006), sexual assault survivors (Macy, Nurius, & Norris, 2007), and assisted-living programs for older persons (Park, Zimmerman, Sloane, Gruber-Baldini, & Eckert, 2006). To our knowledge, LCA has not been used to develop typologies of juvenile offenders based on scores from structured needs assessment instruments.

This article reports the findings of an exploratory LCA using a sample of court-involved youths assessed with the JRM. The purpose of the analysis was to classify offenders into common profiles and to describe the characteristics of those profiles.

Table 1
Characteristics of the Reduced Sample

	Full Sample ($N = 583$)	Reduced Sample ($N = 542$)
Mean age (*SD*)	14.6 (1.33)	14.6 (1.31)
Percent male	68.1	67.7
Race/ethnicity (%)		
White	46.7	46.3
Black	45.2	45.4
Offense class (%)		
Status offenses	12.2	12.2
Misdemeanor	55.7	55.6
Felony	32.1	32.2
Mean risk score (*SD*)		
Dynamic Risk Scale	8.1 (3.52)	8.1 (3.52)
Static Risk Scale	1.4 (1.28)	1.4 (1.28)

Methods

Sample

This study was conducted with a statewide proportional sample of juvenile court–involved youths in North Carolina. Each court district ($N = 39$) submitted assessment data, described below, for a preassigned quota of adjudicated juveniles. Quotas were calculated by multiplying the proportion of the total statewide population of delinquent offenders for each district by the target sample of 600 juveniles. Data collection began in February, 2002, and was concluded by September of that year. In all, assessment data were gathered for 583 youths. Table 1 shows sample characteristics. The majority of the juveniles were male (68%). The sample was evenly balanced between African American and non-Latino White youths (45% and 47%, respectively) with the remaining youths (8%) classified into other racial and ethnic groups.

Measures

JRM. The JRM includes 14 items divided into two scales: the Static Risk Scale and the Dynamic Risk Scale. The static Risk scale is comprised of measures of historical risk that, once identified, can never be reduced. Whereas, the Dynamic Risk Scale is comprised of measures of risk factors that can be altered through successful intervention or developmental change. Probation officers completed JRM assessment items as a part of routine practice. Typically, youths were assessed following an adjudication of delinquency and prior to judicial disposition. The development of the JRM is described in detail elsewhere (Schwalbe et al., 2007). A copy of the JRM is included in the appendix.

Analysis

LCA. LCA is a type of latent variable modeling that uses measured variables to determine an underlying factor. This latent variable explains the statistical relationships among the measured observations by capturing the heterogeneity within the sample to infer group membership. LCA is a preferred strategy for person-centered analyses because its method is consistent with the premise of underlying typologies that manifest as distinct profiles (Hagenaars & Halman, 1989). LCA yields four kinds of results: (a) identification of the statistically distinct groups of participants in a given sample; (b) identification of risk profiles that correspond to these groups; (c) estimations of the prevalence of these groups within the sample; and (d) classifications of participants into groups (Macy & Chapman, 2006; Muthen, 2002). The Mplus 3.01 was used to perform the LCA (Muthén & Muthén, 1998-2004). The first stage of the analysis determines the optimal number of latent classes. We estimated competing models with different numbers of latent classes and compared empirical model fit indices to identify the most parsimonious model. The second stage of the analysis examines the characteristics of the latent classes and evaluates their substantive meaning. In the end, measures of both model fit and substantive meaning combine to select a final solution (Everitt, Landau, & Morven, 2001; Muthen, 2002).

Missing data. Of the 583 initial cases, 41 had missing data. Table 1 compares sample cases with missing data and those with complete data. These comparisons revealed no statistically significant differences along demographic characteristics, offending characteristics, or overall risk level. Therefore, cases with missing data were dropped from the analysis: the final sample consisted of data for 542 youths.

Results

Table 2 presents the prevalence of measured needs for the sample. Prevalence is defined as the percentage of youths with Dynamic Risk Scale item scores greater than zero (see appendix). Across all need indicators, prevalence rates ranged from 9% to 90% ($M = 48\%$, $SD = 25.2$). The most frequently reported need areas included school behavior problems (90%), peer delinquency (82%), and mental health (73%). Of these three areas, school behavior problems stood out as having both the highest prevalence and a skewed distribution: 63% of youth had school behavior problems in the highest risk category.

Initial attempts to estimate LCA models were unsuccessful. A sensitivity analysis suggested that low levels of variability of some variables might have interfered with model identification. For example, only 9% of all juveniles had parents who were noncooperative (see Table 2). However, when we excluded parental cooperation, the analysis yielded models for the one-, two-, three-, four-, and five-class solutions. We hypothesized that this dichotomously measured variable did not vary enough to discriminate among classes and returned to this problem in a follow-up analysis reported below. Although we attempted to identify models for the six-, seven-, and eight-class solutions, these efforts did not result in identification of additional solutions.

Table 2
Prevalence of Measured Need

	% At Risk
School behavior problems	90
Peer delinquency	82
Mental health need	73
Expression of remorse	55
Hostility toward others	43
Hyperactivity/inattention/impulsivity	42
Parental supervision	41
Substance use/abuse	40
Family criminality	36
Juvenile cooperation	18
Parental cooperation	9

Table 3
Model Fit Indices for One-, Two-, Three-, Four-, and Five-Class Solutions

	Log(L)	BIC	L-M-R	Posterior Probabilities Range and Weighted Mean
1	–6777.68	13668.68		
2	–6570.85	13324.27	406.5 (p = .0001)	.90-.90 (.90)
3	–6387.80	13027.41	82.9 (p = .044)	.88-.997 (.91)
4	–6317.66	12956.37	137.8 (p = .012)	.84-.99 (.89)
5	–6270.07	12930.44	141.9 (p = .019)	.83-.94 (.89)

Note: Six-, seven-, and eight-class solutions failed to identify.

Table 3 shows three fit indices for the one-, two-, three-, four-, and five-class solutions: the Bayesian Information Criterion (BIC), the Lo-Mendell-Rubin (L-M-R) test statistic, and the posterior probability statistics (Everitt et al., 2001; McLachlan & Peel, 2000; Muthén & Muthén, 1998-2004). The BIC is a transformation of the likelihood statistic that penalizes the likelihood for model complexity. As a convention, models with smaller BIC scores are favored; the magnitude of the difference is not interpretable. The L-M-R test statistic is a chi-square test statistic showing improvement in the model compared to the model with one class less. Taken together, these two criteria converged to indicate the five-class model as best fitting. The next phase in our analysis was the examination of the posterior probability statistics. Our analysis yielded weighted average posterior probability statistics that indicated that the model fit the data well and that the model will classify participants into their respective groups approximately 89% of the time. Given the strength of these indicators, we then examined the five-class solution for its substantive utility and found the five-class solution to be meaningful for juvenile justice policy and practice.

The analysis next turned to a substantive comparison of the five classes. Table 4 compares the five classes according to the latent class indicators from the Dynamic Risk Scale; Table 5 compares the five classes according to demographic, offending, and Static Risk

Table 4
Mean Values of Latent Class Indicators for Five-Class Solution

	Base Rate (N = 542)	1 (n = 92)	2 (n = 173)	3 (n = 123)	4 (n = 57)	5 (n = 97)	ANOVA
Substance use/abuse (mean)	0.28	0.13	0.15	0.13	0.17	0.91	5>1,2,3,4
School behavior problems (mean)	0.78	0.13	0.87	0.96	0.94	0.94	3,4,5>1,2; 2>1
Peer delinquency (mean)	0.42	0.25	0.33	0.49	0.43	0.62	5>1,2,3,4; 3,4>1,2
Parental supervision (mean)	0.22	0.16	0.11	0.33	0.16	0.39	3,5>1,2,4
Hyperactivity/inattention/ impulsivity (mean)	0.31	0.27	0.18	0.52	0.30	0.33	5>2; 3>1,2,4
Hostility toward others (mean)	0.26	0.17	0.11	0.52	0.28	0.30	5>1,2; 4>2; 3>1,2,4,5
Mental health need (mean)	0.61	0.47	0.47	0.74	0.69	0.80	3,4,5>1,2
Family criminality (mean)	0.25	0.16	0.08	0.12	0.96	0.36	5>1,2,3; 4>1,2,3,5
Juvenile cooperation (% at risk)	17.9	9.8	0.6	40.7	15.8	28.9	3>1,2,4; 5>1,2; 4>2
Expression of remorse (% at risk)	55.0	34.8	31.5	87.0	82.5	58.8	3,4>1,2,5; 5>1,2

Note: All variables have been placed on a common metric (0-1) to facilitate comparison across variables.

Table 5
Comparison of Demographic, Offending, and Risk Characteristics for Five-Class Solution

	1	2	3	4	5	ANOVA
Mean age	14.4	14.6	14.4	14.6	15.1	5>1,2,3
Percent male	63.0	71.7	70.7	59.7	66.0	ns
Race/ethnicity (%)						
White	59.8	42.8	42.3	28.8	54.6	1,5>4
Black	31.5	45.1	50.4	63.2	42.3	3,4>1
Static Risk Scale (%)						
First offense <12	7.6	10.4	19.5	15.8	15.5	3,5>1
First-time offender	65.2	48.0	35.8	38.6	28.9	1>2,3,4,5; 2>3,4,5
History of running away from home or placement	19.6	17.9	22.8	17.5	51.0	5>1,2,3,4
Offense severity (%)						
Status	9.9	9.8	20.3	5.3	12.4	3>1,2,4
Misdemeanor	53.9	59.0	51.2	59.7	54.6	ns
Felony	28.6	28.9	26.8	35.1	32.0	ns
Serious felony	7.7	2.3	1.6	0	1.0	ns

Note: ns = nonsignificant.

Scale variables. In general, Class 1 is comprised of low-need juveniles, Class 2 is defined by youth with high rates of school behavior problems but low needs in other areas, and Classes 3 to 5 describe groups of juveniles with distinguishing patterns of high needs. Characteristics of each class are highlighted below. To aid in the interpretation and discussion of the results, we gave heuristic labels to each class.

Class 1: Low-Need

Class 1 represents a low-need group. Compared to other classes, members of this class had the lowest average scores on all class indicators (see Table 4). Given the prevalence of school behavior problems in the sample, it is notable that 60% of Class 1 members were rated in the lowest level on this item (score equal to zero) and that the remainder had "minor" problems (see the appendix for the JRM operational definition of "minor" problems). In addition, members of this group were more likely to be first-time offenders (see Table 5).

Class 2: Serious School Problems

Class 2 comprised the largest group and included nearly one third of the sample (32%). High need rating in school behavior problems and rating of low need on all other dynamic risk factors distinguished this group (see Table 4). Similar to juveniles in Classes 3, 4, and 5, the school behavior problems of Class 2 youths were rated as either moderate or severe (see appendix). Class 2 juveniles were more likely than Class 3, 4, or 5 juveniles to be first-time offenders, however (see Table 5).

Class 3: Hostility-Inattention

Class 3, the second largest group (23%), was the first of three multiple problem classifications. Table 4 shows that members of this group had mean values greater than either Class 1 or Class 2 on 8 of 10 latent class indicators. Among these indicators, several were shared with Classes 4 and 5 including school behavior problems, peer delinquency, and mental health problems. In addition, Class 3 youths shared elevated need scores with Class 5 youths on the measure of parental supervision, and with Class 4 youths on the measure of remorse. Three identified needs distinguished Class 3 youths from all other classes: hyperactivity/inattention/attention (HIA), hostility toward others, and juvenile cooperation. Two thirds of Class 3 juveniles (69%) exhibited at least some HIA symptoms as compared to 27% to 46% of juveniles in other classes. Furthermore, 80% of Class 3 juveniles exhibit at least some hostility compared to 20% to 49% of juveniles in other classes. Substantially more than one third of Class 3 juveniles (41%) were noncooperative as compared to 1% to 29% of youths in other classes. Moreover, it is the combination of these three areas of heightened needs that distinguished Class 3 from other classes; 76% of Class 3 members had elevated scores on at least two of the three measures as compared to 8% to 40% of juveniles in other classes. Table 5 shows that Class 3 youths were more likely than others to be adjudicated for status offenses.

Class 4: High-Risk and Family-History

Class 4 was the smallest group with 11% of the sample and distinguished from other classes by higher average scores on current family involvement with the criminal or juvenile justice system. Among Class 4 juveniles, 93% had parents or siblings who were on probation, parole, or incarcerated at the time of the assessment. Of all sampled juveniles who had parents or siblings with current criminal or juvenile justice involvement ($N = 72$), 74% were members

of Class 4. In addition, members of Class 4 were least likely to be White and most likely to be Black as compared to other classes (see Table 5).

Class 5: Substance Abuse and Peer Delinquency

Table 4 shows that Class 5 juveniles had mean values greater than either Class 1 or Class 2 on all latent class indicators. In addition, the average Dynamic Risk Scale score for Class 5 youths was greater than all other classes ($F[4] = 208.28$, $p < .001$). Class 5 youths were differentiated from other classes by higher average scores on substance use or abuse and peer delinquency. Among Class 5 juveniles, 81% were rated as having substance abuse problems (score equal to two; see appendix) compared to 0% to 5% among other classes. Furthermore, 78% of Class 5 juveniles had ratings in the top two levels of the measure of peer delinquency (score greater than one; see appendix) compared to 14% to 46% of juveniles in other classes. In addition to these distinguishing latent class indicators, Class 5 juveniles were older than those in Classes 1, 2, and 3 and were more likely to have a history of running away (51%) than those in other classes (see Table 5).

Parental Cooperation and the 5-Class Solution

Rates of parental noncooperation ranged from 3% for Class 1 to 15% for Class 5 ($\chi^2[df = 4] = 12.87$, $p < .05$). Although parental noncooperation is statistically significant, it does not distinguish strongly among classes as we suspected. In comparison, school behavior problems were also highly prevalent across all groups. However, school behavior problems were measured along a scale with a greater range (0-3); substantively meaningful differences in the intensity of school behavior problems were observed for youths in Class 1 compared to the other groups.

Discussion

Classification is a strategy to reduce a complex set of information into conceptually meaningful categories, types, or risk profiles. The present analysis identified five distinct profiles in a sample of court-involved youths based on divergent patterns of need. Although replication of these risk profiles in various samples is warranted, the profiles that emerged from our analysis suggest that a limited number of specialized intervention packages may respond to the needs of the majority of youths seen by the juvenile courts.

For instance, in general the juveniles in Class 1 (*Low Need*) and Class 2 (*Serious School Problems*) are youths with few presenting problems and who are at low risk of repeat offending. For Class 1 youths, restorative sanctions, such as offender–victim meetings, and modest punitive interventions, such as fines or community service, may be all that is required to prevent recidivism. However, elevated school behavior problems for Class 2 youths suggest the addition of school-based interventions. These interventions should focus on truancy and behavioral management in addition to support of academic performance. Some research exists showing that promising interventions that target truancy often colocate juvenile court proceedings and community social service providers in the school setting

(Byer & Kuhn, 2003; Fantuzzo, Grim, & Hazan, 2005). These interventions strive to prevent the escalation of truancy related problems into academic failure, school dropout, and recidivism by serving youths proactively and in an ecologically sensitive manner.

Relative to Class 1 and Class 2 youths, the characteristics of Class 5 youths (Substance Abuse and Peer Delinquency) call for a package of more comprehensive interventions capable of simultaneously addressing multiple presenting problems, such as their co-occurring substance abuse and mental health problems. In addition, a greater tendency to associate with delinquent peers in conjunction with lower levels of parental involvement complicates the prospects for these youths. Jenson and Potter (2003) demonstrated that well coordinated services that concurrently targeted mental health and substance abuse problems among court-involved youth could reduce both problems. In addition, when markedly impaired parental functioning warrants out-of-home placement, a placement in an evidenced-based program such as Multidimensional Treatment Foster Care program may be recommended (Chamberlain, 2003).

Similarly, juveniles in Class 3 (Hostility-Inattention) may also warrant out-of-home placement because of their parents' inability or unwillingness to provide effective supervision. Whereas serious drug and alcohol problems complicate Class 5 youths' problems, mental health problems combined with the effects of behavioral control issues such as impulsivity, hostility, and noncooperation complicate Class 3 youths' problems. These behavioral problems are certain to interfere with the mission of the juvenile court to prevent recidivism. Thus, these youths might benefit from an intensive intervention program that has clearly specified and ecologically relevant behavioral contingencies along with evaluation for psychopharmacological treatment of existing mental health or attention deficit and hyperactivity related problems (Connor, Glatt, Lopez, Jackson, & Melloni, 2002; Lipsey & Derzon, 1998).

Class 4 youths (High Risk and Family History), whose need profile is marked by the involvement of parents and other family members in the justice system require interventions to interrupt the intergenerational transmission of criminal behavior. Although substantial research has indicated that youths whose parents are involved in the criminal justice system are at high risk for sustained court involvement, the mechanism underlying this relationship has not been explored in-depth. Contemporary criminology theories based on classic theories such as Sutherland's differential association theory, Bandura's social learning perspective, and Hirschi's social control theory suggest potential intervention targets (Hirschi, 1969; Shoemaker, 2000). For instance, Catalano and Hawkins' (1996) integrative Social Development Model posits that childhood exposure to the opportunity to engage in, and be rewarded by participation in, antisocial behaviors ultimately leads to the development of beliefs and attitudes favoring antisocial behavior and bonds with like-minded role models. This argument suggests two intervention activities: (a) developing behavioral contingencies that reinforce prosocial behavior and that may lead to bonding with more prosocial adults, and (b) interventions such as cognitive-behavioral therapy that target antisocial belief systems for change (Robertson, Grimes, & Rogers, 2001).

Our findings do not provide evidence in support of a "cookie-cutter" approach to intervention planning, nor do the profiles developed provide a prescription for interventions. The common characteristic among all needs assessment instruments developed in accord with the Comprehensive Strategy is that they summarize information gathered in a more detailed assessment. As such, the strength of these tools is that they structure assessments

and produce a needs profile; their weakness is that they are insufficient to describe causal processes. For example, these instruments do not identify the forces that interfere with parental supervision. Whereas some poorly supervising parents will be amenable to interventions aimed at strengthening this capacity, others may not. The decision to offer family-based interventions rather than impose an out-of-home placement hinges in part on identifying the risk and protective processes that underlie factors such as poor parental supervision. Therefore, although the profiles identified in this study can inform policy about types of services that may be needed, they do not prescribe an intervention approach for individual youths.

In addition to intervention availability, the large percentage of youths in Classes 1 and 2 who presented with low-need profiles and the large numbers of Class 3 youths adjudicated for status offenses emphasizes the critical importance of evaluating policies and practices related to diversion. Diversion of low risk, nonserious offenders remains a high priority for the juvenile justice system (Cocozza et al., 2005; Cuellar, McReynolds, & Wasserman, 2006). In our sample of youths, unmeasured mitigating factors might justify referral to the juvenile court for these low-risk (Classes 1 and 2) or nonserious (Class 3) offenders. Nevertheless, further research is warranted to identify the rationale for their court referral and to develop policy prescriptions that increase the likelihood that appropriate diversion will be made.

The failure of the measure of parental cooperation to discriminate group membership points to a limitation of LCA with low base-rate latent class indicators. The lack of variation in the parental cooperation measure, in effect showing that more than 90% of parents were rated as "cooperative" by probation officers, could incorrectly be construed as evidence for the insignificance of this variable. However, few in the field would describe parental cooperation as an inconsequential element in the management of a probation caseload. Rather, the interpretation of this finding should be constrained to the purpose of LCA: to identify a grouping structure within a population. As in all statistical analysis, LCA masks variation across individuals (Nagin & Tremblay, 2005). In the case of parental cooperation, individual-level variation may be crucial for the assessment of a case though it may not be an indicator of any specific offender type.

In addition, although there is growing use of person-centered analyses by applied social science researchers, some uncertainty exists regarding how best to select models that fit the data (Bauer & Curran, 2004). In this study, every effort was made to select the most parsimonious and best fitting model. However, readers should be mindful that it is possible that other models also fit the data. Moreover, it is premature to suggest that the classification groups found in this investigation constitute a typology. Instead, these findings should encourage further application of person-centered analyses toward establishing generalizability across samples of court-involved youths.

Our conclusions are tempered by limitations of the JRM itself. First, like all needs assessment instruments, the JRM is limited in scope. For example, although the JRM indicates youths in need of mental health interventions, specific mental health diagnosis and associated functional impairment is not measured by the JRM. Therefore, follow-up on all identified needs is a critical step toward the development of evidence-based service plans. Second, measurement error could threaten the validity of our analysis. Measurement error in juvenile justice research originates from several sources. The structure of the measure is one source. For instance, the JRM contains several items that call on probation officers to

judge problem severity without providing explicit criteria. Although our prior research indicates that structured assessments of this type increase interrater reliability compared to subjective judgment (Schwalbe, Fraser, Day, & Arnold, 2004), we have not yet established the criterion validity of the individual measures. Moreover, the context of assessment, probation intake, creates incentives against the full disclosure of sensitive information such as substance use and peer delinquency. It is possible that measurement error from any of these sources interfered with our LCA.

On the other hand, our analysis used needs assessment data collected as a part of routine practice increasing the practical application of our findings. A strength of needs assessment instruments like the JRM is that they are relatively straightforward to complete and require little interpretation and data-collection—key features for probation agencies burdened with high caseloads. Based on the classification of need profiles demonstrated in this study, juvenile justice officials can make informed decisions about the need for psychosocial intervention packages to reduce recidivism among court involved youths. In this context, our study provides an innovative way to describe a sample of court-involved juveniles. We considered youths holistically and clustered them into groups based on similar needs. This approach produced a person-centered classification that yielded information with significant potential for informing program-level resource planning.

Appendix A
Static Risk Scale

S1. Age when first delinquent offense alleged in a complaint:

0 – Age 12 or above or no delinquent complaint
1 – Under age 12

S2. Number of undisciplined or delinquent referrals to intake:

0 – Current referral only
1 – 1 referral
2 – 2-3 prior referrals
3 – 4+ prior referrals

S5. Runaways (from home or placement):

0 – No
1 – Yes

Dynamic Risk Scale

D1. Known use of alcohol or illegal drugs during past 12 months

0 – No known substance use
1 – Some substance use, need for further assessment
2 – Substance abuse, assessment, and/or treatment needed

(continued)

Appendix A (continued)

D2. School behavior problems during the prior 12 months:

0 – No problems (enrolled, attending regularly)
1 – Minor problems (attending with problems handled by teacher/school personnel)
2 – Moderate problems (4 to 10 unexcused absences/truancy)
3 – Serious problems (more than 10 unexcused absences or expelled/dropped out.)

D3. Peer relationships:

0 – Peers usually provide good support and influence
1 – Youth is rejected by prosocial peers, or youth sometimes associates with others who have been involved in delinquent activity but is not primary peer group
2 – Youth regularly associates with others who are involved in delinquent activity
3 – Youth is a gang member or associates with a gang

D4. Parental supervision:

0 – Parent, guardian, or custodian willing and able to supervise
1 – Parent, guardian, or custodian willing but unable to supervise
2 – Parent, guardian, or custodian unwilling to supervise

D5. Does the juvenile exhibit Hyperactivity/impulsivity/attention (HIA) issues?

0 – No symptoms reported by parent/guardian, teacher, or others.
1 – Some symptoms reported.
2 – Confirmed diagnosis of ADHD or history of prescribed medications for concentration.

D6. Does the juvenile have a pattern of hostile behavior toward others?

0 – Hostility reported infrequently
1 – Hostility reported at least weekly
2 – Hostility reported daily

D7. How cooperative is the juvenile with court services?

0 – Youth is cooperative with the court counselor
1 – Youth is uncooperative with the court counselor.

D8. What is the juvenile's attitude toward the current or most recent offenses?

0 – Youth expresses concern or remorse for current offense
1 – Youth lacks expression of concern or remorse for current offense

D9. How cooperative is the parent/guardian with court services?

0 – Parent/guardian is cooperative with the court counselor.
1 – Parent/guardian is uncooperative with the court counselor.

D10. Mental Health

0 – No need for mental health care indicated.
1 – Has mental health needs that are being addressed.
2 – Behavior indicates a need for additional mental health assessment or treatment.

(continued)

Appendix A (continued)

D11. Family Criminality

0 – No family member (including siblings) has been convicted/adjudicated for criminal acts.
1 – Parents, guardian, or custodian and/or siblings have record of convictions/adjudications.
2 – Parent, guardian, or custodian and/or siblings are currently incarcerated or are on probation or parole or are known gang members.

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