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Differential Effects of Mental Health Problems Among Truant Youths

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Abstract

Research indicates at-risk youth are more likely to experience emotional and psychological problems. Young people who are often truant from school represent a group of at-risk youth, but one for which mental health issues are understudied. This study examined heterogeneity of mental health problems among a sample of 300 truant adolescents using latent class analysis (LCA). LCA indicated the sample of truants was best represented by four latent subgroups of youth with low mental health problems; high depression, low mania; high mania, low depression; and high depression and mania. These subgroups were examined in relation to sociodemographic and psychosocial measures at baseline and after truancy offenses. Results indicated general and unique differences in these covariates across the four latent classes. Service and practice implications of better understanding mental health issues of truant youth are discussed.

Introduction

Truancy is a serious problem that affects most school districts in the USA. Research on truancy can be challenging because there is no uniform definition of truancy, and statistics on truancy rates are lacking and/or inconsistently reported across school districts.[1,2] Generally, truancy is defined as unauthorized, intentional absence from compulsory schooling. It is estimated that thousands of youth in the USA are absent from school each day. For example, recent statistics on truancy in Los Angeles County[3] and Colorado[4] indicate truancy rates greater than 10%, with the highest rates in

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urban high schools. Comparable statistics corroborating high rates of truancy can also be found in other jurisdictions.[5]

Truancy appears to be a risk factor for a life course trajectory toward more negative behaviors.[2] As Garry[5] observed, truancy may be the beginning of a lifetime of problems among students who routinely skip school, including poor standardized test performance,[6,7] high school dropout,[8] a stressed family life,[9,10] difficulties in emotional/psychological functioning,[10–12] drug use,[13,14] and progression to both juvenile delinquency[15–18] and adult criminal offending.[19] Related research has also documented a link between truancy and later problems with employment, adult crime, and incarceration.[20–23]

Among criminological research, examination of attendance problems in school is typically limited to truancy, defined as the intentional and unauthorized absence from compulsory school. Psychiatrists, however, have long distinguished between three forms of school absenteeism: parent-driven absenteeism, school refusal, and truancy.[24–26] Parent-driven absenteeism is due to the parent's decision, not the child's, and is attributed to neglectful parenting practices. Both school refusal and truancy refer to absenteeism that is motivated by the child. The distinction between school refusal and truancy is not always clear, but research suggests it relates to the motive for the absenteeism. School refusal is a psychological term and is viewed as the result of emotional distress or mental health problems such as general anxiety, social anxiety, somatic complaints, and depression that prevent the student from attending school. School refusal is generally known and supported by parents, and not the result of antisocial behavior or conduct problems. Unlike school refusal, truancy is a legal term and occurs without parental knowledge and authorization. From a psychological perspective, truancy is generally considered a product of antisocial behavior, such as defiant or conduct problems. Research suggests school refusal and truancy are not mutually exclusive categories.[12,27,28]

Psychological research reports a high prevalence of mental health problems among youths characterized as school refusers. School refusers demonstrate symptoms of mood disorders such as depression and dysthymia; anxiety disorders such as generalized anxiety, separation anxiety, and panic disorder; and disruptive behavior disorders such as oppositional defiant, attention deficit hyperactivity disorder (ADHD), and conduct disorders.[12,29–31] Studies indicate many school refusers suffer from comorbidity or more than one concurrent mental health diagnosis.[29,31] Given the respectable amount of research on the prevalence and comorbidity of mental health problems among school refusers and/or truants, it is surprising that criminologists examining truancy as a risk factor for offending have all but ignored the influence of mental health problems.

Research has consistently indicated significant associations between mental health problems and crime and delinquency among general populations, but especially those having contact with the justice system.[32–39] Anxiety problems tend to be negatively associated with delinquency and antisocial behaviors.[40] Research on depression, affective, and mood disorders, including major depressive disorder with symptoms of mania-like and suicidal ideation, indicates a positive association with delinquency and antisocial behavior.[41–45] Youth with attention and ADHD difficulties reported higher levels of delinquency and criminal behavior in adulthood,[46–48] especially when compared to youth without attention disorders.[49–51] Teplin and colleagues found a 6-month prevalence of ADHD among 17% of male and 21% of female detainees (Cook County, Chicago).[52] Further, a sizable comorbidity has been found between ADHD and affective disorders (e.g., depression), substance use disorders, and anxiety disorders among juvenile offenders.[53,54] Research also indicates that youth with ADHD are more likely to become delinquent[55] and adult offenders.[56] Delinquent youths with ADHD may be more cognitively impaired in comparison to ADHD youths who are not involved in delinquent behavior. This finding suggests that significant neuropsychological deficits may exist in this group.[57] Increasing consideration has been given to ADHD impulsivity and its relationship to delinquency and other psychosocial functioning problems.[58] Impulsivity is an important component of ADHD among youths and is associated

with, and often precedes, an increased engagement in a variety of problem behaviors such as drug use and risky sexual activities (e.g., having sexual intercourse without using a condom).[59]

Positive relationships have consistently been found between mental health functioning and substance use (e.g., alcohol, marijuana, and other drug use [e.g., cocaine]), as well as delinquent behavior in cross-sectional and longitudinal studies involving a variety of samples in the USA[44,60,61] and in other countries.[62,63] Emotional and psychological functioning problems have been found to be related to substance use in delinquent[64] and non-delinquent[65] samples of boys and girls. Therefore, it is reasonable to anticipate significant associations between mental health and delinquency and substance use will emerge in truant populations.

Few studies have tracked the complex relationships between truant youths' mental health functioning in multiple domains (e.g., ADHD, depression, anxiety, and mania-like) to offense behavior over time. To the authors' best knowledge, only one study has specifically examined these relationships among truant youth.[13] Using structural equation modeling, Dembo et al. studied the effect of latent constructs of mental health problems (ADHD, anxiety, depression, and mania-like) and substance use on four waves (baseline and 3, 6, and 12 months) of delinquency among a sample of truant adolescents.[13] They found that mental health problems at baseline predicted future delinquency among truant youth, while substance use had little to no effect on future delinquency. While Dembo et al. examined mental health problems and their effect on delinquency among truant youth, their study did not examine the variability, or heterogeneity, in mental health problems. Given the literature indicates mental health problems drive school refusals and that school refusals may conceptually and empirically overlap with truancy, it is important to examine variation in mental health problems when studying truancy and other forms of school absenteeism. The present study utilizes regression mixture models to assess differential effects of mental health problems on future offending and key covariates.

There is a lack of research examining the longitudinal relationships between mental health and delinquency among truant youths. The present study completed a longitudinal analysis of emotional and psychological functioning (generally referred to as mental health problems) in a sample of 300 truant youths. Latent profile analysis was used to examine variation and identify subgroups of youths who differed in their experience of ADHD, depression, anxiety, and mania-like. Next, these subgroups were compared on a variety of sociodemographic and psychosocial characteristics at baseline and frequency of arrests during a 19- to 24-month follow-up period. Results indicated important longitudinal relationships of mental health with crime, even after controlling for time at risk and involvement in intervention services. Service and practice implications from the findings of this study are discussed.

Method

All study procedures were approved and monitored for ethics by the university Institutional Review Board (IRB). Participants were involved in a brief intervention (BI) project for truant youth involved in substance use. They were recruited for the project from the local truancy center, a school-based center were truant youth are held during school hours, guidance counselors in the local school district, and a community diversion program. Project staff met with recruited youth and their parent(s)/guardian(s) to provide an overview of the project and inform them that the services were free, voluntary, and delivered in-home. For eligible and interested participants, an in-home meeting was scheduled to discuss the project, complete consent and assent processes, and conduct separate baseline interviews with the youth and parent. Following baseline interviews, participants were randomly assigned to one of three project service conditions: BI-youth only (BI-Y), BI-youth plus an additional parent individual session (BI-YP), or standard truancy services (STS). Data were also collected for a 24-month follow-up period.

Participants

Eligible truant youths met the following criteria: 11 to 17 years old; two or fewer misdemeanor arrests; alcohol or drug use, as determined by a screening instrument (Personal Experience Screening Questionnaire)[66] or as reported by a school or truancy center social worker; and lived within 25-mi radius of the truancy center. The truancy center is located within a large urban area in the southeastern USA. The total sample consisted of 300 youths, who were enrolled and completed baseline interviews between March 2, 2007 and June 22, 2012.

Interventions

The present study did not test the efficacy of the BI on truant youth; however, since the youth were undergoing an intervention, it was important to control for the effects of treatment. As mentioned, the youths were randomly assigned to one of three groups for intervention. Random assignment was balanced to ensure equal numbers in each group. Two groups received the BI (BI-Y and BI-YP), while a third group received the standard truancy center services (STS). The goal of the BI was to promote abstinence and prevent relapse among drug-using adolescents. Adapted from previous work,[67] the BI incorporated elements of Motivational Interviewing, Rational-Emotive Therapy, and Problem-Solving Therapy to develop adaptive beliefs and problem-solving skills. The goals of the BI therapy was to diminish factors contributing to drug use (e.g., maladaptive beliefs) and promote factors that protect against relapse via problem-solving skills and support from the environment.[68,69] Youths randomly assigned to the BI-Y condition were administered two BI sessions, but no session was held with their parents. Youths randomly assigned to the BI-YP condition were administered two BI sessions, and their parents were administered a separate parent BI session. Each BI session lasted 75 min, and the sessions occurred about a week apart.

Youths randomly assigned to the STS condition received the normal truancy services provided by the local school district, as well as a referral service overlay of three weekly, hour-long visits by a project staff member. Referral assistance provided truant youth and their families in the control condition with an additional resource that is not easily available to them and also controlled for service exposure. On each contact occasion, the project staff member carried a copy of a county government-developed agency and service resource guide, which contained hundreds of agency listings, contact persons, telephone, and e-mail information. Staff members provided participating families with the referral information contained in the resource guide, when requested. No form of counseling or therapy was offered in the STS condition.

Assessment procedures

Each youth and parent was paid $15 for completing the in-home, baseline interview. On average, youth interviews took 1 h to complete, and parent interviews took 30 min to complete. The majority of the measures in the present study reflect baseline interview data. Official arrest and charge information was collected over a 24-month follow-up period. The follow-up period began the day after the date of the youth's last participation in project services (i.e., the last intervention or STS session).

Measures

The main data collection instruments were the Adolescent Diagnostic Interview (ADI),[70] and the Adolescent Diagnostic Interview–Parent/Guardian (ADI-P).[71] Both the ADI and ADI-P were designed to be delivered within a highly structured and standardized format (e.g., most questions

are yes/no) to capture Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria for substance use disorders and related areas of functioning. Item construction was informed by the literature on structured interviews, advice from an expert panel, and feedback from field testers.[70] DSM-IV guidelines and results from the statistical analysis provided the basis for scoring rules. Reliability and validity studies, involving over 1,000 drug clinic adolescents for the ADI and about 200 parents/guardians for the ADI-P, provide a wide range of psychometric evidence pertaining to inter-rater agreement, test-retest reliability, convergent validity (with clinical diagnoses), self-report measures, and treatment referral recommendations.[70,71]

Mental health functioning factors using Bayesian estimation Each of the mental health summary measure was created using exploratory and confirmatory factor analyses (CFA) with maximum likelihood (ML) and Bayesian estimation procedures. For ML estimation, the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA) were used to evaluate model fit. The typical range for both CFI and TLI is between 0 and 1 (although it may values greater than 1), with values greater than 0.90 indicating an acceptable fit and values greater than 0.95 indicating a good fit.[72] For RMSEA, values of 0.05 or less indicate a close model fit, and values between 0.05 and 0.08 indicate an adequate fit.[73]

In recent years, however, Bayesian analysis has become increasingly popular. Bayesian estimation is a preferred approach for analyzing relatively complex models, especially when data are sparse or samples are small—where asymptotic distributions underlying ML and other frequentist estimation procedures are unlikely to hold.[74–76] When samples are large, the results of ML and Bayesian analysis tend to be similar. Two estimates of model adequacy are important in Bayesian analysis: (a) convergence and mixing and (b) model fit. Convergence and mixing refer to the degree to which the Markov chain Monte Carlo algorithm produces a chain that "converges" to the appropriate posterior density (i.e., reaches a stationary distribution), and that "'mixes' well throughout the support of the density".[74] The Gelman-Rubin diagnostic, referred to as the potential scale reduction (PSR) factor, is often used to assess convergence mixing.[77,78] A PSR value close to 1 and below 1.1 is considered as evidence that convergence and adequate mixing have been achieved. Model fit refers to assessing whether the model fits the data well enough to permit the drawing of inferences about the parameters.[74] One of the best approaches for examining model fit is posterior predictive distribution checking.[78,79] As implemented in Mplus,[80] a posterior predictive *p* value (PPP) fit statistic is based on the commonly used likelihood ratio chi-squared test of an H0 model against an unrestricted H1 model.[81] A low PPP value (e.g., 0.05 or 0.01) indicates a poor fit, while values around 0.5 reflect an excellent fit.[82]

Four measures of mental health problems for *ADHD*, *anxiety*, *depression*, and *mania-like* respectively were created from items in the ADI.[70] Table 1 reports the distribution of affirmative responses to the ADI questions comprising the mental health measures. The youth reported relatively high rates of emotional/psychological issues or mental health problems. For each question, youth not reporting the experience were coded as 0, and those reporting the experience were coded as 1. Then, separate composite measures of each of the mental health problem domains were created with CFA of the dummy-coded items.

Table 2 reports the CFA results for each of the composite measures of mental health problems included in subsequent analyses. For ADHD and mania-like, CFA results using ML estimation indicated a good fit of a single factor model to the data for each mental health domain. Bayesian estimation also confirmed the existence of a one-factor model for both ADHD and mania-like, with each item in the factors being significantly loaded on the single factor. Based on these results, an ADHD factor score and a mania-like factor score were created for use in further analyses. For anxiety and depression, the CFA results also confirmed the items within each domain were significantly loaded on one factor, respectively. However, the distribution of the data for anxiety

Table 1

Percent of truant youth who reported experiencing mental health issues (n=299 or 300)

Mental health issue	Percentage "Yes"
ADHD	
1. Do you find that you are the type of person who often gets complaints from parents or teachers that you don't listen to instructions or direction?	56%
2. Do you frequently tend to act before thinking?	70%
3. Do you often have difficulty waiting for your turn during games or when doing things with other people your age?	32%
4. Do you often fidget and find it difficult to sit still?	52%
Anxiety	
1. Do you worry a great deal when you are away from home that something bad might happen to your parents?	40%
2. Do you often refuse to go to school because you are afraid that something bad will happen to your parents or some other important person?	10%
3. Do you ever worry a lot about how well you are doing as a student or whether you have enough friends?	41%
4. Do you worry a great deal about how future events will turn out?	63%
Depression	
1. Has there ever been a continuous 2-week time period during which you felt sad or down most of the time—as if you didn't care anymore about anything?	56%
2. Have you ever continuously felt like crying for several days in a row?	36%
3. Have you ever had any trouble sleeping that lasted for many days?	43%
4. Have you ever felt so down that you felt like ending your life?	24%
5. Have you ever actually attempted suicide?	8%
Mania-like	
1. Has there ever been a period of time of at least several days, during which time you were not using alcohol or other drugs, when you felt on top of the world—as though you had special abilities or superhuman talents?	24%
2. During such a period, when you were not using alcohol or drugs, have you ever felt that you had tremendous energy, like that of a superperson?	34%
3. During such a period, when you were not using alcohol or drugs, did you ever feel as though your thoughts were racing?	38%
4. During such a period, when you were not using alcohol or drugs, did you ever feel that you could go for a long time period without sleep?	32%
5. Has this kind of "high" feeling ever gotten you into trouble?	36%

and depression did not meet asymptotic distribution assumptions of ML, with a resulting poor model fit, as shown in Table 2. On the other hand, CFA with Bayesian estimation confirmed the existence of a one-factor model for anxiety and depression, respectively. Based on these results, an anxiety factor score and a depression factor score were created for use in further analyses.

Covariates for youth and family at baseline Covariates at baseline interview for sociodemographic characteristics, substance use for the youths and their parents, sexual risk behaviors, offending for

Table 2
Emotional/psychological functioning scale analysis results

Maximum likelihood							Bayesian estimation	
Variable	Chi-squared	*df*	*p* value	CFI	TLI	RMSEA	PSR	PPP
ADHD	0.614	2	0.736	1.000	1.021	0.000	1.062	0.547
Anxiety	37.728	2	0.000	0.824	0.472	0.244	1.069	0.222
Depression	30.481	5	0.000	0.961	0.922	0.130	1.006	0.333
Mania-like	9.173	5	0.100	0.981	0.962	0.053	1.012	0.463

ADHD attention deficit hyperactivity disorder, *CFI* comparative fit index, *TLI* Tucker-Lewis index, *RMSEA* root mean square error of approximation, *PSR* potential scale reduction factor, *PPP* posterior predictive *p* value

the youths, attitudes toward school for the youths, and stressful life events were included in the analyses. Table 3 reports the distributions of the covariates in the sample. Below is a description of these baseline covariates.

Sociodemographic measures A number of sociodemographic covariates were used in this study: age (in number of years), gender (1=female, 0=male), race (1=African American, 0=other), and ethnicity (1=Hispanic, 0=other). Table 3 shows the distributions of the youths' demographic characteristics (age, gender, race, and ethnicity), as well as the other baseline covariates used in this study. Most of the youth were male. They averaged 14.8 years in age at entry into the study and were racially and ethnically diverse.

Who the youth was living with Information was obtained from the youth and parent interviews regarding who the youth was living with at baseline. Relatively few youth were living with both of their biological parents (17%). On the other hand, a third of the youth were living with their birth mother alone. A variable reflecting youth residence (1=living with birth mother alone, 0=other living arrangement) was created for the analyses.

Family income Parents were asked for information regarding their annual family income at baseline. Overall, the families in the project had modest annual incomes. A family income level measure was created, ranging from 1=less than $5,000 to 6=more than $75,000.

Family experience of stressful/traumatic events The youths' parents were asked at baseline interview to indicate if the youth or their family ever experienced serious stressful or traumatic events. Many of the families reported experiencing one or more stressful events at baselines. Affirmative responses to the nine stressful/traumatic events were assigned a score of 1. A summary index for affirmative responses was created and included in analyses. Overall, an average of 2.99 (standard deviation (SD)=1.76) stressful/traumatic events was reported per family.

Parent reports of past year alcohol use At their baseline interviews, parents were also asked about their use of alcohol and other drugs during the past year. Very few parents (<5%) reported the use

Table 3

Information of youths and family covariates at baseline (n=300)

Sociodemographic characteristics

Gender		Who youth lived with	
Female	37%	Birth mother and father	17%
Male	63%	Birth mother alone	33%
	100%	Birth mother and stepfather or boyfriend	23%
Age			
11	1%	Birth mother with relative or friend	10%
12	3%	Birth father alone	3%
13	11%	Birth father with stepmother or	
14	22%	girlfriend	4%
15	37%	Birth father with relative or friend	<1%
16	13%	Adoptive parents	3%
17	11%	Grandparent(s)	4%
18[a]	<1%	Other relative(s)	2%
	98%	Other arrangement	<1%
	Mean=14.80; SD=1.30		99%
Race/ethnicity		Annual family income range (n=297)	
Asian	1%	Less than $5,000	5%
African American	26%	More than $5,000 up to $10,000	8%
Hispanic	29%	More than $10,000 up to $25,000	26%
Anglo	37%	More than $25,000 up to $40,000	28%
Other	7%	More than $40,000 up to $75,000	23%
	100%	More than $75,000	10%
			100%

Youth behavioral issues

Marijuana use	
Denied use and urine test results negative	7.0%
Denied use and urine test missing—reasons beyond control	0.3%
Denied use and urine test missing—refusal	0.3%
Reported use one to four times and urine test missing/negative	17.0%
Reported use five or more times and urine test missing/negative	29.3%
Urine test positive	46.0%
	99.9%

Number of previous arrest charges at enrollment

Range 0 to 6	Mean=0.89	SD=1.04

Self-reported delinquency: frequency in year before baseline interview

Index/behavior	0	1–4	5–29	30–54	55–99	100–199	200+	Total
Total delinquency	6%	22%	38%	12%	7%	7%	8%	100%

Sexual risk behavior (n=299)		Number of sexual risk behaviors	
Had sexual intercourse	67.0%	0	32.4%
Had sexual intercourse without using a condom	33.3%	1	23.7%
Had sex with two or more people	29.7%	2	23.7%
Had sexually transmitted disease (STD)	2.7%	3	18.7%
		4	1.3%

Other problems

Youth reports being sent to live away from home	19%
Youth reports alcohol/other drug abuse problem	17%

Youth reports receiving services for emotional/behavioral problems		48%
Attitudes toward school (BASC) items at baseline (n=299–300)		Percent answering "true"
1. Finishing my school work is important to me.		80%
2. I can hardly wait to quit school.		33%
3. I can't wait for school to be over.		83%
4. I don't care about school.		22%
5. I don't like thinking about school.		56%
6. I get bored in school.		81%
7. I hate school.		35%
8. I wish there were no report cards.		50%
9. My school feels good to me.		53%
10. School has too many rules.		71%
11. School is a waste of time.		15%
12. School is boring.		69%
Parent reports of problems		
Parent frequency of alcohol use in past year		
Never	30%	
1–5 times	24%	
6–20 times	22%	
21–49 times	9%	
50–99 times	4%	
100 or more times	11%	
	100%	
Biological mother report of youth/family member experiencing traumatic events in lifetime		
Unemployment of parent	50%	
Divorce of parent	39%	
Death of loved one	58%	
Serious illness	31%	
Victim of a violent crime	17%	
Eviction from house or apartment	17%	
Legal problem resulting in jail time or detention	27%	
Accidental injury requiring hospitalization	12%	
Other traumatic event not listed	50%	
Average number of reported traumatic events	Mean=2.99	SD=1.76

[a]Turned 18 after enrollment, but before baseline interview

of any substance other than alcohol. A measure of the frequency of parents' self-reported alcohol use was included in the analyses. The distribution had acceptable skewness (<2) and kurtosis[5] values and was not log transformed.[83]

Attitudes toward school The Behavioral Assessment System for Children (BASC)[84] was used to measure attitudes toward school at baseline. The 12-item scale for the BASC possesses very good psychometric properties (alpha=0.83, retest reliability=0.80). Table 3 presents the youths' replies to each of the 12 attitude to school questions at baseline interview. There was a mixture of positive and negative attitudes towards school, although negative attitudes were more often reflected in the youths' replies to these questions.

Unfortunately, due to the skewed question response patterns and relatively small number of cases, exploratory and confirmatory factor analyses of the binary attitudes towards school measures could not be estimated to replicate the BASC scale. Thus, each of the attitudes toward school questions was recoded such that 1=a response reflecting a positive attitude towards school and 0=a negative attitude toward school. Then, the rescored items were summed to produce a total score, with higher scores reflecting more positive attitudes about school. At baseline, the summed attitudes toward school measure had mean of 6.17 (SD=3.09).

Other youth problems The youth in this study were also asked to report on three additional at-risk behavioral problems during baseline interviews: (a) being sent to live away from home (mainly for behavior problem reasons—e.g., difficulty getting along with father), (b) an alcohol/other drug abuse problem (mainly marijuana as discussed below), and (c) receiving services for emotional/behavior problems. As shown in Table 3, several youth indicated experiencing these problems. Each of the problem behavior items was coded 0=no reported problem or 1=reported problem for use in the analyses.

Marijuana use at baseline Marijuana use was measured through self-report questions on the ADI[70] and the results of urine tests (UA), which were administered at baseline interview. The ADI questions probed the use of marijuana as follows: never, less than five times, or five or more times. Urine specimens using the Onsite CupKit® urine screen procedure were also collected to assess recent drug use. For marijuana (THC), urine test positive threshold levels were 50 ng/ml of urine. The surveillance windows were 5 days for moderate users of marijuana, 10 days for heavy users of marijuana, and 20 days for chronic users.

The self-reported marijuana use and marijuana urine test data were combined into an overall measure of marijuana use involving six categories: (1) use denied and UA test negative; (2) use denied and UA test data missing due to reasons beyond the youth's control (e.g., incarcerated); (3) use denied and UA test data missing not due to reasons beyond the youth's control (e.g., participant refusal); (4) UA test missing or negative, but youth reported use one to four times; (5) UA test missing or negative, but youth reported use five or more times; and (6) UA test positive. Table 3 reports prevalence rates for these six categories. Since relatively few cases were in categories 2 and 3, they were combined with category 1 for further analysis.

Sexual risk behavior at baseline Youths were interviewed about their involvement in sexual risk behavior at baseline using the POSIT HIV/STD Risk Behavior instrument. The POSIT 11-item HIV/STD risk scale was developed by the NOVA Research Company.[85] The instrument has been pilot tested and found to have very good psychometric properties (e.g., internal consistency=0.80, 1-week test-retest reliability=0.90; concurrent validity with the Sexual Risk Questionnaire scores: r=0.80).

Lack of condom use and number of sexual partners are also widely used sexual risk behavior measures in related research.[86–97] Hence, a summary measure was created for responses (1=yes, 0=no) to the following four indicators of the youths' involvement in sexual risk behaviors at baseline: (1) sexual intercourse, (2) sexual intercourse without using a condom, (3) sex with two or more people, and (4) sexually transmitted disease. Table 3 shows these results as well as the summary index for sexual risk behavior used in subsequent analyses. Comparison of these results with findings reported in the Centers of Disease Control's Youth Risk Behavior Surveillance (CDC)[98,99] indicates a much higher rate of ever having had sexual intercourse among youths in this study than that reported by youths in the YRBS nationally (47%) or in Florida (overall, 48%; 9th

grade, 31%; 10th grade, 45%; 11th grade, 57%). This result is consistent with the expectation that truant youth engage in sexual risk behavior at a higher rate than the general youth population. Since relatively few youth reported having an STD, the summary measure was recoded to include youth reporting all four sexual risk behaviors into category three of this ordinal measure.

Self-reported delinquent behavior at baseline Based on the work of Elliott and associates, self-reported delinquent behavior prior to baseline interviews was measured by asking how many times the youths engaged in each of 23 delinquent behaviors.[100] Similar to Elliott et al., five summary indices of delinquent involvement (i.e., general theft, crimes against persons, index crimes, drug sales, and total delinquency) were initially developed, but correlations between the measure of total delinquency and the other four delinquency measures at baseline were sizable and statistically significant (mean correlation=0.60). Therefore, only total delinquency was used in the present analyses.

The range of offenses for the total delinquency index was large, ranging from no activity to hundreds (in few cases, thousands); hence, this measure was transformed using logarithm to the base 10. Since the logarithm of 0 does not exist, the score of −1 was added to total delinquency before taking the log. This evaluates the difference between no offense and 1 offense as equal in importance as the difference between 1 offense and 10 or between 10 offenses and 100.[101] Importantly, the skewness (−0.32) and kurtosis (0.38) of the log-transformed measure of total delinquency were dramatically lower than those of the untransformed measure (6.23 and 46.71, respectively).

Previous arrest charges at enrollment A review of official records at the time of enrollment in the study indicated the youth received an average of 0.89 arrest charges (range 0–6; SD=1.04) prior to enrollment in the project. Most of these arrests were for violent misdemeanors (e.g., battery) (12%), drug misdemeanors (e.g., marijuana possession) (12%), or property misdemeanors (e.g., retail theft) (21%). A measure of the total number of arrest charges at enrollment was included in the analyses. The distribution had acceptable skewness (<2) and kurtosis (5) values and was not log transformed.[83]

Follow-up official arrest charges Following persuasive discussion by Maltz[102] and Blumstein and Cohen,[103] data on arrests, not convictions, was used as a measure of future offending. Official state arrest information was obtained on the number of arrest charges during the 19- to 24-month follow-up period. The official arrest charges information was obtained from state records within the juvenile justice system and adult criminal justice system, for youths who were 18 years old or older during the follow-up period. A summary score for total arrest charges were created for the follow-up period. One-sample Kolmogorov-Smirnov tests indicated the distribution of the number of arrest charges during the follow-up period was not consistent with a normal, uniform, Poisson or exponential distribution and had very high skewness and kurtosis values. Therefore, the total arrest charges measure was log-transformed to the base 10 (with −1 assigned to no charges prior to log). The log transformations reduced the distribution's skewness and kurtosis values below levels indicating severe non-normality (e.g., skew >2 and kurtosis >7).[83]

Treatment effects Measures for treatment effects were also included in analyses. The overall BI treatment effect was measured by a variable that contrasts youth and families receiving BI services (BI-Y and BI-YP) versus those receiving standard truancy services (STS). In addition, specific comparisons were made between service conditions: (1) BI-Y versus STS, (2) BI-YP versus STS,

and (3) BI-Y versus BI-YP. Due to the exploratory nature of this study, a two-sided test of significance ($p<0.10$) was used for the various BI treatment effects.

Time in a secure facility during 24-month follow-up period Time in a secure setting reduces the likelihood of engaging in risky behavior. Hence, for each youth, the number of days he/she spent in a secure facility (e.g., detention center and jail) during the entire 24-month follow-up period was recorded to create a measure of time in secure facility. Examination of the distribution of this variable indicated large skewness (31.23) and kurtosis (21.51). Accordingly, the distribution was log-transformed to the base 10 (with −1 assigned to 0 days in a secure facility prior to log). The log transformation reduced greatly its skewness (2.65) and kurtosis (5.52).

Analysis strategy

This study used latent class analysis (LCA) (often called latent profile analysis when the variables are continuous, as in the current study) using Mplus version 7.11.[80] LCA seeks to identify an underlying classification of entities (e.g., individuals) which are related to manifest indicators in probabilistic terms.[104] In particular, the latent class model is useful when studying a heterogeneous population. The use of latent class analysis in this study was exploratory in nature, i.e., without specification of hypotheses relating to the values of the conditional or latent class probabilities. The main purpose of the LCA analyses was to examine the heterogeneity, or variation, in mental health problems among the sample and identify subgroups of youths in the sample, assuming heterogeneity exists. The secondary purpose was to examine how identified subgroups differentially related to certain covariates and future offending.

Since the issue of class enumeration or determining the appropriate number of subgroups for a study population in LCA is unresolved, it is recommended that multiple criteria are employed for determining class enumeration.[105] In this study, good classification quality was established if (1) the classification table based on probabilities for likely latent class membership had high diagonal values and low off-diagonal values[80]; (2) entropy was close to 1[80]; (3) Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample size adjusted BIC (saBIC) scores were closest to zero; (4) Vuong-Lo-Mendell-Rubin likelihood ratio test (LRT), Lo-Mendell-Rubin adjusted likelihood ratio test (aLRT), and bootstrap likelihood ratio test (bLRT) statistics had significant p values[105,106]; (5) examination of the univariate and bivariate frequency tables revealed smaller residuals for covariances among the variables used in the LCA within each class[107–110]; and (6) substantive meaningfulness of LCA results.

Latent class analyses were performed on the mental health functioning measures for one to five latent classes. In the subsequent analyses, MLR estimation (maximum likelihood parameter estimates with standard errors and a chi-squared statistic that are robust to non-normality and non-independence of observations) was used.[80] The Mplus feature for ML estimation of missing values was used to treat any missing data.[80]

Following LCA estimations, three additional analyses were completed. First, the latent categorical variables were regressed on the baseline covariates using categorical latent variable multinomial logistic regression with posterior probability-based multiple imputations (pseudo-class draws).[80] Second, following the three-step procedure recommended by Asparouohov and Muthen,[82] the latent class variable (subgroup membership) was regressed on the distal outcome variable of the number of arrest charges during follow-up (months 19–24). A supplementary analysis of covariance also evaluated the latent class effects after taking into account the youth's time at risk during the 24-month follow-up period and treatment group placement. Third, a two-

way analysis of variance compared the effects of the overall BI treatment on distal arrest charges in the latent classes. Figure 1 presents the model that was estimated.

Results

Bivariate relationships among the variables in the latent class analysis

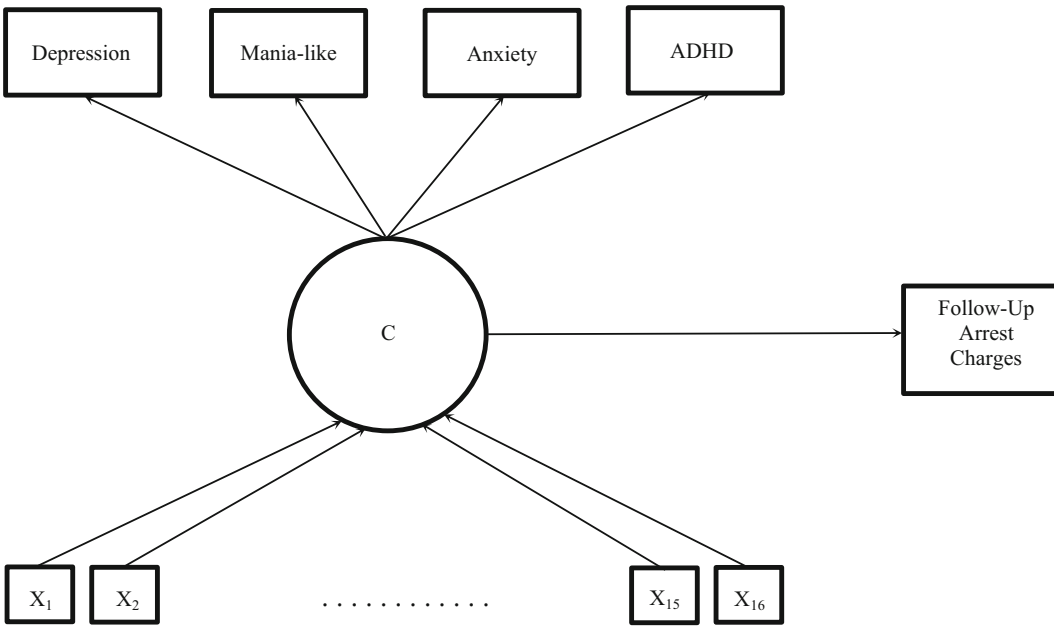
Prior to the LCA, Pearson correlations were obtained among the four emotional/psychological measures (ADHD, mania-like, anxiety, and depression). Results indicated moderate to high relationships (range r=0.190 to 374, each significant at $p<0.001$ level [two-tailed test]) (a table reporting these results has been omitted due to space concerns; a copy is available from the senior author upon request).

Latent class analysis of the mental health measures

LCA fit statistics After LCA models were estimated for one to five latent classes, a comparison was made of the fit measure results of two classes versus one, three versus two, four versus three, and five versus four. The LCA fit statistics for the emotional/psychological functioning LCA are shown

Figure 1

Latent profile model with covariates and a distal outcome. *C* latent class. All covariates (X_1–X_{16}) were measured as baseline. X_1=age, X_2=gender, X_3=family income, X_4=who the youth lives with, X_5=African American, X_6=Hispanic, X_7=family experience of stressful/traumatic events, X_8=sexual risk behavior, X_9=marijuana use, X_{10}=youth alcohol/other drug problem, X_{11}=youth receiving mental health, problem behavior treatment, X_{12}=youth sent to live away from home, X_{13}=parent reported alcohol use in past year, X_{14}=youth arrest charges prior to project enrollment, X_{15}=self-reported delinquency, X_{16}=attitudes toward school



in Table 4. The fit statistics indicating a four-class solution appears to fit the data best. The four-class solution has the lowest BIC value, and second lowest AIC and sample size adjusted BIC values among the LCA results, as well as having an excellent entropy value (0.83). Importantly, the LRT, aLRT, and bLRT results indicated significant improvements of the successive models up through the four-class model versus the three-class model (p=0.0172, p=0.0199 and p<0.0001, respectively). This was not the case for the LRT (p=0.3818) and aLRT (p=0.3949) for five latent class model versus the four latent class model.

LCA results for four latent classes The LCA results for the four-class solution of mental health problems among truant youth are shown in Table 5. The classification table based on class probabilities for most likely latent class membership by latent class indicates high main diagonal and low off-diagonal values. The residuals for the covariances for each latent class were quite low, indicating a good fit of the four-class model. The four subgroups identified were as follows: (1) a low-problem-level group (n=97, 32.2% of the youths), (2) a group high on depression and low on mania-like (n=87, 29.0%), (3) a group high on both mania-like and depression (n=55, 18.3%), and (4) a group high on mania-like and low on depression (n=61, 20.3%). None of the classes indicated substantially high levels of anxiety or ADHD, though anxiety and ADHD were highest in latent class 3, which also had the highest levels of depression and mania-like. Thus, the four subgroups distinguish the four combinations of low versus high depression and low versus high mania-like.

Class comparisons with baseline covariates

A multinomial logistic regression analysis was completed to assess the influence of the baseline covariates in predicting latent class membership. As shown in Table 6, a number of significant covariate effects were found. Compared to youth high on depression and low on mania-like (class 2), low-problem youth (class 1) were significantly more likely to be male. Youth in the low-problem class were also less involved in self-reported delinquent behavior at baseline (marginally

Table 4

Latent class analysis fit statistics: emotional/psychological measures (n=300)

Number of classes	AIC	BIC	Sample size adjusted BIC	Entropy	Vuong-Lo-Mendell-Rubin likelihood ratio test (LRT)	Lo-Mendell-Rubin adjusted LRT (aLRT)	Parametric bootstrapped LRT
1	2,926.77	2,956.40	2,931.03	n/a	n/a	n/a	n/a
2	2,796.30	2,844.44	2,803.22	0.82	0.0000	0.0000	0.0000
3	2,742.16	2,808.83	2,751.74	0.88	0.0053	0.0062	0.0000
4	2,714.75	2,799.94	2,727.00	0.83	0.0172	0.0199	0.0000
5	2,704.88	2,808.59	2,719.79	0.87	0.3818	0.3949	0.0000

The chi-squared tests apply only to the categorical variable part of each model
AIC Akaike information criterion, *BIC* Bayesian information criterion, *n/a* not applicable

Table 5

Latent profile analysis results: emotional/psychological functioning (n=300)

	Estimate	S.E.	Critical Ratio
Latent class 1: low-problem-level youth (n=97)			
Means			
ADHD	−0.312	0.050	−6.246***
Depression	−1.292	0.074	−17.358***
Anxiety	−0.317	0.081	−3.903***
Mania-like	−0.592	0.030	−19.989***
Variances			
ADHD	0.189	0.015	12.560***
Depression	0.603	0.066	9.106***
Anxiety	0.732	0.053	13.931***
Mania-like	0.108	0.010	10.348***
Latent class 2: high on depression, low on mania (n=87)			
Means			
ADHD	0.164	0.047	3.471***
Depression	1.014	0.124	8.053***
Anxiety	0.096	0.105	0.918
Mania-like	−0.386	0.049	−7.880***
Variances			
ADHD	0.189	0.015	12.560***
Depression	0.603	0.066	9.106***
Anxiety	0.732	0.053	13.931***
Mania-like	0.108	0.010	10.348***
Latent class 3: high on mania and depression (n=55)			
Means			
ADHD	0.264	0.084	3.140**
Depression	1.315	0.220	5.973***
Anxiety	0.328	0.136	2.417*
Mania-like	1.027	0.061	16.795***
Variances			
ADHD	0.189	0.015	12.560***
Depression	0.603	0.066	9.106***
Anxiety	0.732	0.053	13.931***
Mania-like	0.108	0.010	10.348***
Latent class 4: High on mania, low on depression (n=61)			
Means			
ADHD	0.026	0.070	0.372
Depression	−0.691	0.192	−3.590***
Anxiety	0.018	0.143	0.127
Mania-like	0.666	0.082	8.084***
Variances			
ADHD	0.189	0.015	12.560***
Depression	0.603	0.066	9.106***
Anxiety	0.732	0.053	13.931***
Mania-like	0.108	0.010	10.348***

Table 5
(continued)

	Estimate	S.E.	Critical Ratio
Categorical latent variables			
Means			
C#1	0.455	0.217	2.098*
C#2	0.354	0.229	1.550
C#3	−0.113	0.336	−0.336
Average latent class probabilities for most likely latent class membership (row) by latent class (column)			
1	2	3	4
1 0.955	0.031	0.000	0.014
2 0.058	0.905	0.017	0.021
3 0.000	0.006	0.900	0.094
4 0.027	0.028	0.076	0.869
Entropy=0.833			

*$p<0.05$; **$p<0.01$; ***$p<0.001$ (two-tailed p values)

significant) than those in the high depression, low mania-like group. Further, low-problem youth experienced fewer lifetime stressful/traumatic events, and were less likely to report ever receiving services for emotional/behavioral problems.

Compared to youth high on mania-like and depression (and anxiety and ADHD as well) (class 3), low-problem youth (class 1) were significantly more likely to be male and Hispanic. Low-problem youth were significantly less involved in self-reported delinquency than those in the high-problem group. Low-problem youth were also less likely to report ever receiving services for emotional/behavioral problems at baseline (marginally significant), and had more favorable attitudes toward school at baseline (marginally significant) than high-problem youths.

Compared to youth high on mania-like and low on depression (class 4), low-problem youth (class 1) were significantly less involved in self-reported delinquency at baseline. None of the other baseline covariates was significantly different when comparing the low-problem youth to the high mania-like youth.

Compared to youth high on depression and low on mania-like (class 2), youth with high mental health problems (class 3) were marginally significantly more likely to live in mother-headed households at baseline. None of the other baseline covariates were significantly different comparing class 2 to class 3.

Compared to youth high on mania-like and low on depression (class 4), youth high on depression and low on mania-like (class 2) were significantly more likely to be older and female. Youth high on depression were also more likely to report being sent to live away from home (marginally significant) and receiving services for emotional/behavioral problems at baseline than youth high on mania-like.

Compared to youth high on mania-like and low on depression (class 4), youth high on mental health problems (class 3) were significantly more likely to be female. Youths with high problems also reported receiving more services for emotional/behavioral problems at baseline (marginally significant) and to have less positive attitudes to school (marginally significant).

Overall, results indicated that groups low on depression tended to be male and groups high on depression tended to be female. The low-problem group reported less baseline delinquency than

Table 6

Tests of categorical latent variable multinomial logistic regression using posterior probability-based multiple imputations (pseudo-class draws), unstandardized estimates

	Estimate	S.E.	Critical ratio
Low-problem youth (class 1) versus youth high on depression, low on mania-like (class 2)			
Latent class 1 ON			
Sociodemographics			
Age	−0.153	0.177	−0.866
Gender (1=female)	−1.313	0.401	−3.273***
Lives with (1=mother only)	0.252	0.426	0.592
Race (1=African American)	0.015	0.556	0.027
Ethnicity (1=Hispanic)	0.303	0.440	0.689
Family income level	0.264	0.175	1.508
Official records			
Number of previous charges at enrollment	0.043	0.201	0.212
Behavioral issues			
Marijuana use, baseline	0.195	0.217	0.901
Delinquency, baseline	−0.481	0.249	−1.929†
Sexual risk behaviors, baseline	−0.024	0.191	−0.127
Being sent to live away from home	−0.728	0.500	−1.458
Alcohol/other drug abuse problem	−0.547	0.522	−1.047
Receiving emotional/behavioral services	−0.938	0.403	−2.327*
Attitudes toward school:			
Attitudes toward school, baseline	0.048	0.069	0.686
Parent/guardian reports on:			
Parent frequency of alcohol use, past year	0.121	0.129	0.931
Family stressful/traumatic events	−0.257	0.114	−2.250*
Low-problem youth (class 1) versus youth high on mania-like and depression (class 3)			
Latent class 1 ON			
Sociodemographics			
Age	0.090	0.206	0.439
Gender (1=female)	−1.396	0.480	−2.910**
Lives with (1=mother only)	−0.636	0.487	−1.307
Race (1=African American)	−0.278	0.601	−0.462
Ethnicity (1=Hispanic)	1.137	0.574	1.980*
Family income level	0.197	0.201	0.981
Official records			
Number of previous charges at enrollment	0.357	0.248	1.442
Behavioral issues			
Marijuana use, baseline	0.379	0.249	1.523
Delinquency, baseline	−0.918	0.298	−3.084**
Sexual risk behaviors, baseline	−0.319	0.225	−1.420
Being sent to live away from home	−0.232	0.585	−0.396
Alcohol/other drug abuse problem	−0.317	0.607	−0.523
Receiving emotional/behavioral services	−0.909	0.468	−1.941†
Attitudes toward school			
Attitudes toward school, baseline	0.159	0.082	1.938†
Parent/guardian reports on			

Table 6
(continued)

	Estimate	S.E.	Critical ratio
Parent frequency of alcohol use, past year	0.175	0.153	1.147
Family stressful/traumatic events	−0.150	0.136	−1.098
Low-problem youth (class 1) versus youth high on mania-like, low on depression (class 4)			
Latent class 1 ON			
Sociodemographics			
Age	0.241	0.169	1.424
Gender (1=female)	0.820	0.533	1.539
Lives with (1=mother only)	−0.147	0.448	−0.329
Race (1=African American)	0.566	0.575	0.984
Ethnicity (1=Hispanic)	0.860	0.522	1.647
Family income level	0.133	0.192	0.629
Official records:			
Number of previous charges at enrollment	−0.014	0.203	−0.071
Behavioral issues			
Marijuana use, baseline	0.254	0.229	1.111
Delinquency, baseline	−0.646	0.263	−2.455*
Sexual risk behaviors, baseline	−0.270	0.202	−1.341
Being sent to live away from home	0.247	0.611	0.405
Alcohol/other drug abuse problem	−0.037	0.587	−0.063
Receiving emotional/behavioral services	0.046	0.419	0.110
Attitudes toward school			
Attitudes toward school, baseline	−0.010	0.077	−0.133
Parent/guardian reports on			
Parent frequency of alcohol use, past year	0.004	0.129	0.030
Family stressful/traumatic events	−0.139	0.120	−1.151
Youth high on mania and depression (class 3) versus youth high on depression, low on mania-like (class 2)			
Latent class 3 ON			
Sociodemographics			
Age	−0.243	0.201	−1.210
Gender (1=female)	0.083	0.448	0.184
Lives with (1=mother only)	0.889	0.463	1.918†
Race (1=African American)	0.293	0.581	0.505
Ethnicity (1=Hispanic)	−0.834	0.542	−1.539
Family income level	0.067	0.185	0.360
Official records:			
Number of previous charges at enrollment	−0.315	0.232	−1.353
Behavioral issues			
Marijuana use, baseline	−0.184	0.238	−0.772
Delinquency, baseline	0.437	0.283	1.547
Sexual risk behaviors, baseline	0.295	0.212	1.392
Being sent to live away from home	−0.496	0.514	−0.965
Alcohol/other drug abuse problem	−0.229	0.537	−0.428
Receiving emotional/behavioral services	−0.029	0.456	−0.064
Attitudes toward school			

Table 6
(continued)

	Estimate	S.E.	Critical ratio
Attitudes toward school, baseline	−0.111	0.078	−1.427
Parent/guardian reports on			
Parent frequency of alcohol use, past year	−0.055	0.145	−0.379
Family stressful/traumatic events	−0.108	0.129	−0.835
Youth high on depression, low on mania (class 2) versus youth high on mania-like, low on depression (class 4)			
Latent class 2 ON			
Sociodemographics			
Age	0.394	0.197	2.000*
Gender (1=female)	2.133	0.537	3.970***
Lives with (1=mother only)	−0.400	0.483	−0.827
Race (1=African American)	0.550	0.623	0.884
Ethnicity (1=Hispanic)	0.557	0.534	1.042
Family income level	−0.131	0.202	−0.648
Official records			
Number of previous charges at enrollment	−0.057	0.210	−0.271
Latent class 2 ON			
Behavioral issues			
Marijuana use, baseline	0.059	0.247	0.238
Delinquency, baseline	−0.165	0.282	−0.585
Sexual risk behaviors, baseline	−0.246	0.214	−1.151
Being sent to live away from home	0.976	0.567	1.722†
Alcohol/other drug abuse problem	0.510	0.567	0.899
Receiving emotional/behavioral services	0.984	0.445	2.213*
Attitudes toward school			
Attitudes toward school, baseline	−0.058	0.083	−0.699
Parent/guardian reports on			
Parent frequency of alcohol use, past year	−0.117	0.140	−0.836
Family stressful/traumatic events	0.119	0.128	0.928
Youth high on mania and depression (class 3) versus youth high on mania-like, low on depression (class 4)			
Latent class 3 ON			
Sociodemographics			
Age	0.150	0.225	0.668
Gender (1=female)	2.215	0.610	3.629***
Lives with (1=mother only)	0.489	0.554	0.883
Race (1=African American)	0.844	0.697	1.210
Ethnicity (1=Hispanic)	−0.277	0.689	−0.402
Family income level	−0.064	0.234	−0.275
Official records			
Number of previous charges at enrollment	−0.372	0.254	−1.460
Behavioral issues			
Marijuana use, baseline	−0.125	0.290	−0.432
Delinquency, baseline	0.272	0.326	0.835
Sexual risk behaviors, baseline	0.049	0.251	0.196

Table 6
(continued)

	Estimate	S.E.	Critical ratio
Being sent to live away from home	0.479	0.660	0.727
Alcohol/other drug abuse problem	0.280	0.662	0.424
Receiving emotional/behavioral services	0.955	0.524	1.833†
Attitudes toward school			
Attitudes toward school, baseline	−0.169	0.099	−1.716†
Parent/guardian reports on			
Parent frequency of alcohol use, past year	−0.172	0.165	−1.039
Family stressful/traumatic events	0.011	0.156	0.072

The coding of the covariates used in this analysis is discussed in the text
*p<0.05; **p<0.01; ***p<0.001; †0.10>p>0.05 (two-tailed p values)

the other three groups. Groups high on depression received more services than groups low on depression.

Class comparisons with distal outcome of follow-up arrest charges

As discussed earlier, a three-step approach in the analysis was pursued to examine the effect of the distal outcome measure, the number of arrest charges during the follow-up period (months 19–24). Analysis involving unequal variance estimation encountered convergence problems due to a zero variance in one latent class.[82] This convergence problem was resolved by using equal variance estimation, which is helpful when there are small latent classes.

The results of this analysis, presented in Table 7, indicate that youths high on depression and low on mania-like had significantly or marginally significantly fewer arrest charges than youths in each of the other three groups. Analysis of covariance indicated the latent class effects remained significant, after controlling for time at risk and intervention group placement (due to space

Table 7
Distal outcome results for number of arrest charges during follow-up period comparison

			Latent class 2	Latent class 3	Latent class 4
Latent class	**Mean**	**S.E.**	**Youth high on depression, low on mania**	**Youth high on mania and depression**	**Youth high on mania, low on depression**
1. Low-problem-level youth	−0.838	0.054	χ^2=3.36†	χ^2=2.05	χ^2=0.51
2. Youth high on depression, low on mania-like	−0.951	0.031	–	χ^2=4.54*	χ^2=3.76†
3. Youth high on mania-like and depression	−0.585	0.167	–	–	χ^2=0.58
4. Youth high on mania-like, low on depression	−0.760	0.095	–	–	–

*p<0.05; **p<0.01; ***p<0.001; †0.10>p>0.05 (two-tailed significance levels)

concerns, a table reporting these results has been omitted; a copy of the table is available, upon request, from the senior author).

Analysis of variance indicated a significant interaction of the overall BI treatment with the latent classes (F[3,204]=4.22; p=0.01). The difference between the mean arrest charges of the STS and BI conditions (in log transform units) was 0.14 for low-problem youth, −0.07 for youth high on depression and low on mania-like, 0.20 for youth high on both mania-like and depression, and 0.60 for youth high on mania-like and low on depression. Thus, the intervention was particularly effective for youth high on mania-like and low on depression. This was attributable to the high rate for STS youths in that latent class, −0.28. The means of the other seven subgroups (subdividing the latent class groups by treatment status) ranged from −0.52 to −1.00 (i.e., all with no arrest charges).

Discussion

Little is understood about how mental health problems vary among truant youth and how mental health problems affect other domains of truant youths' lives, including delinquency and substance use. The present study utilized regression mixture models, latent class analysis, to examine differentiation in mental health problems, specifically general anxiety, ADHD, depression and mania-like, among a sample of truant adolescents. The latent class analyses indicated substantial variation across the four mental health measures within the sample. Four latent classes best fit the data: a low-problem class, a high-problem class (highest on depression and mania-like), a high-depression class, and a high-mania-like class. These findings are interesting for two main reasons. First, they indicate that there is much variation in mental health problems among truant youth; otherwise, fewer latent classes would have been identified. Research has long established that at-risk youth, especially those involved in the criminal justice system, often suffer from mental health problems and that such problems may be comorbid.[32–34,37] The LCA findings support this conclusion among the sample of "lower"-risk truant youth. Second, the findings contribute to research indicating that mental health problems are not limited to school refusal but include other forms of school absenteeism like truancy.[12,27,28]

The results of this study also indicated that the four subgroups of truant youth were differentially associated with baseline covariates and future offending. Generally, the subgroups that demonstrated higher levels of depression were more likely to contain girls than boys. This is consistent with research demonstrating the prevalence of depression, and internalizing disorders is greater for girls than boys during adolescence.[111] As one might expect, the findings also indicated youth in subgroups marked by high-depression symptoms were more likely to be receiving services for mental health problems. Youths in the low mental health problems subgroup self-reported less involvement in delinquency at baseline interview, compared to the other three subgroups than demonstrated higher rates of mental health problems. This finding is consistent with research establishing an association between mental health and offending.[112–114] Unexpectedly, youths in the high-depression and low-mania-like subgroup had significantly lower official arrest charges during the follow-up period. This finding seems to contradict the baseline delinquency results. Examination of the BI effect revealed that the treatment is likely not attributed to the negative relationship between the depression subgroup and future official offending. The inconsistency may be due to the difference in how offending was measured, i.e., self-report versus official records, and/or the youths aging out of offending faster than the other subgroups. Future studies should attempt to replicate this study among different truant populations to see whether or not this effect still holds. The analyses examining the covariates associated with LCA membership also revealed minor, or unique, differences between a few of the groups.

A particularly interesting finding from these minor differences involved attitudes toward school. Youths in the high mental health problems subgroup (class 3) were more likely to report fewer positive attitudes toward school than youths in the low mental health problems (class 1) and high-

mania-like (class 4) subgroups. This finding seems consistent with the psychological literature on school refusals, which would suggest that youths suffering from mental health problems experience negative attitudes about school and, therefore, refrain from attending school. Inconsistent with the school refusal literature, the LCA results did not identify a subgroup of youths with high anxiety levels. Generally, the school refusal literature indicates students suffering from general and social anxiety, in particular, refuse to attend school.[30] It is conceivable that analyses did not identify an anxiety subgroup because the youths were truant youths who failed to attend school without parental or school authority and, therefore, were not by definition school refusers. It is also possible that the analyses did not identify an anxiety subgroup because a general anxiety measure, rather than a social anxiety measure, was utilized. Future research on truant populations should consider including additional measures of anxiety and other mental health symptoms and greater exploration of the relationship between attitudes toward school, truancy, and offending.

Another interesting finding deals with the interaction between the treatment type and mental health subgroups. Youths in the high mania-like, low-depression subgroup who received the BI treatment had lower rates of future offending (arrest charges) than those in the same subgroup who received standard truancy services. As mentioned, the BI focuses on diminishing maladaptive beliefs and promoting protective factors such as problem-solving skills and strengthening support structures. It is possible that these techniques allowed youth with high mania-like and low depression to utilize better coping mechanisms that lead to legitimate, rather than illicit, behavior. It is unclear, however, why this process would not have worked similarly for youths in the other three latent classes. Future studies should explore the connection between mania-like, coping mechanisms, and offending among truant populations.

There are several limitations of this study that should be acknowledged. First, the nature of the sample limits the generalizability of this study. This study was limited to a small sample of truant youth in a large urban area in the southeastern USA. Further, participating youths in this study were enrolled through referrals from a truancy center where they were being held for truancy or school guidance counselors and diversion program staff who knew of the youth's truancy. Replication is needed to see if similar variations in mental health problems exist in samples of truant youth residing in different geographic areas and those selected through alternative processes. Second, the study was limited in scope in regard to the mental health symptoms that were examined. Future research should examine the variation in a broader spectrum of mental health symptoms among truant youths. Finally, differences in covariates associated with the four latent classes were cross-sectional, though the relationship with future arrest charges was longitudinal. Future research should attempt to better understand the temporal relationships between family and youth characteristics, mental health problems, and offending among truant populations.

This study underscores the importance of examining variation in mental health problems when looking at at-risk populations such as truants and youths involved in the juvenile justice system. Unfortunately, many truancy programs and schools are less concerned with the mental status of youths who fail to attend school. Yet, research clearly shows many youth classified as truant may be suffering from one or more mental health problems. In their evaluation of a truancy intervention program, McCluskey et al. stated only 6% of the truancy population was referred to a social service agency by attendance officers implementing the program.[115] If mental health problems are not recognized and properly addressed, possibly through psychological services, future problems among truant youth can be expected.

Implications for Behavioral Health

This study focused on one particular sample of youths with records of truancy; however, the results may be applicable to truant youths in other communities. Results indicated much heterogeneity in mental health problems among the truant youths, and these variations in mental

health problems affected future offending behaviors differently. This underscores the importance for community-based health services, including school systems, of providing quality, in-depth, psychosocial assessments to youth having truancy problems. Moreover, such services cannot take a singular approach to addressing truancy and the consequences of truancy, when the population of truant youth is diverse. If mental health issues affect truancy among youths, then community-health services have the responsibility of addressing this issue because truancy can lead to other, more severe, behavioral consequences like criminal offending.

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References

1. Education Commission of the States. *State Notes—Attendance: Compulsory School Age Requirements*. 2007. Available at http://www.ecs.org/clearinghouse/64/07/6407.htm. Accessed April 3, 2013.
2. National Center for School Engagement. *Lessons Learned from Four Truancy Demonstration Sites*. Denver, CO: Author, 2006.
3. Dropout Nation. *America's Truancy Problem: L.A. County Example*. 2010. Available at http://dropoutnation.net/. Accessed March 14, 2012.
4. Colorado Department of Education. *School by School Truancy Rates. School Year: 2010-2011*. Available at http://www.cde.state.co.us/cdereval/. Accessed December 5, 2011.
5. Garry EM. Truancy, first step in a lifetime of problems. Juvenile Justice Bulletin, vol. 76, Washington, DC: U.S. Department of Justice, Office of Juvenile Justice Delinquency Prevention, 2001.
6. Caldas SJ. Reexamination of input and process factor effects on public school achievement. *Journal of Educational Research* 1993; 86: 206-214.
7. Lamdin DJ. Evidence of student attendance as an independent variable in education production functions. *Journal of Educational Research* 1996; 89: 155-162.
8. Bridgeland J, Dilulio JJ, Morison KB. The Silent Epidemic: Perspectives of High School Dropouts. A report by Civic Enterprises in association with Peter D. Hart Research Associates for the Bill & Melinda Gates Foundation. Seattle, WA: The Bill & Melinda Gates Foundation, 2006.
9. Baker ML, Sigmon JN, Nugent ME. Truancy reduction: Keeping students in school. Juvenile Justice Bulletin. Washington, DC: U.S. Department of Justice, Office of Juvenile Justice Delinquency Prevention, 2001.
10. Kearney CA, Silverman WK. Family environment of youngsters with school refusal behavior: A synopsis with implications for assessment and treatment. *American Journal of Family Therapy* 1995; 23: 59-72.
11. Diebolt A, Herlache L. The School Psychologist as a Consultant in Truancy Prevention. Paper presented at the Annual Meeting of the National Association of School Psychologists, Dallas, TX, 1991.
12. Egger HL, Costello EJ, Angold A. School refusal and psychiatric disorders: A community study. *Journal of the American Academy of Child & Adolescent Psychiatry* 2003; 7: 797-807.
13. Dembo R, Briones-Robinson R, Barrett K, et al. Mental health, substance use, and delinquency among truant youths in a brief intervention project: A longitudinal study. *Journal of Emotional and Behavioral Disorders* 2013; *21: 176-192.*
14. Soldz S, Huyser DJ, Dorsey E. The cigar as a drug delivery device: Youth use of blunts. *Addiction* 2003; 98: 1379-1386.
15. Henry KL, Huizinga DH. School-related risk and protective factors associated with truancy among urban youth placed at risk. *Journal of Primary Prevention* 2007; 28: 505-519.
16. Henry KL, Thornberry TP, Huizinga DH. A discrete-time survival analysis of the relationship between truancy and the onset of marijuana use. *Journal of Studies on Alcohol and Drugs* 2009; 70: 5-15.
17. Loeber R, Farrington DP. Young children who commit crime: Epidemiology, developmental origins, risk factors, early interventions, and policy implications. *Development and Psychopathology* 2000; 12: 737-762.

18. Puzzanchera C, Stahl AL, Finnegan TA, et al. Juvenile Court Statistics 1998. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice Delinquency Prevention, 2003.
19. Schroeder J, Chaisson R, Pogue R. Pathways to death row for America's disabled youth: Three case studies driving reform. *Journal of Youth Studies* 2004; 7: 451-472.
20. Dryfoos JG. *Adolescents at Risk: Prevalence and Prevention.* New York, NY: Oxford University Press, 1990.
21. Catalano RF, Hawkins JD, Wells EA, et al. Evaluation of the effectiveness of adolescent drug abuse treatment, assessment of risks for relapse, and promising approaches for relapse prevention. *The International Journal of Addictions* 1991; 25: 1085-1140.
22. Robins LN, Ratliff KS. Long-Range Outcomes Associated with School Truancy. Publication No. ED152893, Washington, DC: Public Health Service, U.S. Department of Health, Education, and Welfare, 1978.
23. Snyder HN, Sickmund M. *Juvenile Offenders and Victims: A National Report.* Washington, DC: Office of Juvenile Justice and Delinquency Prevention, 1995.
24. Hersov L. School refusal. In: M Rutter, L Hersov (Eds). *Child and Adolescent Psychiatry Modern Approaches,* 2nd ed. Oxford: Blackwell Scientific Publications, 1985, pp. 382-399.
25. Kearney CA, Silverman WK. A preliminary analysis of a functional model of assessment and treatment for school refusal behavior. *Behavior Modification* 1990; 14: 344-360.
26. Kearney CA, Silverman WK. The evolution and reconciliation of taxonomic strategies for school refusal behavior. *Clinical Psychology: Science and Practice* 1996; 3: 339-354.
27. Berg I, Butler A, Franklin J, et al. *DSM-III-R* disorders, social factors, and management of school attendance problems in the normal population. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 1993; 34: 1187-1203.
28. Berg I, Casswell G, Goodwin A, et al. Classification of severe school attendance problems. *Psychological Medicine* 1985; 15: 157-165.
29. Kearney CA. Identifying the function of school refusal behavior: A revision of the School Refusal Assessment Scale. *Journal of Psychopathology and Behavioral Assessment* 2002; 24: 235-245.
30. Kearney CA, Albano AM. The functional profiles of school refusal behavior: Diagnostic aspects. *Behavior Modification* 2004; 28: 147-161.
31. McShane G, Walter G, Rey JM. Characteristics of adolescents with school refusal. *Australian and New Zealand Journal of Psychiatry* 2001; 35: 822-826.
32. Arseneault L, Moffitt TE, Caspi A, et al. Mental disorders and violence in a total birth cohort: Results from the Dunedin Study. *Archives of General Psychiatry* 2000; 57(10): 979-986.
33. Brennan PA, Mednick SA, Hodgins S. Major mental disorders and criminal violence in a Danish birth cohort. *Archives of General Psychiatry* 2000; 57(5): 494-500.
34. Doorn S van, Jansen LM, Vermeiren RR, et al. Psychopathology of adolescent detained versus psychiatric inpatient females. *Psychiatry Research* 2012; 195(3): 129-33.
35. Fazel S, Doll H, Langstrom N. Mental disorders among adolescents in juvenile detention and correctional facilities: a systematic review and metaregression analysis of 25 surveys. *Journal of the American Academy of Child and Adolescent Psychiatry* 2008; 47(9): 1010-1019.
36. Reef J, Diamantopoulou S, van Meurs I, et al. Developmental trajectories of child to adolescent externalizing behavior and adult *DSM-IV* disorder: results of a 24-year longitudinal study. *Social Psychiatry and Psychiatric Epidemiology* 2011; 46(12): 1233-41.
37. Teplin LA, Welty LJ, Abram KM, et al. Prevalence and persistence of psychiatric disorders in youth after detention: A prospective longitudinal study. *Archives of General Psychiatry* 2012; 69(10): 1031-1043.
38. Tiihonen J, Isohanni M, Rasanen P, et al. Specific major mental disorders and criminality: A 26-year prospective study of the 1966 northern Finland birth cohort. *American Journal of Psychiatry* 1997; 154(6): 840-845.
39. Vincent GM, Grisso T, Terry A, et al. Sex and race differences in mental health symptoms in juvenile justice: The MAYSI-2 national meta-analysis. *Journal of the American Academy of Child and Adolescent Psychiatry* 2008; 47(3): 282-90.
40. Connor DF. *Aggression and Antisocial Behavior in Children and Adolescents: Research and Treatment*. New York: Guilford Press, 2002.
41. Birmaher B, Ryan ND, Williamson DE, et al. Childhood and adolescent depression: A review of the past 10 years. Part I. *Journal of the American Academy of Child and Adolescent Psychiatry* 1996; 29: 914-918.
42. Knox M, King C, Hanna GL, et al. Aggressive behavior in clinically depressed adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 2000; 29: 611-618.
43. Pelkonen M, Marttunen M, Kaprio J, et al. Adolescent risk factors for episodic and persistent depression in adulthood. A 16-year prospective follow-up study of adolescents. *Journal of Affective Disorders* 2008; *106*(1-2): 123-31.
44. Vaughn MG, Freedenthal S, Jenson JM, et al. Psychiatric symptoms and substance use among juvenile offenders: A latent profile investigation. *Criminal Justice and Behavior* 2007; 34: 1296-1312.
45. Vaughn MG, Wallace JM, Davis LE, et al. Variations in mental health problems, substance use, and delinquency between African-American and Caucasian juvenile offenders: Implications for reentry services. *International Journal of Comparative Criminology* 2008; 52: 311-329.
46. Fergusson DM, Lynskey MT, Horwood LJ. Attentional difficulties in middle childhood and psychosocial outcomes in young adulthood. *The Journal of Child Psychology and Psychiatry* 1997; 38(6): 633-644.
47. Moffitt TE, Silva PA. Self-reported delinquency, neuro-psychological deficit, and history of attention deficit disorder. *Journal of Abnormal Child Psychology* 1988; 16: 553-569.
48. Rapport MD, Chung K. Attention deficit hyperactivity disorder. In: M Hersen, RT Ammerman (Eds). *Advanced Abnormal Child Psychology.* Mahwah, NJ: Lawrence Erlbaum Associates, 2000, pp. 413-440.
49. Angold A, Costello EJ, Erkanli A. Comorbidity. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 1999; 40: 57-87.
50. Hinshaw SP, Lahey B, Hart L. Issues of taxonomy and comorbidity in the development of conduct disorder. *Development and Psychopathology* 1993; 5: 31-49.
51. Waschbusch DA. A meta-analytic examination of comorbid hyperactive/impulsive/inattention problems and conduct problems. *Psychological Bulletin* 2002; 128: 118-150.

52. Teplin LA, Abram KM, McClelland GM, et al. Psychiatric Disorders of Youth in Detention. Juvenile Justice Bulletin. Washington, DC: U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention, 2006.
53. Abram KM, Teplin LA, McClelland GM, et al. Comorbid psychiatric disorders in youth in juvenile detention. *Archives of General Psychiatry* 2003; 60: 1097-1108.
54. Molina BSG, Pelham WE. Childhood predictors of adolescent substance use in a longitudinal study of children with ADHD. *Journal of Abnormal Psychology* 2003; 112(3): 497-507.
55. Sibley MH, Pelham WE, Molina BS, et al. The delinquency outcomes of boys with ADHD with and without comorbidity. *Journal of Abnormal Child Psychology* 2011; 39(1): 21-32.
56. Satterfield JH, Schell A. A prospective study of hyperactive boys with conduct problems and normal boys: Adolescent and adult criminality. *Journal of the American Academy of Child and Adolescent Psychiatry* 1997; 36(12): 1726-35.
57. Moffitt TE, Silva PA. Neuropsychological deficit and self-reported delinquency in an unselected birth cohort. *Journal of the American Academy of Child and Adolescent Psychiatry* 1988; 27: 233-240.
58. Biederman J, Petty CR, Monuteaux MC, et al. The longitudinal course of comorbid oppositional defiant disorder in girls with attention-deficit/hyperactivity disorder: findings from a controlled 5-year prospective longitudinal follow-up study. *Journal of Developmental and Behavioral Pediatrics* 2008; 29(6): 501-507.
59. Winters KC, Botzet A, Fahnhorst T, et al. Impulsivity and its relationship to risky sexual behaviors and drug abuse. *Journal of Child and Adolescent Substance Abuse* 2009; *18:* 43-56.
60. Mulvey EP, Schubert CA, Chassin L. Substance Use and Delinquent Behavior among Serious Adolescent Offenders. Washington, DC: Office of Juvenile Justice and Delinquency Prevention, 2010.
61. Windle M. A retrospective measure of childhood behavior problems and its use in predicting adolescent problem behaviors. *Journal of Studies on Alcohol* 1993; 54: 422-431.
62. Fergusson DM, Woodward LJ. Mental health, educational, and social role outcomes of adolescents with depression. *Archives of General Psychiatry* 2002; 59: 225-231.
63. Hayatbakhsh MR, Najman JM, Jamrozik K, et al. Adolescent problem behaviors predicting *DSM-IV* diagnoses of multiple substance use disorder: Findings of a prospective birth cohort study. *Social Psychiatry and Psychiatric Epidemiology* 2008; 43(5): 356-363.
64. Teplin LA, Elkington KS, McClelland GM, et al. Major mental disorders, substance use disorders, comorbidity, and HIV/AIDS risk behaviors in juvenile detainees. *Psychiatric Services* 2005; 56: 823-828.
65. Farrell AD, Danish SJ, Howard CW. Relationship between drug use and other problem behaviors in urban adolescents. *Journal of Consulting and Clinical Psychology* 1992; 60: 705-712.
66. Winters KC. Development of an adolescent alcohol and other drug abuse screening scale: Personal Experience Screening Questionnaire. *Addictive Behaviors* 1992; 17(5): 479-490.
67. Winters KC, Leitten W. Brief intervention for drug-abusing adolescents in a school setting. *Psychology of Addictive Behaviors* 2007; 21: 249-254.
68. Winters KC, Lee S, Botzet A, et al. One-year outcomes of a brief intervention for drug abusing adolescents. *Psychology of Addictive Behaviors*, in press.
69. Winters KC, Fahnhorst T, Botzet A, et al. Brief intervention for drug abusing adolescents in a school setting: Outcomes and mediating factors. *Journal of Substance Abuse Treatment* 2012; 42: 279-288.
70. Winters KC, Henly GA. *Adolescent Diagnostic Interview Schedule and Manual*. Los Angeles, CA: Western Psychological Services, 1993.
71. Winters KC, Stinchfield RD. *Adolescent Diagnostic Interview-Parent*. Minneapolis, MN: University of Minnesota, 2003.
72. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional versus new alternatives. *Structural Equation Modeling* 1999; 6(1): 1-55.
73. Browne MW, Cudeck R. Alternative ways of assessing model fit. In: KA Bollen, JS Long (Eds). *Testing Structural Equation Models.* Beverly Hills, CA: Sage, 1993.
74. Lynch S. *Introduction to Applied Bayesian Statistics and Estimation for Social Scientists*. New York: Springer, 2010, p. 132.
75. Rupp AA, Dey DK, Zumbo BD. To Bayes or not to Bayes, from whether to when: Applications of Bayesian methodology to modeling. *Structural Equation Modeling* 2004; 11(3): 424-451.
76. Scheines R, Hoijtink H, Boomsma A. Bayesian estimation and testing of structural equation models. *Psychometrika* 1999; 64(1): 37-52.
77. Gelman A, Rubin DB. Inference from iterative simulation using multiple sequences. *Statistical Science* 1992; 7(4): 457-511.
78. Gelman A, Carlin JB, Stern HS, et al. *Bayesian Data Analysis*, 2nd ed. Boca Raton, FL: Chapman & Hall, 2004.
79. Gelman A, Meng XL, Stern HS, et al. Posterior predictive assessment of model fitness via realized discrepancies (with discussion). *Statistical Sinica* 1996; 6: 733-807.
80. Muthèn LK, Muthèn BO. *Mplus User's Guide, 7th Version*. Los Angeles, CA: Muthèn & Muthèn, 1998-2012.
81. Muthén B, Asparouhov T. *Bayesian SEM: A More Flexible Representation of Substantive Theory.* Available at http://www.statmodel.com/download/BSEMv4.pdf. Accessed January 10, 2010.
82. Asparouhov T, Muthen B. *Auxiliary Variables in Mixture Modeling: A 3-Step Approach Using Mplus*, 2013, p. 4. Available at http://www.statmodel.com/download/3stepOct28.pdf. Accessed January 22, 2014.
83. Fabrigar LR, Wegener DT, MacCallum RC, et al. Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods* 1999; 4: 272-299.
84. Reynolds CR, Kamphaus RW. *Behavior Assessment System for Children*, 2nd ed. Circle Pines, MN: American Guidance Service, 2005.
85. Young P, Rahdert E. *Development of a POSIT-Related HIV/STD Risk Scale.* Bethesda, MD: NOVA Research Company, 2000.
86. Brook JS, Balka EB, Abernathy T, et al. Sequence of sexual behavior and its relationship to other problem behaviors in African American and Puerto Rican adolescents. *The Journal of Genetic Psychology* 1994; 155: 107-114.
87. Bryan AD, Ray LA, Cooper LM. Alcohol use and protective sexual behaviors among high-risk adolescents. *Journal of Studies on Alcohol and Drugs* 2007; 68(3): 327-335.
88. Cooper LM. Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. *Journal of Studies on Alcohol* 2002; 14: 101-117.

89. Elkington KS, Bauermeister JA, Brackis-Cott E, et al. Substance use and sexual risk behaviors in perinatally human immunodeficiency virus-exposed youth: Roles of caregivers, peers and HIV status. *Journal of Adolescent Health* 2009; 45(2): 133-141.
90. Goldstein AL, Barnett NP, Pedlow CT, et al. Drinking in conjunction with sexual experiences among at-risk college student drinkers. *Journal of Studies on Alcohol and Drugs* 2007; 68(5): 697-705.
91. Komro KA, Tobler AL, Maldonado-Molina MM, et al. Effects of alcohol use initiation patterns on high-risk behaviors among urban, low-income, young adolescents. *Prevention Science* 2010; 11(1): 14-23.
92. Morris RE, Baker CJ, Valentine M, et al. Variations in HIV risk behaviors of incarcerated juveniles during a four-year period: 1989-1992. *Journal of Adolescent Health* 1998; 23: 39-48.
93. Morris RE, Harrison EA, Knox GW, et al. Health risk behavioral survey from 39 juvenile correctional facilities in the United States. *Journal of Adolescent Health* 1995; 17: 334-344.
94. Murphy DA, Brecht M, Herbeck D, et al. Trajectories of HIV risk behavior from age 15 to 25 in the national longitudinal survey of youth sample. *Journal of Youth and Adolescence* 2009; 38(9): 1226-1239.
95. Wetherill RR, Fromme K. Alcohol use, sexual activity, and perceived risk in high school athletes and non-athletes. *Journal of Adolescent Health* 2007; 41(3): 294-301.
96. de Guzman MR, Bosch KR. *High-Risk Behaviors among Youth. Neb Guide: Division of the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln, Lincoln, NE.* Available at http://www.ianrpubs.unl.edu/epublic/live/g1715/build/g1715.pdf?redirected=true. Accessed September 19, 2012.
97. Warren CW, Santelli JS, Everett SA, et al. Sexual behavior among US high school students, 1990-1995. *Family Planning Perspectives* 1998; 30(4): 170-172.
98. Centers for Disease Control and Prevention. *Youth Risk Behavior Survey: United States-2009*. Available at http://www.cdc.gov/yrbs. Accessed April 3, 2013.
99. Centers for Disease Control and Prevention. *Youth Online-High School Youth Risk Behavior Survey.* Available at www.cdc.gov/yrbs. Accessed April 3, 2013.
100. Elliott DS, Ageton SS, Huizinga D, et al. *The Prevalence and Incidence of Delinquent Behavior: 1976-1980*. Boulder, CO: Behavioral Research Institute, 1983.
101. Dembo R, Schmeidler J. *Family Empowerment Intervention: An Innovative Service for High-Risk Youths and Their Families*. New York: The Haworth Press, 2002.
102. Maltz MD. *Recidivism*. Orland, FL: Academic Press, Inc, 1984.
103. Blumstein A, Cohen J. Estimation of individual crime rates from arrest records. *Journal of Criminal Law and Criminology* 1979; 70: 561-585.
104. Dayton CM. *Latent Class Scaling Analysis*. Thousand Oaks, CA: Sage Publications, 1998.
105. Nylund KL, Asparouhov T, Muthèn BO. Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling* 2007; 14: 535-569.
106. Lo Y, Mendell NR, Rubin DB. Testing the number of components in a normal mixture. *Biometrika* 2001; 88: 767-778.
107. Akaike H. Factor analysis and AIC. *Psychometrika* 1987; 52: 317-332.
108. Bozdogan H. Model selection and Akaike's Information Criteria (AIC): The general theory and its analytical extensions. *Psychometrika* 1987; 52: 345-370.
109. Lubke GH, Neale MC. Distinguishing between latent classes and continuous factors: Resolution by maximum likelihood? *Multivariate Behavioral Research* 2006; 41: 499-532.
110. Ramaswamy V, DeSarbo W, Reibstein D, et al. An empirical pooling approach for estimating marketing mix elasticities with PIMS data. *Marketing Science* 1993; 12: 103-14.
111. Crick NR, Zahn-Waxler C. The development of psychopathology in females and males: Current progress and future challenges. *Development and Psychopathology*2003; 15(3): 719-742.
112. Eronen M, Angermeyer MC, Schulze B. The psychiatric epidemiology of violent behaviour. *Social Psychiatry and Psychiatric Epidemiology* 1998; 33: 13-23.
113. Hodgins S. Major mental disorder and crime: An overview. *Psychology, Crime & Law* 1995; 2: 5-17.
114. Vermeiren R. Psychopathology and delinquency in adolescents: A descriptive and developmental perspective. *Clinical Psychology Review* 2003; 23: 277-318.
115. McCluskey CP, Bynum TS, Patchin JW. Reducing chronic absenteeism: An assessment of an early truancy initiative. *Crime & Delinquency* 2004; 50: 214-234.