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Psychosocial Problems Among Truant Youth: A Multi-Group, Exploratory Structural Equation Modeling Analysis

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Abstract

Truant youth represent a critical group needing problem-oriented research and involvement in effective services. The limited number of studies on the psychosocial functioning of truant youths have focused on one or a few problem areas, rather than examining co-morbid problem behaviors. The present study addresses the need to examine the interrelationships of multiple domains of psychosocial functioning, including substance involvement, mental health, and delinquency, among truant youth. Exploratory structural equation modeling on baseline data collected on 219 truant youths identified two major factors reflecting psychosocial functioning, and found the factor structure was similar across major sociodemographic subgroups. Further analyses supported the validity of the factor structure. The research and service delivery implications of the findings are discussed.

Keywords

Truancy; psychosocial problems; mental health; substance use; delinquency

Introduction

The interrelationships of substance use, mental health problems, and delinquency have been examined in a variety of ways in many retrospective, cross-sectional and longitudinal studies

involving at-risk youths in the U.S. and in other countries. Most of these studies have analyzed youths involved with the justice system. Overall, this body of literature provides strong evidence that significant cross-sectional and longitudinal relationships exist between and among these domains of behavior (e.g., Bor, McGee, & Fagan, 2004; D'Amico, Edelen, Miles, & Morral, 2008; Hayatbakhsh et al., 2008; Mannuzza, Klein, & Moulton, 2008; Paradise & Cauce, 2003; Salekin, 2008; Satterfield & Schell, 1997; Slade et al., 2008; Teplin et al., 2005; Van der Laan, Veenstra, Bogaerts, Verhulst, & Ormel, 2010; Vaughn, Freedenthal, Jenson, & Howard, 2007; Vaughn, Wallace, Davis, Fernandes, & Howard, 2008; Vermeiren, De Clippele, Schwab-Stone, Ruchkin, & Deboutte, 2002; Windle, 1993). Little, however, is known about how substance use, mental health problems, and delinquency are interrelated among truant youth.

Truancy refers to an unexcused absence from school without approval from appropriate school officials or parents; however, the exact definition of truancy varies across school districts and jurisdictions. Truant youth represent a segment of the population that are particularly at risk of becoming involved in negative and antisocial behaviors (Garry, 1996; Loeber & Farrington, 2000). Additional research is needed to better understand problems associated with truancy. The focus of this paper is the co-morbidity of substance use, mental health, and delinquency problems among a sample of truant youth.

Mental Health, Substance Use and Delinquency Among Non-Truant Populations

A large body of research has examined mental health problems among various populations. With specific regard to mental health, the emotional/ psychological issues examined typically included attention difficulties, impulsivity, attention deficit-hyperactivity disorder (ADHD) (e.g., Bor et al., 2004; Fergusson, Lynskey, & Horwood, 1997; White et al., 1994), depression (including suicidal ideation), anxiety and traumatic experiences (e.g., Pelkonen, Marttunen, Kaprio, Huurre, & Aro, 2008; Vaughn, Freedenthal et al., 2007; Vaughn, Wallace et al., 2008). Mania (e.g., several days of felt elation, boundless energy, racing thoughts, sleeplessness) has not received as much attention in the literature.

Positive relationships have consistently been found between substance use (e.g., alcohol, marijuana and other drug use [e.g., cocaine]), delinquent behavior, and mental health functioning in cross-sectional and longitudinal studies involving a variety of samples in the U.S. (e.g., Mulvey, Schubert, & Chassin, 2010; Vaughn, Freedenthal et al., 2007; Windle, 1993) and in other countries (e.g., Fergusson & Woodward, 2002; Hayatbakhsh et al., 2008). Emotional/ psychological problems have also been found to be related to substance use in delinquent (e.g., Teplin et al., 2005) and non-delinquent (e.g., Farrell, Danish, & Howard, 1992) samples of boys and girls. Young people experiencing problems with depression have been found to be at heightened risk of later major depression, anxiety disorders, substance involvement, and other adverse outcomes (Fergusson & Woodward, 2002).

Significant attention has focused on conduct disorders characterized by aggressiveness, property destruction, deceitfulness, or lack of regard for rules or laws, which is quite prevalent among juvenile offenders, especially incarcerated youths (Lahey et al., 1994; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002; Teplin et al., 2006; Wasserman, McReynolds, Ko, Katz, & Carpenter, 2005). Research findings suggest that conduct disordered juvenile offenders, especially those with callous traits, comprise a minority of incarcerated youth, yet are responsible for the majority of crime, especially serious crime (Dembo et al., 2007; Frick & White, 2008; Hill & Maughan, 2001; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007; Salekin, 2008).

In recent years, increasing attention has been paid to ADHD-impulsivity and its relationship to delinquency and other psychosocial functioning problems among juvenile offenders. Past

neglect of this relationship is surprising, given the prevalence of this disorder among these youths. For example, Teplin and colleagues (2006) found a six month prevalence of ADHD among 17% of male and 21% of female detainees (Cook County, Chicago). Further, sizable co-morbidity has been found between ADHD and affective disorders (e.g., depression), substance use disorders, and anxiety disorders among juvenile offenders (Abram, Teplin, McClelland, & Dulcan, 2003; see also Molina & Pelham, 2003). Related research indicates that ADHD delinquents 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 (Moffitt & Silva, 1988). Furthermore, 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) (Winters, Botzet, Fahnhorst, Baumel, & Lee, 2009).

Mental Health, Substance Use and Delinquency Among Truants

Less is known about mental health, substance use, and delinquency problems among truant populations of youth. In general, research on truant youth has focused on examining these three psychosocial areas separately, without consideration of co-morbidity in the problem areas. Truant youths often experience serious problems in regard to a stressed family life (Baker, Sigmon, & Nugent, 2001; Kearney & Silverman, 1995), alcohol and other drug use (Baker et al., 2001; Dembo & Turner, 1994; Diebolt & Herlache, 1991), emotional/psychological functioning (Diebolt & Herlache, 1991; Egger, Costello, & Angold, 2003; Kearney & Silverman, 1995), and poor educational functioning (e.g., low grades, high rates of being retained in grade or placed in remedial or special programs) (Dembo & Turner, 1994; Garry, 1996; Ingersoll & LeBoeuf, 1997; Dembo et al., in press).

Research has long recognized the association between truancy and psychopathology. From a psychological perspective, truant youth are typically divided into two classifications: youth who fail to attend school because of defiant behavior (typically this category is referred to as truancy), and youth who fail to attend school because of social anxiety or fear (typically this category is referred to as school refusal) (Egger et al., 2003; King & Berstein, 2001). School absenteeism may be symptomatic of certain psychological disorders such as conduct disorder and social phobia (American Psychiatric Association, 2000). Moreover, truant youth have demonstrated higher prevalence rates of psychological disorders than non-truant youth (e.g., Brandibas, Jeunier, Clanet, & Fouraste, 2004; Egger et al., 2003; Kearney, 2003). Research is unclear, however, about the connection between truancy and mental health problems, with preliminary data suggesting a reciprocal relationship between mental health problems and truancy (Wood et al., 2011).

Research has also linked truancy with other forms of antisocial behavior. In particular, studies have reported an association between truancy and substance use and abuse (Bryant & Zimmerman, 2002; Chou, Ho, Chen, & Chen, 2006; Miller & Plant, 1999). Truancy has been shown to lead to the onset of alcohol, tobacco, and marijuana use (Henry & Huizinga, 2007; Henry, Thornberry, & Huizinga, 2009). Further, truancy can lead to an escalation of substance use (Henry & Thornberry, 2010). In addition, research has indicated truancy is associated with delinquency and crime (e.g., Baker et al., 2001; Catalano, Arthur, Hawkins, Berglund, & Olson, 1998; Garry, 1996; Onifade, Nyandoro, Davidson, & Campbell, 2010). Truant youths are at considerable risk of continuing their troubled behavior in school and entering the juvenile justice system (Garry, 1996; Ingersoll & LeBoeuf, 1997; Loeber & Farrington, 2000; Puzzanchera, Stahl, Finnegan, Tierney, & Snyder, 2003).

The Need for More Research on Truant Youth

Truant youth represent a critical group warranting more research. According to the Office of Juvenile Justice and Delinquency Prevention (Baker et al., 2001), hundreds of thousands of youths are truant each day, with many who are chronically absent. Relatedly, truant youth often experience problems in school, troubled family situations, failing grades, and psychosocial difficulties, which includes drug use (Dembo & Turner, 1994; Dembo et al., in press). Unfortunately, truant youth are often treated as management and disciplinary problems (DeKalb, 1999; Diebolt & Herlache, 1991; Dougherty, 1999). Resources are focused on identifying, locating, and transitioning truant youth back into their respective schools with sanctions and/or citations, rather than identifying their problems and linking them with needed service programs (Dembo & Gullledge, 2009).

Research examining the interrelationships among multiple domains of psychosocial functioning among truant youth, including substance involvement, mental health, and delinquency, is needed. Greater understanding of co-morbidity in problem behaviors among truants may offer insight into the motivations of truancy and more serious school refusal behavior, as well as intervention and treatment. Identifying the service needs of truant youth before they become more seriously troubled and involved in high risk behaviors, and linking them with effective programs/ services, provides an excellent opportunity to reduce the likelihood they will move into the juvenile justice system. With few exceptions (e.g., Henry & Huizinga, 2007; McCluskey, Bynum, & Patchin, 2004), however, truancy has not received significant attention by criminologists.

There is a critical need to: (1) document comprehensively the psychosocial problems experienced by truant youths, (2) identify any underlying factors that account for the interrelationships among these problems, and (3) assess the validity of these factors. These were the main objectives of the research reported in this paper. Due to the very limited literature on this topic, and because our findings may stimulate further research studies, we present interim results from an ongoing NIDA-funded project involving truant youths.

This paper reports analyses of data collected on 219 truant youths and their parents/ guardians, who are participating in an ongoing, prospective, Brief Intervention (BI) study of substance using, truant youth. Exploratory factor analyses identified two major factors accounting for the youths' psychosocial functioning, and found the factor structure was similar across major sociodemographic subgroups in the study. Further analyses supported the validity of the factor structure. Following a presentation and discussion of our results, we review the research and service delivery implications.

Method

Participants and Procedures

The main place of recruitment into the BI project occurred at a south Florida Juvenile Assessment Center, Truancy Intake Center (TIC). Eligible youth met the following criteria: (1) aged 11 to 15, (2) no official record of delinquency or up to two misdemeanor arrests on record, (3) some indication of alcohol or other drug use, as determined by a screening instrument, such as the Personal Experience Screening Questionnaire [PESQ (Winters, 1992)] or as reported by a county school district social worker located at the TIC, and (4) lived within a 25 mile radius of the TIC. Additionally, participants were referred to the BI project by social workers or guidance counselors from area schools.

A second place of recruitment into the BI project was at a community diversion program. Case managers referred youth with a current truancy record who met project criteria for BI services to project staff for enrollment. At both locations, project enrollment proceeded as

follows. A project staff member met with the youth and his/her parent/ guardian and provided an overview of the project and its services. Potential participants were then informed that project services were provided in-home, were free, and that participation was voluntary. For interested parents and youth, an in-home meeting was scheduled to discuss the project further, to answer any questions they had, complete the consent and assent processes, and to conduct separate baseline interviews with the youth and his/her parent/ guardian. (More information on the BI project and intervention can be found in Dembo et al., in press and Winters & Leitten, 2007. Further information on the TIC can be found in Dembo & Gullledge, 2009.)

Of the 422 TIC and diversion truancy youth who were eligible for enrollment, 56% of families agreed to an initial in-home meeting. Of families who agreed to an initial in-home meeting, 77% completed the baseline assessment between March 6, 2007 and June 27, 2010 resulting in a sample of 219 youth. Each youth and parent/ guardian was paid \$15 for completing the interview. The baseline interviews for parents/ guardians averaged 30 minutes; the youth interviews averaged one hour. The youth and parent/ guardian interviews were conducted separately and in private. All study procedures were approved and monitored by a local IRB. Comparisons of participating and non-participating youth with regard to gender, race, and ethnicity found no statistically significant differences between the two groups. However, older youth were more likely to participate than younger youth ($t[420] = 3.31, p < .001$).

Most youths in the study were male (65%), and averaged 14.80 years in age ($SD = 1.31$). Thirty-nine percent of the youths were Caucasian, 25% were African American, 27% were Hispanic, 1% were Asian, and 8% were from other, mainly multi-ethnic, backgrounds. Relatively few youths (15%) lived with both their biological parents. In contrast, a majority of the youths were living either with their biological mother alone (32%) or with their mother and another adult (35%). Many of the youths tended to live in modest socioeconomic circumstances. For example, 10% of the caretakers reported an annual income of more than \$75,000, whereas 37% reported annual incomes of \$25,000 or less. Median family income was \$25,000 to \$40,000.

Measures

Mental health measures—Below we present the youths' responses to questions probing mental health experiences, and the procedures that were used to create corresponding summary measures, which involved exploratory and confirmatory factor analyses using maximum likelihood (ML) and Bayesian estimation procedures. Currently, ML estimation procedures are extensively used in statistical analyses. For the ML estimation, the comparative fit index (CFI) and the Tucker-Lewis index (TLI) were used to evaluate model fit. The typical range for both CFI and TLI is between 0 and 1, although the TLI may achieve values slightly greater than 1, with values greater than .90 indicating an acceptable fit and values greater than .95 indicating a good fit (Hu & Bentler, 1999). Two additional indices were used to assess model fit. First, the root mean square error of approximation (RMSEA) was used to determine fitness. RMSEA values of .05 or less indicate a close model fit, and values between .05 and .08 indicate an adequate fit (Browne & Cudeck, 1993). Second, fitness was determined using the weighted root mean square residual (WRMR) for categorical variables. Yu and Muthén (2001) suggest WRMR scores less than .90 indicate good models.

In recent years, however, Bayesian analysis has become increasingly utilized. 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/ other frequentist estimation procedures, are unlikely to hold (Lynch, 2010; Rupp, Dey, & Zumbo,

2004; Scheines, Hoijtink, & Boomsma, 1999). 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, which is firmly established in mainstream statistics: convergence-mixing and model fit. In Bayesian analysis, Markov chain Monte Carlo (MCMC) estimation algorithms are used to make random draws of parameter values, resulting in an approximation of the joint distribution of all parameters in the analysis. Usually, several MCMC chains are used, involving different starting values and different random seeds in making the random draws (Muthén & Asparouhov, 2010; see also Lynch, 2010). The Gelman-Rubin diagnostic (Gelman & Rubin, 1992; see also Gelman, Carlin, Stern, & Rubin, 2004), referred to as the potential scale reduction (PSR) factor, is often used to assess convergence-mixing. 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 (Lynch, 2010). One of the best approaches for examining model fit is posterior predictive distribution checking, introduced by Gelman, Meng, Stern, and Rubin (1996) and refined by Gelman et al. (2004). As implemented in the statistical software, Mplus (Muthén & Muthén, 2010), a posterior predictive p-value (PPP) fit statistic is based on the commonly used likelihood-ratio chi-square test of an H_0 (null hypothesis) model against an unrestricted H_1 model (Muthén & Asparouhov, 2010). A low PPP value [e.g., .05 or .01 (see Asparouhov & Muthén, 2010)] indicates a poor fit, with values around 0.5 reflecting an excellent fit. The aforementioned estimation techniques and fit statistics for ML and Bayesian estimation were used to create the mental health measures used in this study.

The main mental health data collection instruments used in the study were the Adolescent Diagnostic Interview (ADI, Winters & Henly, 1993), and the Parent/Guardian ADI (ADP-I, Winters & Stinchfield, 2003). Both the ADI and ADP-I were designed within a highly structured format (e.g., most questions are yes/no) and to measure *DSM-IV* criteria for substance use disorders and related areas of functioning. Item construction primarily involved advice from an expert panel and feedback from field testers. *DSM* guidelines and results from the statistical analysis provided the basis for scoring rules. Reliability and validity studies, involving over 1000 drug clinic adolescents for the ADI and about 200 parents/ guardians for the ADP-I, 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 (Winters & Henly, 1993; Winters & Stinchfield, 2003).

Attention deficit hyperactivity disorder: Four questions keyed to *DSM-IV* criteria for ADHD were included in the youth ADI interviews (Winters & Henly, 1993). Specifically, youths were asked: “Do you find that you are the type of person who gets complaints from parents or teachers that you don't listen to instructions or directions?” (55% responded yes); “Do you frequently tend to act before thinking?” (71% responded yes); “Do you often have difficulty waiting for your turn during games or when doing things with other people your age?” (32% responded yes); and “Do you often fidget and find it difficult to sit still?” (52% responded yes). Confirmatory factor analysis (CFA), using ML and Bayesian estimation, was used to assess how well a one factor model, involving each of the four ADHD items, fit the data (Muthén & Muthén 1998-2010, version 6.1). CFA results based on ML estimation indicated a very good fit for the single factor ADHD model (Chi-square = 3.13[2], $p = 0.21$; CFI = 0.992; TLI = 0.977; RMSEA = 0.051; WRMR = 0.430), with all standardized loadings greater than .40. Bayesian estimation also confirmed the existence of a one factor

model (PSR = 1.05; PPP = 0.500). Based on these results, a measure of ADHD was created by saving the factor scores for use in further analyses. (Detailed tables reporting these results are available from the corresponding author upon request.) The descriptive statistics for ADHD, as well as the other measures and sociodemographics included in this study, are reported in Table 1.

Mania: Youths were also asked to indicate whether they had experienced problems with four symptoms of mania. The youths were asked: “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?” (26% responded yes); “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?” (36% responded yes); “During such a period, when you were not using alcohol or drugs, did you ever feel as though your thoughts were racing?” (40% responded yes); and “During such a period, when you were not using alcohol or drugs, did you ever feel that you could go for a long period without sleep?” (31% responded yes). CFA was used to assess how well a one factor model, involving each of the four mania items, fit the data. ML results indicated a very good fit for the single factor model (Chi-square = 4.19[2], $p = 0.12$; CFI = 0.982; TLI = 0.945; RMSEA = 0.071; WRMR = 0.545), with all standardized loadings greater than .50. Bayesian estimation also confirmed the existence of a one factor model (PSR = 1.05; PPP = 0.514). Based on these results, a measure of mania was created from saved factor scores and used in the analyses. (Detailed tables reporting these results are available from the corresponding author upon request.)

Anxiety: To examine anxiety, youths were asked to indicate whether they felt anxious about situations involving the safety of their parents, social phobia, academics/ peers and their futures. Specifically, four questions about anxiety were asked: “Do you worry a great deal when you are away from home that something bad might happen to your parents?” (42% responded yes); “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?” (9% responded yes); “Do you ever worry a lot about how well you are doing as a student or whether you have enough friends?” (36% responded yes); and “Do you worry a great deal about how future events will turn out?” (65% responded yes). CFA using ML was used to assess how well a one factor model, involving each of the four anxiety items fit the data. Results indicated the four anxiety items were significantly loaded on one factor. However, the distribution of these data did not meet the asymptotic distribution assumptions of ML, with a resulting poor model fit (Chi-square = 16.27[5], $p = 0.001$; CFI = 0.873; TLI = 0.619; RMSEA = 0.180; WRMR = 1.172). However, Bayesian estimation did confirm the existence of a one factor model. A good Markov chain Monte Carlo algorithm convergence was achieved, with a potential scale reduction value of 1.08. In addition, a good model fit, reflected in a posterior predictive p-value, of 0.315 was obtained. Therefore, an anxiety measure was created from saved factor scores and used in subsequent analyses. (Detailed tables reporting these results are available from the corresponding author upon request.)

Depression: Youth responses to five items in the ADI were used to measure depression. Youths were asked to indicate problems with sadness, insomnia and suicidal thoughts. Specifically, the truant youths were asked: “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 about anything anymore?” (55% responded yes); “Have you ever continuously felt like crying for several days in a row?” (33% responded yes); “Have you ever had any trouble sleeping that lasted for many days?” (41% responded yes); “Have you ever felt so down that you felt like ending your life?” (22% responded yes); and “Have you ever actually attempted suicide?”

(9% responded yes). CFA using ML of a one factor model indicated the five depression items were significantly loaded on one factor. However, the distribution of these data did not meet the asymptotic distribution assumptions of ML, with a resulting poor model fit (Chi-square = 21.81[5], $p < 0.001$; CFI = 0.963; TLI = 0.926; RMSEA = 0.124; WRMR = 1.097). However, a very good one factor fit was obtained using Bayesian estimation (PSR = 1.07; PPP = 0.369). A depression measure was created using the saved factor scores and used in the analyses. (Detailed tables reporting these results are available from the corresponding author upon request.)

Trauma—The youths' parents/ guardians were asked to indicate if the youth or their family ever experienced various traumatic events. Many of the youths and their families experienced traumatic or negative life events, with unemployment of parent (49%), divorce of parents (42%), death of a loved one (60%), serious illness (32%), and legal problem resulting in jail or detention (26%) being noteworthy. In addition, 46% of the caretakers reported other traumatic experiences (e.g., youth being placed in foster care, not having a relationship with their father, mother's drug addiction, youth witnessing mother being verbally and physically abused by father, and separation from their mother). Overall, an average of 2.96 (SD = 1.73) traumatic events were reported. For each youth, we calculated the total number of traumatic events he/she or another family member experienced. This measure of trauma was used in subsequent analysis.

Substance use—During their baseline interviews, youths were asked about their lifetime use of alcohol to the point of feeling its effects (e.g., feeling a buzz or intoxicated), lifetime use of marijuana, and lifetime, non-medical use of other drugs (e.g., barbiturates, hallucinogens, cocaine, opioids [including opioid pain medications], club drugs) (Winters & Henly, 1993). Thirty-four percent of the youths reported alcohol use to achieve effects five or more times, 69 percent used marijuana five or more times, and 10 percent reported engaging in other drug use (primarily barbiturates) five or more times.

For youths reporting alcohol, marijuana, or other drug use, detailed questions for each drug used five or more times in their lives were asked regarding the extent, experiences, and consequences of use. For each drug, the responses were keyed to *DSM-IV* criteria for a substance use disorder, leading to a classification of each youth as having diagnoses of no drug abuse, drug abuse, or drug dependence. Finally, the diagnostic results for the three categories of drugs (alcohol, marijuana, and other drugs) were combined into an overall substance use diagnosis measure, based on their most serious diagnostic classification on any of the three mutually exclusive drug categories: 0 = no diagnosis on any of the three categories of drugs, 1 = abuse disorder on any of the drug categories and no dependence disorder on all categories, and 2 = dependence disorder on any of the three categories of drugs.

Self-reported delinquent behavior—Based on the work of Elliott, Ageton, Huizinga, Knowles, and Canter (1983), we measured the youths' delinquent behavior prior to their interviews by asking how many times they engaged in each of 23 delinquent behaviors. Youths who reported committing an act 10 or more times were also asked to indicate how often they participated in this behavior (once a month, once every two or three weeks, once a week, two to three times a week, once a day, or two to three times a day). Moreover, youths were asked to indicate the age during which a committed act first occurred for each delinquent behavior. Similar to Elliott et al. (1983), we developed five summary indices of delinquent involvement: general theft (e.g., petit theft, vehicle theft/joyriding, burglary); crimes against persons (e.g., aggravated assault, fighting, robbery); index crimes (similar to Uniform Crime Report [UCR] Index Part I); drug sales; and total delinquency (i.e., the sum of the 23 delinquent activities).

The range of responses to the items comprising the five self-reported delinquency scales was large, ranging from no activity to hundreds (and in few cases thousands), and analysis of the frequency data as an interval scale was not appropriate as a measure of involvement in delinquency. Raw numbers of offenses do form an interval scale, which might be useful if one were predicting crime rates for populations. However, the difference between no offense and 1 offense is not the same as the difference between 99 and 100 offenses in terms of involvement. A transformation was employed so that equal intervals on the transformed scale would represent differences in involvement. The differences between 1 and 10, 10 and 100, and 100 and 1,000 offenses were interpreted as being comparable. Accordingly, the number of offenses for each scale was log transformed to the base 10. A score of -1 was assigned to youths who reported engaging in zero offenses. 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 (Dembo & Schmeidler, 2002).

The correlations between the log transformed measure of total delinquency and the other delinquency measures were sizable and statistically significant (mean correlation = 0.612). Hence, we decided to use the log transformed measure of total delinquency in subsequent analyses. Importantly, the skewness and kurtosis (-0.489 and 0.268, respectively) of the log transformed measure of total delinquency were dramatically lower than those of the untransformed measure (4.682 and 25.728, respectively).

Validity of the self-reported delinquency data: Truthfulness in reporting sensitive behavior, such as delinquency, is a very important issue. We studied this matter in a longitudinal analysis of self-reported delinquency among youths in our study. The results indicated relatively low rates of denial of officially recorded delinquency compared to the rates of admission for delinquency among youths with no official delinquency record; and suggested that most youths reported their delinquency fairly accurately (Dembo et al., in press).

Results

Strategy of Analysis

Since we had no theoretical/conceptual framework guiding the specification of factor structure or the pattern of loadings of the measures on the factors, we pursued an exploratory factor analysis of the youths' co-morbidity of mental health problems, substance use, and delinquency, as discussed earlier. Confirmatory factor analysis is frequently regarded as the "gold standard" of factor analysis, in that it examines how well a hypothesized factor model fits a new sample from the same population or another population, distinguished by placing restrictions on the parameters of the model. On the other hand, exploratory factor analysis (EFA) is often used to assess the dimensionality of a measurement model, by seeking to identify the smallest number of interpretable factors to explain the correlations in a set of variables. It is particularly useful when the factor loading pattern does not reflect simple structure (Asparouhov & Muthén, 2009). As Asparouhov and Muthén assert (2009), "misspecification of zero loadings usually leads to distorted factors with overestimated factor correlations and subsequent distorted structural relations" (p. 397). Exploratory factor analysis is distinguished by the placing of no restrictions on the linear relationships among the observed variables or on the linear relationships between the observed variables and the factors—only specifying the number of latent variables to be estimated (Muthén & Muthén, 2009).

In practice, CFA is frequently used in an exploratory manner. Often, confirmatory factor analysis models involve prespecified factor loadings which are found to not fit the data, and are subsequently rejected. A sequence of model modifications are, then, pursued in an effort

to improve model fit (Nesselroade & Baltes, 1984), often resulting in a situation of model uncertainty (MacCullum, Roznowski & Necowitz, 1992). In these situations, EFA, with factor matrix rotation, would be preferable (Browne, 2001).

In the present study, Yates' (1987) Geomin was used to perform an oblique rotation of the initial factor structure. It is a preferred rotational procedure when factor measures are loaded on more than one factor (Muthén & Muthén, 1998-2010). Adapted from a solution to the row complexity problem suggested by Thurstone (1935, 1947), Yates' (1987) replaced "the sum of within row products of squared reference structure elements by a sum of within row geometric means of squared pattern coefficients" (Browne, 2001, p. 120).

The analyses proceeded in four steps. First, we completed an exploratory factor analysis of the seven measures discussed in the methods section. Figure 1 presents the model we examined. Second, we conducted multi-group assessments of the identified factor structure across sociodemographic subgroups in the study (gender, age, African American race, and Hispanic ethnicity). Third, the relationships between the sociodemographic factors and the identified factors were examined. Fourth, we sought to evaluate the concurrent and predictive validity of the obtained factor structure by assessing the relationship between the factors and: (1) parent/guardian reports on their child and (2) the youths' reported involvement in sexual risk behavior over a 12-month follow-up period.

EFA Results

As noted earlier, EFA with Geomin rotation was used to estimate a one to four factor solution involving the following seven variables: (1) anxiety, (2) depression, (3) mania, (4) ADHD, (5) trauma, (6) delinquency, and (7) substance use diagnosis. The exploratory factor analyses were completed using Mplus Version 6.1 (Muthén & Muthén, 2010; also see: Asparouhov & Muthén, 2009), a multivariate statistical modeling program that estimates a variety of models for continuous and categorical observed and latent variables. Results indicated three and four factor solutions could not be estimated.

However, as shown in Table 2, a nice two factor solution was obtained (Chi-square = 10.68 [8]; $p = 0.22$; RMSEA = 0.039; CFI = 0.984; TLI = 0.957; WRMR = 0.286). Factor 1 appears to be a general factor, in that all variables except substance use diagnosis are significantly loaded in it. Of particular interest is the significant loading of a rather wide range of psychosocial characteristics on this first factor, reflecting their salience among the truant youth we studied. Trauma represents an important aspect of this domain. The standardized loadings for factor 1 indicate high loadings for depression, mania, ADHD, and anxiety, with significant but more modest loadings of trauma and delinquency.

Factor 2 is more problem specific, with significant, positive loadings for delinquency and substance use diagnosis, but none of the mental health indicators. These are two experiences repeatedly found to be related to one another in the research literature discussed earlier. The standardized loadings for factor 2 indicate a high loading for substance use diagnosis and a lower, though significant, loading for delinquency.

It is also important to note that delinquency cross-loads significantly on both factors. In addition, the two factors are not significantly related to one another. These results indicate a more complex than simple structure configuration of the youths' externalizing and internalizing behaviors.

Multiple Group Estimation of the Two Factor Solution

Having identified the existence of a two factor model of co-morbidity for the truant youth, we examined the fit of the two factor model across the following sociodemographic groups:

(1) gender, (2) race (African American or not), (3) ethnicity (Hispanic or not), and age (grouped as aged 11 to 14, and aged 15 to 17). Analyses began by ensuring the two-factor co-morbidity model was invariant across both groups for each sociodemographic measure. Multi-group model specification involved measurement invariance across the various comparison groups (i.e., equal factor loadings, intercepts, and thresholds). Results indicated a good fit of the two factor model across gender (Chi-square = 36.34 [31]; $p = 0.23$; RMSEA = 0.040; CFI = 0.966; TLI = 0.954; WRMR = 0.747), race (Chi-square = 28.99 [31]; $p = 0.57$; RMSEA = 0.000; CFI = 1.000; TLI = 1.020; WRMR = 0.620), ethnicity (Chi-square = 43.53 [31]; $p = 0.07$; RMSEA = 0.061; CFI = 0.921; TLI = 0.894; WRMR = 0.877), and age (Chi-square = 29.34 [31]; $p = 0.55$; RMSEA = 0.000; CFI = 1.000; TLI = 1.014; WRMR = 0.670) groups. In other words, the two-factor model fit the data well for both boys and girls, both African Americans and non-African Americans, both Hispanics and non-Hispanics, and both younger and older truants.

Sociodemographic covariates of the two identified factors—Having determined a similar factor structure across sociodemographic groups in the study, we examined the relationships between these characteristics and the two identified factors. Table 3 presents the effects of the sociodemographic characteristics on the two factors.

While the factor structure was consistent across the sociodemographic groups, female truants, younger (aged 11-14) truants, and non-Hispanic truants were significantly more likely to experience the issues reflected in Factor 1, the mental health, trauma, and delinquency problem factor, than male truants, older truants, and Hispanic truants, respectively. Neither factor was significantly related to race. No significant sociodemographic relationships were found for Factor 2.

Concurrent and Predictive Validity of the Factor Solution

Concurrent validity—Information asked of parents/ guardians about the study youth during their baseline interviews provided important collateral information on the youths' functioning. We asked parents/ guardians whether their children had ever received mental health treatment for a non-drug related problem, had ever been sent to live away from home due to behavior problems at home, had ever received substance abuse treatment, had ever received psychotropic medication for mood, behavior or other mental/emotional health issues, had ever used alcohol to the point of experiencing its effects (e.g., feeling dizzy or being intoxicated), had ever used alcohol five or more times with these effects, had ever used marijuana, or had ever received special school services for learning problems. Results indicated significant or marginally significant relationships between general factor 1 and parent/ guardian reports that their child received non-drug related mental health services (Critical ratio [CR] = 1.782, two level $p = 0.075$), used alcohol to the point of experiencing its effects five or more times (CR = 2.012, $p = 0.044$), and not used marijuana (CR = -2.171, $p = 0.030$). Significant relationships were also found between the delinquency-substance involvement factor 2 and parent/guardian reports that their child received substance use/ abuse treatment (CR = 2.885, $p = 0.004$), ever used alcohol (CR = 5.563, $p < 0.001$), used alcohol five or more times (CR = 4.546, $p < 0.001$), and used marijuana (CR = 3.279, $p < 0.001$).

Predictive validity—In order to assess the predictive validity of the factor solution, we regressed the youths' reports of involvement in sexual risk behavior on the two factors at 3-month, 6-month, and 12-month follow-up. Lack of condom use and number of sexual partners are widely used sexual risk behavior measures in related research (Brook, Balka, Abernathy, & Hamburg, 1994; Bryan, Ray, & Cooper, 2007; Cooper, 2002; Elkington, Bauermeister, Brackis-Cott, Dolezal, & Mellins, 2009; Goldstein, Barnett, Pedlow, &

Murphy, 2007; Komro, Tobler, Maldonado-Molina, & Perry, 2010; Morris, Baker, Valentine, & Pennisi, 1998; Morris, Harrison, Knox, Tromanhauser, & Marquis, 1995; Murphy, Brecht, Herbeck, & Huang, 2009; Wetherill & Fromme, 2007). Hence, we developed a measure of sexual risk behavior focusing on engaging in these two most prominent indicators of sexual risk behaviors at each time point from the youths' replies to these items, which consisted of three ordinal categories: 0 = engaged in none of the two sexual risk behaviors (i.e., sexual intercourse without using a condom, having 2 or more sexual partners), 1 = engaged in one of the two sexual risk behaviors, and 2 = engaged in both sexual risk behaviors.

We found a significant, positive relationship between the delinquency and substance diagnosis factor (factor 2) and reported engaging in sexual risk behavior at 3-month follow-up ($CR = 2.353$, $p < .05$ [$n = 166$]); and marginally significant relationships between factor 2 and reported engaging in sexual risk behavior at 6-month follow-up ($CR = 1.782$, $p = 0.075$ [$n = 147$]) and 12-month follow-up ($CR = 1.704$, $p = 0.088$ [$n = 107$]). No significant or marginally significant effects of general psychosocial functioning (factor 1) and reported involvement in sexual risk behavior over time were found.

Discussion

Truant youth represent an understudied segment of society. Truant youth often experience difficulties associated with school, family, and psychosocial development. They are also at risk of engaging in delinquent behavior, including substance use. The purpose of the present study was to expand our knowledge of how psychological problems, delinquency, and substance use are interrelated among truant youth. An examination of preliminary data from truant youth involved in a Brief Intervention project revealed several interesting findings regarding the relationships between psychological and behavioral risk factors.

Our results document the high prevalence levels of psychosocial problems experienced by truant youths. In the study sample, the exploratory factor analysis indicated two underlying, yet independent factors accounted for the relationships among the seven functioning measures. The two factors were not easily characterized as internal vs. external factors. Factor 1 appeared to be a general factor of mental health problems, exposure to trauma, and self-reported delinquency, while factor 2 primarily reflected involvement in delinquent behavior and substance use. The pattern of variable loadings on the factors, especially the cross loading of delinquency on both factors, did not reflect a simple structure. Multi-group analyses confirmed the factor structure was similar across sociodemographic subgroups (gender, age, race, and ethnicity), permitting a meaningful assessment of the effects of these variables on the two derived factors. Also, several significant relationships between sociodemographic characteristics and factor 1 were found, such that female, younger, and non-Hispanic truants were more likely to demonstrate problems associated with this general psychosocial problem factor.

Importantly, evidence was found in support of the concurrent and predictive validity of the two factors. Baseline parent/guardian interview data indicated significant or marginally significant relationships between general factor 1 and parent/ guardian reports that their child received non-drug related mental health services, used alcohol to the point of experiencing its effects five or more times in their lives, and non-use of marijuana. Significant relationships were also found between the delinquency/substance use diagnosis factor (factor 2) and parent/ guardian reports that their child received substance use/abuse treatment, used alcohol, and used marijuana. In regard to predictive validity, we found a significant, positive relationship between delinquency/substance use diagnosis, factor 2, and reported engaging in sexual risk behavior at 3-month follow-up; and marginally significant

relationships between factor 2 and reported engaging in sexual risk behavior at 6-month and 12-month follow-up.

Taken together, the results indicate that many of the truant youths are experiencing serious psychosocial difficulties-including stress/trauma. These troubled youths often live in households where other family members are experiencing substance use or mental health problems. The findings underscore the importance of the interrelationships among the youths' mental health, substance use, delinquency, and stress/trauma experiences in understanding their psychosocial risk.

The study also points to the need for ongoing, in-depth assessments of truant youth. Such assessments are indispensable in order to best allocate intervention services based on their psychosocial needs. As well, the troubled family situations of these youths should be identified, and, if indicated, addressed and remediated in comprehensive treatment services.

There are several limitations to our study. First, the study involved a relatively small number of cases. We plan to replicate these analyses with a larger number of cases in this ongoing study to address this issue. Second, there is a need to replicate the findings with truant youth in other jurisdictions, who differ in their sociodemographic characteristics. Such an effort will identify whether the factor structure we obtained was sample specific or holds among other truant youth. Third, the variables used in the exploratory factor analyses were developed from cross-sectional data collected during baseline interviews. We are planning to conduct and report the results of additional longitudinal analyses, beyond the sexual risk data used to validate the obtained factor structure, in future manuscripts produced from this ongoing, prospective study. These planned studies will offer greater insight into the types of problems truant youth develop over time; however, they will be unable to speak to the temporal connection between truancy and problem behaviors. Additional longitudinal research is needed that can clarify the interrelationship between truancy and psychosocial problems. As mentioned in the literature review, truancy may be a symptom of psychopathology, including fear and anxiety problems. Students experiencing problems in school may find relieve from their stress by skipping school. In such cases, psychopathology leads to truancy. On the other hand, students may skip school for neutral reasons and find their truant behavior leads to stress and psychological problems. Future research is necessary to address the nature of the truancy-psychosocial problem relationship. Moreover, such research may offer insight into the motivations of truancy.

Truancy represents a continuing epidemic in academic settings across the United States (Fantuzzo, Grim, & Hazan, 2005). Efforts to address truant behavior remain primarily sanction and procedure oriented, with truant youths being treated as disciplinary and management problems. Current and foreseeable educational funding cuts increase the likelihood these responses to truancy will continue. Yet, truant youth likely need services, not sanctions. Interventions that do not target the root causes of their problem behavior will fail to address the issues that can lead many seriously troubled truant youth to move into the juvenile justice system. Moreover, directing treatment resources to truant youth is far less costly, and has greater potential for redirecting troubled lives in more prosocial directions, than having these youths develop more serious, troubled behavior problems with resulting adverse consequences for them, their families, and their communities. As described earlier, there are examples of this. Some truancy programs have started to move away from one-dimensional strategies and, instead, involve more collaborative and holistic approaches (Dembo & Gullledge, 2009), and offer guidance for developing additional programs.

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Figure 1.
Exploratory Factor Analysis Model of Co-Morbidity Among Truants

Table 1

Descriptive Statistics of Measures

Variable		<i>n</i>	%
Gender:	Female	77	35.2
	Male	142	64.8
	Total	219	100.0
Race:	African American	55	25.1
	Non-African American	164	74.9
	Total	219	100.0
Ethnicity:	Hispanic	60	27.4
	Non-Hispanic	159	72.6
	Total	219	100.0
Age:	11-14 years	86	39.3
	15-17 years	133	60.7
	Total	219	100.0
Substance use diagnosis:	No drug abuse	80	36.5
	Drug abuse	78	35.6
	Drug dependence	61	27.9
	Total	219	100.0

Variable	Mean	SD	Min	Max
ADHD factor	0.004	0.318	-0.593	0.613
Anxiety factor	0.026	0.507	-0.840	1.267
Depression factor	0.043	0.688	-1.049	1.665
Mania factor	0.019	0.387	-0.620	0.916
Trauma index	2.963	1.732	0	7
Total delinquency (log)	1.078	0.907	-1.000	3.060

Table 2

Exploratory Factor Analysis Results of Co-Morbidity Model - Maximum Likelihood Estimation

	Unstandardized Estimate	SE	Critical Ratio	Standardized Estimate
Factor 1 BY				
Anxiety	0.289	0.037	7.883 ***	0.570 ***
Depression	0.558	0.054	10.365 ***	0.813 ***
Trauma	0.370	0.127	2.903 **	0.214 **
Delinquency	0.324	0.066	4.912 ***	0.358 ***
Substance Use Diagnosis	-0.006	0.010	-0.592	-0.006
ADHD	0.241	0.025	9.668 ***	0.760 ***
Mania	0.313	0.032	9.842 ***	0.810 ***
Factor 2 BY				
Anxiety	-0.027	0.043	-0.626	-0.053
Depression	0.002	0.003	0.715	0.003
Trauma	0.249	0.152	1.639	0.144
Delinquency	0.445	0.156	2.845 **	0.492 ***
Substance Use Diagnosis	0.732	0.246	2.971 **	0.732 ***
ADHD	0.036	0.022	1.616	0.113
Mania	-0.011	0.026	-0.406	-0.028
Factor 2 WITH				
Factor 1	0.015	0.117	0.127	
Intercepts				
Anxiety	0.026	0.035	0.754	
Depression	0.043	0.048	0.895	
Mania	0.019	0.026	0.720	
ADHD	0.004	0.022	0.187	
Delinquency	1.079	0.065	16.688 ***	
Trauma	2.963	0.123	24.024 ***	
Thresholds				
Substance Use Diagnosis \$1	-0.344	0.087	-3.979 ***	
Substance Use Diagnosis \$2	0.587	0.090	6.509 ***	
Variances				
Factor 1	1.000	0.000	999.000 ***	
Factor 2	1.000	0.000	999.000 ***	
Residual Variances				
Anxiety	0.172	0.019	9.030 ***	
Depression	0.159	0.022	7.235 ***	

	Unstandardized Estimate	SE	Critical Ratio	Standardized Estimate
Mania	0.051	0.008	6.305***	
ADHD	0.041	0.006	7.339***	
Delinquency	0.511	0.140	3.638***	
Trauma	2.783	0.329	8.461***	

Note. Critical ratio = Unstandardized estimate / SE. Chi-square = 10.68 (8); $p = 0.22$; RMSEA = 0.039; CFI = 0.984; TLI = 0.957; WRMR = 0.286.
Two-tailed p -value:

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3

Sociodemographic Covariate Effects on the Two Factors

Covariate	Factor 1	Factor 2
Gender (female)	0.607 ***	-0.223
Age	-0.180 **	0.134
African-American	-0.085	-0.220
Hispanic	-0.391 *	0.239

Note. Two-tailed p-value:

*
p<.05

**
p<.01

p<.001