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The Three Latent Classes of Adolescent Delinquency and the Risk Factors for Membership in Each Class

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This study used latent class analysis to examine subpopulation membership based on self-reports of delinquent behaviors obtained from Australian youth. Three discrete identifiable classes were derived based on 51 indicators of physical violence, property damage, minor infractions, drug use, and social delinquency. One class of youth engaged in primarily rule breaking and norm violations including underage alcohol use, typical of this age period. A second class was more actively delinquent emphasizing drug use, trespassing, and various forms of disobedience. A third class of highly delinquent youth differed from their counterparts by endorsing drug use, thievery that involved stealing money, goods, and cars, property damage, gambling, precocious sexual experiences, involvement with pornographic materials, and fighting. Multinomial logistic regression predicting class membership indicated highly delinquent youth were more likely to be older males, use venting coping strategies, and be fun or novelty seeking compared with rule breakers. Findings are discussed in terms of refining current taxonomic arguments regarding the structure of delinquency and implications for prevention of early-stage antisocial behavior. Aggr. Behav. 37:19–35, 2011. © 2010 Wiley-Liss, Inc.

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INTRODUCTION

Discussion of adolescent delinquency usually entails description of behavioral actions that are deemed counter normative and socially unacceptable. Specific features involve a variety of minor status offences (public disturbance, littering, and truancy), drug use, promiscuous sexual practices, petty crimes (theft and vandalism), various forms of physical (bullying, fighting) and social aggression (verbal taunts), and more violent behaviors that involve assault, bodily harm, or weapons possession. Although there is a high probability that during adolescence any single youth will commit one or two of the more minor transgressions, the likelihood they engage in numerous forms of delinquent activity is much lower. The broad nomenclature and wide band of behaviors used to characterize delinquency is problematic from several points of view [Hindelang et al., 1981; Simourd and Andrews, 1994].[1] One especially important concern is the "equal valence problem" where each behavior is given similar footing in demarcating the overall syndrome. In other words, youth engaging in fisticuffs or committing violent acts against persons are considered delinquent in the same way as youth truant from school, drinking or smoking cigarettes underage. What differentiates delinquency subtypes is usually ascribed to frequency of commission rather than the discrete nature of the act [e.g. Bird

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[1]Loeber [1990] distinguished delinquency as a "subset of antisocial behaviors" and suggests delinquent behaviors violate criminal law. Antisocial behavior, on the other hand, is more serious than "disruptive" behaviors (persistent negative emotional behavior usually associated with difficult temperament, oppositional behavior, and temper tantrums). This broad spectrum includes theft, vandalism, and physical aggression. Missing from this definition is a role for drug use and there is some concern that victimless behaviors, such as truancy, are not given full accord but considered etiologically relevant. Others, most notably Osgood et al. [1988], have made this same argument for "deviance" owing to its conceptualization as a unified phenomenon.

et al., 2005]. This contributes to a misconception because delinquency may represent a myriad of offenses, some overlapping and some unique, requiring a more fine tooth comb to discern different subtypes. In the juvenile offending literature, this concern has been poignantly termed the ''one size fits all approach'' [Odgers et al., 2007].

Evidence for a Single Syndrome

Epidemiological evidence has not been too helpful in addressing this concern. The bulk of research studies use very narrow definitions for delinquency based primarily on rule-breaking behaviors (i.e. truancy, bullying, and nuisance disturbances like littering); or in some cases apply broader and more inclusive definitions to characterize under a single umbrella diverse features of antisocial, aggressive, and even violent behaviors [Elliott et al., 1989; Stewart et al., 1980]. General population studies have explored the dimensional structure of delinquency by summarizing item-to-item or inter-scale correlations into more parsimonious factor dimensions [e.g. Farrell et al., 1992; Newcomb and McGee, 1991; Willoughby et al., 2004]. This has been the case with studies conducted in the US [e.g. Kolbe, 1990], Europe [Vazsonyi et al., 2002] and other modern industrialized countries [Hemphill et al., 2007; McMorris et al., 2007]. Many of these studies found theoretical support for the common factor model proposed by Jessor and Jessor [1977]. According to this view, the syndrome of problem proneness encompasses the dynamic interplay between personality dispositions (i.e. motivations and instigations to use drugs such as alienation, locus of control, and self-esteem), and environmental constraints (e.g. parental supports taking shape as tolerance of deviance and peer models for drug use) that fuel delinquency. The full breadth of the behavioral features of the syndrome includes alcohol and marijuana use, lying, shoplifting, aggression, anti-establishment views, and promiscuous sexual activity.

Despite strong theoretical impetus, there have been varying configurations used to represent the dimensional structure of delinquency [Gillmore et al., 1991]. In some cases, one factor appears to adequately account for the statistical relations between deviant acts [Donovan and Jessor, 1985; Farrell et al., 1992; McGee and Newcomb, 1992; Scheier and Botvin, 1996], whereas others suggest that more elaborate structures specifying separate constellations of substance use and delinquent acts is required [Farrell et al., 2000; Grube and Morgan, 1990; Willoughby et al., 2004]. Willoughby et al. [2004], for example, reported that a three-factor model specifying separate factors for minor delinquency and substance use, aggression, and major delinquency fit appreciably better than a model specifying a single factor.

Studies of high-risk youth, including gang members, reinforce that deviance may represent a broad aggregation of behaviors [e.g. Thompson et al., 1996]. Thompson et al. suggested that delinquent youth are more likely to be ''generalists'' in their offending practices rather than specialists. Support for this view comes from the general theory of crime [Gottfredson and Hirschi, 1990], which suggests a ''common cause'' leading to delinquent behaviors stemming from poor self-control [Brownfield and Sorenson, 1993]. In fact, Brownfield and Sorenson went as far as to say ''people who steal are also likely to use drugs, commit acts of violence, and vandalize the property of others'' (p. 246). This view also contraindicates the need to establish typologies based on specialization [e.g. Kenny and Press, 2006; Klein, 1984].

Methodologically speaking, the bulk of studies examining youth delinquency have relied primarily on traditional variable-centered analyses. This body of work has emphasized statistical relations with the ''variable'' as the unit of analysis. Evidence for delinquency as a unitary phenomenon is based either on product-moment correlation models or with data summarization achieved through factor analysis. Although this approach, when applied to longitudinal data, has the potential to delineate how one variable causally influences another, we still have limited knowledge of how a respondent will ''pattern'' their answers to a myriad of questions about delinquent involvement. In other words, we know very little about the ''dependence'' between answers to questions regarding minor status offenses (stealing, vandalism, or trespassing) and other activities like lying, cheating, and drug use. This hinders attempts to learn more about specific typologies or ''subtypes'' underlying commission of these behaviors.

Focus of the Present Study

In the current study we use latent class analysis (LCA) to test typologies of delinquency based on 51 self-report delinquency items. LCA is one of several person-centered approaches that utilize response profiles as the central analytic focus with the intent of identifying homogeneous subtypes or ''classes'' that resemble each other more than members of

different classes [McCutcheon, 2002]. These classes or "mixtures" differ in certain ways that are not observable to the naked eye. Class extraction is based on cross-classification techniques available in multi-way contingency table analysis [Clogg, 1995; Goodman, 1974]. The technique fits the profile of latent variable estimation methods because a latent (unobserved) categorical variable is hypothesized to "cause" or explain membership in the various classes based on responses to manifest (observed) categorical indicators [Muthén, 1992]. Importantly, LCA methods attend to spurious causation in ways that other variable-centered approaches cannot. Although this technique has been applied in studies of conduct problems [Maughan et al., 2000], drug and alcohol use [Collins et al., 1994; Crum et al., 2005], mental health [Eaton et al., 1989], and psychopathology [Bucholz et al., 2000], only a handful of studies have used this approach to clarify typologies of youth delinquency. Below, we briefly mention some of these studies, and then present findings from LCA conducted with a school-based sample of Australian youth.

Modeling Subpopulation Heterogeneity in Delinquency

Brownfield and Sorenson [1987] were one of the first to use LCA methods to identify homogeneous subtypes of delinquent youth. Their reanalysis of Hirschi's [1969] data produced a three-class solution using six items assessing theft, vandalism, and assault. The resulting classes were labeled conformists, moderate, and seriously delinquent. Lee et al. [2007] used LCA methods to examine subgroup heterogeneity with a large cross-sectional, general population sample of Canadian elementary school youth. Key measures of delinquency included physical aggression (fighting, attacking people, kicking, biting, and hitting) with age and gender used to condition class membership. A logit-based, three-class model fit best positing low, medium, and highly aggressive children (frequency or propensity of committing physical aggression was used to determine class membership) with noted age differences in prevalence of aggression for girls but not boys.

Odgers et al. [2007] used LCA to examine delinquency in a relatively small sample of juvenile female offenders. They derived three classes corresponding to violent (with physical aggression) and delinquent behaviors (including substance use, theft, and fighting), delinquency only (few violence items were endorsed), and a low offending group. The highly violent and delinquent group was characterized by the greatest accumulation of risk including psychiatric symptoms, diagnoses of ADHD, depression, anxiety, and PTSD, experienced neglect and were exposed to violence at school or in the home.

Fergusson et al. [1994] examined delinquency subtypes in a sample of adolescent New Zealand youth (age 15) that had been followed since birth. They found a four-class model fit best with measures of alcohol use disorder, sexual activity (intercourse), marijuana use, diagnoses of conduct and oppositional disorders (using standardized instruments), and frequency of police contact. The four classes included a group displaying almost no problem behaviors (85%), a group showing elevated sexual activity, alcohol abuse, and marijuana use (5%), an anti-social group characterized by marijuana use, conduct problems, and police contact (7%), and a norm-violating group reporting all forms of problem behavior (3%). The four-class model fit adequately for both boys and girls.

Muthén and Muthén [2000] reported four distinct classes of youth based on a 17-item assessment of delinquency using the US National Longitudinal Survey of Youth. The classes consisted of youth with limited endorsement of delinquent behaviors (47%), youth characterized by fighting and person offenses (25%), substance users (18%), and property offenders (9%) who stole, trespassed, and damaged property. In almost all of these representative studies, the authors make the point that delinquency is best viewed as discrete events with different constellations or patterns of commission rather than as a dimensional construct.

Predicting Class Membership

Interest in determining typologies of youth delinquency also dovetails with a focus on etiology. In other words, once latent classes are extracted, a second set of questions attend to whether a set of putative risk factors for delinquent involvement efficiently discern class membership. Uncovering the class typologies is the first step to indicate vulnerability and should be followed by identification of what specific risk factors predict class membership. To address this concern, we used multinomial logistic regression to examine factors that may distinguish vulnerability to delinquency. This technique is a form of regression appropriate for identifying optimal predictors when the outcome measure is categorical (polytomous) and contrasts are desired between more than two classes. The first domain included demographic measures (age and

gender), both of which have been related to delinquency across the lifespan [Bartusch et al., 1997; Hirchi and Gottfredson, 1983; Simourd and Andrews, 1994, and see Gorman-Smith and Loeber, 2005 for a review of gender differences]. A second domain included measures of activation and inhibition based on Gray's dual system model of self-regulation [1970, 1982; Gray and McNaughton, 2000]. Activation reflects novelty and fun seeking, which includes exploratory behaviors, impulsivity, and avoidance of frustration. Inhibition is best conceptualized as withdrawal from excitatory stimuli for protection and often shows up as a failure to act and take decisive action. Reward responsiveness (measured as delay of gratification), impulsivity, and fun-seeking have repeatedly been related to delinquent behavior in both clinical and nonclinical samples [e.g. Brownfield and Sorenson, 1993; Hasking, 2007; Richter et al., 2002; Shapiro et al., 1988; Yule and Fonseca, 1995].

A third marker in this domain includes a measure of self-efficacy, which captures the self-directedness that makes individuals engage tasks with certainty and is a central feature in theories of social learning and motivation [Bandura, 1997]. A lack of adaptive coping and low self-efficacy has been related to delinquency [Bandura et al., 2003; Bartek et al., 1993; Brezina, 2000; Chung and Elias, 1996; Eftekhari et al., 2004; Ludwig and Pittman, 1999]. A third domain tapping mental health included measures of depression, anxiety, hostility, and social functioning. All four measures are considered essential to psychopathic models of deviance and as optimal mental health predictors of delinquent involvement [Craig, 1998].

METHOD

Sample Description

The sample consisted of 548 youths between the ages of 12 and 17 (mean age = 14.0, SD = 1.10). A slight majority were male (53%) and most (79%) reported living with both parents (the remainder lived with their mother only [16%], their father [2%], some other situation [2%], and less than 1% lived with their grandparents or friends). Almost all of the students reported they were native born (91%) and recruitment was from two nongovernment schools located on the Gold Coast, Australia. The two schools were co-educational, and of a similar size. One school was considered to be in a relatively low socio-economic area, whereas the other was located in a more middle class socio-economic area.

Forty-four percent of participants reported never having used alcohol with the remaining 56% stating they used it monthly (35%), once a week (14%), 2–4 times a week (4%), and more than five times a week (3%). There was no statistically significant difference in the age of boys or girls in this sample, though boys reported drinking more frequently, $t(480) = 3.00$, $P < .01$ ($M_M = 1.12$ [.81], $M_F = .73$ [.87]).

Overview of the Sample Design

Surveys were administered by trained researchers in class groups of 15–30 students. Students were instructed the survey was voluntary, they could withdraw at any time without penalty, and that their responses were anonymous. Researchers remained in the room during survey administration to answer any questions. Ethical clearance was obtained from the Human Research Ethics Committee and parents/guardians provided consent for their children.

Measures

Delinquency. The Self-Reported Delinquency Scale [Furnham and Thompson, 1991] was used to assess delinquent behaviors. This scale canvasses a broad spectrum of delinquent activities and juvenile offenses [e.g. Moffitt and Silva, 1988]. Included were items assessing smoking cigarettes and drinking alcohol under age 18, using or selling illegal drugs, stealing money, taking items of value from stores, trespassing, using or carrying weapons, causing disturbances, damaging property, lying, cheating, being obscene, having underage sex, or sexual intercourse in public places, fighting, and having a criminal record. All items requested participants to indicate if they had engaged in that behavior at any point in their lifetime. A dichotomous response format ("*Yes*" = 1 and "*No*" = 0) was used for all 51 items.

External markers. The BIS/BAS [Carver and White, 1994] was used to assess behavioral inhibition (BIS) and activation (BAS). The two systems operate to coordinate responses to environmental cues and are labeled by their affinity to measure movement toward (activation) or away (inhibition) from aversive or rewarding stimuli. Overall, the scales have good convergent and discriminant validity with other scales assessing anxiety, extraversion, positive and negative affective states, temperament, and those assessing sensitivity to

punishment and reward cues [Carver and White, 1994]. Four subscales of the BIS/BAS were created based on factor analyses reported in the literature, including eight items assessing inhibition or anxiety provoking situations (e.g. "I feel worried when I think I have done poorly at something": $\alpha = .69$), four items assessing drive (e.g. "I go out of my way to get things I want": $\alpha = .70$), five item assessing reward-responsiveness (e.g., "When I get something I want I feel excited and energized": $\alpha = .65$), and four items assessing fun or novelty seeking ("I often act on the spur of the moment": $\alpha = .59$). Response categories for all the items ranged from 1 (*Very true for me*) through 4 (*Very false for me*).

The 28-item brief COPE [Carver, 1997; Carver et al., 1989] was used to assess youths' ability to respond to and manage stress. An oblique rotation with ML extraction on the current data set produced three identifiable factors, with all loadings exceeding the .40 critical threshold [Zwick and Velicer, 1986]. Factor 1 consisted of seven items ($\alpha = .78$) and was labeled "active coping strategies" (e.g. "I think hard about what steps to take" and "I take action to try to make the situation better"). These items reflect skills revolving around planning and taking direct action in order to reduce the impact of a stressor. This factor accounted for 40% of the rotated factor variance. Factor 2 ($\alpha = .81$) contained four items and was labeled "instrumental support strategies" (e.g. "I get help and advice from other people" and "I get emotional support from others"). This factor accounted for 28% of the variance. Factor 3 ($\alpha = .72$), which accounted for 11% of the variance, consisted of six items and was labeled "venting emotions coping strategies" (e.g. "I blame myself for things that happened" and "I criticize myself"). All three eigenvalues exceeded the benchmark of 1.0 and accounted for 80% of the factor structure variance. Response formats ranged from 1 (*I don't do this at all*) through 4 (*I do this a lot*).

We also used the eight-item General Self-Efficacy Scale [Chen et al., 2001]. Validation studies support the unidimensional nature of this scale, which exhibits sound internal consistency, predictive validity, and concurrent validity [Chen et al., 2001]. In the current sample, factor analysis reinforced that rotation was not possible with a single factor (principal component FA also reinforced this finding). Cronbach α in the current sample was .86. Response formats for this scale ranged from 1 (*Strongly disagree*) through 5 (*Strongly disagree*).

Mental health was assessed using four scales from the Brief Symptom Inventory [Derogatis and Melisaratos, 1983]. The four scales included a six-item scale assessing frequency in the past seven days of depressive symptoms (e.g. "feeling lonely, blue, no interest in things": $\alpha = .93$), six items assessing anxiety (e.g. "nervousness or shakiness and feeling fearful": $\alpha = .90$), five items assessing hostility (e.g. "temper outbursts that you could not control": $\alpha = .87$), and four items assessing interpersonal functioning (e.g. "your feelings being easily hurt": $\alpha = .89$). All scales used a response format ranging from 1 (*Not at all*) through 4 (*Extremely*).

Analyses and Model Testing Strategy

We first tested whether a single undifferentiated homogeneous population underlies the sample response patterns. We then tested progressively more complex models with greater numbers of classes until model fit indices suggested the most parsimonious and best fitting model was achieved (the models that could potentially be tested is equivalent to the number of subjects in the sample and there are 2^{51} possible response patterns). For decisions regarding model selection we used the Bayesian Information Criteria [BIC: Kass and Raferty, 1993; Schwarz, 1978] and the Akaike Information Criteria [AIC: Akaike, 1981, 1987] to gauge model fit. The BIC adjusts the likelihood ratio statistic (L^2) for number of model parameters and the AIC is sample size dependent. Both indices suggest that smaller numbers represent more parsimonious and well fitting models [Bozdogan, 1987; Kotz and Johnson, 2006; Raftery, 1995]. Important model parameters include the estimated probabilities associated with membership in a particular latent class (indicating the strength of the relationship between the manifest symptom indicator and the latent class), and the posterior class probabilities, which indicate how well the different classes account for the sample response profiles.

Treatment of Missing Data

Levels of missing data ranged from trivial amounts to 30% for items appearing at the end of the survey. Analyses not reported show that among several factors survey length (fatigue) may have contributed partly to missing data. Three quarters of the sample had between zero and six items missing (of 63 used in the model). Sixty-one cases (11%) were missing relatively large numbers of data. No cases were missing all the data. When percent missing was regressed on demographic factors including age, gender, and intact family status only

age ($\beta = .11$, $SE = 0.01$, $P < .05$) significantly predicted the outcome ($R^2 = 2\%$).[2] Missing data was imputed using the iterative Expectation Maximization algorithm in SAS© PROC MI. This procedure derives parameter estimates using a posterior mode relying on the Markov Chain Monte Carlo method [Schafer, 1997]. The procedure iteratively produces means and covariances based on the present data until stable parameter estimates for the missing values are obtained [Enders, 2001]. Although this imputation procedure does not totally eradicate bias in the standard errors [Schafer, 1997], it is considered robust to departures from multivariate normality and produces efficient estimates when the levels of missing data are quite small and the data are missing at random [Rubin, 1979]. Post-imputation, dichotomous values were rounded.

RESULTS

Prevalence and Gender Differences in Delinquency

Table I contains the prevalence rates for the delinquency items for the sample and by gender. Among the more prevalent forms of delinquency, 58% of the sample reported they drank alcohol under the age of 18 (the legal drinking age in Australia). This was followed in decreasing order by 53% admitting they had trespassed on private property, 41% who viewed an x-rated film while under age, 36% said they made insulting or obscene telephone calls, 34% used a false name, 34% deliberately littered, 32% took money from home with returning it, and 31% said they travelled without paying the correct ticket or fare. One in five youth said they had sexual intercourse under the age of 16 and 10% reported this activity took place in public.

Among the more serious offenses, 20% said they had fought in a public place, 15% carried a weapon, 9% said they attacked an enemy or rival in public, and 6% said they used a weapon in a fight. Very few youth admitted to committing an offense that could result in incarceration, for instance, breaking and entering to a small (3%) or large (3%) store, and stealing goods from school (7%) or work (5%), although 8% said they had set fire to property that was not theirs. Rule violations included truancy (16%), lying (18%), and 25% said they had urinated in public. In the category of drug-related offenses, 9% of youth said they smoked cigarettes underage, 13% said they had taken an illegal drug, 9% said they had purchased illegal drugs, 7% said they drank alcohol in a pub or bar while underage, and 5% sold an illegal drug.

As expected, males were more likely to commit delinquent acts with the exception of three items (drink underage, taking money from home, and deliberately littering the streets). Forty-one of the tests for gender differences were significant. Among the most notable gender differences, a disproportionate number of male youth said they had viewed an x-rated film (60 vs. 24%, for male and female youth, respectively), and likewise the same gender difference was noted for purchasing pornographic materials underage (30 vs. 4%). Fighting in a public place also reinforced traditional gender differences in aggression (28 vs. 14%), as did using a weapon (10 vs. 3%), carrying a weapon (25 vs. 7%), and damaging property (22 vs. 11%). Males were more likely to lie, cheat, steal, admit they damaged property, have sexual intercourse under age 16 and in public places, as well as urinate in public. Although male and female youth were equally likely to report they smoked cigarettes, males were more likely to take or sell an illegal drug and also report they drink in pubs.

Results of the LCA

Table II shows the fit statistics corresponding to the sequence of models tested. All of the models are covariate-adjusted for gender and age. The likelihood ratio test statistic (L^2) shows the amount of variation left in the model among the variables after extracting the classes. Smaller numbers indicate a better fit. The far right column of the table shows the L^2 divided by the degrees of freedom for the model, which yields an approximate F-statistic [Haberman, 1979]. The BIC and AIC progressively shrank with the addition of classes (and parameters) and the most parsimonious model appeared to contain three classes [the BIC can be used to indicate model change and superiority of fit: see for example Singer and Willett, 2003]. The work of Kotz and Johnson [2006] suggests that a good model is defined by a "*saturation point*" and that beyond these $k+1$ classes there is weak identifiability, too many classes, too few class indicators, and too few people allocated to the classes (i.e. sparse data) that affects estimation of

[2]The addition of a measure assessing frequency of alcohol use does not change the results of this model. Moreover, a unit-weighted index of the delinquency items was not statistically related to percentage of missing (with levels of missingness incrementing in 10% intervals). There were 68 missing data patterns (70% had complete data), and other than fatigue, which increased the volume of missing data at the end of the survey, the missing data was at random.

TABLE I. Prevalence Rates for Delinquency Activities for Sample and Based on Gender

Delinquency item	Total[a] (%)	Girls (%)	Boys (%)
Regularly smoked cigarettes underage	9	8	11
Drank alcohol under age	58	59	56
Viewed x-rated film underage	41	24	60
Regularly gambled underage	11	5	17
Have taken an illegal drug	13	9	17
Have sold an illegal drug	5	3	6
Have travelled without correct fare or ticket	31	29	33
Played truant from school under age 16	16	15	18
Have trespassed on private property	53	46	61
Have taken money from home and not returned it	32	34	29
Have stolen money from slot machines	7	6	9
Have fought in a public place	21	14	28
Have broken windows of empty house	12	7	19
Have stolen from a small store	15	13	18
Have stolen from a large store or supermarket	12	9	16
Have broken into a small store	3	1	4
Have broken into large store garage or workhouse	3	1	5
Have used a weapon in a fight	6	3	10
Have struggled to get away from policeman	11	8	14
Have bought goods that I knew were stolen	12	11	14
Have carried a weapon	15	7	25
Have smashed, slashed, or damaged property belonging to someone else	16	11	22
Have attacked an enemy or rival in public	9	5	12
Have deliberately littered the streets	34	36	32
Have annoyed or insulated unknown person in the streets	27	22	32
Have caused a disturbance while in large group	28	25	32
Have intentionally set fire to property belonging to someone else	8	3	13
Have purchased pornographic literature under age 18	16	4	30
Have lied on an official form	18	10	27
Have used a credit card that was not mine without permission	5	2	8
Have avoided payment of bills/fines	9	7	12
Have fiddled with meter reading	7	5	10
Have made insulting or obscene telephone calls	36	31	42
Have used a false name	36	33	38
Have lied on insurance claim form for my own personal gain	2	0	5
Have purchased illegal drugs	9	7	11
Have stolen goods from work worth more than $20	5	2	7
Have stolen goods from school worth more than $10	7	4	11
Have planned break-in with intention to steal valuables	2	1	5
Have stolen a bicycle	4	2	7
Have stolen car or motorbike but returned after using	3	1	5
Have stolen motorbike or car and not returned it	3	0	5
Have stolen something out of a car	6	4	7
Had sexual intercourse under age 16	20	16	26
Had sexual intercourse in public place	10	8	13
Have smoked a cigarette in a place where smoking is forbidden	5	3	8
Have urinated in public	25	16	35
Have attended demonstration/sporting event wanting to cause disturbance or participate in act of violence	5	1	8
Regularly drank alcohol in pubs and bars while under age 18	7	4	9
Have a criminal record	4	2	6

Note: $N = 548$.
$^{*}P \leq .05$; $^{**}P \leq .01$; $^{***}P \leq .001$. $m = P \leq .06$ (one tailed).
[a]Numbers rounded.

item probabilities. Garrett and Zeger [2000] suggest that weakly identified parameters (determined by contrasting prior and posterior distributions) are a critical factor when choosing the proper model. According to these conventions, the three-class model had the least classification error and the best statistical fit (% error reduction progressively decreases considerably from this point in the

TABLE II. Fit Statistics From the Latent Class Analyses

Number of classes	Log-likelihood (L^2)	BIC_L^2	AIC_L^2	Npar/DF	P-value[a]	CE[b]	%ER[c]	L^2/df
1-class	16,182.986	13,048.767	15,188.986	51/497	.0001	.000	0.0	32.56
2-class	12,636.923	9,843.243	11,750.923	105/443	.0001	.0135	94.24	28.52
3-class	11,594.708	9,141.567	10,816.708	159/389	.0001	.0302	93.88	29.80
4-class	11,177.116	9,064.514	10,507.116	213/335	.0001	.0504	91.13	33.36
5-class	11,006.827	9,236.172	10,446.235	267/281	.0001	.0652	90.46	39.17
6-class	10,850.684	9,445.749	10,423.273	321/227	.0001	.0576	89.67	47.92

[a]Significance values can be computed using the Lo–Mendall–Rubin likelihood-ratio test [Lo et al., 2001] allowing for direct tests between models with "k" and "$k-1$" classes. Low P-values indicate the model with one less class should be rejected in favor of the estimated model.
[b]CE, Classification error is the proportion of cases expected to be misclassified. Values closer to zero are better and has been termed Entropy.
[c]%ER, percent error reduction in L^2 when model is pitted against the null model of complete independence. Full Information Maximum Likelihood estimation was used for cases with missing data. All models control for gender and age.

extraction process). Importantly, the classes are interpretable and could be identified in terms of substantive meaning.[3]

Table III shows the conditional probabilities for the individual items. The probabilities indicate the strength of a particular item distinguishing whether a youth would be a member of the class (and are like factor loadings in a common factor model). Several items provide clear markers that differentiate the classes. The first class comprised 51% of the sample and captures youth involved in very low levels of delinquency, primarily rule breaking behaviors. Although their endorsement probabilities were relatively low (below .50), characteristic features of this class include alcohol use (.37), trespassing (.26), and littering infractions (.15). Based on this pattern of item endorsement, the class is labeled "*Rule Breakers*." Forty-one percent of the sample was classified as being members of the second class. These youth were characterized by slightly more variegated forms of delinquent activities when compared with rule breakers in the first class. Youth in the second class were more likely to endorse trespassing (.78), underage drinking (.78), cheating on a fare (.46), making obscene phone calls (.56), using a false name (.53), pornography involvement (.58), and littering (.50). Several items below the benchmark of.50 included causing a public disturbance (.46), taking money from home (.45), and fighting (.32). Despite this variegated pattern of delinquent activities, one could assume these youth are reluctant to engage in serious offenses that could be punishable by imprisonment (damage to property, arson, felony theft or grand larceny, and illegal drug activity like purchasing or selling). By the nature of their modest and restricted involvement we labeled these youth "*Minor Delinquents*."

Eight percent of the sample was classified as members of the third class. These youth endorsed a wide range of items that transcended the minor delinquent involvement of the first two classes. They were more likely to engage in drinking (.84), gambling (.54), and pornography (.95) [.81 for purchasing pornography], and to take (.63) or sell an illegal drug (.41). These same youth reported they were likely to trespass (.95), litter (.73), insult strangers (.82), lie (.77), cheat (.57), and cause disturbances while in large groups (.82). They were also more likely to report making obscene phone calls (.88), use a false name (.86), and be truant from school (.65). Members of the third class were also more likely to report involvement in activities that could be punishable by imprisonment if caught including stealing from slot machines (.42), small (.65) or large stores (.67), and to a lesser degree taking property like cars (.32) or bikes (.45). For the more serious offenses, they were more likely to report setting fire to something (.63) and they were pugilistic having carried (.54) or used weapons (.41) or gotten into fights (.72). Perhaps as part of their overall reluctance to follow conventions for their age, they also had promiscuous sexual intercourse (.77) and in public places (.63). Given this pattern of delinquent activities, these youth were labeled "*Major Delinquents*."

Testing the LCA Model With a Reduced Set of Items

The use of 51 items can contribute to sparse cells in the cross-classification tables, contributing to

[3]Additionally, the four-class model divides a group of youth that had been designated minor delinquents into two classes, with youth divided along the lines of committing sexual acts, smoking and drinking and a second group that engage in these behaviors as well as one or two other minor property offenses. There is also a migration of nine youth from the major delinquent class to another less active delinquent class. As a result, there is not much more additional information gained substantively from choosing the four over the three-class model.

TABLE III. Conditional Probabilities (Loadings) From Three Class Model

Delinquency item	Class-1 rule breakers (50.73%)	Class-2 minor delinquents (41.2%)	Class-3 major delinquents (8.1%)
Smoke cigarettes under age 18	.0040	.1173	.5058
Drank alcohol under age 18	.3712	.7775	.8424
Viewed x-rated film under age	.1831	.5803	.9507
Regularly gambled under age 18	.0266	.1221	.5426
Taken an illegal drug	.0015	.1884	.6334
Sold an illegal drug	.0001	.0353	.4067
Travelled without correct ticket or fare	.1060	.4621	.8177
Played truant from school under age 16	.0165	.2517	.6449
Trespassed on private property	.2616	.7802	.9514
Taken $ from home without returning it	.1393	.4536	.7647
Stolen money from slot machines	.0218	.0662	.4286
Fought in a public place	.0352	.3199	.7219
Broken windows in empty house	.0134	.1794	.5368
Stolen from a small store	.0305	.2019	.6537
Stolen from a large store or supermarket	.0053	.1541	.6711
Broken into a small store	.0000	.0043	.2936
Broken into large store, garage or workhouse	.0000	.0177	.2481
Used a weapon in a fight	.0034	.0623	.4060
Struggled to get away from a policeman	.0085	.1400	.5653
Bought goods that I knew were stolen	.0146	.1754	.5493
Carried a weapon	.0253	.2352	.5389
Smashed, slashed, damaged property belonging to someone else	.0064	.2800	.5419
Attacked an enemy or rival in public	.0072	.1099	.4784
Deliberately littered the streets	.1504	.4993	.7334
Annoyed or insulted an unknown person	.0440	.4322	.8172
Caused a disturbance while in large group	.0607	.4558	.8181
Intentionally set fire to property belonging to someone else	.0120	.0570	.6277
Purchased pornographic materials under age 18	.0423	.1867	.8147
Lied on an official form	.0330	.2463	.7725
Used credit card belonging to someone else without permission	.0001	.0398	.4060
Avoided payment of bills and fines	.0049	.1080	.5696
Fiddled with a meter reading	.0095	.0726	.4736
Made insulting or obscene phone calls	.1171	.5597	.8827
Used a false name	.1340	.5301	.8597
Lied on an insurance claim form for personal gain	.0000	.0088	.2484
Purchased illegal drugs	.0032	.1074	.5160
Stolen goods from work value > $20	.0001	.0141	.5148
Stolen goods from school value > $10	.0050	.0949	.3881
Planned to break into flat to steal valuables	.0000	.0045	.2703
Stolen a bicycle	.0000	.0057	.4674
Stolen a car or motorbike but returned it later	.0001	.0177	.3157
Stolen a motorbike or car and not returned it	.0000	.0000	.3156
Stolen something out of car	.0041	.0438	.4511
Had sexual intercourse < age 16	.0348	.3024	.7688
Had sexual intercourse in public place	.0088	.1191	.6250
Acted in violent manner towards person in position of authority	.0001	.0877	.5006
Smoked cigarette in public place where smoking is forbidden	.0001	.0572	.3626
Urinated in public	.0719	.3455	.8577
Attended demonstration with intention to cause disturbance or participate in act of violence	.0030	.0153	.4672
Regularly drank alcohol in pubs or bars < age 18	.0031	.0630	.4719
Have a criminal record	.0000	.0266	.3609

unstable models. Although the fit indices did not seem to indicate this problem, it is worth considering whether we would obtain the same model structure with a reduced set of items. In order to reduce the item pool we created summary categories using conditional statements. To exemplify this method, individuals stating they had used alcohol or drank in pubs underage, received a ''1'' indicating ''alcohol

use," irrespective of whether they responded "yes" to drinking underage, "yes" to drinking in pubs, or responding affirmatively to both items. There should be minimal loss of information using this conceptual approach, because we still capture response profiles indicating underage alcohol use, just not the precise condition in which it occurred.

The same conceptual scoring system was used for the remaining delinquent behaviors noting when youth committed a particular act and using the positive commission response to indicate "yes" to the overall category. This system resulted in a reduced set of 20 behaviors indicating: (1) Drug Use (alcohol only, alcohol and cigarettes, alcohol, cigarettes, in combination with another illicit drug, and trading drugs); (2) Fisticuffs and Fighting (fighting in public places, struggling with policeman, and attacking enemy in public); (3) Gambling (underage); (4) Minor Status Offenses (including separate indices for littering, causing public disturbance, truancy, trespassing, and hustling); (5) Pornography (viewing or purchasing); (6) Sexual Behavior (underage or in public); (7) Thievery, Vandalism, and Property Destruction (including defrauding, breaking and entering, stealing, damaging property, and arson); (8) Violent Crimes (involving using weapon, carrying weapon, and acting in violent manner); (9) and possessing a criminal record. These nine subcategories and their constituent component indices resulted in 20 new categorically scored delinquency items.

We then tested the 20 new items using LCA, as outlined above, and again produced a satisfactory three-class solution. Although there are slight differences in the solution between models (response patterns based on cross-tabulations differ when 51 items are trimmed to 20) the basic tenor of the model remains consistent and they are behaviorally isomorphic. There is a "null" class (39%) with little endorsement of any behaviors (response probabilities did not exceed 0.30 for any single item), a class containing slightly elevated response probabilities for drug use (49%), trespassing, hustling, pornography, defrauding (using credit cards, not paying fare and lying), littering, vandalism, stealing, causing public disturbances, violent behavior, and a third class (12%) noted by particularly high endorsement of drug use (alcohol and cigarettes, buying and selling drugs), breaking and entering (property damage), arson, and having a criminal record.

Cross-tabulation of the two sets of findings (comparing the three-class solution from the 51-item set to the three-class solution from the 20-item set) revealed there was a migration of youth classified as "rule breakers" from the 51-item model who now became minor delinquents in the 20-item model. Likewise, there was a migration from the minor delinquents in the 50-item class solution who were now classified as major delinquents in the 20-item solution, $\chi^2(4) = 626$, $P < .0001$. This loss of form between the two models occurs because in the 20-item solution we dampened the natural spread of behaviors that were left as individual items in the 51-item solution, thus forcing youth with very little commission of delinquent behaviors to appear more delinquent.

Results of the Multinomial Logistic Regression

Table IV contains the association among the external markers. A careful inspection of these correlations indicates that inhibited youth used venting or emotional release strategies and were reward oriented. All of the approach scales were positively related. Youth who reported applying

TABLE IV. Factor Intercorrelations for External Markers

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
Inhibition (V1)	(.69)	.03	.31*	.03	.07	.26*	.31*	−.09**	.16*	.11***	.05	.12***
Drive (V2)		(.70)	.43*	.51*	.27*	.21*	.13***	.32*	.04	.05	.09**	.05
Reward (V3)			(.65)	.45*	.33*	.20*	.10**	.32*	−.08	−.08**	−.02	−.04
Fun/Novelty (V4)				(.59)	.18*	.09**	.11**	.22*	−.05	−.02	−.01	−.02
Active coping (V5)					(.78)	.41*	.14***	.33*	−.14*	−.13***	−.04	−.12***
Support coping (V6)						(.81)	.33*	.08**	.01	−.07	−.04	−.06
Vent coping (V7)							(.72)	−.22*	.29*	.14***	.23*	.21*
Self-efficacy (V8)								(.86)	−.18*	−.15*	−.14***	−.14***
BSI depression (V9)									(.93)	.61*	.56*	.62*
BSI anxiety (V10)										(.90)	.58*	.62*
BSI hostility (V11)											(.87)	.58*
BSI interpersonal (V12)												(.89)

Note: $N = 548$. Numbers on diagonal represent estimates of internal consistency.
*$P \leq .001$; **$P \leq .05$; ***$P \leq .01$.

active coping skills also sought instrumental support and were less likely to use venting strategies.

Across the different markers, inhibited youth vented more and coped by seeking instrumental support. Drive-oriented youth, on the other hand, applied active coping skills, sought instrumental support, and reported more venting. Reward oriented youth applied active coping and sought instrumental support. Those youth who were fun seeking used active coping skills, and to a lesser extent sought instrumental support. Youth reporting high self-efficacy were less inhibited, more drive oriented, sensitive to reward, were fun seeking, and used active coping strategies.

Table V contains the results of the multinomial regression (MNR). We ran the MNR in a stepwise fashion, first conditioning the model by entering gender (male) and age. This was then followed by the inclusion of measures of activation and inhibition (BIS/BAS), and then sequentially the three coping scales, the four BSI mental health scales, and finally self-efficacy. This stepwise inclusion was conducted to provide protection against confounding and suppression effects. The reference group against which all remaining clusters are compared is the rule breaking cluster (negative for delinquency) from the three-cluster model.

In the model with demographics only, both gender and age significantly predicted class membership for minor (gender: $b = 0.449$, SE = 0.185, $z = 2.42$, $P \leq .05$ and age: $b = 0.423$, SE = 0.088, $z = 4.79$, $P \leq .001$) and major delinquents (gender: $b = 1.84$, SE = 0.399, $z = 4.60$, $P \leq .001$) with an adequate model fit, Likelihood Ratio (LR) $\chi^2(4) = 61.15$, $P \leq .0001$, Pseudo $R^2 = .061$. The latter statistic indicates the proportion of variance in cluster membership that can be accounted for by the select group of predictors, in this case 6%. The next step in the sequence included the four measures from the BIS/BAS scale assessing inhibition and activation. Only the scales assessing reward and fun/novelty seeking were significant in this model for minor

TABLE V. Results of Multinomial Regression Analyses

	β	SE	$P>\|z\|$	RRR[a]	95% CI
Mild delinquency					
Gender (male)	.570	0.213	.007	1.768	[1.16, 2.68]
Age (older)	.426	0.098	<.001	1.531	[1.26, 1.85]
Inhibition (BISBAS)	−.413	0.260	.113	0.662	[0.39, 1.10]
Drive (BISBAS)	.162	0.239	.498	1.176	[0.74, 1.88]
Reward seeking (BISBAS)	−.454	0.327	.165	0.635	[0.33, 1.21]
Fun/Novelty (BISBAS)	1.314	0.277	<.001	3.721	[2.16, 6.41]
Active coping	−.484	0.206	.019	0.616	[0.41, 0.92]
Support coping	.252	0.158	.111	1.287	[0.94, 1.76]
Venting coping	.414	0.197	.036	1.513	[1.03, 2.23]
Depression (BSI)	.014	0.035	.682	1.014	[0.95, 1.09]
Anxiety (BSI)	.184	0.173	.289	1.201	[0.86, 1.69]
Hostility (BSI)	.356	0.152	.019	1.427	[1.06, 1.92]
Interpersonal sensitivity (BSI)	−.111	0.142	.435	0.894	[0.68, 1.18]
Self-efficacy	−.462	0.245	.059	0.629	[0.39, 1.02]
Intercept	−7.182	1.856	<.001	N/A	N/A
Major delinquency					
Gender (male)	1.788	0.458	<.001	5.980	[2.44, 14.68]
Age (older)	.619	0.172	<.001	1.856	[1.32, 2.60]
Inhibition (BISBAS)	−.996	0.474	.035	0.369	[0.15, 0.93]
Drive (BISBAS)	.026	0.465	.955	1.026	[0.41, 2.56]
Reward seeking (BISBAS)	−.713	0.613	.245	0.490	[0.15, 1.63]
Fun/Novelty (BISBAS)	1.721	0.519	.001	5.591	[2.02, 15.49]
Active coping	−.057	0.391	.884	0.944	[0.44, 2.03]
Support coping	.014	0.301	.964	1.014	[0.56, 1.83]
Venting coping	.763	0.363	.036	2.145	[1.05, 4.37]
Depression (BSI)	.132	0.053	.013	1.141	[1.03, 1.27]
Anxiety (BSI)	.691	0.314	.027	1.996	[1.08, 3.69]
Hostility (BSI)	.420	0.265	.113	1.522	[0.91, 2.56]
Interpersonal sensitivity (BSI)	−.339	0.283	.231	0.712	[0.41, 1.24]
Self-efficacy	−.418	0.440	.343	0.658	[0.28, 1.56]
Intercept	−13.428	3.457	<.001	N/A	N/A

[a]RRR, Relative risk ratio of being in the designated cluster vs. the rule breakers (cluster-1).

delinquents (reward: $b = -0.874$, SE = 0.299, $z = 2.92$, $P \leq .01$ and fun/novelty: $b = 1.19$, SE = 0.257, $z = 4.65$, $P \leq .001$). The same outcome was obtained for major delinquents (reward: $b = -1.27$, SE = 0.548, $z = 2.32$, $P \leq .05$ and for fun/novelty: $b = 1.28$, SE = 0.484, $z = 2.66$, $P \leq .01$). The fit statistics indicated an adequate model, LR $\chi^2(12) = 98.84$, $P \leq .001$, Pseudo $R^2 = .098$, showing an almost 4% increase in variance with the addition of this set of predictors. The three coping scales were then added to the model. Only active and venting support were significant in the model for minor delinquents (active: $b = -0.591$, SE = 0.197, $z = 3.00$, $P \leq .01$ and venting: $b = 0.626$, SE = 0.182, $z = 3.43$, $P \leq .001$). In the model for major delinquents only venting was significant ($b = 1.24$, SE = 0.317, $z = 3.91$, $P \leq .001$), LR $\chi^2(18) = 130.14$, $P \leq .0001$, Pseudo $R^2 = .13$, representing another 4% increment in variance predicting class membership with the inclusion of these predictors.

After inclusion of these predictors, we then added the four measures of mental health functioning. Only hostility was significant in the model for minor delinquents ($b = 0.374$, SE = 0.151, $z = 2.47$, $P \leq .05$) and depression and anxiety were significant predictors in the model for major delinquents (depression: $b = 0.131$, SE = 0.053, $z = 2.46$, $P \leq .05$ and anxiety: $b = 0.707$, SE = 0.313, $z = 2.26$, $P \leq .05$). The model fit indices indicated an appreciable gain in explanatory power with the inclusion of this set of predictors (5% gain), LR $\chi^2(26) = 180.50$, $P \leq .001$, Pseudo $R^2 = .181$.

The addition of self-efficacy did not add significant incremental variance to the model and was not a significant predictor for either minor or major delinquents (compared with rule breakers). The right hand columns of Table V include the relative risk ratios (RRR) and corresponding 95% confidence intervals (CI). The RRR indicates the odds (probability of success over failure) of being in one class compared with the referent class (the rule breakers [Class-1]; RRR of 3.0 suggests the designated class members are three times as likely to have this particular characteristic compared with the reference group).

Members of the minor delinquent group were almost twice as likely to be male and 1.5 times more likely to be older than rule breakers. They were also slightly under four times more likely to score high on fun or novelty seeking compared with rule breakers, 1.5 times more likely to say they use venting strategies and 1.4 times more likely to report hostility. More seriously delinquent youth (major), were almost six times as likely to be male compared with rule breakers, almost twice as likely to be older, five times as likely to be fun or novelty seeking, twice as likely to use venting coping strategies, 14% more likely to report depressive symptoms, and twice as likely to report being anxious.

DISCUSSION

This study used LCA to test whether delinquency among youth is best conceptualized as a unitary phenomenon or better construed as unique assemblages of behaviors forming discrete typologies. The impetus for this study comes from the ongoing debate over whether "specialization" is the best way to characterize delinquency [Deane et al., 2005; Lattimore et al., 1994], as contrasted with the "generalist" approach offered in the general theory of crime [Gottfredson and Hirschi, 1990]. Whether delinquent youth specialize or engage in a broad spectrum of nefarious behaviors has important implications for prevention and early intervention, as well as for understanding the etiology of delinquency and more serious criminal activity [Osgood and Schreck, 2007].

In this study, we obtained three clearly identified classes of youth endorsing slightly different patterns of delinquency. Indeed, the classes of delinquency we obtained appear to be differentiated by both the variety and severity of delinquent acts endorsed. We discuss these findings in the context of how this sample matched up in their prevalence rates to other similar comparison samples, whether the different latent classes represent unique facets of delinquency, and our ability to differentiate class membership using putative risk factors for delinquent involvement.

Prevalence of Delinquency

By far, the most prevalent forms of delinquent behavior were the least offensive from a criminal behavior standpoint. Typical behaviors for this age group included drinking underage, viewing pornography, littering, making obscene phone calls, and lying. Prevalence for the more injurious (weapon carrying) or visible forms of deviance (stealing, arson, fighting) were quite low indicating some reluctance on the part of these youth to engage in, or report, punishable offences. More than half of the sample for girls and boys alike reported underage drinking, a behavior that is considered somewhat normative among teenagers in this age group. Recent Australian surveillance data shows that 65% of youth over 15 years of age report using alcohol [Australian Bureau of Statistics, 2007;

Hemphill et al., 2007] and this is supported by other cross-national comparisons [Beyers et al., 2004].

The prevalence rates obtained on this sample show a high correspondence to studies conducted in both Australia and other large contemporary Western societies [e.g. McMorris et al., 2007]. For instance, data obtained from the Youth Risk Behavioral Surveillance Study, a nationally representative survey conducted in the US, shows that 18% of students reported carrying a weapon compared with 15% in the Australian data. Twenty percent of the Australian youth reported having sexual intercourse underage (16 years), whereas these numbers for American youth are slightly higher (33% for nineth graders equivalent to 15 years of age). Likewise data from the US National Longitudinal Survey of Youth shows that 10% of males and 5% of girls report they have stolen something worth more than $50. These numbers are well within the range for prevalence estimates reported by the Australian youth (7% for boys and 2% for girls).

Unique Classes of Delinquency

Consistent with previous studies using LCA methods, we found that a three-class solution best fit the sample data. One class consisted of rule breakers characterized by a low level of delinquent involvement and what is generally considered normative alcohol use. Brownfield and Sorenson [1987] referred to these youth in their sample as ''conformists'' given their low levels of delinquency. In our sample, no single item response probability was above the threshold of 0.50 for this low level group. For the most part, the research literature shows these nonconformist activities are adolescent-limited behaviors, which quickly desist with time [e.g. Loeber et al., 1991], and are not related to later criminal behavior. In particular, the low endorsement of truancy suggests that, from a primary prevention standpoint, these youth would probably benefit from being exposed to evidence-based drug and violence prevention activities delivered in the schools.

The second class was more characteristic of what the literature calls moderate delinquency with youth endorsing a wider gamut of activities, including underage drinking, cheating, viewing pornography, fighting, and trespassing. What clearly differentiated these youth from the first class of relative conformists was their endorsement of drinking, cheating, trespassing, being a nuisance (e.g. littering and urinating in public), and promiscuous sexual activity. Because some of these behaviors may presage later criminal behavior a concern is whether they are adolescent-limited [Moffitt, 1993] or whether behaviors like these persist if the right contextual factor invigorates these youth to continue transgressing. Also worth noting is that endorsement patterns for truant behavior was also relatively low, suggesting that like their truly nondelinquent counterparts their presence in school also makes them likely candidates to benefit from school-based prevention activities.

The third class indicated a profile typically considered serious delinquency and many of the activities are valuable indicators of later more enduring offending behaviors. This very small (8%) group of youth was clearly different from the majority, and they engaged in a variegated form of delinquency. These youth stole, misused legal and illegal substances, lied and cheated, broke rules, and failed to follow social conventions (urinating in public, making obscene phone calls). Compared with the other classes, these youth were also likely to be truant thus increasing the likelihood of contact with police and law enforcement. If truancy is such a hallmark feature of this group, the possibility exists that many high-risk delinquent youth were not present in school during the assessment.

The fact that over 90% of the sample fit a modest profile of delinquency should bode well for prevention efforts. Apparently, most youth are reluctant to engage in the more punishable offenses, perhaps indicative of the strength of societal norms. Programs that engage a mixture of normative education and skills building can convey to youth the infrequent nature of these behaviors, emphasizing injunctive norms from their peers. The same programs can provide various skills building exercises that teach youth to avoid or refuse offers to engage antisocial activities [e.g. Prothrow-Stith, 1987].

One other point worth noting is the prominent role for alcohol and cigarettes for both the more moderate and separately the high-risk delinquents. Even for youth belonging to the more conventional, rule breaking, class there was comparatively modest endorsement of this behavior. Using illegal drugs was more prominent for highly delinquent youth in the major delinquent class, and to a lesser extent they acknowledged selling an illegal drug. Notwithstanding, some form of drug activity appeared to be a marker for delinquent behavior. The centrality of alcohol and drug use was noted in general theories of deviance proneness [e.g. Donovan and Jessor, 1985; Willoughby et al., 2004], in models applied to offending youth [Fergusson et al., 1994], and general theories of crime [Brownfield and Sorenson, 1993].

Much of this research isolates heavy, frequent, or abusive drinking in the etiology of juvenile offending and later criminal behavior; however, our results suggest that alcohol plays an important role even at more modest levels of delinquency assessed in a school-based, convenience sample of youth.

Relation to External Markers

Results of the MNR showed that compared with rule breakers (lowest levels of delinquency) both minor and major delinquents were more likely to be older males, act impulsively, and engage in novelty seeking. Novelty seeking is a proxy for sensation-seeking or risk-taking, both of which are linked with the inability to focus on school work, stick to tasks, and the need for high levels of cognitive stimulation. Researchers have generally embodied these characteristics in the broad catchall of behavioral undercontrol and disinhibition [Patterson and Newman, 1993; Wills and Ainette, 2010] specifically linking fun-seeking and sensitivity to reward to antisocial and delinquent behaviors [Colder and Stice, 1998; Shapiro et al., 1988; White et al., 1985; Yule and Fonseca, 1995]. Ultimately, a theoretical accounting would suggest that the inability to accrue positive reinforcement for work and effort encourages movement away from conventional institutions (i.e. disenfranchisement from school) fostering a search for friendships that provide behavioral models for deviance. This is a core feature of deviant subgroup bonding [Kaplan et al., 1984], identifying self-derogation and weakening of social controls as progenitors of later problem behaviors.

The MNR findings suggest that delinquent youth lack self-regulation and rely on emotional outbursts and inefficient self-management strategies to control their impulsive behaviors. Furthermore, both major and minor delinquents were more reliant on venting emotion as a coping strategy. Major delinquents were also psychologically vulnerable characterized by greater depression and anxiety, instability in emotional mood regulation and lacking skills to regulate their distress. The constellation of novelty seeking, poor self-regulation, and reliance on venting strategies appears consonant with the notion of weakened "self-control" that forms the backbone of the General Theory of Crime [Gottfredson and Hirschi, 1990]. One thing to consider is that many of the coping strategies we measured, including goal directed behaviors like planning, reaching for assistance or support, and venting emotion, are trademark features of multi-modal drug [Botvin, 2000] and violence [Botvin et al., 2006; Durant et al., 1996] prevention programs. Repeatedly it has been shown that these types of skills are amenable to improvement through traditional role-playing and behavioral practice.

Limitations

Some limitations of the current study should be noted. First the analyses were conducted using a relatively small sample and replication with larger samples is warranted. This is a major area of concern for studies that rely on model testing procedures in general [Cudeck and Brown, 1983] and specifically those using LCA methods [Collins et al., 1994]. There is certainly no one "true" model that will fit all of the data, but only approximations of the underlying reality characterizing delinquency. Second, we affirmed the latent classes with 51 items tapping delinquency and then further refined this with a reduced set of 20 items. Although the classes obtained in both models retained their basic characteristics (i.e. youth who were delinquent remained delinquent), the larger set of items does provide greater refinement in classification. Other self-report assessments of delinquency use contain even considerably more items [Elliott et al., 1989; Hindelang et al., 1981; Quay and Peterson, 1983; Shapland, 1978; Zucker and Fitzgerald, 1996] reflecting very similar broad categories of adolescent status offenses (e.g. drug use, serious and violent crimes, property theft, vandalism, and other forms of antisocial behavior). We also assumed that the variables used to create the class solutions are sufficient to typologically cast these youth. It is possible that additional measures of social aggression, rule or norm breaking, and other lesser offenses would provide a finer sieve to discern between the classes. There is a tradeoff here because additional items take more response time for students, introduce fatigue, and require that we expand our notion of delinquency to go beyond status offenses prevalent for this age category.

Students provided self-report data and there is no corollary information from significant others including friends, parents, or school truancy data obtained from archival records. Added to this, the cross-sectional nature of these data and the wide time frame used (lifetime occurrence) does not allow us to track whether these behaviors are episodic or intransient. We did control for age in the LCA models and also conducted the MNR analyses with age as a covariate to prevent confounding class membership with age. Related to this, the question format was dichotomous asking only if the act had been committed without obtaining additional information as to age of onset, frequency, and other

contextual factors (persistence) that would provide useful information to law enforcement authorities dealing with these youth should they present for remediation in the juvenile justice system.

We also modeled a restricted set of external markers, albeit reliable and valid ones. There are numerous predictors that have been identified as risk factors for delinquency that we did not include. For instance, harsh, inconsistent, and punitive parenting has been linked with onset to and development of delinquent behaviors [e.g. Richter et al., 2002], as have psychopathic traits and intellectual abilities [e.g. Loeber, 1990; Loeber and Stouthamer-Loeber, 1998; Lynam et al., 1993]. Although we included measures tapping different forms of coping, underlying propensities toward activation and inhibition, and mental health indicators, the inclusion of a broader set of ecological influences would be helpful.

In the case of external markers, a more elegant way to model the influence of socialization requires modeling separate classes based on gender. Such a restricted test would strain the robustness of the analyses given the small samples and low statistical power. There is a limit to the model space where sparseness becomes a liability and too many covariate adjustments yield problems with identification. Given the different patterns of delinquency between male and female participants, future studies would benefit from a search for subgroup heterogeneity using distinct samples of male and female youth in order to see if the same discrete classes are evident.

CONCLUSION

Although typically conceptualized as a single unidimensional construct, recent evidence suggests delinquency may be better viewed typologically consisting of several classes of qualitatively distinct behaviors which can be used to categorize youth. In this study we confirmed that, at least in a normative sample, three distinct classes of delinquency exist, ranging from minor social transgressions to more severe delinquent acts. Class membership can be predicted from a range of psychosocial markers, including tendency to approach or avoid environmental stimuli, coping strategies, and indicators of mental health. Future research in clinical and forensic samples would aid in furthering our understanding of how delinquency is conceptualized, paving the way for more effective prevention, early intervention, and judicial initiatives.

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