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Childhood Predictors of Male Criminality: A Prospective Population-Based Follow-up Study From Age 8 to Late Adolescence

ANDRE SOURANDER, M.D., HENRIK ELONHEIMO, L.L.M., SOLJA NIEMELÄ, M.D.,
ARI-MATTI NUUTILA, L.L.D., HANS HELENIUS, M.Sc., LAURI SILLANMÄKI, M.Sc.,
JORMA PIHA, M.D., TUULA TAMMINEN, M.D., KIRSTI KUMPULAINEN, M.D.,
IRMA MOILANEN, M.D., AND FREDERIK ALMQVIST, M.D.

ABSTRACT

Objective: To study childhood predictors for late adolescence criminality. **Method:** The follow-up sample included 2,713 Finnish boys born in 1981. Information about the 8-year-old boys' problem behavior was obtained from parents, teachers, and the children themselves. The follow-up information about criminal offenses was based on the national police register between the years 1998 and 2001 when the subjects were 16 to 20 years old. **Results:** According to the national police register, 22.2% of boys had at least one criminal offense other than a minor traffic violation during the 4-year study period. Living in nonintact family, low parental education level, parent reports of conduct problems, and teacher reports of hyperactivity problems when the child was 8 independently predicted a high level (more than five) of offenses. Living in nonintact family at age 8 predicted all types of criminal offenses. Low parental education level and parent or teacher reports of conduct problems independently predicted violence, property, traffic, and drunk driving offenses. Teacher reports of hyperactivity problems independently predicted all types of criminal offenses except drunk driving. Self-reports of bullying others independently predicted violent offenses. **Conclusions:** Living in a broken home, low parental education level, conduct problems, and hyperactivity in middle childhood predict criminal offenses in late adolescence. Efforts to prevent later criminality already in childhood are emphasized. *J. Am. Acad. Child Adolesc. Psychiatry*, 2006;45(5):578-586.

Key Words: childhood, criminology, epidemiology, follow-up, predictors.

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Dr. Sourander is with the Department of Child Psychiatry, Turku University Hospital, Turku, and the Department of Child and Adolescent Psychiatry, Columbia University, New York; Mr. Elonheimo and Dr. Nuutila are with Department of Criminology, Drs. Niemelä and Piha are with the Department of Child Psychiatry, Mr. Helenius and Mr. Sillanmäki are with the Department of Biostatistics, Turku University, Turku; Dr. Tamminen is with the Department of Child Psychiatry, Tampere University, Tampere; Dr. Moilanen is with the Department of Child Psychiatry, Oulu University Hospital; Dr. Kumpulainen is with the Department of Child Psychiatry, Kuopio University Hospital, Kuopio; and Dr. Almqvist is with the Department of Child Psychiatry, Helsinki University Hospital, Helsinki, Finland.

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Correspondence to Dr. Andre Sourander, Department of Child and Adolescent Psychiatry, Columbia University, 1051 Riverside Drive, Unit Box #78, New York, NY 10032; e-mail: andre.sourander@utu.fi.

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Few population-based longitudinal studies have been reported on developmental associations between early childhood emotional and behavioral problems, and adolescent or early adulthood criminality. In the Dunedin Longitudinal Study in New Zealand, undercontrolled temperament (restless, impulsive, with poor attention) at age 3 predicted self-reported delinquency and convictions at ages 18 to 21 (Caspi, 2000). Several studies have shown that conduct problems in childhood predict later delinquency and crime. In the birth cohort study from Christchurch, New Zealand, including about 1,000 children, conduct problems in middle childhood predicted self-reported crime in early adulthood, even after control of confounding factors (Fergusson et al., 2004). In the Seattle Social Development Project, a longitudinal study of about 800 elementary school students from high-crime neighborhoods in Seattle, several

childhood behavioral problems reported by parents, teachers, and children at ages 10 to 11 predicted early adulthood violence (Mason et al., 2004). In the Pittsburgh Youth Study, the strongest childhood correlates for teenage early-onset offenders were physical aggression, oppositional defiant disorder, attention-deficit/hyperactivity disorder (ADHD), truancy, peer delinquency, and poor parental supervision (Loeber et al., 1991). The strongest predictor for young adult violence was self-reported conduct problems. Farrington et al. (1990) found that ADHD-type problems predicted juvenile offending independently of conduct problems. Other predictors for adolescent delinquency or criminal convictions are low IQ and low school achievement, poor parental supervision, inconsistent discipline, child neglect, harsh or punitive discipline, parental separation and single parenthood, large family size, delinquency among family members, low socioeconomic status, peer rejection, bullying, attending a high delinquency-rate school, and living in a high-crime neighborhood (for reviews, see Farrington, 2004; Rutter et al., 1998; Smith, 1995).

Criminality is a challenging phenomenon to study because it evades scrutiny. The three main methods of collecting data on criminal behavior are self-reports of offending, victim reports, and official police or court statistics. None of these methods give a complete picture of crime. The main problem with the self-report and victim report method is how to reach the research subjects and get them to commit themselves to responding. We chose to use the police register instead of the criminal records because the latter only capture those convicted, whereas the police register covers a larger number of suspected offenders.

The present study investigated the relationship between family factors and childhood emotional and behavioral problems at age 8 and the number of offenses, as well as specific types of offenses in late adolescence. Furthermore, the aim is to compare the relative strength of different informants of children's problems to criminal offenses. Only few studies have examined the assessment of child emotional and behavioral problems collected from different informants as predictors for criminal activity in adolescence and early adulthood. For early intervention purposes, it is valuable to study which informants have the highest predictability for later criminal offenses.

METHOD

Subjects

This investigation is a part of a nationwide "From a Boy to a Man" study, a follow-up study included in the Epidemiological Multicenter Child Psychiatric Study in Finland (Almqvist et al., 1999). The study design and material were described previously in this journal (Sourander et al., 2004, 2005a, b). As described previously, the original study sample was drawn from the total population of Finnish children born during 1981 ($N = 60,007$). The original representative sample consisted of 6,017 children, which was 10% of the basic population. Of the selected 6,017 children, 5,813 (96.6%) took part in the study in 1989. Of the 5,813 children, 2,946 were boys. Because of missing identification numbers, police register information was obtained for 2,713 males (92.1% of the original study group at age 8). When the group of children with no information available at follow-up was compared with the rest of the sample, no significant differences were found in living in intact/nonintact family, parental education level, or being "screen positive" in parent or teacher Rutter total scores at age 8.

Criminal Offenses at Follow-up

Data on the cohort's criminal behavior were gathered through the Finnish National Police Register. This is a nationwide electronic database kept by the administration of the Finnish Police. Access to the register was granted by the Police Department, Ministry of the Interior.

A nationwide police register was created after the reform of county administration in 1997. The register includes all suspected offenders caught by the police. However, mere admonitions are not usually covered by the register. Furthermore, municipal parking fines are not included in the register. The present study is limited to acts registered during the years 1998–2001. Data are removed from the police register according to a certain schedule, pertaining to the limitation of prosecution by lapse of time. Data were collected from the register at two time points (in the beginning of the years 2000 and 2002) to ensure that the information concerning offenses during the years 1998–2001 is complete. Register information of the year 1997 was not included because of missing data. Minor traffic offenses have been excluded from the analysis as trivial. Within the 4-year period, there were 3,052 registered (other than minor traffic) offenses.

According to information obtained from the police register, subjects were classified into four groups: those who had (1) no registered offenses during the 4-year period; (2) one or two offenses; (3) three to five offenses; and (4) more than five offenses, indicating a high level of criminal acts. To study different crime types, criminality was divided into five categories: drug, violent, property, and traffic offenses and drunk driving. In this classification, the subject could belong to more than one offense group. There were 193 registered drug offenses, all of which are included in the data. These refer to various kinds of drug-related activity: producing, importing, exporting, delivering, selling, purchasing, or merely possessing illegal drugs, which are forbidden in Finland. The 193 drug offenses were classified by the police in three specific categories: unlawful use of narcotics (14 cases), narcotics offense (171), and aggravated narcotics offense (8). According to law, drug offenses can be categorized, for example, according to the quality and quantity of the drug. However, on the basis of these classifications made by the police, the exact

nature of the drug offenses cannot be securely distinguished. We defined violence (335 offenses) as overt aggressive behavior toward another human being. The main subgroups are various kinds of assaults, battery, and robbery. Property crime (1,616 offenses) included covert behavior targeted not at human beings but at property. This category includes different kinds of stealing, illicit use of a motor vehicle, receiving stolen goods, and vandalism. Economic crime (fraud, embezzlement, and various kinds of forgery) was also included in this category. Traffic offenses (526 offenses) consist of reckless driving of various degrees and driving without a license. As mentioned, minor traffic violations (157 offenses) were ignored. Finally, there were 193 registered drunk driving offenses. In Finland, drunk driving presumes a blood alcohol concentration $>0.05\%$.

Instruments and Methods in 1989

At age 8, three assessment procedures were used; details of the instruments used at age 8 in this follow-up study were reported previously (Almqvist et al., 1999; Sourander et al., 2004; 2005a, b). Parents were asked to complete the Rutter A2 Scale (Rutter et al., 1970) and the teachers were asked to complete the Rutter B2 Scale (Rutter, 1967), both including three subscales (conduct, hyperactivity, and emotional scores). Further questions about family structure (intact two-biological parent–family versus nonintact family structure), parental education level (father's or mother's completion of 12 years' schooling versus others), and child's somatic health problems using the question "Is the child physically healthy?" (alternatives 1 = yes, 2 = no) were added to the parent questionnaire. The question "Is the child psychologically healthy?" (1 = yes, 2 = I don't know, 3 = no; alternatives 2 and 3 were pooled) and a question about school performance (1 = better than average, 2 = average, 3 = poor; alternatives 1 and 2 were pooled) were added to the teacher questionnaire. Information about help-seeking and perceived need for help was obtained from both teachers and parents ("have you considered seeking or have sought help or treatment for [your] child's emotional or behavioral problems?"; scale: 1 = no, 2 = have considered it, 3 = have sought help; alternatives 2 and 3 were pooled).

The children completed the Children's Depression Inventory in the classroom (Kovacs, 1992). The question concerning suicide was excluded because it was assumed that it may confuse children of the age group involved, especially in the absence of an opportunity to discuss the issue with an adult. A psychosomatic scale developed for the purposes of the present study, including questions about headache, stomachache, nausea, and other pains, was included (four items rated on a 0–2 scale, with a range of scores from 0–8 points). The children were also asked about bullying other children (alternatives 1 = I do not usually bully other children, 2 = I sometimes bully other children, 3 = I bully other children nearly every day) and being victims of bullying (alternatives 1 = other children do not usually bully me, 2 = other children sometimes bully me, 3 = other children bully me nearly every day). Alternatives 2 and 3 were pooled in both cases.

Statistical Methods

When studying predictors for specific types of criminal offenses, each criminal offense group was studied as a dichotomous response variable with the categories "yes" and "no criminal offenses." The reference group in the logistic regression analyses for each criminal offense group belonged to the group with no criminal offenses.

Univariate and multivariate logistic regression were used to analyze the predictive associations between the response variables at follow-up and the explanatory variables when the child was 8 years of age. These associations were quantified by calculating odds ratios (ORs) and 95% confidence intervals (CIs). The ORs for continuous variables were calculated for 1 standard deviation (SD). The multivariate analyses of the predictors for number of criminal offenses were carried out by applying multivariate multinomial logistic regression analysis. ORs and CIs were calculated separately for the group of boys who had been recognized as having one or two, three to five, and more than five criminal offenses versus the group with no criminal offenses. The multinomial logistic regression analysis for a polychotomous response variable is a generalization of the methodology of logistic regression analysis for a dichotomous response variable (Hosmer and Lemeshow, 2000).

Explanatory variables at age 8 measuring a child's symptomatology (parent and teacher Rutter scores, Children's Depression Inventory, Psychosomatic scale) were analyzed as continuous variables. Other explanatory variables at age 8 (family structure, parental educational level, child's somatic health problems, child having psychological problems, school performance, bullying, and help-seeking variables) were used categorically. The variables independently associated with outcome variables, first analyzed in five groups (family variables, information on child's problems from parent, teacher and self-reports, help-seeking variables), were entered in the final multivariate analysis. Because of the hierarchical relationship between Rutter total scores and subscores, the multivariate analysis was performed in two models. *p* Values $< .05$ were considered statistically significant. All tests were two-tailed. Statistical computations were performed using the SAS system for Windows, release 8.2/2000 (SAS, Cary, NC).

RESULTS

Prevalence of Offenses

According to the police register, of 2,713 males, 2,111 (77.8%) had no offenses, 391 (14.4%) had one or two offenses, 111 (4.1%) three to five offenses, and 100 (3.7%) more than five offenses during the 4-year period 1998–2001, when the subjects were 16 to 20 years old. Furthermore, 93 (3.4%) had drug offenses, 185 (6.8%) violent offenses, 287 (10.6%) property offenses, 287 (10.6%) traffic offenses (not including minor traffic violations), and 140 (5.2%) drunk driving. Of the 602 offenders, 239 (39.7%) were involved in more than one of the five crime categories.

The descriptive characteristics of the categorical explanatory variables and the number of offenses is available on the *Journal's* Web site <http://www.jaacap.com> via the Article Plus feature. In particular, the group with more than five offenses during the 4-year period had an accumulation of childhood risk factors. Almost all (82%) came from families with a lower parental education level, 43% came from broken families, 26% had psychological problems

according to the teacher when assessed with a single question "Is the child psychologically healthy," 24% had poor school achievement, and 44% reported bullying others at age 8.

Predictors at Age 8 of Number of Offenses

Family Variables. As shown in Table 1, in univariate analysis living with other than biological parents and parents' low educational level when the child was 8 predicted the number of offenses committed in late adolescence. Furthermore, the predictive association between family structure and the number of crimes was linear: it was much stronger among those who had committed more than five crimes (OR = 4.5, 95% CI 2.9–6.9) than among those who had committed one

or two crimes (OR = 1.6, 95% CI 1.2–2.1) or three to five crimes (OR = 2.1, 95% CI 1.4–3.3). When the effect of family variables was controlled in multivariate analysis, both these explanatory variables remained significant predictors for outcome.

Parent Reports. In univariate analysis, total, conduct and hyperactivity symptoms predicted offenses at follow-up (Table 1). The predictive association between symptom levels and number of offenses was linear because the strongest predictive associations were found in the group with more than five offenses. When the effect of hyperactivity and conduct problems was controlled in multivariate analysis, only conduct problems independently predicted outcome.

Teacher Reports. In univariate analysis, teacher reports of a child's psychological problems were assessed

TABLE 1
Predictive Associations Between Explanatory Variables at Age 8 and No. of Offenses/Crimes in Late Adolescence:
Results of Multinomial Univariate Logistic Regression Analysis

Explanatory Variable	Overall <i>p</i> Value	1–2 Offenses (<i>n</i> = 391)		3–5 Offenses (<i>n</i> = 111)		>5 Offenses (<i>n</i> = 100)	
		OR	95% CI	OR	95% CI	OR	95% CI
Family characteristics							
Living in other than 2-biological parent family	<.001	1.6	1.2–2.1	2.1	1.4–3.3	4.5	2.9–6.9
Mother's low education level	<.001	1.4	1.1–1.8	4.1	2.2–7.7	2.5	1.4–4.5
Father's low education level	<.001	1.4	1.05–1.9	6.4	2.3–17.6	3.4	1.5–8.0
Mother's or father's low education level	<.001	1.4	1.1–1.7	4.2	2.4–7.4	2.9	1.7–5.0
Parent's report							
Child's health problems	NS	0.8	0.6–1.1	0.6	0.3–1.1	0.5	0.2–1.1
Rutter A2 total scale	<.001	1.1	1.01–1.2	1.4	1.2–1.6	1.5	1.3–1.8
Rutter A2 emotional scale	NS	1.0	0.9–1.1	0.9	0.7–1.1	0.9	0.7–1.1
Rutter A2 conduct scale	<.001	1.2	1.1–1.3	1.6	1.3–1.8	1.8	1.6–2.1
Rutter A2 hyperactivity scale	<.001	1.2	1.04–1.3	1.4	1.2–1.7	1.6	1.3–1.8
Teacher's report							
Psychological problems	<.001	1.8	1.3–2.3	2.5	1.7–3.9	2.2	1.4–3.6
Low school achievement	.002	1.4	1.0–1.8	1.8	1.1–2.9	1.9	1.2–3.1
Rutter B2 total scale	<.001	1.4	1.2–1.5	1.6	1.3–1.9	1.8	1.5–2.1
Rutter B2 emotional scale	NS	1.1	0.98–1.2	1.1	0.9–1.3	1.1	0.9–1.3
Rutter B2 conduct scale	<.001	1.4	1.3–1.6	1.7	1.5–2.0	1.8	1.5–2.1
Rutter B2 hyperactivity scale	<.001	1.4	1.3–1.6	1.6	1.4–1.9	1.8	1.6–2.2
Child's self-report							
CDI	<.001	1.2	1.1–1.3	1.4	1.1–1.6	1.5	1.3–1.8
Psychosomatic scale	<.001	1.1	1.02–1.3	1.3	1.1–1.5	1.3	1.1–1.6
Bullying	<.001	1.4	1.1–1.8	2.1	1.4–3.1	2.0	1.4–3.1
Victim of bullying	NS	1.1	0.9–1.4	1.2	0.8–1.8	1.0	0.7–1.6
Help-seeking							
Need of services (parent)	<.001	1.0	0.7–1.6	2.8	1.7–4.6	1.6	0.9–3.2
Need of services (teacher)	<.001	1.7	1.1–2.4	3.0	1.8–5.2	3.4	2.0–5.8

Note: Rutter scales, Children's Depression Inventory, and Psychosomatic scale were analyzed as continuous variables. The odds ratios were calculated for 1 SD. OR = odds ratio; CI = confidence interval; NS = not significant; CDI = Children's Depression Inventory.

with a single question “Is the child psychologically healthy?”; poor school achievement and total, conduct, and hyperactivity symptoms predicted offenses (Table 1). The association between all of these explanatory variables and the number of offenses was linear. When the effect of teacher evaluations was studied with multivariate analysis including Rutter total scores, school achievement, and having psychological problems, only total scores independently predicted outcome. When the multivariate analysis included Rutter subscores, both conduct and hyperactivity symptoms independently predicted outcome.

Self-Reports. In univariate analysis, depressiveness assessed with the Children’s Depression Inventory, psychosomatic symptoms, and the child’s own report that he or she bullied other children predicted offenses (Table 1). In multivariate analysis including self-report variables, depressive symptoms and bullying independently predicted outcome.

Help-Seeking. Both parent and teacher reports of a child’s possible need of services predicted outcome (Table 1).

Final Multivariate Analysis. All variables with an independent predictive association with the outcome variables when analyzed first in groups of family, parent reports, teacher reports, self-reports, and help-seeking variables were included in the final multivariate analysis. As shown in Table 2, when controlled with the effects of other significant explanatory variables, not living with two biological parents, parents’ low educational level, teacher reports of total and hyper-

activity problems, and parent and teacher reports of conduct symptoms had an independent predictive association with outcome.

Predictors at Age 8 of Specific Offense Types

The table showing univariate associations between explanatory variables and specific crime types is available on the *Journal’s* Web site <http://www.jaacap.com> via the Article Plus feature.

Family Variables. In univariate analysis, living with other than two biological parents and father’s low education level when the child was 8 predicted all offense types at follow-up. Furthermore, mother’s low education level predicted all offense types except drug offenses.

Parent Reports. In univariate analysis, total, conduct, and hyperactivity symptoms predicted all crime types at follow-up. Parent reports of a child’s emotional symptoms had a protective association with traffic and drunk-driving offenses, and physical health problems had a protective association with property offenses.

Teacher Reports. All types of offenses were predicted by teacher’s estimation of the child’s total, conduct, and hyperactivity symptoms. Teacher reports that the child has psychological problems predicted all types of offenses except drug offenses. Low school achievement predicted violence, property, and traffic crimes.

Self-Reports. Depressive symptoms predicted all offense groups except drug offenses. Psychosomatic symptoms predicted violent, property, and traffic

TABLE 2
Predictive Associations Between Explanatory Variables at Age 8 and No. of Offenses/Crimes in Late Adolescence:
Results of Final Multinomial Multivariate Logistic Regression Analysis

Explanatory Variable	Overall <i>p</i> Value	1–2 Offenses		3–5 Offenses		>5 Offenses	
		OR	95% CI	OR	95% CI	OR	95% CI
Model 1 (including Rutter total scores)							
Living in other than a 2-biological parent family	<.001	1.4	1.1–1.9	1.5	0.9–2.4	3.2	2.0–5.1
Mother’s or father’s low education level	<.001	1.2	0.96–1.6	3.7	2.1–6.5	2.1	1.2–3.6
Rutter B2 total scale (teacher)	<.001	1.4	1.2–1.5	1.4	1.1–1.7	1.7	1.4–2.1
Model 2 (including Rutter subscores)							
Living in other than a 2-biological parent family	<.001	1.4	1.02–1.9	1.4	0.8–2.3	2.8	1.7–4.6
Mother’s or father’s low education level	<.001	1.2	0.96–1.6	3.4	1.9–6.0	2.0	1.1–3.5
Rutter A2 conduct scale (parent)	.001	1.0	0.9–1.1	1.2	1.01–1.4	1.2	1.1–1.4
Rutter B2 conduct scale (teacher)	.026	1.1	1.01–1.2	1.1	1.02–1.3	1.1	0.95–1.2
Rutter B2 hyperactivity scale (teacher)	.007	1.1	1.03–1.2	1.1	0.9–1.2	1.2	1.04–1.4

Note: Rutter scales were analyzed as continuous variables. The odds ratios were calculated for 1 SD. OR = odds ratio; CI = confidence interval.

offenses. Bullying at school predicted all offense types, whereas being bullied by others predicted drunk driving.

Help-Seeking. Teacher reports of a child's need of services predicted all offense types. Parent reports of a child's need of services predicted drug, violence, and property offenses.

Final Multivariate Analysis. All variables with an independent predictive association with the outcome variables when analyzed first in groups of family, parent reports, teacher reports, self-reports, and help-seeking variables were included in the final multivariate analysis. When controlled with the effects of other significant explanatory variables, a child living in other than a two-biological parent family independently predicted all specific crime types. Parents' low education level and teacher reports of a child's total symptoms independently predicted all offense types except drug offenses. Furthermore, parent reports of a child's total symptoms predicted drug offenses. Parent and teacher reports of conduct problems independently predicted violence, traffic, and drunk-driving offenses, whereas parent reports of conduct problems independently predicted property offenses. Teacher reports of hyperactivity symptoms indepen-

dently predicted all crime types except drunk driving. When controlled with the effect of family variables and symptom dimensions (model 2 in Table 3), self-reported bullying predicted violent crime. Parent reports of emotional symptoms were protective for traffic and drunk-driving offenses (Table 3).

DISCUSSION

According to register information, 22% of boys had committed some criminal offenses and 4% had committed more than five criminal acts during the 4-year period. These prevalence figures parallel those found in previous studies on male criminality based on register studies (Farrington, 1992; Tracy et al., 1985). Living in a broken home, low parental education level, and parent and teacher reports of conduct problems and hyperactivity had the strongest predictive associations with later offenses.

Family Factors

Both living in a nonintact family and low parental education level independently predicted most of the

TABLE 3
Significant Predictive Associations Between Explanatory Variables at Age 8 and Type of Offenses/Crimes in Late Adolescence:
Results of Final Multivariate Logistic Regression Analysis

Explanatory Variable	Drug Offenses		Violence		Property Offenses		Traffic Offenses		Drunk Driving	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Model 1 (including Rutter total scores)										
Living in other than 2-biological parent family	2.5	1.5–4.1***	2.1	1.4–3.0***	1.8	1.3–2.5***	1.9	1.4–2.6***	2.1	1.4–3.2***
Mother's or father's low education level			1.9	1.3–2.9**	1.7	1.2–2.3**	1.5	1.1–2.0*	2.3	1.4–7***
Rutter A2 total scale	1.1	1.01–1.1*								
Rutter B2 total scale			1.1	1.04–1.1***	1.1	1.01–1.8***	1.1	1.05–1.1***	1.1	1.03–1.1***
Bullying			1.7	1.2–2.4**	1.4	1.01–1.8*			1.5	1.01–2.2*
Model 2 (including Rutter subscores)										
Living in other than 2-biological parent family	2.5	1.5–4.1***	1.9	1.3–2.9**	1.7	1.2–2.4**	1.9	1.4–2.7***	2.1	1.3–3.2**
Mother's or father's low education level			1.9	1.2–2.8**	1.6	1.2–2.2**	1.4	1.02–1.9*	2.2	1.4–3.5**
Rutter A2 emotional scale							0.9	0.8–0.97*	0.8	0.6–0.98*
Rutter A2 conduct scale			1.1	1.01–1.3*	1.2	1.1–1.3**	1.2	1.04–1.3**	1.2	1.02–1.5*
Rutter B2 conduct scale			1.1	1.01–1.2*			1.1	1.03–1.2**	1.4	1.1–1.8**
Rutter B2 hyperactivity scale	1.2	1.01–1.4*	1.2	1.1–1.4**	1.1	1.02–1.3*	1.1	1.03–1.3*		
Bullying			1.6	1.1–2.2*						

Note: OR = odds ratio; CI = confidence interval. Rutter scales were analyzed as continuous variables. The odds ratios were calculated for 1 SD.
* $p < .05$; ** $p < .01$; *** $p < .001$.

specific crime types. The effect of family structure on the number of crimes was linear; it was most strongly associated with a high level (more than five) of criminal offenses. Accordingly, previous studies have shown that living in a broken home and family socioeconomic status in childhood predict later delinquency (Fergusson et al., 2004). In the Dunedin study, boys from single-parent families disproportionately tended to have convictions (Henry et al., 1996). Furthermore, in the Newcastle Thousand Family Study, Kolvin et al. (1988) showed that parental separation or divorce in a boy's first 5 years of life predicted his later convictions up to age 32. In his review, Smith (1995) suggests that offending in itself is only weakly related to social class, whereas getting a police record and especially recidivism are strongly associated with parental social class. Living in a broken home is often associated with a series of stressful experiences such as parental conflict, parental loss, reduced socioeconomic circumstances, changes in parental figures, and poor child-rearing practices, all of which may be associated with later delinquent behavior. Unfortunately, information about parenting qualities, parent psychopathology, and family conflicts was not collected in the present study.

Parent and Teacher Reports of a Child's Problems

As expected, both parent- and teacher-reported conduct problems in childhood predicted crimes in late adolescence. The effect of parent reports of conduct problems on frequency of crimes was linear; the strongest association was found with a high level of crimes. Parent or teacher reports of conduct problems predicted all specific types of offenses in univariate analysis. These results confirm many previous studies showing that childhood conduct problems strongly predict later delinquency (Fergusson et al., 2004; Simonoff et al., 2004). Because childhood conduct problems have a nonspecific predictive association with all types of crimes, targeted prevention programs focused on early conduct problems in early childhood to prevent later criminality are emphasized. Preschool programs, parent training interventions, and social skills training have proved to be effective interventions in childhood conduct and oppositional problems (Anderson et al., 2003; Brestan and Eyberg, 1998).

Teacher reports of hyperactivity independently predicted number of offenses and all specific types of offenses except drunk driving. Accordingly, previous

studies show that boys lacking concentration are at risk of later criminal behavior, with some studies showing that hyperactivity predicts juvenile offending independently of conduct problems (Farrington et al., 1990; Lynam, 1998). The finding that childhood hyperactivity is an independent predictor of traffic offenses is in accordance with studies showing that childhood ADHD is associated with traffic accidents. Previous studies show that adolescents with ADHD are two to four times more likely to experience a motor vehicle accident and more than three times more likely to incur associated injuries (Barkley et al., 2002; Liebson et al., 2001). When interpreting the results of the present study, it is also important to notice that the use of psychostimulants in the treatment of childhood ADHD was almost nonexistent in Finland until the year 2001. Further studies are needed to show whether active treatment of childhood ADHD can prevent later criminal offenses. However, information about hyperactivity in the present study was based on questionnaires and not on diagnostic interviews.

Poor school achievement predicted number of crimes as well as violent, property, and traffic offenses. Accordingly, low IQ and poor school achievement in childhood have been shown to be associated with antisocial behavior in adolescence (Moffitt, 1993). Attention problems, low IQ, and poor school achievement could be linked to deficits in the executive functions of the brain. However, when controlled with other explanatory variables, poor school achievement was not independently associated with outcome.

Self-Reports of Problems

Self-reports of depressive symptoms were in linear predictive association with the number of crimes and all specific crime types except drug offenses in univariate analysis. However, neither parent nor teacher reports of child's emotional problems correlated with the number of offenses. Self-reported depressive symptoms may indicate pessimism, low self-esteem, and poor coping strategies, which may in turn predispose to crime. However, self-reported depressive symptoms did not hold up in multivariate analysis. Despite the uncertainty of the association, self-reported internal distress may be a public health sign identifying boys who are at risk of future criminal behavior.

The child's self-report of bullying other children at age 8, indicating conduct problems, predicted all

offense types at the follow-up in univariate analysis. These findings stress the importance of assessing the young child's own perceptions of distress and behavior. Such early information provides children with a "voice" in the process of selecting them for prevention and intervention measures.

Comparison of Predictive Associations

To a large extent, childhood risk factors were similar among different offense types. However, drug offenses stood out because of their relatively few antecedents. In univariate analysis, unlike all other offense categories, drug offenses were not predicted by low parental education level, teacher-reported psychological problems, or self-reported depressive symptoms. Furthermore, drug offenses were not associated with low school achievement. In the final multivariate analysis, drug offenses were the only offense category not predicted by childhood conduct problems. The results indicate that drug offending is less associated with childhood problems and not as tightly related to social class as the other types of offending.

There are certain features that distinguish drug offenses from the other crime types, accounting for our findings. Drug offenses as such do not comprise externalizing and impulsive behavior, such as vandalism, reckless driving, or attacking other people or some other predatory crime. Drug use lacks an outsider victim, rendering its legal status substantially a matter of political decision making rather than a universal wrong. There are signs that drug use is more spread across the social strata and more widely accepted a part of youth culture than predatory crime (Parker et al., 2002). In a recent review, it was concluded that associations between youth cannabis use and psychological problems in different epidemiological studies were not consistent (Macleod et al., 2004). It may be that drug offending is mediated by psychosocial factors in adolescence rather than in childhood, and its special features make it more difficult to foresee who becomes a drug offender.

Cross-Informant Comparison

Teacher, but not parent, reports of total problems predicted the number of crimes in the final multivariate analysis. Furthermore, teacher reports of total problems predicted violence, property offenses, traffic offenses, and drunk driving, whereas parent reports of total problems predicted only drug offenses in the final

multivariate analysis. Therefore, it can be concluded that teacher reports of the child's problems had a stronger correlation with later criminality than parent reports or child self-reports. This indicates that the education sector and school health care are of central importance in the early detection of boys at risk of criminality. The simple questions about the child's need for mental health services and psychological health administered to teachers predicted the number of crimes and most crime types. These results are in accordance with our previous reports that such simple questions predict later mental health service use and psychiatric diagnosis at military call up (Sourander et al., 2004, 2005b). In recognizing risk groups needing early prevention and interventions, these findings have implications for identifying children in need of selective or targeted prevention efforts.

Limitations

The present community-based sample was representative of the target population, and the study design was a prospective follow-up study. The 3% attrition rate at baseline and the 8% attrition rate at follow-up were low considering the duration of the follow-up and the sample size. Recorded crime consists of incidents that have been referred to the authorities. Obviously, this information depends on the prevailing legal codes and changing methods of dealing with offensive behavior. It has been shown that victim survey figures are higher than those of recorded crime (Smith, 1995). The Finnish information about criminal offenses is updated continuously, and the register is well maintained. Police data cover a large number of apprehended and suspected offenders and was therefore preferred as a data source to court statistics that only include the convicted ones. Although police data may include innocent "false positives," using court data would ignore a huge amount of crime. Hidden criminality refers to the fact that not all criminal behavior comes to the notice of the police. Furthermore, the police may not always arrest every single (minor) offender. Despite these limitations, information based on this Finnish national register gives comprehensive and unique information about criminal offenses, information that is not available in most countries.

Clinical Implications

Active screening to detect children in need of early interventions in childhood to prevent negative development

in adolescence and early adulthood is emphasized. An important finding is that teacher observations of the child's problems predict later criminality. School personnel are in a central position in a child's early problem recognition, gatekeepers for help-seeking and providing early services. At present, there is substantial evidence of the efficacy of several child mental health interventions in childhood externalizing problems. At the same time, because family circumstances and parental education level are associated with later crime, there is a need for a broader social policy aimed at reducing socioeconomic inequalities and reducing family adversity. Further studies are needed to find out whether these intervention strategies could be used to prevent later criminality.

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