

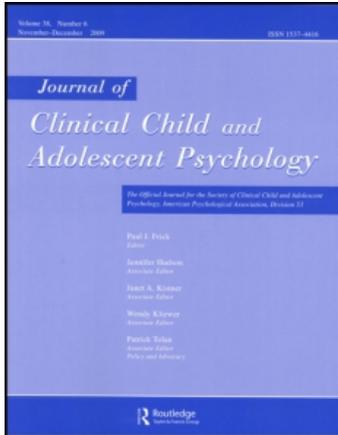
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## Pathways of Behavior Problems From Childhood to Late Adolescence Leading to Delinquency and Academic Underachievement

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Adolescent delinquency and academic underachievement are both linked with child and adolescent behavior problems. However, little is known about behavioral pathways leading to these adverse outcomes. Children's aggression, opposition, status violations, and property violations scores were collected at ages 5, 10, and 18. Delinquency and academic functioning was rated at age 18. Age 18 status violations were linked to delinquency, and property violations to academic underachievement. Engagement in status and property violations was predicted by childhood opposition. Findings suggest that (a) disaggregated forms of externalizing behavior are needed to understand behavioral pathways to adverse outcomes and (b) prevention of adolescent delinquency and academic underachievement should target childhood opposition.

Adolescent delinquency and academic underachievement are considered serious consequences of a problematic behavioral development and impose a great risk for future adolescent functioning. According to the coercion model (Capaldi, Chamberlain, & Patterson, 1997; Patterson, Reid, & Dishion, 1992), these two outcomes are the consequence of prolonged externalizing behavior problems. According to this model, children's early noncompliant and aggressive behaviors learned at home generalize to the school setting where they, possibly through processes of deviant peer affiliation and peer influences, escalate into delinquent behaviors and academic failure. Indeed, many studies have linked both delinquency and academic underachievement to previous externalizing problems (Campbell, Spieker, Burchinal, & Poe, 2006; Fergusson & Horwood, 1998; Fergusson & Woodward, 2000; French & Conrad, 2001; Newcomb et al., 2002; Patterson, DeBaryshe, & Ramsey, 1989). Specifically, although these are not the only outcomes linked to externalizing problems, academic underperformance and delinquency most likely severely reduce the youths' future chances of adaptive adult societal functioning. Adolescent delinquency

increases the risk of running into conflict with the law, being convicted, and engaging in drug-related and violent crime (Moffitt, 2001; Moffitt, Caspi, Harrington, & Milne, 2002). Academic underachievement, such as grade retention and school dropout, leads to poor educational qualifications and thus to low employment status, low income, and low future (socioeconomic) status (Chen & Kaplan, 2003; Eide & Showalter, 2001; Fergusson, Swain-Campbell, & Horwood, 2002; Jimerson, 1999; Ronka, Kinnunen, & Pulkkinen, 2000). These explicit risks may be distinct from other indices of risky adolescent development, such as alcohol and drug use or risky sexual behavior. Although these risk behaviors are also linked to maladaptive adult functioning, they do not necessarily imply a high risk for poor societal function, as alcohol and drug use is quite common among adults in the general population (for Dutch population, see Trimbos Institute, 2007).

As outlined in the model by Capaldi and colleagues (1997), delinquency and academic underachievement do not emerge newly in late adolescence.<sup>1</sup> Rather, they

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<sup>1</sup>Note that we refer to academic *underachievement*, which is operationalized as completing a lower level of education than expected, or dropping out of school. We do not refer to *poor* academic achievement, which is mostly linked to low cognitive ability.

are—in part—the ultimate outcomes of an earlier problematic development. However, Capaldi et al. are not specific in what forms of behavior problems at what ages are of importance in the pathways toward delinquency and underachievement. According to the developmental pathways model of delinquency (Loeber, Keenan, & Zhang, 1997; Loeber et al., 1993) we should discriminate between forms of externalizing problems, and study how these develop into new and more serious forms of externalizing problems, when trying to understand the pathways leading toward deviancy in adolescence. Specifically, the authors formulated three different paths. In the first pathway, behavior problems manifest themselves as early authority conflicts, indicated by oppositional behaviors (stubborn, defiance), which are followed by status violations such as truancy and running away from home. A second, covert pathway consists of property violations like lying or cheating, followed by fire setting, vandalism, and eventually serious crime, such as fraud and breaking and entering. The third, overt pathway, is postulated to consist of minor aggression, followed by physical fighting, and ending with physical violence, such as rape and attack. According to this theory, early oppositional problems predict engagement in both the overt and covert paths later in development.

Empirical evidence suggests that, indeed, externalizing problems reflect a rather broad array of problems, ranging from oppositional behavior, (physical) aggression, vandalism, and theft to severe rule-breaking behaviors (Fergusson, Horwood, & Lynskey, 1994; Frick et al., 1993). Moreover, these different forms have unique developmental courses. Indeed, opposition and physical aggression have their onset probably already in the infancy/toddlerhood period and may diminish with age (Alink et al., 2006; Bongers, Koot, van der Ende, & Verhulst, 2004; Koot, van den Oord, Verhulst, & Boomsma, 1997; Tremblay, 2004), whereas other forms such as property violations and status violations are found to become more salient in late childhood and adolescence (Lahey et al., 2000). Despite the theoretical and empirical evidence that forms of externalizing behaviors should be discriminated, previous research has generally aggregated different forms of externalizing behavior, or studied single subtypes of externalizing problems, when trying to predict adverse adolescent outcomes (e.g., physical aggression; Broidy et al., 2003). Other studies, however, did account for differential effects of different forms of externalizing behavior. For instance, when both physical aggression and oppositional behaviors were considered together, physical aggression was found to be a stronger predictor of delinquency than opposition (Nagin & Tremblay, 1999).

Thus, it is likely that not all forms of externalizing problems predict poor adolescent outcomes, or predict

it to the same extent. However, studies addressing the question of differential effects did not adequately account for the hypothesized transitions between forms of externalizing problems with age in the development toward delinquency and underachievement. In fact, little research has been directed at testing Loeber's developmental pathways of antisocial behavior. However, Loeber et al. (1997) did find that boys who persisted in either the overt or covert pathway also had persisted in the earlier and more common authority conflict pathway. Similarly, another study by Loeber and colleagues (Loeber, Green, Keenan, & Lahey, 1995) demonstrated that 80% of all new cases with a clinical diagnosis of conduct disorder had a prior diagnosis of oppositional defiant disorder, supporting the hypothesized transition from oppositional problems to more serious conduct problems. Finally, Tolan, Gorman-Smith, and Loeber (2000) showed that within each of the hypothesized pathways less serious behaviors had earlier onsets than more serious acts and that serious acts did not precede less serious behaviors. Although these findings may be supportive of Loeber's model, these studies were hampered by a number of methodological limitations. They did not account for transitions between subtypes of antisocial behavior over time, which is a central theme of the pathways theory. Furthermore, the age periods covered were limited to adolescence (maximum of 6 years), and only at-risk male samples were used.

The objective of this study is therefore to explore which types of externalizing problems are most salient as predictors of poor outcome at what age, and whether and how they, through transactions to other types of externalizing problems, ultimately lead to the poor adolescent outcomes. We studied these questions in a general population sample followed from age 5 to 18 years. Specifically, the first aim of the study was to explore which subtypes of externalizing problems in adolescence account best for engagement in late adolescent delinquency and academic underachievement. The second aim was to study whether these predictor(s) are the result of continuity of the same subtype of behavior problems, or the result of the transaction between subtypes of externalizing problems. Based on Loeber's theory and the limited previous research on this topic, we hypothesized aggression and property violations to appear as unique predictors of delinquency and academic underachievement. We also expected to find evidence for transactional influences between subtypes of externalizing problems. Specifically, in line with Loeber's authority conflict pathway, we expected early childhood oppositional behaviors to account for engagement in other forms of externalizing problems (aggression, property violations, and status violations), and aggression and property violations to

ultimately account for engagement in delinquency and academic underachievement in late adolescence.

## METHOD

### Participants

The original sample of 420 two- and three-year-old children was drawn randomly from the Dutch province of Zuid-Holland using inoculation registers and the municipal population register of Rotterdam in 1989 (Koot & Verhulst, 1991). For the current study, parent-reports at three follow-up assessments (ages 5, 10, and 18 years) were used, as well as self-reports at age 18. Written informed consent was obtained from parents at each assessment and from adolescents at the age 18 assessment.

At follow-up at age 5 (1991), a response rate of 95% of the original sample was reached, including 201 boys and 195 girls ( $M$  age = 4.83 years,  $SD$  = 8.4 months). At age 10 (1997), usable information for 85% of the original sample was obtained (180 boys, 178 girls;  $M$  age = 10.46 years,  $SD$  = 7.2 months). At age 18 (2005), 77% of the parents in the original sample (1989) provided information about their children (165 boys and 159 girls;  $M$  age = 18.19 years,  $SD$  = 8.4 months), and 74% of the adolescents (152 boys and 159 girls) about themselves. Detailed information on sample attrition can be found elsewhere (Mesman & Koot, 2000; Timmermans, van Lier, & Koot, 2008). The study was approved by the Erasmus MC Ethical Review Board.

### Measures

**Outcomes.** *Self-reported delinquency* was measured through the International Self-Report Delinquency Study (Junger-Tas, Terlouw, & Klein, 1994) assessing violent delinquency (six items; e.g., *Did you join a public fight*, *Did you carry a weapon with you*, *Did you wound someone with some kind of weapon*), and nonviolent delinquency (28 items; e.g., *Did you dodge fare in public transport (train)*, *Did you go joyriding with someone else's car*, *Have you destroyed public/someone's property on purpose*) in the past 12 months. Items were scored on a 6-point scale ranging 0 (*never*), 1 (*once*), 2 (*twice*), 3 (*3–5 times*), 4 (*6–10 times*), and 5 (*11 times or more*). Cronbach's alpha for the total delinquency scale was .82. Because the delinquency score was skewed a square-root transformed score was used in the analyses.

*Academic (under) achievement* was based on the discrepancy score between the early adolescent academic (advised) school level and the actual school level in late adolescence, or actual degree obtained. When children

leave elementary school in the Netherlands, they can choose between four levels of secondary education (aside from special education), ranging from low, intermediate, and high prevocational education, to preuniversity training. The Dutch law prescribes that elementary school directors and teachers advise each child which secondary school level to choose. This advice is based on the child's entire elementary school record and is highly decisive of the level that will be followed during the secondary school period. To account for possible deviance from the elementary school advice (in some cases the parents/child may deviate from this advice), we also recorded the actual level attended in first-grade secondary school.

At age 18, actual academic achievement was recorded as the current level of education and/or the obtained degree, and years in school. Academic underachievement (coded as 1) represented (a) adolescents who followed their advised school level but who had a 2-year (or more) delay (i.e., repeated a class), (b) adolescents who were in a lower school level (or degree) than advised (possibly with an additional delay), and (c) adolescents who dropped out of school without a degree. Expected achievement (coded as 0) represented (a) adolescents who performed at a higher level than expected, based on their advised school level; (b) adolescents who followed their advised level; and (c) adolescents who followed their advised level with only 1 year of delay. Note that in the Netherlands, being 1 year behind in the advised level (24% of all cases) does not necessarily imply grade retention. It likely is the result of following an alternative route to completion of the advised level. For instance, a student with preuniversity level advice could first have completed the high prevocational level (5 years) and subsequently follow the 2 final years of preuniversity level. This would cause him or her to successfully graduate at preuniversity level in 7 years. The shortest route however is 6 years. In other words, a 1-year delay often does not represent academic underachievement but merely taking a frequently used "detour." Being 1 year behind was therefore not labeled as academic underachievement.

**Predictors.** *Externalizing behaviors* were rated by parents through the Dutch version of the Child Behavior Checklist for ages 4 to 18 years (CBCL/4–18; Achenbach, 1991; Verhulst, van der Ende, & Koot, 1996) at age 5 and 10. At age 18, the updated version of the CBCL (CBCL/6–18; Achenbach & Rescorla, 2001) was completed. The response format is a 3-point Likert scale running from 0 (*not true*) to 1 (*somewhat true or sometimes true*) and 2 (*very true or often true*). Good reliability and validity of the Dutch translation of the CBCL were reported (Verhulst et al., 1996).

CBCL items corresponding to the four clusters of externalizing behavior as identified by Frick et al. (1993) were used. These authors showed that externalizing behaviors vary along a nondestructive/destructive dimension and an overt/covert dimension. Opposition represents the nondestructive/overt cluster and contained seven items: *Argues a lot*, *Stubborn (sullen or irritable)*, *Sulks a lot*, *Teases a lot*, *Temper tantrums (or hot temper)*, *Disobedient (at home)*, and *Disobedient at school*. Aggression represents the destructive/overt cluster and consisted of four items: *Cruelty*, *Fights*, *Attacks people*, and *Threatens people*. Status violations, representing the nondestructive/covert cluster, originally contained four items: *Runs away from home*, *Swearing or obscene language*, *Truancy or skipping school*, and *Uses alcohol or drugs for nonmedical purposes*. However, we decided to exclude the latter item because it had no variance at the age 5 and age 10 assessments. Finally, property violations represents the destructive/covert cluster and consisted of six items: *Cruel to animals*, *Vandalism*, *Sets fires*, *Steals at home*, *Steals outside home*, and *Lying or cheating*. Two-week test-retest reliabilities ( $N=89$ , all  $ps < .01$ ) of the four subtypes were computed:  $r = .72$  for opposition,  $r = .81$  for aggression,  $r = .54$  for status violations, and  $r = .80$  for property violations. Because aggression, status violations, and property violations were nonnormally distributed a square-root transformed score for these scales was used in the analyses. Skewness of opposition scores was within acceptable limits ( $< 2$ ) and these were herefore not transformed.

*Sex* (1 = boy, 0 = girl) and *socioeconomic status* (SES; coded as low, intermediate, high) based on the scoring of Statistics Netherlands (Statistics Netherlands, 1993) were included in this study to control for sex and SES differences, respectively.

## Procedure

At age 5, all parents who had participated in the first assessment (1989) were approached by phone. Parents who agreed to participate were visited by one of four female interviewers, who had a master's degree in psychology. At age 10, again all parents were asked to participate, regardless of participation at age 5. A package of questionnaires was sent to the parents after they gave their consent on the phone. At age 18 all parents and adolescents who could be traced (regardless of earlier participation) received an invitation for the fourth assessment. Parents were only phoned in case the target adolescent gave permission to do so. Participants could either choose to complete paper-and-pencil questionnaires or online questionnaires. Questionnaires were identical in both situations.

## Statistical Analyses

An autoregressive cross-lagged model (Jöreskog, 1970) was used to test our hypotheses. In the autoregressive part of the model, the four clusters of externalizing problems were regressed on their immediate prior value. The model can be extended by allowing earlier lagged values to influence the current value (i.e., cross-influences; e.g., opposition at age 5 predicting [new] engagement in aggression at age 10). In this way, the estimate of age 18 aggression, opposition, status violations, and property violations, respectively, represented the actual score controlled for all prior scores within the same cluster, and all possible cross-influences from other subtypes from each of the prior time points. Delinquency and (dummy coded) academic underachievement scores were regressed on all age 18 externalizing subtypes simultaneously to test which subtypes were uniquely associated with these outcomes. All parameter estimates of the model were controlled for sex and SES. Model fit was evaluated using the comparative fit index (CFI), Tucker-Lewis Index (TLI), and root mean square error of approximation (RMSEA). For CFI and TLI, a value greater than .95 was considered to be a good fit (Bentler, 1990). The critical value of RMSEA is less than or equal to .08 (Browne & Cudeck, 1993). Analyses were conducted using Mplus 4.21 (Muthén & Muthén, 1998–2007).

## RESULTS

### Preliminary Analyses

Only cases in which both outcome variables and at least one CBCL assessment were available were included in the analyses ( $N = 307$ ). Compared to the original sample ( $N = 420$ ) excluded children did not differ with respect to sex,  $\chi^2 (N = 420) = 1.72$ ,  $p > .05$ , and scores on the CBCL Externalizing scale ( $t = .93$ ,  $p > .05$ ). However, excluded children more often came from lower SES families than included children,  $\chi^2 (N = 418) = 27.64$ ,  $p < .01$ .

Raw mean scores of delinquency were 9.34 ( $SD = 10.03$ ) for boys and 3.98 ( $SD = 7.04$ ) for girls. Of all adolescents 77% (136 boys, 100 girls) showed at least one nonviolent delinquent act in the past 12 months, whereas 21% (47 boys, 17 girls) showed at least one physical violent offence. According to our criteria for academic underachievement, 15% (19 boys, 28 girls) were categorized as performing worse than expected.

Raw means and standard deviations for boys and girls for each of all externalizing subtypes at each assessment are provided in Table 1. The correlations between the repeatedly assessed subtypes of externalizing behavior are in Table 2. To test the association between each

TABLE 1  
Distribution of Externalizing Problems at Age 5, 10, and 18 Years

Cluster (n items)	Age	Male		Female	
		M	SD	M	SD
Opposition (7)	5	3.52	2.36	2.98	2.35
	10	3.16	2.48	2.54	2.37
	18	2.12	2.25	2.09	2.37
Aggression (4)	5	.44	.84	.11	.47
	10	.55	.97	.11	.36
	18	.25	.66	.08	.36
Status Violations (3)	5	.42	.65	.13	.38
	10	.32	.53	.14	.36
	18	.60	.82	.36	.82
Property Violations (6)	5	.30	.56	.22	.45
	10	.29	.72	.81	.57
	18	.34	.87	.15	.51

Note. Entries represent raw data scores. In the statistical analyses, square-root transformed scores for aggression, status violation, and property violations were used. *N* (age 5) = 297; *N* (age 10) = 286; *N* (age 18) = 296.

of the externalizing subtypes at age 18 separately with delinquency and academic underachievement, simple regression, and logistic regression models, respectively, were run. For delinquency, significant associations were found with opposition ( $B = .17, SE = .04, \beta = .24$ ), aggression ( $B = 1.06, SE = .23, \beta = .26$ ), status violations ( $B = 1.01, SE = .15, \beta = .36$ ), and property violations ( $B = .97, SE = .20, \beta = .28$ ). Academic underachievement was associated with opposition (odds ratio [OR] = 1.15, confidence interval [CI] = 1.02–1.30), and property violations (OR = 2.20, CI = 1.27–3.81), but not significantly with aggression (OR = 0.94, CI =

.43–2.07) or status violations (OR = 1.52, CI = .92–2.52).

Prediction of Delinquency and Academic Underachievement

The results of the autoregressive cross-lagged model are in Figure 1. As no significant associations between age 18 aggression and status violations and academic underachievement were found in the preliminary analyses, these two paths were not specified in the autoregressive model. All paths between the four forms of externalizing problems were estimated (second order paths were not allowed for). Nonsignificant paths between the four forms were kept in the model; when excluding these nonsignificant paths from the model, all results remained the same. Note that only the significant paths are printed in Figure 1. The model had a good fit to the data: CFI = .99, TLI = .97, RMSEA = .04.

With regard to the associations between the age 18 subtypes of externalizing problems and delinquency and academic underachievement, we found significant links with status violations and property violations when controlling for other forms of externalizing problems. Specifically, delinquency was associated with status violations ( $B = .61, SE = .41, \beta = .29$ ). Academic underachievement was associated with age 18 property violations (OR = 2.21, CI = 1.08–4.54).

The results further showed that status violations and property violations at age 18 were the result of continuity within these subtypes (i.e., significant autoregressive paths) and the cross-lagged influence from prior oppositional difficulties (see Figure 1). To test our

TABLE 2  
Correlations Between Subtypes of Externalizing Behaviors

Cluster	Age 5				Age 10				Age 18			
	OP	AG	SV	PV	OP	AG	SV	PV	OP	AG	SV	PV
Age 5												
OP	—	.43**	.36**	.34**	.46**	.29**	.29**	.27**	.32**	.14*	.23**	.15*
AG		—	.36**	.30**	.17*	.30**	.22**	.05	.10	.13*	.16*	.04
SV			—	.26**	.26**	.24**	.38**	.19*	.24**	.15*	.31**	.24**
PV				—	.12*	.14*	.17**	.26**	.14*	.11	.12*	.14*
Age 10												
OP					—	.53**	.46**	.50**	.56**	.36**	.39**	.22**
AG						—	.43**	.41**	.36**	.41**	.31**	.18**
SV							—	.27**	.27**	.14*	.33**	.19**
PV								—	.37**	.35**	.26**	.35**
Age 18												
OP									—	.55**	.58**	.52**
AG										—	.39**	.39**
SV											—	.45**
PV												—

Note. OP = opposition; AG = aggression; SV = status violations; PV = property violations.  
\* $p < .05$ . \*\* $p < .01$ .

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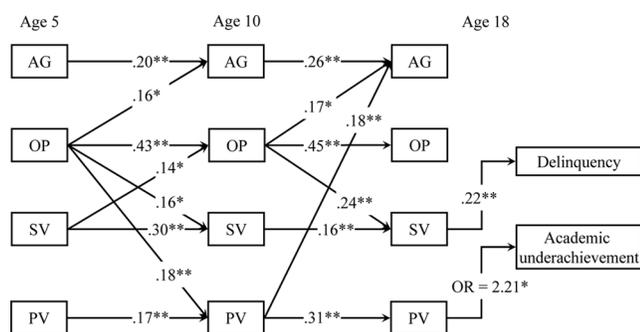


FIGURE 1 Behavioral cascades to delinquency and academic underachievement at age 18. *Note.* Age 18 property violations (PV) scores range from 0 to 2.45. Only significant paths are reported. AG = aggression; OP = opposition; SV = status violations. \* $p < .05$ . \*\* $p < .01$ .

hypothesis that especially early childhood opposition accounts for the engagement in later types of behavior problems, ultimately leading to delinquency and academic underachievement, the indirect paths from age 5 opposition to age 18 status violations, and to age 18 property violations were estimated. Of importance, in contrast to our hypothesis, no link between age 18 physical aggression and delinquency or underachievement was found. Therefore, no indirect paths from age 5 opposition to age 18 aggression were explored.

When regarding age 18 status violations, two indirect paths from age 5 opposition were possible: age 5 opposition to age 10 opposition, leading to age 18 status violations, and age 5 opposition to age 10 status violations, leading to age 18 status violations. Results showed a significant overall indirect influence from early opposition to age 18 status violations via these two pathways:  $B = .03$ ,  $SE = .01$ ,  $\beta = .13$ . Regarding age 18 property violations, only one indirect path from age 5 opposition was possible: age 5 opposition to age 10 property violations, subsequently leading to age 18 property violations. This indirect pathway was significant:  $B = .01$ ,  $SE = .004$ ,  $\beta = .06$ .

Finally, it is important to note that age 18 delinquency and academic underachievement outcomes were assessed at the same time as the age 18 parent-reported forms of externalizing behavior. As a result, it is unclear whether status and property violations have a (cross-sectional) correlation with these outcomes or actually predict delinquency and academic underachievement over time (longitudinal association). We therefore specified a model in which the age 18 subtypes of externalizing problems were excluded. The results remained the same: Significant predictive links were found from age 10 status violations to delinquency ( $B = .46$ ,  $SE = .23$ ,  $\beta = .13$ ), and from age 10 property violations to academic achievement (OR = 3.42, CI = 1.54–7.59).

## DISCUSSION

The central aim of this study was to explore whether, as postulated by the developmental pathways model of Loeber and colleagues (Loeber et al., 1997; Loeber et al., 1993), different forms of externalizing problems should be discriminated, and their transitions with age should be studied, to understand how externalizing problems lead to delinquency and academic underachievement. In answering this question, we found that while controlling for other subtypes of externalizing problems at age 18, status violations were linked with delinquency, and property violations with academic underachievement. We also found that these links were not merely concurrent at age 18 years but also were predictive from age 10 years onward across the 8-year period.

As engagement in status and property violations were uniquely linked to delinquency and academic underachievement respectively, we explored the behavioral pathways leading toward these specific forms of externalizing problems. We found that both the continuity within property violations and status violations, and the cross-influence of early childhood oppositional problems, accounted for the manifestation of property and status violations at age 18 years. The demonstrated influence of early oppositional problems on the development of other forms of externalizing behavior is in accordance with our hypothesis, supports the developmental pathway model of Loeber and colleagues (1993), and is in accordance with recent findings on the importance of oppositional problems in predicting later deviant trajectories of conduct problems (van Lier, van der Ende, Koot, & Verhulst, 2007).

In contrast to our expectations based on past research (Broidy et al., 2003; Nagin & Tremblay, 1999), no link between physical aggression and delinquency was found. There may be several explanations for these unexpected findings. The association found in earlier studies may be carried by only a limited number of individuals, most notably those with life-course persistent antisocial behavior. Also, physical aggression itself decreases with age (Bongers et al., 2004; Lahey et al., 2000). In accordance with this, not many of the adolescents in this study engaged in physical violence at age 18 years, as tapped by our delinquency measure. Indeed, the vast majority of participants engaged in some form of nonaggressive offenses, whereas only 21% engaged in a form of physical violence at age 18 years. Although this was in accordance with findings in other population samples (Woodward & Fergusson, 2000), it may have hindered us demonstrating an association between delinquency and aggression.

Our finding that adverse late adolescent outcomes are only associated with two forms of problem behavior out of the overall externalizing behavior cluster questions

the use of aggregated forms of externalizing problems when trying to understand poor functioning during adolescence. In fact, our findings do not stand alone. Externalizing behaviors have been found to be distinct (Frick et al., 1993), these distinct forms were shown to have different developmental courses (Bongers et al., 2004), and in our study the concurrent correlations between the subtypes were only small to moderate. Moreover, previous research also showed that not all forms uniquely predicted adolescent delinquency and serious drug use (Brody et al., 2003; Nagin & Tremblay, 1999). Other studies demonstrated that subtypes of externalizing problems are differently linked to underlying personal and environmental factors. For instance, the continuity of physical aggression from childhood to adolescence was largely accounted for by genetic influences, whereas the continuity of nonphysical aggression was largely accounted for by environmental influences (Eley, Lichtenstein, & Moffitt, 2003). Similarly, high-level physical aggression across adolescence was linked with low neurocognitive functioning (verbal IQ, executive function), whereas theft was associated with higher neurocognitive functioning (Barker et al., 2007). Thus, there is evidence that we should disaggregate externalizing problems to understand how such problems lead to poor functioning in late adolescence. This study demonstrated that age should also be accounted for. That is, at different ages, different aspects of the externalizing spectrum of problems become evident and trigger the development of subsequent, more serious behavior problems, which in turn account for late adolescent delinquency and academic underachievement. Thus, neither lumping nor simply statistically controlling for the co-occurrence between subtypes of externalizing problems is desirable. Instead, we have to take the transactional nature between subtypes of externalizing problems into account to detect likely developmental pathways.

The finding that status violations and property violations predict later delinquency and academic underachievement does not prove a causal relation. A nonincluded variable, shared by the predictors and outcomes, may account for the associations found in this study. For instance, behaviors in the status and property violations cluster (e.g., truancy, theft, vandalism) are suggested to be influenced by deviant peer affiliations (Barnow, Lucht, & Freyberger, 2005; Dishion, 2000; Rowe, Maughan, Worthman, Costello, & Angold, 2004), which in turn may account for the link with both academic underachievement and serious delinquency. Deviant peer associations have been found to predict school dropout (Battin-Pearson et al., 2000) and high-level delinquency in adolescence (van Lier, Wanner, & Vitaro, 2007; Vitaro, Pedersen, & Brendgen, 2007).

This study is not without limitations. The first concerns the use of a relatively small community sample. This, for instance, prohibited us from the modeling of sex-specific pathways to delinquency and academic achievement. Although sex-effects were controlled for, future studies among larger samples are needed to test whether the found associations are similar among boys and girls. In addition, it has been demonstrated that girls may engage in other forms of behavior problems, such as relational aggression (Crick & Zahn-Waxler, 2003). Future studies on sex-specific pathways should also account for this possible sex difference in the manifestation of behavior problems leading to poor adolescent outcomes. Second, only parent-reports of externalizing behavior were used as predictors. Parents may not be well aware of the problem behaviors their children engage in, especially in adolescence when parents' ignorance of their children's experiences may increase, because children are more outside direct parental supervision (Lahey et al., 2000). However, Loeber, Green, Lahey, and Stouthamer-Loeber (1991) have shown that when parent, teacher, and self-reports were considered, only parent-reported problem behavior was associated with later police contacts. Moreover, our results showed that parent-reported status violations and property violations were linked with self-reported delinquency and an unbiased rating of academic underachievement. A third limitation is the rather large gap in the data collection between the age 10 and the age 18 assessments. Studies have indicated that some externalizing problems might show an increase through mid-adolescence and a subsequent decline (Farrington, 1986; Moffitt & Caspi, 2001). Therefore, the associations between externalizing behavior types might in fact be more complex than our results suggest, although this is not expected from the developmental model outlined by Loeber et al. (1993).

#### Implications for Research, Policy, and Practice

Research has shown that delinquent behavior and underachieving in school are serious consequences of problematic behavioral development and impose great risk for future adult poor functioning or even societal dropout. Our findings that different types of behavior problems, and their transition with age, should be accounted for to understand the behavioral pathways leading to these outcomes have implications for future research, policy making, and prevention practices. First, when trying to understand the behavioral origins of such poor late adolescent functioning, research should not use aggregated forms of externalizing problems. Rather, as specific forms of externalizing behavior are more salient at certain age periods, and transactions into other forms with age are likely, research should account

for this development in understanding the links to poor functioning. Multiple forms of externalizing problems, their mutual influence with age, and their (unique) associations with underlying variables and putative mechanisms should be considered from childhood onwards. Second, we suggest that, to prevent delinquency and academic failure, prevention should be directed at early oppositional behaviors. Although they may not seem serious in terms of violating basic rules of others, at age 5 years exactly these behaviors are likely to set off a chain of persistent and more serious behavior problems in late childhood and adolescence (Loeber et al., 1993; Patterson et al., 1989). Ultimately, these behaviors may end up in adolescent failure such as delinquency and low academic qualifications, as shown in this study.

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