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Childhood-Limited Versus Persistent Antisocial Behavior

Why Do Some Recover and Others Do Not? The TRAILS Study

René Veenstra
Siegwart Lindenberg
University of Groningen
Frank C. Verhulst
Erasmus Medical Center Rotterdam
Johan Ormel
University Medical Center Groningen

Possible differences between childhood-limited antisocial youth and their stable high-antisocial counterparts were examined. Children were 11 years old at wave 1 (T1) and 13.5 at wave 2 (T2). At both waves, the same parent, teacher, and self-reports of antisocial behavior were used. Stable highs and childhood-limited antisocial youth differed somewhat in family and individual background. Stable highs had less effortful control, perceived more overprotection, had a higher level of familial vulnerability to externalizing disorder, and lived less often with the same parents throughout their lives than the childhood-limited group. Both groups had similar levels of service use before T1, but after that period, the childhood-limited youth received more help from special education needs services than from problem behavior services, and vice versa for stable highs. The results suggest that the childhood-limited antisocial youth recovered not only from antisocial behavior but also from academic failure, peer rejection, and internalizing problems.

Keywords: *antisocial behavior; developmental psychopathology; elementary school; life course persistent; stability*

Although most antisocial adults display long histories of problem behavior from childhood, most antisocial children do not go on to lead sociopathic and criminal lives (Maughan, Pickles, Rowe, Costello, & Angold, 2000). Looking backward from adulthood, consistency seems strong. Looking forward from childhood, inconsistency is more marked.

Thus, childhood behaviors are not perfectly stable, and some children who show early onset problem behaviors may desist from such behavior as adolescents. In a number of longitudinal studies, continuities and discontinuities in antisocial behavior have been investigated, but until now, little attention has been paid to desistance from antisocial behavior in early adolescence. What could be the reason for this early desistance? Do childhood-limited antisocial youth come from more advantaged backgrounds than children who show a persistent pattern of antisocial behavior problems? Do childhood-limited antisocial youth receive different or more professional services than their stable high-antisocial (henceforth called "stable high") counterparts? And how are antisocial behavior, academic failure, and rejection interrelated over time?

In general, childhood antisocial behavior is widely recognized as a precursor of antisocial behavior in adolescence and adulthood. Several researchers have demonstrated that antisocial behavior identified as early as preschool predicts later antisocial behavior (Loeber & Hay, 1997; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996). Yet, the available evidence also suggests that a substantial proportion of those children who display high levels of antisocial behavior in childhood do not manifest such behavior in adolescence or adulthood (Blumstein, Cohen, & Farrington, 1988; Farrington & Hawkins, 1991; Maughan & Rutter, 1998; Robins, 1978). There has been increasing interest in examining the factors that distinguish those with changing patterns of behaviors from those who show stable behavioral tendencies, also in research on antisocial behavior (Ayers et al., 1999; Fergusson, Lynskey, & Horwood, 1996; Maughan et al., 2000; Petras et al., 2004).

Moffitt et al. (1996) showed that of all boys who had been extremely antisocial in childhood, almost half were not antisocial in adolescence. Such changes in observed behavior scores may result from measurement errors or occur for substantive reasons (Fergusson et al., 1996). Although some male childhood-limited antisocial youth may have been false positives in childhood or false negatives in adolescence, it is likely that there are also genuine behavioral changes that arise from factors that lead behavior to vary over time. Such changes indicate that childhood behavioral trajectories are not entirely fixed and immutable.

Little is known about the causes of desistance from antisocial behavior in late childhood or early adolescence. Typological research on antisocial behavior has concentrated on the differences between life-course-persistent and adolescence-limited antisocial youth. This emphasis has overlooked the changes that Moffitt et al. (1996) reported in children who behaved antisocially at a young age but showed remission of these behaviors in adolescence.

Half of children with childhood antisocial behavior problems desist from that behavior (Fergusson et al., 1996; Moffitt et al., 1996; Robins, 1978). Moffitt et al. (1996) failed to provide insight into how these childhood-limited antisocial youth avoided the inauspicious adolescent outcome predicted for them. Parents had sought professional services for half of the male childhood-limited antisocial youth, but treatment had also been sought by parents for a similar number of the life-course-persistent boys. Moffitt et al. (1996) noted that these childhood-limited antisocial youth need to be further researched to determine why they have outcomes that are less extreme than expected. Furthermore, it cannot be assumed that the causes of desistance from antisocial behavior in childhood are the same as in late adolescence or adulthood (for research on desistance in late adolescence, see Laub & Sampson, 2003; Sampson & Laub, 1993; Stouthamer-Loeber, Wei, Loeber, & Masten, 2004; Warr, 1998; Weitekamp & Kerner, 1994). Better knowledge about continuities and discontinuities early in the developmental course may benefit mental and public health preventions and interventions.

The Present Study

Our aim was to examine possible differences between childhood-limited antisocial youth and their stable high counterparts. The central questions were the following: To what extent do stable highs and childhood-limited individuals differ in family and individual background? To what extent do antisocial behavior, academic failure, and rejection co-occur? To what extent do stable highs and childhood-limited individuals differ in professional service use? To answer these questions, we used the first two waves of the TRacking Adolescents' Individual Lives Survey (TRAILS), a prospective cohort study of Dutch preadolescents who will be measured biennially until they are at least 25 years old. Children were 11 years old at the first wave (T1) and 13.5 at the second wave (T2). The time interval is shorter than in most other studies of desistance from antisocial behavior in adolescence. Fergusson et al. (1996) examined continuities and discontinuities between middle childhood (7-9 years) and middle adolescence (14-16 years). Moffitt et al. (1996) made a comparison between childhood (5-11 years) and late adolescence (15-18 years). McGee and Mazerolle (2003) compared between age 5 and age 14. Though the period covered in our study is much shorter, it coincides with the important transition from primary to secondary education. As we argue, this transition allows a fresh start (see Natsuaki, Ge, & Wenk, 2008, for a study that focuses on high school graduation as turning point).

We combined at both waves information collected on antisocial behavior from parent, teacher, and self-reports. This is an improvement on prior work with single-informant designs (Ayers et al., 1999) or designs with different informants (Fergusson et al., 1996; McGee & Mazerolle, 2003; Moffitt et al., 1996; Odgers et al., 2007) over time. For example, Moffitt et al. (1996) used parent and teacher information for the assessment of childhood antisocial behavior, but for adolescent antisocial behavior, they relied on self-reports.

Hypotheses

Childhood-limited antisocial youth and stable highs are both likely to have an unfavorable family and individual background. Prior work has shown that socioeconomic status, family composition, and parenting practices (e.g., rejection and emotional warmth) are strongly related to antisocial behavior (e.g., Bugental & Grusec, 2006; Carlo, Roesch, & Melby, 1998; Dekovic, Janssens, & Van As, 2003; Farrington, 1990; Loeber & Stouthamer-Loeber, 1986; Veenstra, Lindenberg, Oldehinkel, De Winter, & Ormel, 2006). Others have shown that children who are antisocial in childhood have a difficult temperament, such as low effortful control, low frustration tolerance, or a tendency to seek high-intensity pleasure (Caspi et al., 1994; Caspi et al., 1995; Eisenberg, 2000; Frick & Morris, 2004; Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004; Rothbart & Putnam, 2002; Sanson, Hemphill, & Smart, 2004; Wills & Dishion, 2004). With respect to differences between childhood-limited individuals and stable highs, we expected that stable highs would have a more unfavorable temperament, most likely a combination of aggressiveness, easy frustration, and little effortful control (Veenstra et al., 2006), and a more unfavorable environment, such as an adverse family setting (Fergusson et al., 1996; Maughan et al., 2000) than childhood-limited individuals. The hypothesis was the following:

Hypothesis 1: Childhood-limited individuals will have a more favorable temperament and environment than stable highs.

Though it was not possible to test it fully in this study, we suggest that the following process is at work for the desistance of childhood-limited individuals. Under unfavorable conditions (difficult temperament and problematic family background of the child), learning difficulties can create a

serious deficiency in social approval, which feeds a vicious cycle of aggressiveness of the child and coerciveness of the teacher, with loss of support from peers and possibly also parents. Such a cycle fits what Lewis (1997) calls "cascading constraints" (see also Granic & Patterson, 2006), in which the child-teacher and child-peer interaction becomes increasingly constrained and predetermined by its prior history. Children, like all human beings, need social approval from interaction with significant others (Steverink & Lindenberg, 2006). A fairly aggressive child from an unfavorable family background who has learning difficulties is quite likely to be treated as unmotivated and hostile by the teacher (Veenstra et al., 2008) and rejected by peers. Both create a deficit in social approval. The important next step is that, when a deficit of social approval is due to rejection, it can lead to a shift in major goals from achievement and acting appropriately to loss-driven goals such as revenge and getting even (Lindenberg, 1998; Shah & Higgins, 2001). This shift elicits aggression to gain acceptance (Twenge, Baumeister, Tice, & Stucke, 2001). Miller-Johnson, Coie, Maumary-Gremaud, Bierman, and the Conduct Problems Prevention Research Group (2002) also showed that rejection makes later conduct disorders more likely. The social approval deficit in the form of rejection feeds antisocial behavior which, in turn, contributes to rejection, and so on. When the vicious cycle is broken by the employment of remedial rather than coercive means, the child will experience an increase in social approval, which makes it more likely that the child will desist from antisocial behavior. Thus, it is important to look at the kinds of professional help children get (such as help for problem behavior or learning problems) as well as the results.

Of the entire process, we were able to test whether, given unfavorable conditions, antisocial behavior, academic failure, and rejection were co-occurring and whether remedial teaching broke that vicious cycle for some antisocial children. Thus, the hypotheses derived from the process theory were the following:

Hypothesis 2: Both childhood-limited individuals and stable highs will feel rejected at T1, whereas only the stable highs will also feel rejected at T2.

Hypothesis 3: Both childhood-limited individuals and stable highs will have a high level of academic failure in elementary education, but the failure of childhood-limited individuals will decrease in secondary education, while it will remain at the same high level for stable highs.

Hypothesis 4: Help focused on learning difficulties (remedial teaching) will reduce antisocial behavior and will more often be given to childhood-limited individuals than to stable highs.

Method

Sample

The present study involved the first two assessment waves of TRAILS, which started in 2001. TRAILS is designed to chart and explain the development of mental health and social development from preadolescence into adulthood. The TRAILS target sample involved pre-adolescents living in five municipalities in the North of the Netherlands, including both urban and rural areas (De Winter et al., 2005).

Of all children approached for enrollment in the study (selected by the municipalities and attending a school that was willing to participate; N = 3,145 children from 122 schools; response of schools 90.4%), 6.7% were excluded because of incapability or language problems. Of the remaining 2,935 children, 76.0% were enrolled in the study, yielding N = 2,230 (consent to participate: both child and parent agreed; mean age of child = 11.09, SD = 0.55; gender: 50.8% girls; ethnicity: 10.3% had at least one parent born in a non-Western country; parent education: 32.6% had parents with a low educational level, at maximum a certificate from a lower track of secondary education). No participation bias was found in our study for the estimation of the prevalence rates of psychopathology, including antisocial behavior. Boys, children from lower social strata, and children with worse school performance were somewhat more likely to belong to the nonresponse group (De Winter et al., 2005). Of the 2,230 baseline participants, 96.4% (N = 2,149, 51.0% girls) participated in the second measurement wave, which was held 2.5 years after T1. Mean age at the second wave was 13.56 years (SD = 0.53).

Well-trained interviewers visited one of the parents (preferably the mother, 95.6%) at their homes to administer an interview covering a wide range of topics, including the child's developmental history and somatic health, parental psychopathology, and care utilization. In addition, the parent was asked to fill out a questionnaire (the participation rate of parents was 98.1% for the interview and 92.2% for the questionnaire). Children filled out questionnaires at school, in the class, under the supervision of one or more TRAILS assistants. In addition, intelligence and a number of biological and neurocognitive parameters were assessed individually. Teachers were asked to fill out a brief questionnaire for all TRAILS children in their classes (the participation rate of teachers was 86.7%). Measures used in the present study are described more extensively below.

Variables

Antisocial behavior (T1 and T2). Antisocial behavior was assessed using the Youth Self-Report (YSR) and the Child Behavior Checklist (CBCL), two commonly used questionnaires in child and adolescent psychiatric research with good test-retest reliabilities (Achenbach, 1991a, 1991b; Verhulst & Achenbach, 1995). Both contain a list of 112 behavioral and emotional problems, which children and parents can rate as 0 = *not true*, 1 = *somewhat or sometimes true*, or 2 = *very or often true in the past 6 months*. The internal consistency of the YSR and CBCL scales for externalizing behavior was .85 or higher. In addition to the YSR and CBCL, we collected data from the teacher using the Teachers Checklist of Psychopathology (TCP). This checklist contains nine descriptions of behaviors; the descriptions were based on the variables used to measure various behaviors in the Teacher's Report Form (Achenbach, 1991c). Response options for each description on the checklist range from 0 = *not applicable* to 4 = *very clearly or frequently applicable*. The validity was assessed among 36 teachers for 103 children. Within 3 months, teachers completed the Teacher's Report Form and the TCP for the same children. Pearson correlation coefficients were .69 and .58 for aggressive and rule-breaking behavior, respectively.

Consistent with other reports (e.g., Achenbach, McConaughy, & Howell, 1987; Jensen, Traylor, Xenakis, & Davis, 1988; Verhulst & Van der Ende, 1992), the agreement between child-, parent-, and teacher-reported problems was only moderate ($r = .27$ to .34 at T1; $r = .33$ to .41 at T2). We believe that all informants perceived different aspects of problem behavior and differences between informants as meaningful. Antisocial behavior rated as present by different informants was assumed to be more severe (more generalized) than problems rated by only one informant. Based on this assumption, we used the mean of the z-standardized child, parent, and teacher scores as a measure of antisocial behavior in this study. An additional advantage of using the mean score is that it reduces the bias associated with mono-informant information (Angold & Costello, 1996; Sourander, Helstelä, & Helenius, 1999).

We then classified the composite score into three categories reflecting degrees of seriousness. The first level comprised the first three quartiles of children on this composite score and indicated no or minor levels of antisocial behavior. The second level included children from the range of the 75th to the 90th percentile and consisted of moderately antisocial children. The 90th percentile is the cutoff point for the clinical range of the Achenbach scales. The present study was focused on stable highs and childhood-limited

antisocial youth. We defined childhood-limited antisocial youth as children who were antisocial (level 3) at T1 but were not antisocial (level 1) at T2, and stable highs as children whose level of antisocial behavior was at level 3 at one of the measurement waves and at least at level 2 at the other wave: 225 children (10.2% of the sample) were stable high and 52 children (2.3%) were childhood-limited.

Temperament (T1). Frustration, high-intensity pleasure, and effortful control, three temperamental characteristics, were assessed using the parent version of the Early Adolescent Temperament Questionnaire–Revised (EATQ-R; Ellis, 2002; Putnam, Ellis, & Rothbart, 2001). The EATQ-R is a 62-item questionnaire based on the temperament model developed by Rothbart and colleagues. Because the EATQ-R has not been confirmed empirically in large population samples, we examined the item structure using principal components analysis and included only items with a loading of >|.40| and at least .15 greater than the loading of all other components (Oldehinkel et al., 2004; Oldehinkel, Hartman, Ferdinand, Verhulst, & Ormel, 2007). This led to some minor alterations to the scales originally proposed by Rothbart and her group. Effortful control is the capacity to voluntarily regulate behavior and attention (11 items, $\alpha = .86$). High-intensity pleasure is the pleasure derived from activities involving high intensity or novelty (6 items, $\alpha = .77$). Frustration is the negative affect related to goal blocking or an interruption of ongoing tasks (5 items, $\alpha = .74$).

Intelligence (T1). Intelligence was assessed using two subtests, block design and vocabulary, of the Wechsler Intelligence Scale for Children–Revised (WISC-R; Wechsler, 1974). This two-subtest short form was chosen on the basis of its high correlation ($r = .90$) with the complete WISC-R (Sattler, 1992; Silverstein, 1972).

Family background (T1). The TRAILS database contains various variables for socioeconomic status: income level, educational level of both the father and the mother, and occupational level of each parent, measured using the International Standard Classification for Occupations (Ganzeboom & Treiman, 1996). Socioeconomic status was measured as the average of the five items (standardized). The scale captured 61.2% of the variance in the five items and had an internal consistency of .84. Missing values (e.g., where there was only one parent in the family) did not affect the association of this scale with other variables. The percentage of children who had lived with the same parents from birth to preadolescence was 76.6. The 23.4% for whom

this was not the case (labeled as *family breakup*) can be divided into children who had always lived with a single parent (4.6%), children who experienced a divorce and had lived with a single parent since then (10.4%), and children who experienced a divorce and lived with a stepparent (8.4%).

Parental psychopathology with respect to depression, anxiety, substance abuse, antisocial behavior, and psychoses was measured using the Brief TRAILS Family History Interview, administered at the parent interview. Each syndrome was introduced using a vignette describing its main symptoms and followed by a series of questions to assess lifetime occurrence, professional treatment, and medication use. The scores for substance abuse and antisocial behavior were used to construct a familial vulnerability index for externalizing disorder. Parents were assigned to any of the following categories: 0 = (probably) *not*, 1 = (probably) *yes*, and 2 = *yes* and *treatment/medication* (substance abuse) or *picked* up by *police* (antisocial behavior). The Brief TRAILS Family History Interview yielded lifetime rates that were by and large comparable to those found in studies in which Composite International Diagnostic Interviews were used, with the exception of fathers' rates for substance abuse, which were relatively low (Ormel et al., 2005; Veenstra et al., 2005).

The Egna Minnen Beträffande Uppfostran (My Memories of Upbringing) for Children (EMBU-C; Markus, Lindhout, Boer, Hoogendijk, & Arrindell, 2003) was developed to assess perceptions of parents' rearing practices by children and early adolescents. Each item was presented for both the father and the mother, with a 4-point answer scale. The EMBU-C contains the factors emotional warmth, rejection, and overprotection. The main concepts of *emotional warmth* are giving special attention, praising approved behavior, unconditional love, and being supportive and affectionately demonstrative. The scale for emotional warmth contained 18 items with an internal consistency of .91 for both fathers and mothers. The factor *rejection* is characterized by hostility, punishment (physical or not, abusive or not), derogation, and blaming of subject (12 items, .84 for fathers and .83 for mothers). The dimension *overprotection* covers fearfulness and anxiety for the child's safety, guilt engendering, and intrusiveness (12 items, .70 for fathers and .71 for mothers). The answers for both parents were highly correlated (r = .79 for emotional warmth, r = .67 for rejection, r = .81 for overprotection), so we felt it was justified to combine them (Veenstra et al., 2006). Markus et al. (2003) have reported on the validity of the EMBU-C.

Peer rejection (T1 and T2). The percentage of nominations children received individually from their classmates with regard to dislike was used to

create a measure of peer rejection. The measure was the aggregate of all the dyadic nominations a child received from others and was, for that reason, potentially highly reliable and valid (Newcomb, Bukowski, & Pattee, 1993).

Academic failure (T1 and T2). Academic failure was measured using a teacher scale that contained items on effort and achievement (e.g., in language and mathematics); this had an internal consistency of .85 for the first wave and .90 for the second wave.

Professional service use (T1 and T2). Parents reported on the service use of their children. At age 11, they reported lifetime prevalence. At the next measurement, they reported service use in the previous 2 years. The answers on service use were yes or no. We focused on three categories: (1) special educational needs: remedial teaching; (2) problem behavior services: youth aid and care; (3) mental health services: psychiatric inpatient and outpatient contacts.

Analyses

First, associations between variables were investigated using Pearson correlations, and differences in means between childhood-limited individuals ($n = 52$) and stable highs ($n = 225$) were examined using t tests. To provide an impression of the effect sizes, we standardized all continuous variables ($\bar{X} = 0$; $SD = 1$). After the t tests, we performed a logistic regression. To interpret the outcomes of the logistic regression, we used marginal effects (Borooah, 2001; Liao, 1994). The marginal effect for a dummy variable is the difference between being in category 1 and being in category 0. The marginal effect for a continuous variable is the effect of a variable on an outcome with one point of increase in the score of the variable.

The amount of missing data was low: For 40 out of 277 cases (14.4%), there was no information on the EATQ. On all other instruments, we had less missing data. After multiple imputation using the MICE method of multivariate imputation (Allison, 2002; Royston, 2004; Van Buuren, Boshuizen, & Knook, 1999), we were able to use all 277 cases in our multivariate analysis.

Results

Most children with a high score on antisocial behavior at T1 had a high (50.9%) or a medium (25.0%) score at the next measurement wave. About a quarter of all children who scored high on antisocial behavior at T1

Table 1
Antisocial Behavior (aggression and rule-breaking behavior): Childhood-Limited Individuals Versus Stable High-Antisocial Counterparts (stable highs)

Variable	Informant	Childhood-Limited Individuals $\bar{X}$ (*SD*)	Stable Highs $\bar{X}$ (*SD*)	
Wave 1: age 11				
Aggression	child	0.66 (0.28)	0.60 (0.27)	$t(270) = -1.22$
	parent	0.64 (0.32)	0.80 (0.34)	$t(243) = 2.80$***
	teacher	1.26 (0.55)	0.97 (0.60)	$t(239) = -2.83$***
Rule-breaking behavior	child	0.41 (0.26)	0.42 (0.21)	$t(270) = 0.24$
	parent	0.25 (0.21)	0.33 (0.17)	$t(243) = 2.82$***
	teacher	0.87 (0.68)	0.58 (0.62)	$t(239) = -2.78$***
Wave 2: age 13.5				
Aggression	child	0.30 (0.19)	0.58 (0.28)	$t(254) = 8.50$***
	parent	0.28 (0.18)	0.65 (0.32)	$t(212) = 10.08$***
	teacher	0.40 (0.50)	1.05 (0.70)	$t(182) = 6.68$***
Rule-breaking behavior	child	0.27 (0.15)	0.48 (0.24)	$t(254) = 7.72$***
	parent	0.09 (0.09)	0.33 (0.21)	$t(211) = 11.80$***
	teacher	0.09 (0.27)	0.61 (0.70)	$t(182) = 7.27$***

***$p < .01$.

were at a low level at T2. In Table 1, we report the differences between childhood-limited individuals and stable highs on the two components of antisocial behavior in the YSR, CBCL, and TCP: aggression and rule-breaking behavior. The scores ranged from 0 to 2. Given the young age of the sample, rates of antisocial behavior were low. The results reveal that all informants contributed to our classification. They also show that the differences between stable highs and childhood-limited individuals were inconsistent at the first wave. According to teachers, childhood-limited individuals were higher on aggression, $t(239) = -2.83$, $p < .01$, and rule-breaking behavior, $t(239) = -2.78$, $p < .01$, than stable highs, whereas parents reported higher levels of aggression and rule-breaking behavior for stable highs. Children themselves reported small or no differences at T1. At T2, all informants reported that childhood-limited individuals had reduced levels of aggression and rule-breaking behavior; the contrary was true for stable highs. In total, 52 children (2.4%) were classified as childhood-limited and 225 (10.3%) as stable highs. Boys were overrepresented in both categories: 71.2% of the childhood-limited individuals and 71.6% of the stable highs were male.

Individual and Family Background

Correlations between the variables are presented in Table 2, above the diagonal for the whole TRAILS sample ($N = 2230$) and below the diagonal for our 277 cases. Antisocial behavior at T1 and T2 was strongly correlated (.58) in the whole sample, but it was uncorrelated (.02) in our subsample. In the subsample, the point biserial correlations of sex with the different individual and family characteristics were close to zero. We next examined whether our classification of antisocial behavior was related to differences in individual and family background (see Table 3 [with all continuous variables standardized]). Note that stable highs and childhood-limited individuals were highly disadvantaged on all characteristics. Their scores differed greatly from those of low-antisocial children on all characteristics. On positive characteristics, low-antisocial children always scored above zero, and vice versa for negative characteristics. Childhood-limited individuals and stable scored usually below zero on positive and above zero on negative characteristics.

Our comparison between stable highs and childhood-limited individuals revealed four differences. Stable highs had less effortful control, $t(235) = -3.10$, $p < .01$, perceived more overprotection, $t(270) = 2.49$, $p < .01$, had a higher level of familial vulnerability to externalizing disorder, $t(268) = 3.16$, $p < .01$, and lived less often with the same parents throughout their lives,

Table 2
Correlations Between Antisocial Behavior and Individual and Family Background

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Antisocial behavior T1	—	.58***	.26***	–.21***	.17***	.15***	–.25***	.21***	.37***	.43***	.15***	–.39***	–.14***
2. Antisocial behavior T2	.02	—	.09***	–.17***	.19***	.16***	–.14***	.15***	.22***	.32***	.09***	–.32***	–.16***
3. Sex (1 = boys)	.10	–.09	—	–.03	–.01	.00	–.10***	.06***	.11***	.08***	.12***	–.18***	.06***
4. Socioeconomic status	–.20***	–.08	.02	—	–.27***	–.21***	.15***	–.09***	–.05	–.06***	.03	.16***	.39***
5. Family breakup	.14	.17***	–.07	–.27***	—	.36***	–.06***	.00	–.01	.06***	.03	–.14***	–.14***
6. Familial vulnerability	.05	.14	–.10	–.16***	.36***	—	–.03	.05	–.01	.07***	.06***	–.12***	–.12***
7. Emotional warmth	–.23***	.05	–.02	.00	–.07	.06	—	.18***	–.33***	–.10***	.02	.18***	.12***
8. Overprotection	.06	.09	–.03	–.02	–.04	.07	.23***	—	.43***	.09***	.04	–.06***	–.05
9. Rejection	.16***	–.06	.02	.00	–.05	–.09	–.41***	.45***	—	.17***	.03	–.18***	.01
10. Frustration	.19***	.12	.01	.02	.13	.03	.02	.06	.03	—	–.01	–.41***	–.02
11. High-intensity pleasure	.03	–.07	.07	.13	.01	.04	.08	.04	.00	–.05	—	.05	.10***
12. Effortful control	–.19***	–.22***	–.14	.06	–.20***	–.14	.09	–.04	–.04	–.36***	.11	—	.22***
13. Intelligence	.09	–.14	.08	.42***	–.15***	–.10	–.05	–.12	.05	–.02	.15	.11	—

Note: Correlations for all TRacking Adolescents' Individual Lives Survey (TRAILS) participants (N = 2,230) are above the diagonal, and for antisocial youths at the first wave (T1) (N = 277), below the diagonal.
***$p < .01$.

Table 3
Individual and Family Background: Childhood-Limited Individuals Versus Stable High-Antisocial Counterparts (stable highs)

Variable	Informant	Childhood-Limited Individuals $\bar{X}$	Stable Highs $\bar{X}$	
Sex	child	71.2%	71.6%	$\chi^2(1, N = 277) = 0.00$
Intelligence T1	test	–0.36	–0.41	$t(275) = –0.37$
Family background T1				
Socioeconomic status	parent	–0.30	–0.50	$t(269) = –1.41$
Family breakup	parent	26.9%	41.3%	$\chi^2(1, N = 277) = 3.70$*
Familial vulnerability	parent	–0.05	0.46	$t(268) = –3.16$***
Emotional warmth	child	–0.67	–0.38	$t(270) = 1.61$
Overprotection	child	0.03	0.44	$t(270) = 2.49$**
Rejection	child	0.67	0.59	$t(270) = –0.40$
Temperament T1				
Frustration	parent	0.63	0.83	$t(235) = 1.31$
High-intensity pleasure	parent	0.38	0.18	$t(235) = –1.37$
Effortful control	parent	–0.34	–0.85	$t(235) = –3.10$***

Note: T1 = first wave.
*$p < .10$. **$p < .05$. ***$p < .01$.

$\chi^2(1, N = 277) = 3.70$, $p = .05$, than did childhood-limited individuals. The differences in means in Table 3 can be interpreted in terms of effect sizes. For example, the difference in familial vulnerability between the two groups was 0.51 *SD*, a moderate effect. The individual and family background of childhood-limited individuals was more favorable than that of stable highs for 4 out of 11 characteristics (and there was no trend for childhood-limited individuals to be more advantaged than stable highs on the other 7 characteristics). Thus, they were more advantaged on some, but clearly not on all, characteristics.

A logistic regression analysis with desistance at T2 as outcome and the four significant variables from the univariate analyses as predictors revealed that effortful control, overprotection, and familial vulnerability had unique effects (see Table 4). Family breakup was not significantly related to desistance in the multivariate analysis. The baseline level of desistance at T2 was 15.9% (calculated for adolescents with average scores on the three continuous variables and coming from intact families). Highly overprotected children scored 6.0% lower on desistance. Thus, their prediction of desistance was 9.9%. Children with high effortful control were 5.5% more likely to desist.

Table 4
Logistic Regression on Desistance From Antisocial Behavior (N = 277)

Variable	Marginal Effect (SE)	
Baseline level of desistance	.159	
Family breakup	–.042	(.047)
Familial vulnerability	–.065	(.033)†
Overprotection	–.060	(.024)‡
Effortful control	.055	(.023)‡

†$p < .05$. ‡$p < .01$.

Children with a high familial vulnerability for externalizing behavior were 6.5% less likely to desist. These findings are similar if we control for sex in the analyses.

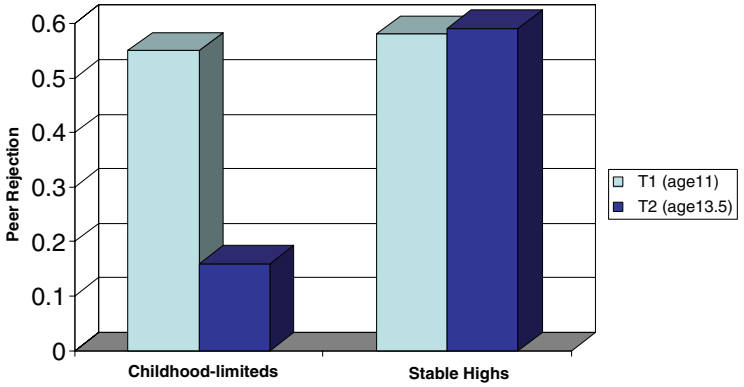
Co-Occurrence of Antisocial Behavior, Rejection, and School Failure

From Figure 1, it can be seen that the level of peer rejection of stable highs was the same at T1 and T2. They scored about 0.60 *SD* above the mean. However, the level of peer rejection of childhood-limited individuals improved significantly, $t(6) = –2.02$, $p = .045$, from the first wave to the second wave—from 0.59 to 0.16. We also examined whether childhood-limited individuals decreased in academic failure. Figure 2 shows that the level of academic failure of childhood-limited individuals decreased significantly, $t(31) = –2.16$, $p = .02$, from the first wave to the second wave—from 0.81 to 0.33—whereas the level of academic failure of stable highs remained the same. They scored about 0.70 *SD* above the mean.

Professional Service Use

About a quarter of childhood-limited individuals and stable highs received help from services for special education needs before age 11. Problem behavior services were used by 6.5% of the childhood-limited individuals and 11.1% of stable highs, which was not a significant difference, $\chi^2(1, N = 261) = 0.85$, $p = .36$. More than 30% of childhood-limited individuals and stable highs received help from mental health services before age 11. In sum, we found no differences in service use between childhood-limited individuals and stable highs at T1.

Figure 1
Peer Rejection of Childhood-Limited Individuals and Stable Highs at Ages 11 and 13.5

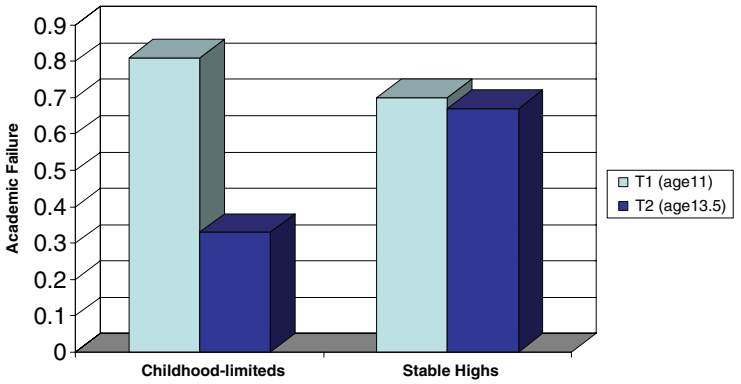


In Figure 3, we show differences between childhood-limited individuals and stable highs for service use between T1 and T2. Childhood-limited individuals (29.3%) received more help from services for special education needs than stable highs (16.5%) after T1, $\chi^2(1, N = 209) = 3.52$, $p = .06$. Stable highs (14.7%) used more problem behavior services than childhood-limited individuals (0%) after T1, $\chi^2(1, N = 209) = 6.84$, $p < .01$. Thus, childhood-limited individuals and stable highs had similar levels of service use before age 11, but thereafter, childhood-limited individuals received more remedial teaching than help from problem behavior services, and vice versa for stable highs.

Are Childhood-Limited Antisocial Youth Also Better Off in Internalizing Behavior?

Finally, we investigated whether childhood-limited antisocial youth developed into depressed and anxious persons or whether they also recovered from internalizing problem behavior. We examined the differences in internalizing problems between the two time periods for childhood-limited individuals and stable highs. Internalizing problem behavior was measured using the YSR, as a composite score of the syndromes of anxiety, somatic complaints, and withdrawal (Achenbach, 1991b). We found that childhood-limited individuals had a higher level of internalizing problems at T1 than stable highs, but the

Figure 2
Academic Failure of Childhood-Limited Individuals and Stable Highs at Ages 11 and 13.5

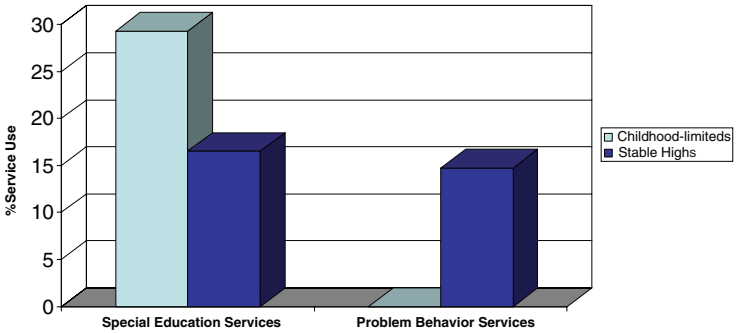


difference was only marginally significant, $t(270) = -1.40$, $p = .08$. At T2, however, stable highs had a significantly higher level of self-reported internalizing problems than childhood-limited individuals, $t(254) = 2.60$, $p < .01$. Stable highs scored 0.23 *SD* above the mean, whereas childhood-limited individuals scored 0.19 *SD* below the mean on internalizing problems. In sum, our findings show that at T2, childhood-limited individuals are better off in internalizing problems. Together with the improvement regarding rejection, this lends good indirect support to the assumed mechanism of breaking out of a vicious cycle of self-reinforcing deficit of social approval.

Discussion

The results suggest that our group of childhood-limited individuals shows remission of antisocial behavior, peer rejection, academic failure, and even internalizing problems. This indicates that not all childhood-onset antisocial behavior persists into adolescence (Fergusson et al., 1996; Moffitt et al., 1996; Robins, 1978) and that the development of antisocial behavior can be changed (Kellam, Ling, Merisca, Brown, & Ialongo, 1998; Van Lier, Vuijk, & Crijnen, 2005). So far, our group of childhood-limited individuals can be seen as a childhood-limited group (cf. Loeber et al., 1993; Maughan & Rutter, 1998), not facing a severe prognosis.

Figure 3
Percentage Service Use of Childhood-Limited Individuals and Stable Highs at Age 13.5



We focused on continuities and discontinuities in antisocial behavior over a period of 2.5 years. Children were an average of 11 years old at the first wave and 13.5 at the second wave. We used the same parent, teacher, and self-reports of antisocial behavior at both waves. The central question was the following: What distinguishes childhood-limited individuals from stable highs such that the former desist from antisocial behavior whereas the latter do not? We formulated a probable mechanism of a temporary deficit of social approval due to the combination of learning difficulties and unfavorable temperament and parental environment. This combination is likely to lead to rejection in school, which, in turn, leads to a shift in major goals from achievement and acting appropriately to loss-related goals such as revenge and getting even, spawning aggressive and counter-productive behavior that reinforces rejection, and the deficit of social approval. It was not possible to test this mechanism directly, but we found much supporting evidence for hypotheses derived from it. As expected, stable highs and childhood-limited individuals differed in temperamental and environmental background, in their development of rejection and academic failure, and in professional service use.

Stable highs had less effortful control, perceived more overprotection, had a higher level of familial vulnerability to externalizing disorder, and lived less often with the same parents throughout their lives than did childhood-limited individuals, as predicted by our first hypothesis. However, on other

characteristics, including socioeconomic status, emotional warmth of parents, intelligence, frustration, and high-intensity pleasure, we found no differences. In line with earlier research, we found that stable highs had the least favorable position at age 11 (Ayers et al., 1999; Fergusson et al., 1996; Maughan et al., 2000), but it would be going too far to conclude that children showing remission of antisocial behavior in adolescence came from backgrounds in which levels of risk were low. Thus, contrary to the findings of most other studies, our findings show that the childhood-limited individuals resembled their stable high counterparts in the first wave (see Fergusson et al., 1996; McGee & Mazerolle, 2003; Vassallo, Smart, Sanson, & Dussuyer, 2004). Our study might differ from prior work because we used the same informants over time, whereas other researchers used designs with single or different informants over time.

How did childhood-limited individuals break out of the vicious cycle? Research on learning shows conclusively that efforts to extinguish undesirable behavior will fail unless alternative behaviors are available that attract reinforcement (Azrin & Holz, 1966). Our hypothesis was that childhood-limited individuals got professional help to deal with their learning problems. Owing to their somewhat better family background (compared to stable highs) and because of better effortful control, childhood-limited individuals were likely to have responded more successfully than stable highs to initial remedial help, and for them, remedial teaching continued and improved. Earlier research has revealed that parents sought professional service use for a similar number of male childhood-limited individuals as stable highs (Moffitt et al., 1996). We found that both groups indeed had similar levels of service use before age 11, but after that period, childhood-limited individuals received more help from special education needs services than from problem behavior services, and vice versa for stable highs. Thus, although the general level of service use was similar over time, the specific treatments differed. Special education needs services, in particular remedial teaching, were related to desisting from antisocial behavior; problem behavior services were related to persistence in antisocial behavior. Although the academic performance of stable highs and childhood-limited individuals was at the same low level in elementary education, it improved in childhood-limited individuals in secondary education, while it remained poor in stable highs. The same improvement holds for peer rejection: Both childhood-limited individuals and stable highs were rejected in elementary education, whereas only the stable highs were rejected in secondary education.

The finding that childhood-limited individuals received more services for special education is intriguing. This group scored higher on effortful control

and lower on family adversity. Other researchers have found that familial vulnerability for externalizing problems and ADHD differentiated childhood-limited individuals and stable highs (see Moffitt et al., 2008, for a discussion).

Strengths and Limitations

Clearly, there are limitations to this study. First, there is a methodological limitation: The comparison groups we examined were defined by cutoff points (75th and 90th percentiles) that are susceptible to misclassifications.

Beginning the assessments at age 11 is a second limitation of this study, because many childhood-limited individuals have desisted by this age (Odgers et al., 2007). As such, we were left with a distinct subgroup of childhood-limited individuals who had not yet begun the desistance process by age 11. This is important as it impacts on the prevalence rates for the childhood-limited subgroup, as in most studies, larger groups of childhood-limited individuals were found, and it restricts the generalizability of these findings to a more severe subset of childhood-limited individuals (Moffitt et al., 2008).

A third limitation is that we cannot be sure that the desistance from antisocial behavior will last. It is not uncommon for juveniles temporarily to cease exhibiting antisocial behavior, only to exhibit the behavior again at a later point in time (Bushway, Thornberry, & Krohn, 2003; Loeber & Stouthamer-Loeber, 1998; Stouthamer-Loeber et al., 2004). The longitudinal nature of our survey, TRAILS, allows us to investigate long-term desistance in the future. In future research, it must also be examined whether childhood-limited individuals develop other forms of maladjustment as adults, as suggested by Robins (1966). Moffitt, Caspi, Harrington, and Milne (2002) showed that childhood-limited antisocial boys developed into depressed and anxious men (and that their original "recovery" label was a misnomer). A similar finding by Farrington, Gallagher, Morley, St. Ledger, and West (1988) on males followed from ages 8 to 32 led them to conclude that there are no true recoveries, in which all adjustment problems are escaped. So far, in our study, recovery does not seem to be a misnomer for the desistance group. The childhood-limited individuals were better off not only in antisocial behavior but also in peer rejection, academic failure, and internalizing problems.

A major advantage of the present study was that we used the same parent, teacher, and self-reports of antisocial behavior at both waves. The most important contribution of our study may be that we were able to show that young childhood-limited individuals may seem indistinguishable from stable high-antisocial children of the same age but that there are combinations of tell-tale signs (effortful control, no overprotection, no familial vulnerability) and interventions (remedial teaching) that will pull these children into

a different, non-antisocial developmental path. The mechanism of a self-reinforcing deficit of social approval, which we assume leads to these divergent paths, deserves to be investigated more closely in the future. Several questions remain for future research. For example, do learning difficulties form the basis of a negative feedback loop of academic failure, rejection, and antisocial behavior? And does this vicious cycle lead to loss-driven goals? Furthermore, how are such processes related to other developmental issues during this period: puberty, transitions within the family, and so on? Finally, it seems important to open the black box of remedial teaching. Under what circumstances does that intervention help children with their learning difficulties and related problems (such as feeling rejected)? Such knowledge is necessary before it can be recommended that remedial teaching be given to all antisocial children.

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René Veenstra, PhD, is an associate professor in the Department of Sociology and the Interuniversity Center for Social Science Theory and Methodology at the University of Groningen, the Netherlands. He is a visiting professor in the Department of Psychology at the University of Turku, Finland. He has published on bullying and victimization, prosocial and antisocial behavior, and temperament-by-environment interactions.

Siegwart Lindenberg, PhD, is a professor of cognitive sociology in the Department of Sociology and the Interuniversity Center for Social Science Theory and Methodology at the University of Groningen, the Netherlands. He is a member of the Royal Netherlands Academy of Arts and Sciences. His interests lie in the development and application of theories of "social rationality" that deal with the influence of the social environment on social behavior via its influence on cognitive and motivational processes.

Frank C. Verhulst, MD, PhD, is a professor of child and adolescent psychiatry at the Erasmus Medical Center Rotterdam.

Johan Ormel, PhD, is a professor of social psychiatry at the University Medical Center Groningen.