

Preschool Attention-Deficit/Hyperactivity and Oppositional Defiant Problems as Antecedents of School Bullying

Marina Verlinden, PhD, Pauline W. Jansen, PhD, René Veenstra, PhD, Vincent W.V. Jaddoe, MD, Albert Hofman, MD, Frank C. Verhulst, MD, Philip Shaw, MD, Henning Tiemeier, MD

Objective: To examine whether early manifestations of attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD) increase children's later risk of bullying or victimization.

Method: Using a population-based, prospective cohort, our multi-informant approach comprised reports of parents, teachers, and peers. ADHD and ODD behavioral problems at ages 1.5, 3, and 5 years were determined from parental reports on the Child Behavior Checklist. Later bullying behavior at school was reported by teachers using a questionnaire ($n = 3,192$, mean age 6.6 years), and by peer/self-reports using peer nominations ($n = 1,098$, mean age 7.6 years). We examined the following: whether problem behavior scores at age 1.5, 3, or 5 years predicted a risk of bullying involvement; and whether high or increasing behavioral problems throughout ages 1.5 to 5 years were associated with bullying involvement at school. Analyses were adjusted for a range of child and maternal covariates.

Results: Behavioral problems at a young age each predicted later bullying involvement at school. For example, higher ADHD problem scores at age 3 years were associated with the risks of becoming a bully or a bully-victim ($OR_{\text{BULLY}} = 1.20$, 95% CI = 1.07–1.35 [teacher report], $OR_{\text{BULLY-VICTIM}} = 1.28$, 95% CI = 1.14–1.43 [teacher report], and $OR_{\text{BULLY-VICTIM}} = 1.35$, 95% CI = 1.03–1.78 [peer/self-report]). Children whose behavioral problem scores were high or increased over time consistently had elevated risks of becoming a bully or a bully-victim.

Conclusion: Behavioral problems at a young age may predispose children to bullying involvement in early elementary school.

Key Words: bullying, victimization, children, ADHD, ODD

J Am Acad Child Adolesc Psychiatry 2015;54(7):571–579.

Bullying is defined as intentional and continuous peer aggression characterized by power imbalance between a bully and a victim.¹ Bullying involvement—that is, being a bully, victim of bullying, or a bully-victim (i.e., both bullying and being victimized)—is common in early elementary school.² Experiencing bullying has detrimental effects on the physical and mental health of children,³ leading to long-lasting health consequences.⁴ Well-conducted longitudinal studies show that childhood experiences of bullying and victimization are associated with psychopathology and other problem behaviors in adolescence and adulthood.^{5–8} In particular, bully-victims have been shown to develop high levels of psychiatric problems.⁵ Although it has been established that bullying involvement increases children's risk of psychopathology, less is known about the behavioral problems of children before school entry and before their possible involvement in bullying.

The direction of the association between psychopathology and bullying has been a topic of debate,⁹ suggesting that

this association may be bidirectional.¹⁰ Early-manifesting behavioral problems may predispose children to bullying. At the same time, experiencing bullying or victimization may exacerbate pre-existing problems or may trigger new behavioral problems. Hwang *et al.* suggested that children with disruptive behavior, such as attention-deficit/hyperactivity disorder (ADHD) or oppositional defiant disorder (ODD), are particularly inclined to demonstrate peer aggression.¹⁰ However, prospective studies of young children that examine such antecedent effects are largely lacking. Given that both ADHD and ODD are implicated in bullying¹¹ and that ADHD and ODD are among the most common childhood disorders,^{12,13} it is important to understand whether these behavioral problems predispose children to school bullying when already evident before school entry.

To better understand the role of preschool psychopathology as an antecedent of school bullying, we used large, population-based samples, assessed child problem behavior prospectively from an early age onward, used information obtained from different informants to avoid a problem of shared method variance, and adjusted for important confounders. We hypothesized that higher levels of ADHD or ODD problems at preschool age would be associated with an increased risk of school bullying.



Supplemental material cited in this article is available online.

METHOD

Design

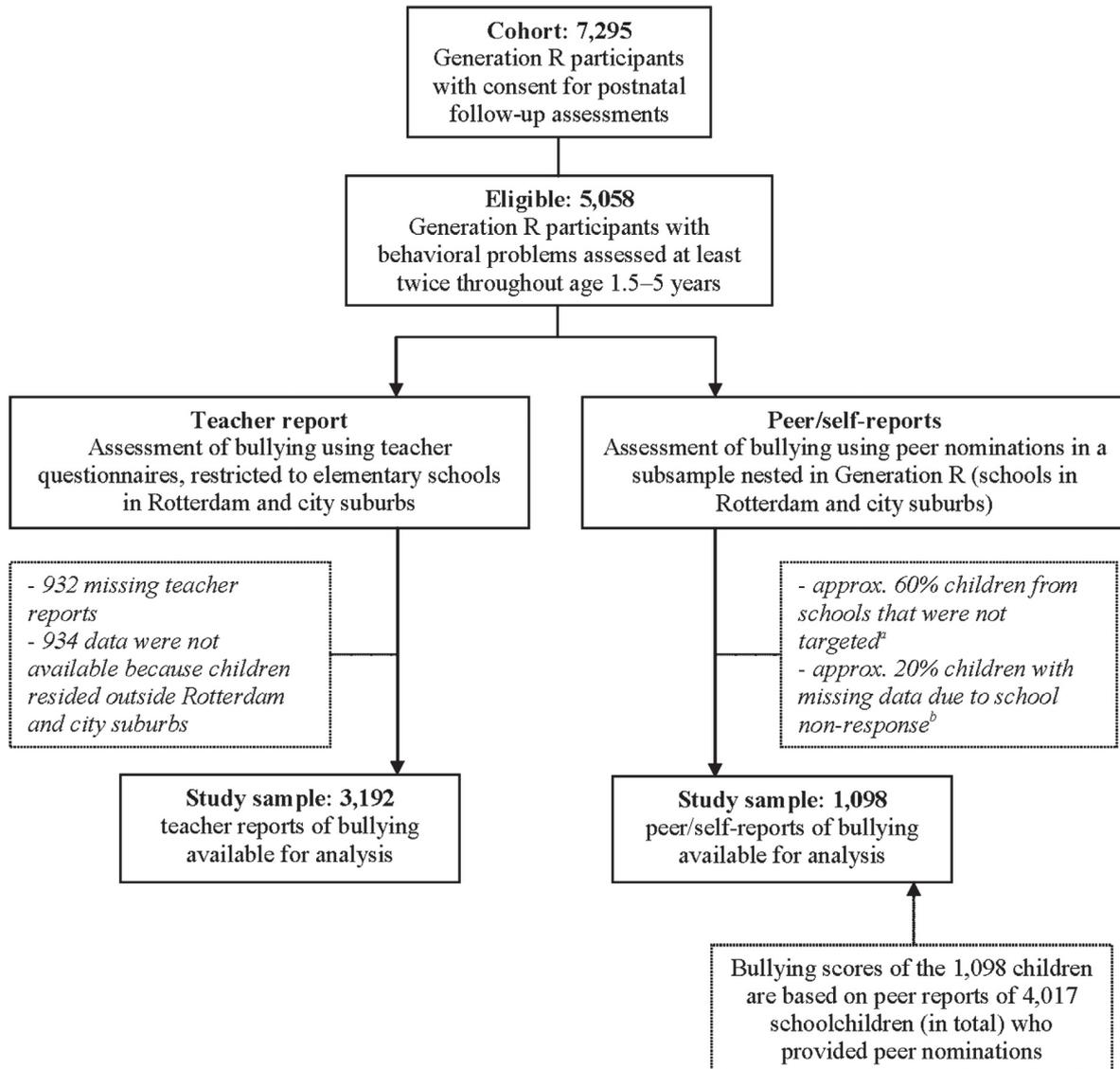
Our study was embedded in the Generation R Study, a large, population-based birth cohort in Rotterdam, the Netherlands. The cohort was set up to study children's health and development from fetal life onward. All pregnant women living in Rotterdam with an expected delivery date between April 2002 and January 2006 were invited to participate (baseline participation rate 61%).¹⁴ Regular assessments have been carried out in children and parents throughout the preschool period.^{14,15} Full consent for the postnatal phase of the Generation R Study was obtained for 7,295 children and their parents. From these, parents of 5,058 children reported about child behavioral problems at 2 time points (at least) at ages 1.5 to

5 years. Of these, 3,192 had teacher reports of bullying behaviors at school. In addition, 1,098 children participated in a nested study using peer and self-reports of school bullying (see flowchart in Figure 1 and baseline characteristics in Table S1, available online).

Measures

The Dutch version of the Child Behavior Checklist (CBCL1½-5)¹⁶ was used to obtain parent reports of child behavioral problems at the ages 1.5, 3, and 5 years (i.e., ratings of problems in the preceding 2 months on a 3-point scale ranging from "not true" to "very true or often true"). Two DSM-oriented scales were used in our analyses: Attention-Deficit/Hyperactivity Problems (6 items: "Can't concentrate," "Can't sit still," "Can't stand waiting," "Demands must be

FIGURE 1 Flow chart of the sampling procedure. Note: The overlap between the children with teacher reports and with peer/self-report of bullying involvement was $n = 907$. ^aMost of the 5,058 eligible children were never approached for the peer/self-report assessment because no school outside of Rotterdam was targeted, and only about half of all schools in Rotterdam were ever contacted for logistical reasons (i.e., limited budget). ^bExact numbers cannot be estimated because schools that did not participate in the peer assessment cannot provide school records.



met," "Gets into everything," "Quickly shifts") and Oppositional Defiant Problems (6 items: "Defiant," "Disobedient," "Angry moods," "Stubborn," "Temper tantrums," "Uncooperative").

Teachers of 1,664 school classes rated children's involvement in bullying ($n = 3,192$, mean age 6.6 years) over the past 3 months with regard to 4 types of bullying (physical, verbal, relational, and material). The definition of school bullying was not explicitly provided to teachers, as they have a good understanding of the concept; however, questions about bullying were accompanied by examples of bullying behaviors.² To assess physical victimization, teachers were asked: "Was a child victimized physically by other children, for instance by being hit, kicked, pinched, or bitten?" Verbal victimization was measured by: "Was a child victimized verbally, for instance by being teased, laughed at, or called names?" Relational victimization was assessed by: "Was a child excluded by other children?" Material victimization was assessed by: "Were the belongings of a child hidden or broken by other children?" Bullying was measured using the same type of questions. For example, to assess physical bullying, teachers were asked: "Did a child physically bully other children, for instance by hitting, kicking, pinching, or biting them?" Items were rated on a 4-point Likert scale with answer categories ranging from "Never or less than once per month" to "More than twice per week." Children were categorized into 4 mutually exclusive groups: "uninvolved in bullying," "bullies," "victims," and "bully-victims."² Children whose behavior with regard to all bullying and victimization items was rated with "Never or less than once per month" were categorized as "uninvolved in bullying." Children were categorized as "victims" if teachers reported them being victimized in any of the 4 forms of victimization at least once per month. Similarly, children were categorized as "bullies" when a teacher reported their involvement as a bully in any form of bullying at least once per month. Children rated by teachers as both bullies and victims were categorized as "bully-victims."

Bullying involvement of 4,017 elementary school children (190 school classes) in Rotterdam was assessed using peer/self-reports (school participation rate 45%, children's participation rate 98%). Of the 4,017 children who participated in the peer assessment, 1,098 children were Generation R participants, whose scores on bullying involvement were linked with parental reports of behavioral problems at preschool age. These 1,098 children (mean age 7.6 years) formed the population for analysis (Figure 1). Children completed a computerized peer-nomination assessment.¹⁷ The concept of bullying was explained as intentional and hurtful behavior (both verbal and nonverbal) that involves a power imbalance between a bully and a victim.¹⁷ The peer nomination method was used: children nominated their classmates so as to indicate by whom they were victimized. Again, 4 questions were used to assess victimization: physical, verbal, relational, and material. The weighted number of nominations a child gave to others was used to calculate individual victimization scores. The nominations that each child received from classmates were used to calculate individual bullying scores. Considering that, on average, a school class consisted of 21 children, each child's bullying score was based on the ratings of about 20 peers. Higher scores represented more bullying/victimization involvement. The individual bullying and victimization scores across different forms of bullying were averaged to obtain the overall bullying scores. To define specific roles of children's involvement in bullying, we dichotomized the continuous scores using the top 25th percentile as cut-off. Children were then categorized into "uninvolved in bullying," "bullies," "victims," and "bully-victims."

The overlap between the children who were assessed using teacher reports and peer/self-reports of bullying involvement was

$n = 907$. In 66% of the cases, there was an exact agreement between the teachers and peers on whether children were involved in bullying, and the κ value ($\kappa = 0.32$, $n = 907$) demonstrated a fair interrater agreement.¹⁸ In bullying research, the agreement between different informants is typically poor.¹⁹⁻²¹ Also, differences in instruments, methodologies, and the time interval between the 2 assessments must be considered.

Covariates

Analyses were adjusted for: child age, gender, national origin (Dutch, other western or nonwestern) and daycare attendance at age one; maternal age, parity (first-born, other), educational level, marital status, net monthly household income (<1600 euros, 1600-3200 euros, >3200 euros), symptoms of depression, parenting stress and harsh disciplinary practices. We used the Brief Symptom Inventory, a validated instrument containing 53 self-appraisal statements²² on psychological symptoms. Maternal symptoms of depression (6 items) were assessed when children were 3 years old. Parenting stress was assessed when children were 1.5 years old, using the Parental Stress Index,²³ a questionnaire consisting of 25 items on parenting stress related to parent and child factors. An adapted version of the Parent-Child Conflict Tactics Scale (6 items) was used to obtain maternal reports of harsh discipline (i.e., psychological aggression and physical assault) when children were 3 years old.^{24,25} In all measures, sum scores were used in the analyses.

Statistical Analyses

First, we performed multinomial logistic regression analyses to examine whether the problem behavior at a specific age (1.5, 3, or 5 years) predicted the risk of becoming a bully, victim, or bully-victim (versus uninvolved). In our additional analyses, we examined the mutually adjusted associations with ADHD and ODD problems.

Second, we defined groups of children based on their patterns of behavioral problems over time. For this, we analyzed latent class growth models of behavioral problems at 1.5, 3, and 5 years (Mplus version 6).²⁶ This analysis yielded a latent variable that grouped children with similar patterns of behavioral problems over time. Following the recommended criteria,²⁷ the number of latent classes was identified based on the model fit characteristics—the smallest Bayesian Information Criterion (BIC) and a large entropy. Besides these typical fit indices, we also considered the interpretability and size of the latent classes, model parsimoniousness, and posterior probabilities of the classes. The identified classes were analyzed as predictors of bullying involvement using multinomial logistic regression models as described above.

Missing data in the covariates were estimated using multiple imputation technique (chained equations). The reported effect estimates are the pooled results of 30 input datasets (Stata/SE 12.0, StataCorp LP). To account for the clustered structure of the data (i.e., children from the same school classes were tested), we performed multinomial logistic regression analysis using clustered robust standard errors (Huber-White method of variance estimation). School class was used as cluster variable.

Nonresponse Analysis

Of the eligible children ($n = 5,058$), we compared those with ($n = 3,192$) and those without ($n = 1,866$) teacher reports of bullying involvement. Children with missing teacher data had higher ODD problem scores at age 5 years (mean score 2.58 versus 2.33, $p < .001$), were from lower income households (10.2% versus 12.2%, $p = .04$) and of non-Dutch national origin (and 20.3% versus 25.6%, $p < .001$).

TABLE 1 Child and Maternal Characteristics

Child Characteristics	Bullying Involvement Reports			
	Teacher Report (n = 3,192)		Peer/Self-Report (n = 1,098)	
	n	% ^a	n	% ^a
Age, y mean (SD)	2,858	6.56 (1.18)	1,098	7.62 (0.74)
Gender (% male)	3,192	50.7	1,098	48.7
National origin				
Dutch	2,081	65.3	745	67.9
Other western	289	9.1	125	11.4
Nonwestern	815	25.6	227	20.7
Bullying involvement ^b				
Uninvolved	2,233	69.9	770	70.1
Bully	450	14.1	119	10.8
Victim	133	4.2	144	13.1
Bully–victim	376	11.8	65	6.0
Behavioral problems scores at age 1.5 y ^c (mean, SD)				
ADHD	2,900	3.86 (2.45)	997	3.77 (2.44)
ODD	2,883	3.15 (2.15)	992	3.10 (2.13)
Behavioral problems scores at age 3 y ^c (mean, SD)				
ADHD	2,910	2.94 (2.28)	1,007	2.75 (2.24)
ODD	2,902	2.84 (2.09)	1,000	2.87 (2.14)
Behavioral problems scores at age 5 y ^c (mean, SD)				
ADHD	3,002	2.84 (2.44)	1,049	2.65 (2.32)
ODD	2,994	2.33 (2.17)	1,047	2.31 (2.16)
Daycare attendance (% not attending)	1,944	21.6	706	18.7
Maternal Characteristics				
Age at intake (mean [y], SD [mo])	3,192	31.57 (4.64)	1,098	32.25 (4.66)
Educational level				
High	923	30.3	345	32.9
High intermediate	726	23.8	276	26.3
Low intermediate	904	29.7	306	29.2
Low	494	16.2	121	11.6
Monthly household income (euros)				
>3,200	1,570	55.4	554	55.3
1,600–3,200	916	32.4	340	34.0
<1,600	345	12.2	107	10.7
Marital status (% single)	2,831	8.2	1,046	8.8
Depression symptoms ^d (mean, SD)	2,895	0.12 (0.31)	999	0.13 (0.30)
Parenting stress ^e (mean, SD)	2,916	0.31 (0.30)	1,000	0.31 (0.29)
Harsh parenting ^f (mean, SD)	2,866	2.11 (1.88)	998	2.08 (1.86)
Parity (% firstborn)	1,944	55.4	1,098	55.1

Note: ADHD = attention-deficit/hyperactivity disorder; ODD = oppositional defiant disorder.
^aUnless otherwise indicated.
^bBullying involvement was measured using a teacher questionnaire and a peer nomination measure.
^cAssessed with the Dutch version of the Child Behavior Checklist.
^dMeasured with the Brief Symptom Inventory.
^eMeasured with the Parental Stress Index.
^fMeasured using an adapted version of the Parent–Child Conflict Tactics Scale.

Similarly, children with peer/self-reports of bullying involvement (n = 1,098) were compared to those for whom this outcome measure was not available (n = 3,960). Children with no peer reports were more often of non-Dutch national origin (24.5% versus 20.7%,

p < .01), had younger mothers (mean age 31.4 versus 32.2 years, *p* < .001), and their ADHD problem scores at ages 3 and 5 years were higher (mean score 2.98 versus 2.75, *p* < .01, and 2.94 versus 2.65, *p* = .001, respectively).

TABLE 2 Behavioral Problems at Young Age and Teacher Report of Bullying Involvement

Scores	Teacher Report of Bullying Involvement at Age 7 Years (n = 3,192)					
	Bully		Victim		Bully–Victim	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Behavioral problems scores at age 1.5 y						
ADHD	1.08	(0.96–1.22)	0.87	(0.71–1.07)	1.06	(0.94–1.19)
ODD	1.00	(0.90–1.12)	0.84	(0.68–1.03)	0.97	(0.86–1.11)
Behavioral problems scores at age 3 y						
ADHD	1.20**	(1.07–1.35)	1.11	(0.90–1.37)	1.28***	(1.14–1.43)
ODD	1.17**	(1.05–1.31)	1.03	(0.84–1.27)	1.12	(1.00–1.26)
Behavioral problems scores at age 5 y						
ADHD	1.32***	(1.18–1.48)	1.22*	(1.01–1.48)	1.46***	(1.30–1.64)
ODD	1.30***	(1.16–1.45)	1.15	(0.95–1.38)	1.35***	(1.20–1.50)

Note: Continuous variables were z standardized. Higher scores on the Child Behavior Checklist scales denote more behavioral problems. Analyses adjusted for child age, sex, national origin and daycare attendance, maternal age, parity, maternal educational level, monthly household income, marital status, maternal depression symptoms, parenting stress, and harsh parenting. Reference group was "uninvolved." Uninvolved: n = 2,233; bully: n = 450; victim: n = 133; bully–victim: n = 376. ADHD = attention-deficit/hyperactivity disorder; ODD = oppositional defiant disorder; OR = odds ratio.

*p ≤ .05; **p ≤ .01; ***p ≤ .001.

RESULTS

Children's baseline characteristics are presented in Table 1. Based on teachers' ratings, 69.9% of children were categorized as uninvolved in bullying, 14.1% as bullies, 4.2% as victims, and 11.8% as bully–victims. Proportions of bullying involvement in the peer/self-reported sample were as follows: 70.1% uninvolved in bullying, 10.8% bullies, 13.1% victims, and 6% bully–victims.

Behavioral Problems and School Bullying

At age 1.5 years, behavioral problems were not associated with teacher- or peer/self-reported bullying involvement (Tables 2 and 3; for unadjusted analyses see Tables S2 and S3, available online). At age 3 years, higher scores on ADHD problems predicted the risks of becoming a bully (teacher report: odds ratio [OR] = 1.20, 95% CI = 1.07–1.35) and a bully–victim (teacher report: OR = 1.28, 95% CI = 1.14–1.43, peer/self-report: OR = 1.35, 95% CI = 1.03–1.78). Higher scores on ODD scale predicted the risk of becoming a bully (teacher report: OR = 1.17, 95% CI = 1.05–1.31).

At age 5 years, higher scores on ADHD problems predicted the risk of becoming: a bully (e.g., teacher data: OR = 1.32, 95% CI = 1.18–1.48, peer/self-report: OR = 1.34, 95% CI = 1.10–1.62); a bully–victim (teacher report: OR = 1.46, 95% CI = 1.30–1.64, peer/self-report: OR = 1.75, 95% CI = 1.30–2.35); and a victim (teacher report: OR = 1.22, 95% CI = 1.01–1.48). Higher ODD scores at age 5 years predicted the risk of becoming a bully and a bully–victim in both teacher- and peer/self-reports (Tables 2 and 3).

Mutually adjusting ADHD and ODD attenuated the effects of both behavioral problems on bullying (see Table S4 and Table S5, available online). However, some effects of ADHD problems remained (e.g., in teacher data, the association of ADHD at age 3 years with bully–victim status OR = 1.29, 95% CI = 1.12–1.48).

The analyses of peer/self-reported data were also performed using a more stringent cut-off for the categorization of the bullying involvement roles (i.e., top 15%). The results were compatible with a dose–response effect (Table S6).

Patterns of Preschool Problem Behavior and Bullying at School

The best-fitting models were determined as described above. An addition of a class improved the fit of each subsequent model (see Table S7, available online). Models that distinguished 4 latent classes of ADHD and 4 classes of ODD problems were selected because in the 5-class models, 2 classes followed the same pattern over time and differed only slightly in the severity of behavioral problems scores. Also, the posterior probabilities (i.e., the probabilities of belonging to the assigned class) in the 4-class models were well above 0.7 and were higher than in subsequent models. Thus, 4-class models were selected, as they grouped children with clearly distinct patterns of problem behavior, and as the size of the latent classes in these models allowed meaningful further analyses.

The identified latent classes of ADHD problems were: a "low-decreasing" class (comprising children with low and slightly decreasing ADHD problem scores across 3 ages, n = 1,966); a "moderate-increasing" class (compared to the "low-decreasing" class, these children scored higher on ADHD problems at 1.5 and 3 years, and their scores increased further at age 5 years, n = 522); a "moderate-decreasing" class (children whose scores were fairly high at 1.5 years but decreased at 3 years and at 5 years, n = 545); and a "high-increasing" class (children with the highest ADHD scores at ages 1.5 and 3 years, and whose scores further increased at age 5 years, n = 159). Figure S1, available online, illustrates the latent classes of behavioral problems plotted against the mean ADHD scores through ages 1.5 to 5 years. The average score of children in the

TABLE 3 Behavioral Problems at Young Age and Peer/Self-Report of Bullying Involvement

Scores	Peer/Self-Report of Bullying Involvement at Age 8 Years (n = 1,098)					
	Bully		Victim		Bully–Victim	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Behavioral problems scores at age 1.5 y						
ADHD	1.12	(0.90–1.40)	1.14	(0.92–1.42)	1.18	(0.82–1.69)
ODD	1.21	(0.98–1.50)	1.07	(0.88–1.31)	0.96	(0.68–1.36)
Behavioral problems scores at age 3 y						
ADHD	0.99	(0.80–1.24)	1.18	(0.97–1.43)	1.35*	(1.03–1.78)
ODD	1.07	(0.87–1.32)	1.06	(0.86–1.30)	1.31	(0.99–1.03)
Behavioral problems scores at age 5 y						
ADHD	1.34**	(1.10–1.62)	1.16	(0.95–1.43)	1.75***	(1.30–2.35)
ODD	1.30*	(1.05–1.62)	1.11	(0.90–1.36)	1.71***	(1.34–2.19)

Note: Continuous variables were z standardized. Higher scores on the Child Behavior Checklist scales denote more behavioral problems. Bullying was reported by multiple peers; victimization was self-reported. The category “bully–victim” is therefore based on both the peer report of bullying and child self-report of victimization. Analyses were adjusted for child age, sex, national origin and daycare attendance, maternal age, parity, maternal educational level, monthly household income, marital status, maternal depression symptoms, parenting stress, and harsh parenting. Reference group was “uninvolved.” Uninvolved: n = 770; bully: n = 119; victim: n = 144; bully–victim: n = 65. ADHD = attention-deficit/hyperactivity disorder; ODD = oppositional defiant disorder; OR = odds ratio.
*p ≤ .05; **p ≤ .01; ***p ≤ .001.

“high-increasing” class at age 5 years was 8.27, that is, in the borderline clinical range according to the norms for the Dutch population.²⁸

The 4 latent classes of ODD problems are illustrated in Figure S2, available online. Similarly, children were grouped into the “low-decreasing” class (n = 2,013), the “moderate-increasing” class (n = 688), the “high-decreasing” class (n = 359), and the “high-increasing” class (n = 132). The mean score in the “high-increasing” group at age 5 years was 7.34, that is, within the borderline clinical range for the Dutch population of this age group.²⁸

As shown in Table 4 (unadjusted analyses: see Table S8, available online), the latent classes of ADHD problems (reference group: “low-decreasing” problems) predicted children’s risks of becoming a bully or a bully–victim. In particular, the “high-increasing” ADHD problems predicted higher risks, especially in the bully–victims group (OR_{BULLY} = 2.18, 95% CI = 1.36–3.50 and OR_{BULLY-VICTIM} = 2.86, 95% CI = 1.82–4.52). The latent classes of ODD problems that are characterized by problems increasing over time predicted the risk of becoming a bully or a bully–victim. Again, the “high-increasing” class membership was associated with the most pronounced risks (e.g., OR_{BULLY} = 2.38, 95% CI = 1.43–3.97 and OR_{BULLY-VICTIM} = 2.20, 95% CI = 1.33–3.67).

In additional analyses, we examined the risk of bullying involvement in children belonging to the “high-increasing” class of both the ADHD and ODD behavioral problems (n = 51). The results showed even greater risks of becoming a bully or a bully–victim (see Table S9, available online).

DISCUSSION

ADHD and ODD at preschool age predicted children’s risk of bullying involvement in the first years of elementary school, suggesting a possible antecedent effect. These behavioral problems were associated with the risks of

becoming a bully or a bully–victim, and, to a lesser extent, with becoming a (pure) victim.

By unfolding the temporal antecedence of early ADHD and ODD problems in relation to subsequent school bullying, we add to studies that primarily examined the concurrent social problems of (pre)adolescents with ADHD or ODD/conduct disorder (CD).^{29–32} The effects in the group of bully–victims were rather pronounced, and this is consistent with the studies showing that bully–victims are the most troubled group³³ with the greatest levels of concurrent psychopathology.^{11,32} Finally, showing that children with high and increasing levels of behavioral problems were most likely to become a bully or a bully–victim is consistent with research suggesting that mainly persistent ADHD or conduct problems are associated with more pronounced effects on children’s social functioning.³⁴

Fewer friends, peer rejection, and school maladjustment^{31,34} of children with ADHD can be attributed to their poor social skills and low self-control.³⁵ Children with ADHD problems tend to demonstrate inattention, impulsivity, low frustration tolerance, and temper tantrums,³⁶ which makes it difficult for their peers to interact with them. In a highly structured setting such as school, children with ADHD problems may have difficulties with adapting to socially accepted behavior and following the rules. Impaired social–cognitive characteristics of children with ADHD or ODD may be part of the mechanism explaining their bullying involvement. Finally, in a school setting, children with ODD problems typically exhibit hostility, display non-normative behavior, and refuse to comply with rules,³⁷ which can affect their interactions with peers and may predispose them to bullying.

Because of the high comorbidity of ADHD and ODD conditions,³⁶ it is difficult to disentangle their individual effects on children’s bullying involvement. Mutual adjustment of the ADHD and ODD problems attenuated the

TABLE 4 Latent Classes of Child Problem Behavior and Teacher Report of Bullying Involvement

Latent Classes of Problem Behavior	Teacher Report of Bullying Involvement at Age 7 Years (n = 3,192)					
	Bully		Victim		Bully–Victim	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
ADHD Problems						
Low, decreasing	1	—	1	—	1	—
Moderate, increasing	1.51**	(1.13–2.01)	1.27	(0.78–2.09)	2.08***	(1.55–2.78)
Moderate, decreasing	1.23	(0.92–1.65)	0.75	(0.44–1.28)	1.37*	(1.00–1.87)
High, increasing	2.18***	(1.36–3.50)	1.79	(0.82–3.90)	2.86***	(1.82–4.52)
ODD Problems						
Low, decreasing	1	—	1	—	1	—
Moderate, increasing	1.49**	(1.15–1.92)	0.92	(0.57–1.47)	1.58***	(1.21–2.06)
High, decreasing	0.99	(0.70–1.39)	0.69	(0.37–1.30)	0.95	(0.64–1.42)
High, increasing	2.38***	(1.43–3.97)	1.91	(0.86–4.26)	2.20**	(1.33–3.67)

Note: Continuous variables were z standardized. Higher scores on the Child Behavior Checklist scales denote more behavioral problems. Analyses were adjusted for child age, sex, national origin and daycare attendance, maternal age, parity, maternal educational level, monthly household income, marital status, maternal depression symptoms, parenting stress, and harsh parenting. Reference group was “uninvolved.” Uninvolved: n = 2,233; bully: n = 450; victim: n = 133; bully–victim: n = 376. ADHD = attention-deficit/hyperactivity disorder; ODD = oppositional defiant disorder; OR = odds ratio.
*p ≤ .05; **p ≤ .01; ***p ≤ .001.

effects of both behavioral problems on bullying, although some of the effects of ADHD problems remained. However, mutual adjustment may have resulted in overadjustment. The attenuation of the effects of both behavioral problems could be due to common source variance³⁸: both measures were reported simultaneously, by the same parent, using the same instrument. Furthermore, mutual adjustment of frequently co-occurring behavioral problems may be inappropriate from the developmental perspective, as shared variance may indicate a common developmental pathway.³⁹

The behavioral problems at age 1.5 years were not markedly associated with bullying involvement in the adjusted analysis. This may be due to confounding or to difficulties with ascertaining the behavioral symptoms at a very young age, which highlights the importance of using repeated assessments of behavior. Second, the identified latent classes of the ADHD and ODD problems were rather similar. Because the life-cycle assessment methods produce tentative models, cross-validation in independent samples is required to inspect a range of similarly plausible solutions. In our sample, 51 children were assigned to the trajectories with the highest levels of both ADHD and ODD problems. Although this overlap was not substantial, there was a large correlation between the ADHD and ODD scores at the 3 assessment points ($r = 0.59$, $r = 0.57$, and $r = 0.60$). The highest risks of bullying involvement were noted in children who belonged to the “high-increasing” class of both ADHD and ODD behavioral problems. Importantly, ADHD or ODD problems and the bullying problems may be a manifestation of the same underlying cause (e.g., a neuro-cognitive process, such as differences in prefrontal cortical development or a failure of the anterior cingulate cortex). It may be that the ADHD or ODD problems manifest earlier than bullying problems because the latter is a group-specific process that is more likely to manifest in stable peer group contexts.

Along with several strengths, such as the large population-based sample, repeated measures of behavior and the use of multiple informants, our study has some limitations. First, there is a possibility of reverse causality, as involvement in school bullying was assessed at a single time point. Even though there is no school bullying before school entry, children may still experience social problems with peers before school entry in other social contexts (e.g., kindergarten). Second, although we adjusted our analyses for a range of child and maternal covariates, there may still be some residual confounding. Finally, the use of both teacher and peer self-reports enabled us to include the perspectives of different informants. The modest agreement may indicate that the views of different informants are complementary rather than comparable. Yet the consistency of the observed associations across informants supports the validity of our findings.

This study showed that the identification of individual vulnerability to bullying involvement is possible as early as at age 3 years. This highlights the importance of parental observation of child behavior in relation to later outcomes for the child. Given that the decreasing problems posed no risks for bullying involvement, early interventions directed at parents and their children may be helpful in preventing later bullying involvement. There is evidence for effectiveness of intervention programs in decreasing child oppositionality, hyperactivity, and inattention.^{40–42} Improving children’s social and problem-solving skills and their behavioral control⁴³ before school entry could help prevent their bullying involvement and other accumulating problems. Enhancing social skills can help not only to decrease bullying⁴⁴ but may help these children to establish more close friendships, which serve as a protective factor against victimization.⁴⁵ Importantly, teachers may require additional skills to effectively manage⁴⁶ the behavior and the educational process of children with

ADHD or ODD. Finally, clinicians and school staff can undertake actions to prevent bullying involvement among vulnerable children through their work with parents and affected children.^{47,48}

To conclude, ADHD and ODD behavioral problems at a young age may predispose children to bullying involvement in early elementary school. Our findings suggest the importance of addressing these behavioral problems before school entry. ☺

Accepted May 11, 2015.

Drs. Verlinden, Jansen, Jaddoe, Hofman, Verhulst, and Tiemeier are with Erasmus Medical Center, Rotterdam, the Netherlands. Drs. Verlinden and Jaddoe are also with the Generation R Study Group, Erasmus Medical Center. Dr. Jansen is also with Institute of Psychology, Erasmus University Rotterdam. Dr. Veenstra is with University of Groningen, the Netherlands. Dr. Shaw is with Neurobehavioral Clinical Research Section, Social and Behavioral Research Branch, National Human Genome Research Institute, National Institutes of Health, Bethesda, MD.

The Generation R Study is conducted by the Erasmus Medical Center Rotterdam, the Municipal Health Service Rotterdam Area, and the Stichting

Trombosedienst en Artsenlaboratorium Rijnmond (STAR), Rotterdam, the Netherlands. Generation R is made possible by financial support from the Erasmus Medical Center Rotterdam, and the Netherlands Organization for Health Research and Development (NWO-ZonMw Geeskracht 10.000.1003). Additional grants were obtained from the Netherlands Organization for Scientific Research (VIDI017.106.370 to H.T.), and from the Sophia Foundation for Medical Research SSWO (grant 602 to P.V.W.J.).

The authors greatly acknowledge the contribution of participating children and their parents, schools, general practitioners, hospitals, midwives, and pharmacies in the Rotterdam area.

Disclosure: Dr. Verhulst has received remuneration as contributing author of the Achenbach System of Empirically Based Assessment (ASEBA). Dr. Shaw has received grant or research support from the Intramural Program of the National Institutes of Health. Drs. Verlinden, Jansen, Veenstra, Jaddoe, Hofman, and Tiemeier report no biomedical financial interests or potential conflicts of interest.

Correspondence to Henning Tiemeier, Department of Child and Adolescent Psychiatry, Erasmus MC, Rotterdam, PO Box 2060, 3000CB Rotterdam; e-mail: h.tiemeier@erasmusmc.nl

0890-8567/\$36.00/©2015 American Academy of Child and Adolescent Psychiatry

<http://dx.doi.org/10.1016/j.jaac.2015.05.002>

REFERENCES

- Olweus D. *Bullying at School: What We Know and What We Can Do*. Cambridge, MA: Blackwell Publishers; 1993.
- Jansen P, Verlinden M, Domisse-van Berkel A, *et al*. Prevalence of bullying and victimization among children in early elementary school: do family and school neighbourhood socioeconomic status matter? *BMC Public Health*. 2012;12:494.
- Bogart LM, Elliott MN, Klein DJ, *et al*. Peer victimization in fifth grade and health in tenth grade. *Pediatrics*. 2014;133:440-447.
- Lereya ST, Winsper C, Heron J, *et al*. Being bullied during childhood and the prospective pathways to self-harm in late adolescence. *J Am Acad Child Adolesc Psychiatry*. 2013;52:608-618.e602.
- Copeland WE, Wolke D, Angold A, Costello E. Adult psychiatric outcomes of bullying and being bullied by peers in childhood and adolescence. *JAMA Psychiatry*. 2013;70:419-426.
- Sourander A, Jensen P, Rönning JA, *et al*. What is the early adulthood outcome of boys who bully or are bullied in childhood? The Finnish "From a Boy to a Man" study. *Pediatrics*. 2007;120:397-404.
- Wolke D, Copeland WE, Angold A, Costello EJ. Impact of bullying in childhood on adult health, wealth, crime, and social outcomes. *Psychol Sci*. 2013;24:1958-1970.
- Takizawa R, Maughan B, Arseneault L. Adult health outcomes of childhood bullying victimization: evidence from a five-decade longitudinal British birth cohort. *Am J Psychiatry*. 2014;171:777-784.
- Kim Y, Leventhal BL, Koh Y, Hubbard A, Boyce W. School bullying and youth violence: causes or consequences of psychopathologic behavior? *Arch Gen Psychiatry*. 2006;63:1035-1041.
- Hwang S, Kim YS, Leventhal B. Bullying and the development of antisocial behavior. In: Thomas CR, Pope K, eds. *The Origins of Antisocial Behavior: a Developmental Perspective*. New York: Oxford University Press; 2013:159-180.
- Kumpulainen K, Räsänen E, Henttonen I, *et al*. Bullying and psychiatric symptoms among elementary school-age children. *Child Abuse Neglect*. 1998;22:705-717.
- Polanczyk G, de Lima MS, Horta BL, Biederman J, Rohde LA. The worldwide prevalence of ADHD: a systematic review and meta-regression analysis. *Am J Psychiatry*. 2007;164:942-948.
- Nock MK, Kazdin AE, Hiripi E, Kessler RC. Lifetime prevalence, correlates, and persistence of oppositional defiant disorder: results from the National Comorbidity Survey Replication. *J Child Psychol Psychiatry*. 2007;48:703-713.
- Jaddoe VV, Duijn C, Franco O, *et al*. The Generation R Study: design and cohort update 2012. *Eur J Epidemiol*. 2012;27:739-756.
- Tiemeier H, Velders FP, Szekely E, *et al*. The Generation R Study: a review of design, findings to date, and a study of the 5-HTTLPR by environmental interaction from fetal life onward. *J Am Acad Child Adolesc Psychiatry*. 2012;51:1119-1135.e1117.
- Achenbach T, Rescorla L, eds. *Manual for ASEBA Preschool Forms and Profiles*. Burlington, VT: University of Vermont, Research Centre for Children, Youth and Families; 2000.
- Verlinden M, Veenstra R, Ringoot AP, *et al*. Detecting bullying in early elementary school with a computerized peer-nomination instrument. *Psychol Assess*. 2014;26:628-641.
- Altman DG. *Practical Statistics for Medical Research*. London: Chapman and Hall; 1991.
- Olweus D. Understanding and researching bullying: some critical issues. In: Jimerson SR, Swearer SM, Espelage DE, eds. *Handbook of Bullying in Schools: an International Perspective*. New York: Routledge; 2010:9-34.
- Rønning J, Sourander A, Kumpulainen K, *et al*. Cross-informant agreement about bullying and victimization among eight-year-olds: whose information best predicts psychiatric caseness 10–15 years later? *Soc Psychiatr Epidemiol*. 2009;44:15-22.
- Achenbach TM, McConaughy SH, Howell CT. Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for situational specificity. *Psychol Bull*. 1987;101:213-232.
- Derogatis L, ed. *Brief Symptom Inventory (BSI): Administration, Scoring and Procedures*. Third ed. Minneapolis: Pearson; 1993.
- De Brock AJLL, Vermulst AA, Gerris JRM, Abidin RRL. *Nijmeegse Ouderlijke Stress Index (NOSI)—Manual*. Lisse: Swets en Zeitlinger; 1992.
- Straus MA, Hamby SL, Finkelhor D, Moore DW, Runyan D. Identification of child maltreatment with the Parent-Child Conflict Tactics Scales: development and psychometric data for a national sample of American parents. *Child Abuse Neglect*. 1998;22:249-270.
- Jansen PW, Raat H, Mackenbach JP, *et al*. Early determinants of maternal and paternal harsh discipline: the Generation R Study. *Fam Relat*. 2012; 61:253-270.
- Muthén LK, Muthén BO. *Mplus User's Guide*. 6th ed. Los Angeles: Muthén and Muthén; 1998-2010.
- Nylund KL, Asparouhov T, Muthén BO. Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte Carlo simulation study. *Struct Equat Model*. 2007;14:535-569.
- Tick NT, van der Ende JAN, Koot HM, Verhulst FC. 14-Year changes in emotional and behavioral problems of very young Dutch children. *J Am Acad Child Adolesc Psychiatry*. 2007;46:1333-1340.
- Holmberg K, Hjern A. Bullying and attention-deficit-hyperactivity disorder in 10-year-olds in a Swedish community. *Devel Med Child Neurol*. 2008;50:134-138.
- Fite P, Evans S, Cooley J, Rubens S. Further evaluation of associations between attention-deficit/hyperactivity and oppositional defiant disorder symptoms and bullying-victimization in adolescence. *Child Psychiatry Hum Dev*. 2014;45:32-41.

31. Kawabata Y, Tseng WL, Gau SS. Symptoms of attention-deficit/hyperactivity disorder and social and school adjustment: the moderating roles of age and parenting. *J Abnorm Child Psychol.* 2012;40:177-188.
32. Kokkinos CM, Panayiotou G. Predicting bullying and victimization among early adolescents: associations with disruptive behavior disorders. *Aggress Behav.* 2004;30:520-533.
33. Juvonen J, Graham S, Schuster MA. Bullying among young adolescents: the strong, the weak, and the troubled. *Pediatrics.* 2003;112:1231-1237.
34. Bagwell CL, Molina BSG, Pelham WE Jr, Hoza B. Attention-deficit hyperactivity disorder and problems in peer relations: predictions from childhood to adolescence. *J Am Acad Child Adolesc Psychiatry.* 2001;40:1285-1292.
35. Unnever JD, Cornell DG. Bullying, self-control, and ADHD. *J Interpers Viol.* 2003;18:129-147.
36. Barkley RA, ed. *Taking Charge of ADHD: the Complete, Authoritative Guide for Parents.* Revised ed. New York: Guilford Press; 2005.
37. Loeber R, Burke JD, Lahey BB, Winters A, Zera M. Oppositional defiant and conduct disorder: a review of the past 10 years, part I. *J Am Acad Child Adolesc Psychiatry.* 2000;39:1468-1484.
38. Podsakoff PM, MacKenzie SB, Podsakoff NP. Sources of method bias in social science research and recommendations on how to control it. *Ann Rev Psychol.* 2012;63:539-569.
39. Taurines R, Schmitt J, Renner T, Conner AC, Warnke A, Romanos M. Developmental comorbidity in attention-deficit/hyperactivity disorder. *Atten Defic Hyperact Disord.* 2010;2:267-289.
40. Eyberg SM, Nelson MM, Boggs SR. Evidence-based psychosocial treatments for children and adolescents with disruptive behavior. *J Clin Child Adolesc Psychol.* 2008;37:215-237.
41. Webster-Stratton C, Reid MJ, Beauchaine TP. One-year follow-up of combined parent and child intervention for young children with ADHD. *J Clin Child Adolesc Psychol.* 2012;42:251-261.
42. Webster-Stratton C, Reid MJ, Hammond M. Treating children with early-onset conduct problems: intervention outcomes for parent, child, and teacher training. *J Clin Child Adolesc Psychol.* 2004;33:105-124.
43. Webster-Stratton C, Reid J, Hammond M. Social skills and problem-solving training for children with early-onset conduct problems: who benefits? *J Child Psychol Psychiatry.* 2001;42:943-952.
44. DeRosier ME. Building relationships and combating bullying: effectiveness of a school-based social skills group intervention. *J Clin Child Adolesc Psychol.* 2004;33:196-201.
45. Cardoos SL, Hinshaw SP. Friendship as protection from peer victimization for girls with and without ADHD. *J Abnorm Child Psychol.* 2011;39:1035-1045.
46. Webster-Stratton C, Jamila Reid M, Stoolmiller M. Preventing conduct problems and improving school readiness: evaluation of the Incredible Years Teacher and Child Training Programs in high-risk schools. *J Child Psychol Psychiatry.* 2008;49:471-488.
47. American Academy of Pediatrics, Committee on Injury, Violence, and Poison Prevention. Role of the pediatrician in youth violence prevention. *Pediatrics.* 2009;124:393-402.
48. American Academy of Child and Adolescent Psychiatry Task Force for the Prevention of Bullying. Joint AACAP and APA Position Statement on Prevention of Bullying-Related Morbidity and Mortality. 2011. Available at: <http://www.psychiatry.org/advocacy-newsroom/position-statements>.