


## REGULAR ARTICLE

# Relative age is associated with bullying victimisation and perpetration among children aged eight to nine

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## Abstract

**Aim:** To assess whether relative age was associated with bullying involvement and whether the associations were independent of child psychiatric symptoms.

**Methods:** Bullying was assessed among 8576 children in the second grade, aged 8 years, by using four cross-sectional population-based studies with identical methodology completed by children, parents and teachers in 1989 (response rate 97%), 1999 (93%), 2005 (90%) and 2013 (86%). The main outcomes were bullying victimisation and perpetration. Odds ratios (OR) and 95% confidence intervals (95% CI) were calculated with the relatively oldest as the reference group and adjusted for child psychiatric symptoms.

**Results:** The relatively youngest children, born September to December, were compared with the relatively oldest, born January to April. The youngest children had increased odds of being victims according to child (OR 1.2, 95% CI 1.1-1.4) and parent reports (OR 1.2 95% CI 1.008-1.4). The youngest also had decreased odds of being perpetrators according to child (OR 0.8, 95% CI 0.7-0.96) and teacher reports (OR 0.8, 95% CI 0.7-0.95). These findings were independent of psychiatric symptoms.

**Conclusion:** The relative age effects which were found in bullying involvement were independent of psychiatric symptoms. Considering this newly recognised risk factor for victimisation is important within anti-bullying practices.

## KEYWORDS

bullying, relative age, victimisation

## 1 | INTRODUCTION

Bullying is defined by the American Centers for Disease Control and Prevention as unwanted repetitive aggressive behaviour that occurs within an unequal power relationship and inflicts harm or distress on the victim.<sup>1</sup> The prevalence of involvement in bullying is approximately 20%-25%.<sup>2</sup> It has possible long-lasting negative

impacts such as mental<sup>3-7</sup> and physical health problems, socio-economic disadvantages,<sup>5</sup> and criminality.<sup>4,5</sup> Bullies have been shown to demonstrate proactive aggression and be motivated by social dominance, whereas their victims have been characterised as submissive and lacking in confidence in social interaction.<sup>2</sup> These characteristics may be increased by differences in growth and maturity.

**Abbreviations:** ADHD, attention-deficit/hyperactivity disorder; CI, confidence interval; OR, odds ratio.

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In many countries, children are grouped by age for starting school on a fixed date. This means that the actual ages of the children within the same school year can vary by almost a year, depending on their birthday. The difference in the actual age of a child compared with the ages of other children within the same school year is referred to as relative age.<sup>8</sup> Studies of children and adolescents have showed that a younger relative age was an independent risk factor for psychopathology.<sup>8-11</sup> The strongest evidence for this was an increased likelihood of being diagnosed with and/or medicated for attention-deficit/hyperactivity disorder, ADHD.<sup>11-13</sup> Younger relative age has also been associated with less favourable outcomes in self-esteem,<sup>14</sup> peer relationships,<sup>10</sup> education<sup>15-18</sup> and sports.<sup>19</sup> Although diverse studies have been carried out on the effect of relative age, studies of the impact of relative age on being a victim or perpetrator of bullying are scarce. Any associations between relative age and bullying among young children could have major implications on focused anti-bullying interventions and school enrolment policies, especially when the effects of relative age on other problems are taken into account.

Only a few studies have explored the impact of relative age on becoming a victim of bullying<sup>17,18,20</sup> and none have focused on relative age and perpetrators. While some studies have showed an increased likelihood of relatively young children being bullied, others did not show any association between relative age and bullying victimisation.<sup>17,18,20</sup> A multi-country study among 10-year-old children found that those who were relatively younger than their peers were more likely to be bullied.<sup>20</sup> Two British reports included the results of four surveys that covered children and adolescents aged 7-17 years.<sup>17,18</sup> Some of these surveys<sup>17,18</sup> found there was an increased likelihood of bullying victimisation among the relatively youngest children aged 7-14 but some<sup>18</sup> reported insignificant results among 8-to 17-year-old children and adolescents.

In addition to inconsistent findings, previous studies have contained methodological limitations and none of them controlled for psychiatric symptomology. This means that it is not known whether relative age is an independent risk factor for bullying victimisation or if the findings can be explained by psychiatric problems which may function as both antecedents and consequences of peer victimisation.<sup>21,22</sup> In the previous studies, bullying victimisation was not controlled by whether those victims also bullied others, which is important because some children are both victims and perpetrators. Previous studies have also been mainly based on child self-reports<sup>17,18,20</sup> with very few reports from both children and parents<sup>17,18</sup> and none that include reports from teachers. The correlation between different informants on bullying has been poor,<sup>23</sup> which emphasises the importance of ratings from multiple informants.

This was the first study to examine the association between relative age and both bullying victimisation and perpetration, with information from children, parents and teachers. It is important to note that the findings were controlled for psychopathology, unlike previous studies. The first aim of the study was to assess whether the relative age of the child was associated with being a victim or a perpetrator of bullying. The second aim was to address whether the

### Key notes

- The relatively youngest children within the school year were more likely to be victims of bullying and less likely to be bullies.
- These findings were independent of the child's psychiatric symptoms.
- Considering relative age as a risk factor for bullying involvement is important within bullying prevention practices.

possible associations were independent of psychiatric symptomology. Based on previous findings on age-related variations in growth, maturity and behaviour, our first hypothesis was that the relatively younger children were more likely to be victims of bullying. Second, we hypothesised that bullying perpetration would be more prevalent among the relatively older children. The third hypothesis was that relative age would be a risk factor for any involvement in bullying, either as a victim or perpetrator, independent of psychopathology.

## 2 | METHODS

### 2.1 | Subjects

The study participants were 8576 children who took part in four studies carried out in Finland in 1989, 1999, 2005 and 2013. These were epidemiological studies which were designed to assess the prevalence of and time trends in psychiatric well-being and associated factors in childhood. The basic population of the 1989 study were all Finnish-speaking children who were born in Finland in 1981 and still alive in 1989. A random sample of about 10% of these children was drawn from the population cohort that covered the catchment areas of all five of the university hospitals in Finland. The sample was drawn in a representative sample of the communities in the study areas which were selected according to their degree of urbanisation: rural, suburban and urban. In the areas of data collection, every school was included, except in the largest cities, in which a representative subsample was drawn from every school district. Children were included even if they had attended a school outside their community or registered school district because of special education needs or parental choice. The randomly selected sample of 1989 comprised 6017 children and 5813 (97%) took part. The sample well represented school-aged children and their families in Finland regarding demographic and socioeconomic factors.<sup>24</sup> In 1999, 2005 and 2013, the study was repeated in the same municipalities and school districts in the Turku University Hospital catchment area in the south-west of Finland as the 1989 study, with similar principles of sample selection. The basic population of these studies were children who were born in 1991, 1997 and 2004, respectively, and were still alive in the study years.<sup>25</sup> In

1999, the study population included 1035 children, but the number of children who participated was 891 (93%). Three teachers of 73 children refused to participate. In 2005, the study population included 1030 children and 930 (90%) participated. In 2013, the study population included 1114 children and 942 (86%) participated. Three teachers of 23 children refused to participate. Figure 1 shows the study flow.

In Finland, children are enrolled in elementary school in the calendar year that they reach their seventh birthday. Because the school year starts in mid-August, this means that the variation in actual ages between the oldest children and the youngest children within a school year can be almost one year. The subjects of the present study were in the second grade of elementary school and they were aged eight to nine years.

## 2.2 | Procedure

At every time point, the data were collected from the children and their parents and teachers using questionnaires with similar wording. Information on the study was provided to all the principals and teachers in the study schools by the research group. The parents received information and the questionnaires from the school via their child. In 1989, the parents provided their consent by completing the questionnaires. In 1999, 2005 and 2013, written consent needed to be provided by a parent before the child and the teacher completed the questionnaires. After the parents had completed the questionnaires, they returned them to the teachers in a sealed envelope. The children filled in their questionnaires in the classroom and

the teachers completed their questionnaires after parental consent. All the study material was returned to the research group by the teachers. The study was approved by the Ethics Committee of the Hospital District of Turku University Hospital and the school authorities and principals for all four study years.

## 3 | MEASURES

The parental questionnaire included information on the child's exact birth date and sex. Information on psychopathology was measured with the Rutter Behaviour Scale for teachers (Rutter B2 Scale), which has been shown to be valid in children aged eight to nine<sup>26</sup> and have good inter-rater reliability.<sup>27</sup> The questionnaire includes 26 brief statements on the child's behaviour and problems and the responses indicate whether the statements certainly, somewhat or do not apply to the child.<sup>27</sup> Questions on bullying and victimisation were included in all the questionnaires. The children were asked about bullying and victimisation over the past two weeks. The response options for victimisation were that other children bullied them almost every day, sometimes or not usually. For bullying, the response options were that they bullied other children almost every day, sometimes or not usually. For the analyses, involvement in bullying almost every day or sometimes were interpreted as the child being victimised or bullying others. The parents and the teachers were asked if the child had been a victim or a bully over the last 12 months. The responses indicated whether the statements certainly, somewhat or did not apply to the child. For the analyses, the first two options were interpreted as involvement in bullying.

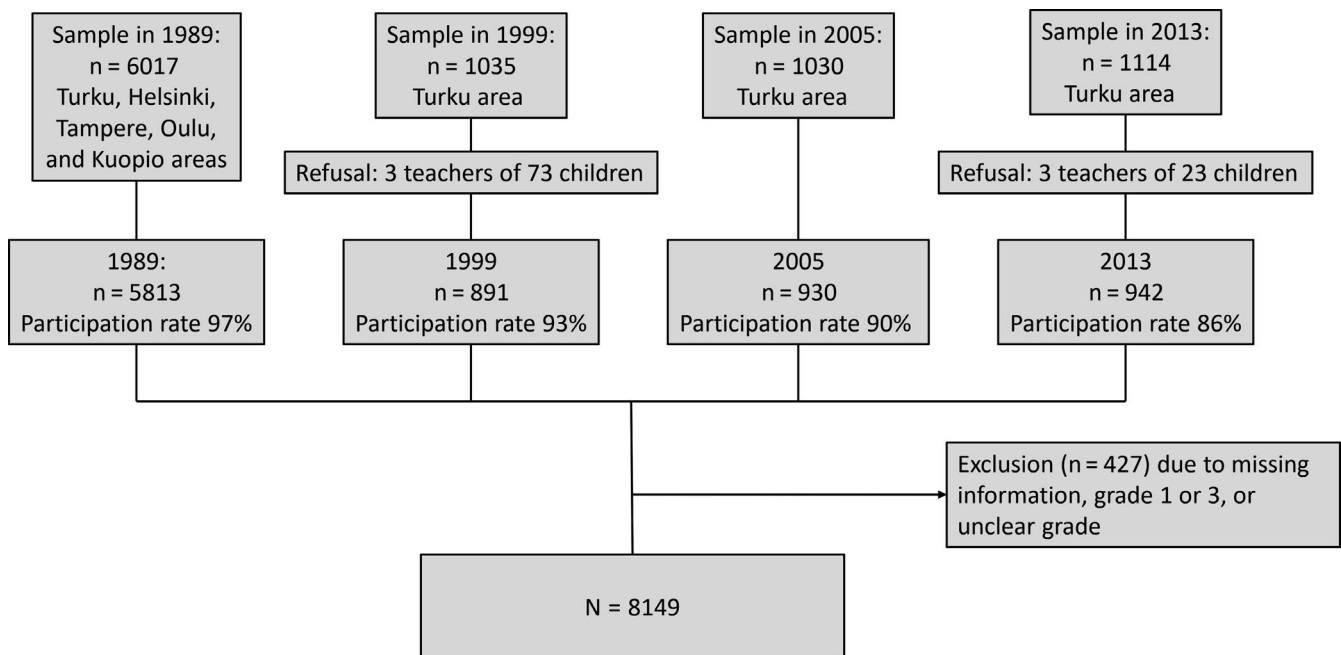


FIGURE 1 Flow chart showing the participants in the study

	Total n (%)	Relative age		
		Oldest n (%)	Middle n (%)	Youngest n (%)
Sex				
Boys	4081 (50.1)	1478 (51.6)	1367 (49.5)	1240 (48.9)
Girls	4068 (49.9)	1381 (48.4)	1393 (50.5)	1294 (51.1)
Year				
1989	5616 (68.9)	1956 (68.5)	1921 (69.6)	1739 (68.6)
1999	786 (9.7)	287 (10.1)	254 (9.2)	245 (9.7)
2005	858 (10.5)	303 (10.6)	293 (10.6)	262 (10.3)
2013	889 (10.9)	309 (10.8)	292 (10.6)	288 (11.4)
Victimisation reported by				
Child	2549 (33.3)	841 (31.4)	868 (33.4)	840 (35.2)
Parent	1610 (20.6)	532 (19.3)	552 (20.8)	526 (21.7)
Teacher	804 (10.1)	249 (8.9)	286 (10.6)	269 (10.9)
Bullying reported by				
Child	1456 (19.0)	535 (20.0)	490 (18.8)	431 (18.0)
Parent	1216 (15.5)	433 (15.7)	419 (15.8)	364 (15.0)
Teacher	1423 (17.8)	510 (18.2)	476 (17.6)	437 (17.7)

**TABLE 1** Descriptive characteristics of the participants and the proportion of children who were involved in bullying

#### 4 | STATISTICAL ANALYSES

Data for all study years were pooled to provide a cohort of 8576 children. We excluded 427 children with missing information on their exact birth date, sex or grade, and those in the first or third grades resulting in the total sample of 8149. Relative age was the explanatory variable and analysed for three blocks of four birthday months: January to April, May to August and September to December. These are referred to in this paper as the oldest, middle and youngest relative age groups, respectively. The outcome variables were victimisation and bullying, which were categorised as binary variables (yes/no). All analyses were conducted separately for the children, parents and teachers. Interactions for relative age  $\times$  sex and relative age  $\times$  year were analysed for the outcome variables. Because they were not significant, we conducted multivariable logistic regression analyses for the total sample. To control for confounding variables, adjustments were made for sex and year and victimisation was controlled for bullying perpetration and vice-versa, based on information acquired from the same informant. This was called statistical model 1. Statistical model 2 was created to address the study question of whether the possible associations between relative age and bullying involvement were independent of the psychopathology of the child. In model 2, the covariates were sex, year, victimisation controlled for bullying perpetration and vice-versa, and psychopathology. Psychopathology was measured by the total score on the Rutter B2 Scale and analysed as a continuous variable. Statistical model 3 was created to assess whether the possible associations between relative age and bullying involvement were independent of any hyperactivity symptoms that the child had, which is a subscale of the Rutter B2 Scale. In model 3, the covariates were sex, year,

victimisation controlled for bullying perpetration and vice-versa, and hyperactivity symptoms.

Multivariable logistic regression analyses were conducted between the explanatory variable and the outcome variables. Odds ratios (OR), their corresponding 95% confidence intervals (95% CI), and *P* values were calculated. Two-sided *P* values of  $<.05$  were considered statistically significant, except for the interaction analyses, where the threshold was  $P<.1$ . The statistical analyses were performed with SAS software (SAS 9.4; SAS Institute Inc) was used to carry out the analyses.

#### 5 | RESULTS

Table 1 shows the descriptive characteristics of the total study sample and the three groups based on their relative age and the proportion of children who were involved in bullying in these groups. The distribution of the sexes and the samples of the four study years are shown. The frequency of victimisation reported by children ranged from 31.4% in the oldest age group to 35.2% in the youngest. These were larger than the respective rates reported by their parents, which ranged from 19.3% to 21.7%, and their teachers, which ranged from 8.9% to 10.9%. The frequency for perpetrating bullying reported by children ranged from 18.0% in the youngest age group to 20.0% in the oldest. In parental reports, this ranged from 15.0% in the youngest age group to 15.8% in the middle group. The frequency for perpetrating bullying reported by teachers ranged from 17.6% in the middle group to 18.2% in the oldest. There were no significant interactions for relative age  $\times$  sex and relative age  $\times$  year, as shown in Table 2.

**TABLE 2** Interaction p values for the outcomes of bullying victimisation and perpetration, separately for child, parent and teacher reports on bullying involvement

Informant	Victimisation		Bullying	
	Interaction P values		Interaction P values	
	relative age × sex	relative age × year	relative age × sex	relative age × year
Child	0.94	0.53	0.52	0.79
Parent	0.38	0.71	0.24	0.45
Teacher	0.12	0.62	0.37	0.42

Table 3 shows the relative age effects for bullying involvement for the three informants and two statistical models. In model 1, in addition to sex and year, victimisation was controlled for bullying perpetration and vice-versa. Model 2 included these and added psychopathology (Rutter B2 total score) as a covariate. These results are shown in Figure 2. The relatively youngest children had increased odds for victimisation, according to both child and parent reports in both models. These were quantified as a 1.2-fold increase in odds of being bullied in both child reports (model 1 OR 1.24, 95% CI 1.10-1.40 and model 2 OR 1.21, 95% CI 1.07-1.36) and parental reports (model 1 OR 1.23, 95% CI 1.06-1.43 and model 2 OR 1.18, 95% CI 1.01-1.37). Based on the teachers' reports, the two relatively youngest groups had increased odds for victimisation in model 1 (middle group OR 1.30, 95% CI 1.07-1.58 and the youngest group OR 1.37, 95% CI 1.12-1.67) but when further controlled for psychopathology, there were no significant findings. When it came to bullying perpetration reported by children, those in the relatively youngest group had decreased odds in model 1 (OR 0.85, 95% CI 0.73-0.98) and in model 2 (OR 0.83, 95% CI 0.71-0.96). Based on parental reports, no significant relative age effects were found for bullying others. The teachers' reports showed no significant findings for bullying others in model 1. In model 2, the odds for bullying others were decreased for the two relatively youngest groups (middle group OR 0.76, 95% CI 0.64-0.91 and the youngest group OR 0.79, 95% CI 0.66-0.95).

In the additional analyses, the results were controlled for any hyperactivity symptoms (model 3) instead of the total symptoms score (model 2) on the Rutter B2 Scale. The results of these two models were very similar. The only difference was when victimisation was reported by teachers, as these showed that the relatively youngest children had significantly increased odds (OR 1.25, 95% CI 1.02-1.53) for being bullied when the data were adjusted for hyperactivity (model 3). There were no significant findings (OR 1.21, 95% CI 0.97-1.50), when the data were adjusted with the total Rutter B2 score (model 2).

## 6 | DISCUSSION

This study has three main findings. First, the relatively youngest children within the school year were more likely to be bullied than their

relatively older peers. Second, children and teachers were more likely to report perpetration by the oldest children. Third, significant associations persisted in most cases after adjusting for psychopathology and this suggests an independent association between relative age and bullying involvement.

The findings suggest that the relatively youngest children were more likely to be bullied than their oldest peers. These relative age effects were reported by the children, parents, and teachers and even remained significant for the children and parents when they were controlled for the psychopathology of the child. This suggests that relative age is a risk factor for victimisation, regardless of the child's psychiatric symptoms. These findings may be explained by differences in the development of children in relation to relative age. In the present study, the children were in the second grade of elementary school and were aged eight to nine years. This means that the differences in maturity may have been even greater than they would have been if our research had focused on older children in a single school grade. The relative immaturity of the youngest children within the school year can lead to differences in physical development, self-regulation, and cognitive and social skills compared to the older children. This could predispose them to being bullied if they are reflected in the child's behaviour and the ability to create and maintain social relationships. It has been stated that any characteristics that set children apart from the group increases the likelihood of them being bullied.<sup>2</sup> The relative age effects found in mental health<sup>10</sup> and ADHD<sup>12,13</sup> have also been explained by differences in maturity<sup>13,28,29</sup> and cognitive and social skills<sup>10</sup> related to age.

This is the first study which has assessed the impact that relative age had on whether children bullied others. According to child and teacher reports, bullying was more common among the relatively oldest children and these relative age effects were independent of the psychiatric symptoms of the child. These findings may be explained by differences in individual maturation and growth. Similar effects were not found in parental reports of bullying, which could be explained by the fact that parents may be less aware of their children's involvement in bullying when they are at school. A previous study found that the agreements between children, parents and teachers on involvement in bullying were low and parents reported the lowest levels.<sup>23</sup>

The effect sizes found in the present study, after controlling for psychiatric problems, indicate that the relatively youngest children had approximately 20% larger odds of being victimised and approximately 20% smaller odds of being a perpetrator compared with their oldest peers. In a previous study, the estimate of effect size for psychiatric disorders indicated a 14% larger risk among the relatively youngest children.<sup>9</sup> A recent meta-analysis that assessed the relative age effects in children who were on ADHD medication found a 27% larger risk of medication among the relatively youngest children.<sup>12</sup> Thus, the increases in the risk of bullying involvement due to relative age found in the present study are comparable to previous studies on child and adolescent mental health. This has important implications at the population level, with regard to the burden of bullying among children and

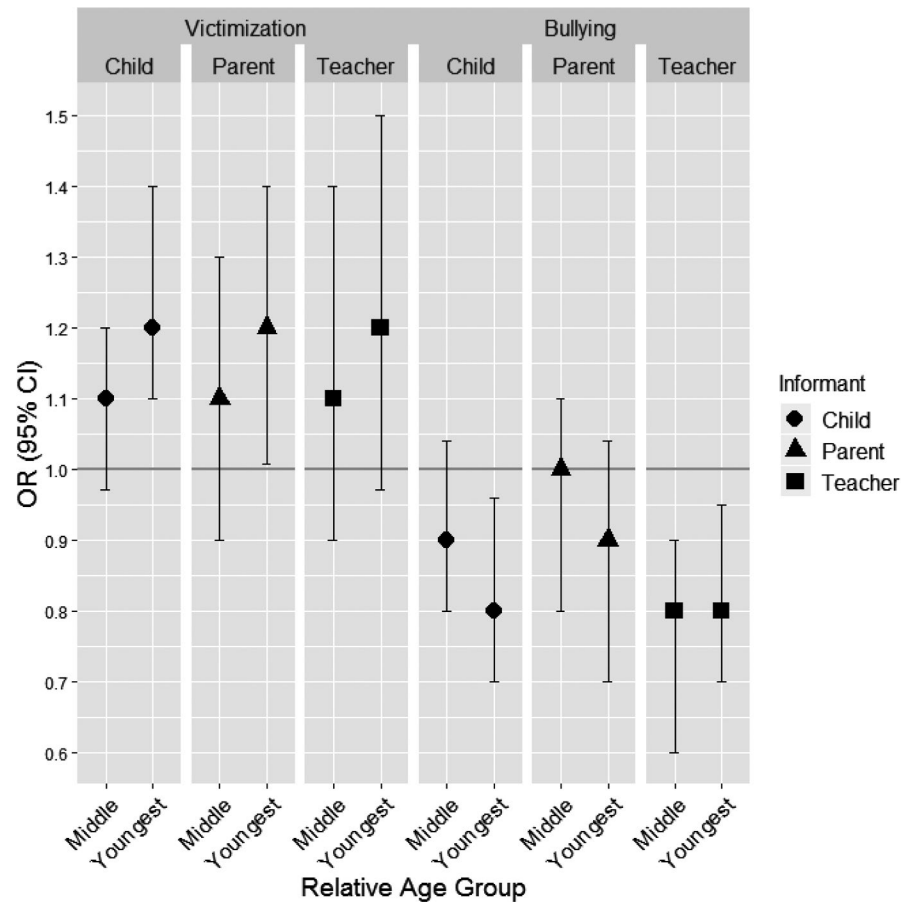
TABLE 3 Relative age effects for bullying victimisation and perpetration separately for child, parent and teacher reports on bullying involvement

Informant	Victimisation						Bullying						
	Relative age			Relative age			Relative age			Relative age			
	Oldest	Middle	Youngest	Oldest	Middle	Youngest	Oldest	Middle	Youngest	Oldest	Middle	Youngest	
n	OR	OR (95% CI)	P Value	OR (95% CI)	P Value	n	OR	OR (95% CI)	P Value	OR (95% CI)	P Value	OR (95% CI)	P Value
Child													
Model 1 <sup>a</sup>	7627	Ref.	1.12 (0.996-1.27)	.06	1.24 (1.10-1.40)	<.001	7627	Ref.	0.92 (0.80-1.07)	.28	0.85 (0.73-0.98)	.03	
Model 2 <sup>b</sup>	7555	Ref.	1.09 (0.97-1.24)	.14	1.21 (1.07-1.36)	.003	7555	Ref.	0.90 (0.78-1.04)	.16	0.83 (0.71-0.96)	.01	
Parent													
Model 1 <sup>a</sup>	7820	Ref.	1.12 (0.97-1.30)	.13	1.23 (1.06-1.43)	.008	7820	Ref.	0.96 (0.82-1.14)	.66	0.89 (0.75-1.06)	.20	
Model 2 <sup>b</sup>	7692	Ref.	1.08 (0.93-1.26)	.32	1.18 (1.01-1.37)	.04	7692	Ref.	0.95 (0.80-1.13)	.57	0.87 (0.73-1.04)	.12	
Teacher													
Model 1 <sup>a</sup>	7971	Ref.	1.30 (1.07-1.58)	.01	1.37 (1.12-1.67)	.002	7971	Ref.	0.90 (0.77-1.05)	.18	0.92 (0.78-1.08)	.31	
Model 2 <sup>b</sup>	7971	Ref.	1.13 (0.91-1.39)	.28	1.21 (0.97-1.50)	.09	7971	Ref.	0.76 (0.64-0.91)	.003	0.79 (0.66-0.95)	.01	

Note: Ref. = Reference.

<sup>a</sup>Model 1: covariates sex, year, bullying (when analysing victimisation) or victimisation (when analysing bullying).<sup>b</sup>Model 2: covariates sex, year, bullying (when analysing victimisation) or victimisation (when analysing bullying), Rutter B Total score.

**FIGURE 2** Relative age effects for bullying involvement. Odds ratios (OR) with their corresponding confidence intervals (95% CI) are shown for the middle, born in May to August, and the youngest groups, born in September to December, with the oldest, born in January to April, as the reference group



adolescents and the detrimental long-term sequelae of bullying. It has been stated that reducing any involvement in bullying could reduce mental health problems<sup>7</sup> and this emphasises the importance of anti-bullying initiatives taking into account the possible impact of relative age.

The strengths of this study include the large sample and the fact that we gathered information from the children and their parents and teachers. We also controlled the findings with psychopathology of the child and victimisation was controlled for bullying and vice-versa. The findings are based on four school surveys that were conducted over 24 years, which increases the generalisability of the results. It was notable that no significant interactions between relative age and the years when the surveys were conducted were found. However, there are some limitations that need to be considered when interpreting the findings. First, the questionnaires did not include any definition of bullying. Second, no information was obtained on cyberbullying, which has become more prominent in recent years. Third, the survey did not include more specific information on the types of bullying, such as whether it was physical, verbal or relational. Fourth, the survey did not include sibling bullying, which has recently been shown to be common.<sup>30</sup> Fifth, we had no information on those who did not participate in the study and an attrition analysis could thus not be performed. However, the attrition rates of the different survey years were low and these ranged from 3% to 14%.

## 7 | CONCLUSIONS

The findings of the present study suggest that relative age is a risk factor for bullying victimisation among the relatively youngest children and for perpetration among the relatively oldest children within the school year. These novel findings have implications for efforts to prevent bullying and its detrimental long-term effects. It is important to increase awareness among teachers, school health personnel, and parents on these findings and to allocate adequate resources to both bullying prevention at schools and school health services. In many countries, school enrolment is rigid and based on the child's date of birth. The possible associations between the relative age effects in bullying victimisation and other fields in which relative age effects have previously been found, such as ADHD and learning, may have implications for school enrolment policies. Most of the existing research has examined the association between relative age and one specific outcome, such as the use of ADHD medication. Future research should examine the cumulative effect of relative age on multiple factors.

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## CONFLICT OF INTEREST

The authors do not have any potential conflict of interests to declare.

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