

# Trends in the Perpetration of Physical Aggression among Norwegian Adolescents 2007–2015

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**Abstract** Most research on trends in physical aggression has shown declining levels among adolescents during the past two decades. However, few studies have attempted to explain such time trends. Based on two representative cross-sectional surveys of students in the final year of high school in 2007 ( $N = 6631$ ; 58.8% girls) and 2015 ( $N = 4145$ ; 60.3% girls), this study reports a substantial decline in physical aggression among Norwegian adolescents. Moreover, mediation analyses show that declining levels in problematic alcohol use and family violence during the same period are plausible explanations for some of this reduction. The results are discussed in light of contemporary changes in socialization of adolescents, and implications for violence prevention are presented.

**Keywords** Aggression · Violence · Perpetration · Time trends

## Introduction

Late adolescence and early adulthood are the periods of life when people are most likely to perpetrate physical aggression (Loeber and Farrington 2014). Perpetration of aggressive acts in adolescence can have long-lasting negative impacts that affect later life. For example, perpetrators have a greater risk

of dropping out of college compared with other youth (Jennings et al. 2011), and they more often participate in later violent and nonviolent crimes (Gilman et al. 2014). Furthermore, problem behavior in general, which includes physical aggression, is related to future economic difficulties, drug problems, and poor mental and physical health (Odgers et al. 2008). Acts of aggression can also injure other people, as well as increase the risk of future problems for the victims, including internalizing problems (Reijntjes et al. 2010), externalizing problems (Reijntjes et al. 2011), involvement in crime and deviance (Macmillan 2001), and problems adjusting to school and work settings (Macmillan 2001).

Given the adverse consequences of adolescent aggression for both perpetrators and victims, it is important to investigate time trends in the perpetration of aggressive acts and factors that may influence such trends. However, even though some studies have examined time trends in physical fighting (e.g., Kann et al. 2016; Pickett et al. 2013), research on time trends in broader measures of physical aggression is sparse. An increased understanding of explanatory factors of trends in aggression may improve the tailoring of measures to prevent or reduce such acts among adolescents. This article investigates whether the prevalence of physical aggression perpetrated among Norwegian adolescents changed in the period from 2007 to 2015, and examines whether trends in potential risks and protective factors of physical aggression may explain such changes. Furthermore, gender differences in the types of aggressive acts and the victims of aggression are explored.

## Time Trends in Physical Aggression

The most comprehensive data on time trends in physical aggression comes from the cross-national Health Behaviour in School-Aged Children (HBSC) study among 11–15-year-

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olds in 30 countries in Europe and North America. The analyses showed decreases in the incidence of physical fighting across three surveys conducted in 2002, 2006, and 2010 in 19 of the 30 participating countries, whereas stable levels were found in eight countries, and only three countries showed increases (Pickett et al. 2013). Declining trends were also found in a US study showing that the proportion of high school students involved in physical fights decreased from 42.5 to 22.6% from 1991 to 2015 (Kann et al. 2016). Only two self-report studies measured time trends using other measures of aggression than involvement in physical fights. Among US children and adolescents aged 6–17 years, Finkelhor et al. (2014) found a 46% reduction from 2003 to 2011 in the proportion of those who had hit, slapped, or pushed other children. Furthermore, a Swedish study showed a decline from 1995 to 2005 in the proportion of 15-year-olds reporting having hit someone in the previous 12 months, from 11.8 to 8.8% among boys and 3.8 to 2.5% among girls (Svensson and Ring 2007). As such, studies in general show reductions in the level of physical aggression perpetrated among adolescents during the last two decades. However, rather narrow measures of aggressive acts were used in most studies, providing limited information about time trends in different aspects of physical aggression or the victims of such behavior. The present study provides data about this issue in a Norwegian context.

### **Risk and Protective Factors for the Perpetration of Physical Aggression**

When time trends in the perpetration of aggression have been identified, the next step is to examine how such trends may be explained by changes in the prevalence of factors that are supposed to increase the risk of aggression or protect against it. Empirical studies have identified several factors that may influence the perpetration of physical aggression and violence (for a review of risk factors, see Farrington et al. 2017; for a review of protective factors, see Lösel and Farrington 2012). First, aspects related to the adolescents' socio-demographic backgrounds have been considered important risk factors for the perpetration of aggressive acts. For example, violence among adolescents is more prevalent in urban areas with poor living conditions (Derzon 2010), and adolescents from low socioeconomic strata are more likely than other adolescents to have attitudinal dispositions toward aggressive acts as justifiable means for attaining status and goods (Markowitz 2003). Second, personality traits facilitating social competence and mastery have been identified as important for understanding why some individuals choose aggression in situations where other actions might have been possible (Harvey et al. 2001). Third, mental health problems have repeatedly been shown to be related to aggressive behavior (Dutton and Karakanta 2013). This association is

probably attributable to the higher prevalence of mood instability and lack of impulse control among people with mental health problems, which in turn may lead to a greater risk of aggressive acts (Dutton and Karakanta 2013). Fourth, substance use and particularly alcohol use have been shown to be risk factors for physical aggression (Tomlinson et al. 2016). The effects of alcohol intoxication, such as disinhibition and impaired judgment in situations where physical aggression is possible, may cause the frequency of alcohol intoxication to be related to such acts (Tomlinson et al. 2016). Fifth, social relationships with parents and peers are important in relation to physical aggression. Proper parental monitoring is found to be a protective factor against aggressive behavior, most likely because parents may influence their offspring's behavior to a greater degree when they know where their children are and what they are doing (Derzon 2010). Furthermore, empirical studies have shown that being a victim of parental violence is related to the victim's own future aggressive behavior (Braga et al. 2017). Research on the importance of peers in understanding the perpetration of physical aggression is somewhat mixed, with some studies showing that social interaction with deviant peers is related to increased levels of aggression (Hoeben et al. 2016), whereas other studies emphasize that social isolation from peers in general is a protective factor (Demuth 2004). Finally, being in a romantic relationship has been identified as a risk factor for the perpetration of aggressive acts (Capaldi et al. 2012). Overall, previous studies have identified sociodemographic background, personality characteristics, mental health, substance use, and social relationships as risk factors or protective factors in relation to the perpetration of physical aggression. Hence, time trends in one or several of these factors may explain changes in the prevalence of physical aggression.

### **Explaining Time Trends in the Perpetration of Physical Aggression**

No empirical study offering statistical explanations of time trends in physical aggression has so far been conducted. Thus, we know little about how changes in factors such as sociodemographic background, personality factors, mental health, substance use, and social relationships are related to time trends in the perpetration of physical aggression. However, several studies have identified relevant time trends in various explanatory factors. Concerning socio-demographic background, studies have identified a substantial increase in the proportion of adolescents not living with both biological parents in recent decades (von Soest and Wichstrøm 2014). Studies exploring time trends in personality factors are scarce, although von Soest and Wichstrøm (2014) identified a stable trend in adolescents' feelings of self-worth from 1992 to 2010. Concerning

mental health problems, several European studies have shown increasing prevalence of internalizing problems among adolescents in the past two decades, especially among girls (Collishaw 2015). Furthermore, studies have shown a marked decrease in alcohol use among adolescents during the same period (Pedersen and von Soest 2015). Finally, some studies have examined time trends in indicators of adolescent social relationships. Collishaw et al. (2012) found an improvement in the quality of parenting from 1986 to 2006, especially regarding parental expectations of youth disclosure and monitoring of adolescents' leisure time activities. Moreover, long-term studies have shown substantial decreases in the incidence of physical abuse of children by parents since the 1960s (Gilbert et al. 2012), although evidence indicates that the level of abuse has stabilized in recent years (Finkelhor et al. 2014). To sum up, potential declines in the perpetration of physical aggression may be related to declines in alcohol use and a positive trend in parenting, whereas other potential risk and protective factors show time trends that are not in accordance with time trends in aggression (such as mental health) or information on time trends is limited.

### Gender Differences in the Perpetration of Physical Aggression

Research tends to classify physical aggression as a typically male domain. However, gender differences in aggression are most prominent in the number of arrests for violent crimes and physical fights, while observed differences are smaller for less serious forms of aggressive behavior (Baxendale et al. 2012). Girls' aggression is more frequently considered to be relational, aiming at dealing with peer or intimate relationships. In contrast, boys' aggression is more frequently classified as instrumental, where gaining power or influence is of importance (Herrman and Silverstein 2012). Moreover, research has shown substantial gender difference concerning victims of aggressive acts, where girls more often than boys behave aggressively against dating partners (Swahn et al. 2008) and fight with family members (Franke et al. 2002), whereas boys more often use violence against peers (Swahn et al. 2008). To account for this gendered dimension of physical aggression, we examine time trends for boys and girls separately, and distinguish between different acts of physical aggression, as the preponderance of male perpetrators may be stronger in some forms of aggressive behavior than others.

### The Current Study

This article analyzes data from two repeated cross-sectional studies conducted in 2007 and 2015 among students in the

final year of senior high school in Norway. The aim of the study is (1) to investigate whether there have been changes in the prevalence of the perpetration of physical aggression among Norwegian adolescents between 2007 and 2015, and, if so, (2) to examine whether such changes can be explained by changes in potential risk and protective factors during the same period. Furthermore, we explore gender differences in the perpetration of different acts of physical aggression and the victims of such acts. Based on previous research, we expect to find a reduction in physical aggression among Norwegian adolescents. Moreover, we expect this reduction to be at least partially explained by concurrent changes in potential risk and protective factors, especially by a decline in alcohol use. Finally, we hypothesize that measuring different aggressive acts will uncover gendered dimensions of physical aggression, where some acts will be more prevalent among boys while other will be more prevalent among girls.

## Methods

### Procedure and Participants

Data from two repeated cross-sectional surveys ("UngVold") conducted among students in the last year of senior high school in Norway were used (Mossige and Stefansen 2016). The first survey was conducted in 2007 at 67 schools. To obtain a nationally representative sample, Statistics Norway included every school in the country in a pool from which participant schools were selected. The sample was stratified according to geographical region and each school's sampling probability was proportional to the number of students enrolled in the school, thereby ensuring that the probability of selection was equal for all students in Norway. In 2015, all schools that participated in 2007 were invited to participate in the second survey. Five schools had either closed down or been merged with other schools. Of the remaining 62 schools, 41 agreed to participate. Because the sizes of high schools in Norway had substantially increased from 2007 to 2015, only eight additional schools were invited to participate as replacements to obtain the desired sample size, resulting in a total sample of 49 schools. The replacement schools were selected from the same strata of schools that had either closed down or refused to participate. The surveys were administered over two consecutive school hours, with a teacher present in the room. The schools were instructed to conduct the survey as they would have conducted an examination, to prevent answers to the highly sensitive questions being visible to other students in the class. In 2007, paper and pencil questionnaires were used, whereas the 2015 study was conducted online.

All students at the sample schools were invited to participate in the survey. In 2007, 7033 students participated (response rate 77.3%). In 2015, 4530 students participated (response rate 66.2%). The analyses in this study were restricted to participants 18–20 years of age with a valid answer to the questions about physical aggression and gender. The final sample consisted of 6631 participants in 2007 and 4145 participants in 2015. The analyses showed that the perpetration of physical aggression was not significantly correlated with response rates at the participating schools (2007:  $r = -.01$ ,  $p = .50$ ; 2015:  $r = .02$ ,  $p = .18$ ). The samples did not differ significantly in the proportion of girls (2007: 58.8%; 2015: 60.3%;  $\chi^2 = 2.18$ ,  $p = .14$ ), the proportion of students from immigrant backgrounds (2007: 7.9%; 2015: 8.2%;  $\chi^2 = 0.18$ ,  $p = .69$ ), or the proportion of students with two parents not working (2007: 6.2%; 2015: 6.9%;  $\chi^2 = 1.83$ ,  $p = .18$ ). The 2015 participants were slightly older than those in 2007 (2007:  $M = 18.30$ ; 2015:  $M = 18.37$ ;  $t = -6.35$ ,  $p < .001$ ), and the proportion of students with at least one parent with higher education increased slightly (2007: 63.9%; 2015: 65.9%;  $\chi^2 = 4.28$ ,  $p = .04$ ).

## Measures

### Physical aggression

Physical aggression was measured by the perpetration of three different aggressive acts during the last 12 months (“clawed or pulled the hair on someone,” “slapped someone,” “hit or kicked someone”), with response options *no*, *yes*, and an open field for number of occasions in 2007, and fixed response options *no*, *yes*, *once*, and *yes, more than once* in 2015. All three items were dichotomized into no instances of the measured aggressive act vs. at least one instance of the measured act during the last 12 months. Moreover, for some analyses, all three items were combined into an instrument measuring the perpetration of at least one of the aggressive acts vs. no acts of aggression during the last 12 months. Those who answered in the affirmative to at least one of the three questions were asked to provide information about the victim(s) of the aggressive act, with response options “acquainted adolescent,” “unknown adolescent,” “girlfriend/boyfriend,” “sibling,” “parent,” and “other adult.”

### Sociodemographic background

Two questions on sociodemographic background were included in the analyses: having two parents currently not working and not living with both biological parents.

### Personality factors

Personality factors were measured by three subscales from the Resilience Scale for Adolescents (READ; Hjemdal et al. 2006): “Personal Competence” (five items;  $\alpha = .71$ ), “Social Competence” (four items;  $\alpha = .77$ ), and “Structured Style” (three items;  $\alpha = .70$ ). The subscales measure individual dispositional attributes of resilience in difficult life situations. More specifically, Personal Competence measures an individual’s level of self-esteem, self-efficacy, and a realistic orientation to life (e.g., “I know how to reach my goals,” “I feel competent,” and “when things go badly I have a tendency to find something good that can come out of it”). Social Competence measures attributes related to extraversion, social adeptness, good communication skills, and flexibility in social matters (e.g., “I easily find new friends,” “I always find something fun to talk about,” and “I always find something comforting to say to others when they are sad”). Structured Style measures preference for planning and structure in daily life (e.g., “I always make a plan before I start something new” and “I am good at organizing my time”) (Hjemdal et al. 2006). The students were asked to evaluate their feelings about themselves and people around them during the past month, and response options ranged from 1 (*totally agree*) to 5 (*totally disagree*). Previous research from both Norway (von Soest et al. 2010) and Ireland (Kelly et al. 2017) has shown that the instrument has acceptable internal consistency and satisfactory convergent validity as it is correlated with expected social and life outcomes.

### Mental health problems

Mental health problems were measured by an eight-item version of the Hopkins Symptom Checklist (HSCL; Derogatis et al. 1974), with responses to items concerning mental health problems in the previous week on a scale ranging from 1 (*not at all distressed*) to 4 (*very much distressed*). The students were asked about how often they had been “bothered or troubled” by the following states: “suddenly scared for no reason,” “feeling fearful,” “nervousness or shakiness inside,” “feeling too tired to do things,” “feeling blue,” “feeling hopeless about the future,” “feeling tense or keyed up,” and “worrying too much about things.” Internal consistency was high ( $\alpha = .89$ ), and previous studies have shown that shorter versions of the HSCL perform almost as well as the full version (Strand et al. 2003).

### Substance use

Alcohol intoxication was measured by a question on frequency of intoxication in the previous 12 months, with response options of *never* (0), *1–4 times* (1), *5–10 times* (2),

1–2 times a month (3), 1–2 times a week (4), and several times a week (5). Alcohol-related problems were measured by a five-item instrument assessing the frequency of negative consequences of drinking in the previous 12 months (quarreling, short-term memory loss, inhibition of physical function, property destruction, and vomiting), with response options *never* (0), *once* (1), *2–4 times* (3), *5–10 times* (7.5), and *more than 10 times* (10) (total range: 0–50). The use of illicit drugs in the previous 12 months was measured by three items: use of cannabis, use of other illicit drugs, and use of intoxicating prescription drugs. The instrument was dichotomized into use of at least one of the included substances vs. no use.

### Social relationships

Social resources were measured by one more subscale from READ, “Social Resources” (five items;  $\alpha = .81$ ), developed for measuring perceived availability of social support from friends and relatives (e.g., “my friends always stick together,” “I have some close friends/family members that really care about me,” and “I always have someone that can help me when I need it”). The students were asked to evaluate their feelings the last month, with response options from 1 (*totally agree*) to 5 (*totally disagree*). The parent–child relationship was measured by two subscales of a short version of the Parental Bonding Instrument (Parker et al. 1979). The students were asked to evaluate how they perceived their parents while growing up. The “Overprotection” subscale (six items,  $\alpha = .74$ ) measured parental control and overprotection vs. encouragement of independence, including items such as “they liked me to make my own decisions,” “they tried to control everything I did,” and “they tended to baby me.” The “Care” subscale (five items,  $\alpha = .77$ ) measured parental care and involvement vs. indifference and rejection (e.g., “they appeared to understand my problems and worries,” “they were affectionate to me,” and “they did not help me as much as I needed”). The response options ranged from 1 (*corresponds very well*) to 4 (*corresponds very poorly*). Previous research has identified satisfactory psychometric properties (Klimidis et al. 1992a) and convergent validity (Klimidis et al. 1992b) of short forms of the Parental Bonding Instrument. A single item measured whether an adult family member had ever hit the respondent. Finally, peer relationships were measured by two dichotomous items: whether the respondents had ever had a girlfriend/boyfriend and whether they had any close friends.

### Statistical Analyses

To identify evidence of time trends in physical aggression, the extent to which the prevalence of aggressive acts and

victims of such acts differed between 2007 to 2015 were analyzed by means of logistic regression analyses. Next, analyses were performed to identify potential explanatory factors of time trends in aggressive behavior. To serve as a factor that can account for time trends, explanatory variables need to fulfill three criteria: (1) evidence of time trends corresponding to those trends identified for aggression, (2) a correlation with aggression, and (3) a reduction in time trends in aggression when adjusting for the explanatory variable (von Soest and Wichstrøm 2014). A series of logistic and linear regression analyses were therefore performed to examine time trends in potential risk and protective factors. Second, all potential explanatory factors were correlated with physical aggression. Third, potential explanatory variables were entered one by one in multiple logistic regression analyses together with a dummy variable for survey year to predict physical aggression. These analyses provided the possibility to examine whether the inclusion of potential explanatory variables reduced the time trend in physical aggression. Moreover, we conducted mediation analyses to test whether the association between survey year and physical aggression was statistically significantly reduced when entering potential explanatory variables in the regression model. More specifically, mediation effects were estimated by the product of coefficients approach in a path analytic framework (Hayes 2009). As recommended in the literature (Hayes 2009), we estimated bias corrected standard errors of the mediation effects by means of bootstrapping based on 5000 bootstrap samples.

Additional analyses were conducted to examine whether associations between potential explanatory variables and physical aggression were moderated by survey year. Such moderator effects would indicate that the strength of the association changed from 2007 to 2015, and would open for the possibility that changes in aggression from 2007 and 2015 could be a result of changes in the association between risk or protective factors and aggression, and not change in the level of such potential factors. For this purpose, logistic regression analyses were conducted where survey year, potential explanatory variables, and the interaction term of those variables were included as predictors of physical aggression. Similarly, interaction analyses were conducted to examine whether the associations between survey year and potential explanatory factors for physical aggression were moderated by gender. Such moderation effects would indicate a need to conduct separate analyses for boys and girls.

Collinearity analyses were conducted, providing variance inflation factors ranging from 1.01 to 1.49. The statistical program Mplus 8 was used for all analyses. Full information maximum likelihood estimation procedures were used, thereby providing contemporary missing data routines that are considered to be adequate (Schafer and Graham 2002).



**Table 1** Frequency of self-reported physical aggression and victims of aggression in 2007 and 2015 for boys and girls

	Boys					Girls				
	2007		2015		Difference test <i>p</i>	2007		2015		Difference test <i>p</i>
	%	<i>n</i>	%	<i>n</i>		%	<i>n</i>	%	<i>n</i>	
<b>Perpetration of physical aggression</b>										
Scratched or pulled the hair on someone	4.2	113	1.8	30	<.001	10.7	413	3.6	89	<.001
Slapped someone	11.1	300	6.5	107	<.001	16.5	636	9.6	240	<.001
Hit or kicked someone	17.4	469	9.9	163	<.001	10.0	385	5.1	128	<.001
Any physical aggression	22.6	618	12.8	211	<.001	23.8	929	12.4	309	<.001
<b>Victim</b>										
Adolescent acquaintance	54.6	337	56.9	120	.569	43.6	402	49.5	153	.073
Unknown adolescent	47.3	292	40.3	85	.079	16.3	150	8.7	27	.002
Girlfriend/boyfriend	1.6	10	2.8	6	.556	28.7	265	28.5	88	.946
Sibling	16.1	99	14.2	30	.529	31.9	294	20.1	62	<.001
Parent	2.3	14	0.9	2	.823	4.1	38	4.2	13	.956
Other adult	4.2	26	4.7	10	.771	1.6	15	2.3	7	.628
Total	615–617		211			919–924		309		

Note. Respondents were able to select more than one form of physical aggression and more than one type of victim

All analyses were additionally conducted using listwise deletion, yielding similar results.

**Results**

The prevalence of perpetrated physical aggression significantly declined between 2007 and 2015, for all aggressive acts and for both boys and girls (see Table 1). Among boys, the prevalence of scratching or pulling the hair on someone declined from 4.2 to 1.8% between the two surveys, slapping from 11.1 to 6.5%, and hitting or kicking from 17.4 to 9.9%. The total prevalence of physical aggression, as assessed by having exercised at least one of the three forms of aggression, declined from 22.6 to 12.8%. Similar trends were observed among girls, with a decline of scratching or pulling the hair on someone from 10.7 to 3.6%, slapping from 16.5 to 9.6%, and hitting or kicking from 10.0 to 5.1%. The total prevalence of physical aggression among girls declined from 23.8 to 12.4%. Logistic regression analyses showed no significant interactions between gender and survey year (scratched or pulled the hair on someone:  $p = .18$ ; slapped someone:  $p = .80$ ; hit or kicked someone:  $p = .63$ ; any physical aggression:  $p = .35$ ), thereby indicating no significant differences in time trends in aggression between boys and girls.

Table 1 further shows that among boys, the most common victims of adolescent physical aggression at both time

points were adolescent acquaintances, with 54.6% of the perpetrators reporting such victims in 2007 and 56.9% in 2015. More than 40% of the male perpetrators at both time points reported aggression against unknown adolescents, while 15% reported use of physical aggression against siblings. Few boys reported aggression against girlfriends/boyfriends, parents, or other adults. The boys showed no significant changes in the composition of victims of aggression between 2007 and 2015. Among female perpetrators, the most commonly reported victims were adolescent acquaintances, with 43.6% of victimization in 2007 and 49.5% in 2015. Unlike boys, the second most common type of victim among girls were girlfriends/boyfriends and siblings; 20 to 32% of perpetrators reported such victims. The proportion of girls who reported using physical aggression against siblings decreased significantly between 2007 and 2015. Aggressive acts against unknown adolescents were uncommon among girls, with a victimization rate of 16.3% in 2007 and a significant decline to 8.7% in 2015. Few girls reported use of physical aggression against parents and other adults.

The first step in identifying potential explanatory factors for the observed time trends in aggression was to examine whether any of the factors showed trends in accordance with physical aggression. Table 2 shows analyses of time trends in potential risk and protective factors for aggressive acts. The proportion of boys not living with both biological parents increased significantly between 2007 and 2015.

**Table 2** Changes in potential risk and protective factors for physical aggression 2007–2015 for boys and girls

	Boys			Girls		
	<i>M (SD) or %</i>		Difference test	<i>M (SD) or %</i>		Difference test
	2007 ( <i>n</i> = 2730)	2015 ( <i>n</i> = 1647)	<i>p</i>	2007 ( <i>n</i> = 3901)	2015 ( <i>n</i> = 2498)	<i>p</i>
Both parents not working (%)	5.2	6.2	.193	6.9	7.3	.495
Not living with both biological parents (%)	26.3	29.9	.013	28.8	30.6	.130
READ personal competence (1–5)	3.79 (0.72)	3.87 (0.78)	.002	3.49 (0.75)	3.49 (0.80)	.963
READ social competence (1–5)	4.06 (0.74)	4.01 (0.83)	.065	4.00 (0.72)	3.90 (0.77)	<.001
READ structured style (1–5)	3.43 (0.86)	3.58 (0.89)	<.001	3.54 (0.82)	3.54 (0.88)	.745
Mental health problems (1–4)	1.46 (0.51)	1.52 (0.57)	<.001	1.81 (0.64)	2.01 (0.74)	<.001
Alcohol intoxication (1–6)	3.30 (1.23)	2.91 (1.26)	<.001	3.27 (1.19)	2.81 (1.21)	<.001
Number of alcohol-related problems (0–50)	5.73 (7.48)	4.44 (5.94)	<.001	5.29 (6.36)	3.95 (5.00)	<.001
Use of illicit drugs (%)	14.3	18.7	<.001	10.5	10.8	.760
READ social resources (1–5)	4.45 (0.61)	4.37 (0.71)	.001	4.51 (0.59)	4.39 (0.69)	<.001
Parenting style–care (0–3)	2.35 (0.50)	2.38 (0.52)	.055	2.42 (0.53)	2.43 (0.55)	.763
Parenting style–overprotection (0–3)	0.94 (0.53)	0.92 (0.53)	.196	0.93 (0.54)	0.87 (0.53)	<.001
Family violence (%)	13.3	8.5	<.001	20.0	9.6	<.001
Ever had a girlfriend/boyfriend (%)	75.8	67.0	<.001	80.7	65.7	<.001
No close friends (%)	2.3	4.2	.001	1.4	3.5	<.001

Furthermore, boys reported a small but significant increase in the personality factors of Personal Competence and Structured Style, as well as in mental health problems. The incidence of alcohol intoxication and alcohol-related problems decreased significantly, while the use of illicit drugs increased. The boys reported a small but significant decrease in Social Resources, while changes in parenting styles were not significant. Finally, a significantly lower proportion of the boys had been victims of violence from a family member, fewer had ever had a girlfriend/boyfriend, and fewer boys had any close friends. The girls showed no change in sociodemographic factors between 2007 and 2015. A small decline in Social Competence was the only significant change in personality factors. As among boys, the incidence of mental health problems among girls increased. Moreover, a similar decline in problematic alcohol use was observed, but the use of illicit drugs did not increase among the girls. Concerning social relationships, girls reported a significant decline in Social Resources, having overprotective parents, and ever having had a girlfriend/boyfriend, while more girls reported not having any close friends. In summary, alcohol intoxication, frequency of alcohol-related problems, family violence, having had a girlfriend/boyfriend, and having no close friends showed time trends consistent with the perpetration of physical aggression for both genders, while Personal Competence and Structured Style were particularly relevant for boys, and overprotective parenting for girls.

The second step in identifying explanatory factors for time trends in aggression was examining associations between such factors and aggression. For this purpose, we first examined by means of interaction analyses whether the relationship between potential explanatory variables and aggression differed across survey year. The logistic regression analyses showed only one significant interaction effect among all 15 potential explanatory factors ( $p < .05$ ), a result that may be due to chance because of multiple testing. The analyses thus indicated similar associations between potential risk and protective factors and physical aggression in 2007 and 2015. Therefore, correlations between explanatory factors and aggression were estimated for the combined data from 2007 and 2015 (see Table 3). In general, the correlations between the different aggressive acts and potential explanatory factors were quite similar, which in combination with the similarity in time trends for the different acts justifies using a combined instrument of the three items in the analyses explaining time trends in aggression. Use of alcohol or illicit drugs and being the victim of violence from a family member correlated strongest with physical aggression ( $r = .11-.34$ ), and most correlations had what is considered to be small to medium effect sizes (Cohen 1988). Interaction analyses by means of logistic regression analyses showed significant gender differences in the associations of Personal Competence, Social Competence, alcohol intoxication, use of illicit drugs, and Social Resources with aggression ( $p < .05$ ), thereby warranting

**Table 3** Correlation matrix between all study variables. Boys above the diagonal, girls below the diagonal

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1. Any physical aggression	–																			
2. Scratched or pulled the hair on someone	.60**	–																		
3. Slapped someone	.82**	.37**	–																	
4. Hit or kicked someone	.61**	.41**	.40**	–																
5. Both parents not working	.02	.02	.02	.02	–															
6. Not living with both biological parents	.06**	.02	.06**	.04**	.07**	–														
7. READ personal competence	–.09**	–.06**	–.08**	–.07**	–.02	–.06**	–													
8. READ social competence	–.04**	–.01	–.02	–.04**	–.02	–.03*	.61**	–												
9. READ structured style	–.09**	–.06**	–.09**	–.07**	–.01	–.05**	.64**	.40**	–											
10. Mental health problems	.10**	.07**	.10**	.09**	.05**	.08**	–.49**	–.28**	–.30**	–										
11. Alcohol intoxication	.15**	.09**	.16**	.09**	–.07**	.06**	–.08**	–.11**	–.12**	.04**	–									
12. Alcohol-related problems	.25**	.18**	.25**	.18**	–.02	.07**	–.12**	.02	–.15**	.15**	.55**	–								
13. Use of illicit drugs	.11**	.07**	.11**	.09**	.03*	.09**	–.12**	–.05**	–.16**	.17**	.24**	.28**	–							
14. READ social resources	–.07**	–.03*	–.07**	–.05**	–.05**	–.09**	.54**	.57**	.40**	–.39**	.04**	–.05**	–.12**	–						
15. Parental bonding–care	–.10**	–.06**	–.10**	–.07**	–.07**	–.14**	.31**	.28**	.20**	–.34**	–.01	–.10**	–.14**	.52**	–					
16. Parental bonding–overprotection	.10**	.06**	.10**	.08**	.07**	.01	–.17**	–.11**	–.10**	.22**	–.01	.08**	–.06**	–.25**	–.43**	–				
17. Family violence	.15**	.12**	.12**	.13**	.06**	.10**	–.12**	–.09**	–.09**	.19**	.00	.09**	.12**	–.22**	–.33**	.24**	–			
18. Ever had a girlfriend/boyfriend	.09**	.05**	.11**	.05**	.01	.05**	.04**	.10**	.03*	.03*	.19**	.16**	.08**	.04**	–.02	.07**	.03	–		
19. No close friends	–.01	–.01	.00	–.01	.04**	.01	–.11**	–.14**	–.06**	.13**	–.08**	–.01	.01	–.25**	–.11**	.08**	.06**	.06**	–	

\* $p < .05$ , \*\* $p < .01$

further analyses to be conducted separately for boys and girls. Not living with both biological parents, Personal Competence, Social Resources, and not having any close friends were uncorrelated with physical aggression among boys, while having two parents not working and not having any close friends were uncorrelated with aggression among girls. Therefore, these factors cannot explain the observed decline in the perpetration of physical aggression.

Finally, logistic regression analyses were conducted to examine the role of potential risk and protective factors for time trends in physical aggression (see Table 4). According to the analyses showing similar time trends and correlations for the individual aggressive acts, further analyses were conducted on the combined instrument measuring the perpetration of any acts of physical aggression. Separate logistic regression analyses were also conducted for each of the individual aggressive acts, yielding similar results (analyses not shown). In a first model, survey year was included as the sole predictor of physical aggression (Table 4, Baseline Model). In accordance with the figures from Table 1, the odds ratio (OR) of 0.50 for boys indicated that the odds of reporting perpetration of physical aggression was reduced by 50% in 2015 compared with 2007. In Model 1, potential risk and protective factors were included one by one in addition to survey year to predict aggressive acts among boys. The results presented in Table 4 show that all the included factors except Personal Competence were significantly related to the perpetration of physical aggression. Moreover, mediation analyses showed that Structured Style, frequency of alcohol intoxication, number of alcohol-related problems, family violence, and having had a girlfriend/boyfriend were significant mediators of the association between survey year and aggression, indicating that the inclusion of these factors reduced the difference in physical aggression between 2007 and 2015. The inclusion of mental health problems and use of illicit drugs resulted in a decreased OR for survey year, while the rest of the included factors had minor influence. In Model 2, all the factors that were significantly related to the perpetration of physical aggression and had similar developmental trends were included simultaneously, resulting in a change in the OR for survey year from 0.50 to 0.61. The change indicated a weaker, but still significant, relationship between aggressive behavior and time, given the inclusion of the potential risk and protective factors. Among the factors included in the multivariate analysis, all factors except Structured Style remained significantly related to the perpetration of physical aggression and significantly contributed to mediating the relationship between survey year and aggression. The total mediating effect of all included factors was  $b = -0.24$  ( $p < .001$ , 95% CI [–0.30, –0.18]).

The regression analyses among girls showed similar results to those of boys (see Table 5). The OR for survey



**Table 4** Results from logistic regression analyses with the perpetration of physical aggression as dependent variable and year of survey and potential risk and protective factors as predictors (boys)

	Relationship of potential explanatory variable with aggression		Indirect effect <sup>a</sup>		Change in aggression from 2007 to 2015 <sup>b</sup>	
	OR	95% CI	b	95% CI	OR	95% CI
Baseline model						
Without predictors					0.50***	[0.42, 0.59]
Model 1 (separate analyses for each predictor)						
Both parents not working	1.41*	[1.01, 1.85]	0.00	[0.00, 0.01]	0.50***	[0.42, 0.59]
Not living with both biological parents	1.20*	[1.01, 1.42]	0.01	[0.00, 0.02]	0.50***	[0.42, 0.59]
READ personal competence (1–5)	0.92	[0.83, 1.03]	−0.01	[−0.02, 0.00]	0.51***	[0.42, 0.60]
READ social competence (1–5)	1.13*	[1.01, 1.26]	−0.01	[−0.02, 0.00]	0.50***	[0.42, 0.59]
READ structured style (1–5)	0.85***	[0.78, 0.93]	−0.02**	[−0.04, −0.01]	0.51***	[0.43, 0.61]
Mental health problems (1–4)	1.52***	[1.33, 1.72]	0.03**	[0.01, 0.05]	0.49***	[0.41, 0.57]
Alcohol intoxication (1–6)	1.61***	[1.49, 1.74]	−0.19***	[−0.24, −0.14]	0.58***	[0.48, 0.69]
Number of alcohol-related problems (0–50)	1.11***	[1.09, 1.12]	−0.13***	[−0.18, −0.09]	0.56***	[0.47, 0.67]
Use of illicit drugs	3.45***	[2.87, 4.14]	0.05***	[0.03, 0.09]	0.45***	[0.38, 0.54]
READ social resources (1–5)	0.89*	[0.79, 0.99]	0.01	[0.00, 0.02]	0.50***	[0.42, 0.59]
Parenting style–care (0–3)	0.65***	[0.56, 0.75]	−0.01	[−0.03, 0.00]	0.51***	[0.42, 0.60]
Parenting style–overprotection (0–3)	1.34***	[1.15, 1.54]	−0.01	[−0.02, 0.00]	0.50***	[0.42, 0.59]
Family violence	2.31***	[1.87, 2.85]	−0.04***	[−0.06, −0.03]	0.52***	[0.44, 0.62]
Ever had a girlfriend/boyfriend	1.69***	[1.39, 2.04]	−0.05***	[−0.07, −0.03]	0.52***	[0.44, 0.62]
No close friends	1.65*	[1.07, 2.44]	0.01	[0.00, 0.02]	0.50***	[0.42, 0.59]
Model 2 (all variables with trends in accordance to physical aggression included simultaneously)						
Structured style (1–5)	0.91	[0.82–1.00]	−0.01	[−0.03, 0.00]		
Alcohol intoxication (0–6)	1.17**	[1.07–1.28]	−0.05**	[−0.09, −0.02]		
Number of alcohol-related problems (0–50)	1.09***	[1.07–1.11]	−0.11***	[−0.15, −0.08]		
Family violence	2.32***	[1.84–2.89]	−0.04***	[−0.06, −0.02]		
Ever had a girlfriend/boyfriend	1.25*	[1.03–1.55]	−0.02*	[−0.04, 0.00]	0.61***	[0.51, 0.73]

OR odds ratio, b unstandardized indirect effect, 95% CI 95% confidence interval

<sup>a</sup> Indirect effect (mediation effect) of the association between survey year and aggression via potential explanatory variables. Indirect effects provide as such information about whether included explanatory variables statistically reduce the estimate of change in aggression from 2007 to 2015

<sup>b</sup> The change in aggression from 2007 to 2015 is estimated by the OR of the association between survey year and aggression

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

year in the Baseline Model was 0.45. In Model 1, all factors except having two parents not working and having no close friends were significantly related to the perpetration of physical aggression. Including alcohol use, overprotective parenting, family violence, and having had a girlfriend/boyfriend in the analyses resulted in significant mediation effects on the OR for survey year, while the inclusion of Structured Style, mental health problems, and Social Resources resulted in a decrease in the OR. The remaining factors had minor influence on the OR for survey year. In Model 2, frequency of alcohol intoxication, number of alcohol-related problems, family violence, overprotective parenting style, and having had a girlfriend/boyfriend were included. The OR for survey year changed from 0.45 to

0.57, and mediation analyses showed a significant change in the relationship between survey year and the perpetration of physical aggression. However, the relationship was still significant. Of the variables included in the multivariate analyses, alcohol-related problems, overprotective parenting, family violence, and having had a boyfriend/girlfriend were related to higher levels of physical aggression, and all the variables significantly mediated the relationship between survey year and aggression. The total mediating effect of the included factors in the model was  $b = -0.25$  ( $p < .001$ , 95% CI [−0.30, −0.20]). Alcohol intoxication was significantly related to physical aggression, but did not function as a significant mediator of the association between survey year and aggression in the multiple model.

**Table 5** Logistic regression analyses with the perpetration of physical aggression as dependent variable and year of survey and potential risk and protective factors as independent variables (girls)

	Relationship of potential explanatory variable with aggression		Indirect effect <sup>a</sup>		Change in aggression from 2007 to 2015 <sup>b</sup>	
	OR	95% CI	b	95% CI	OR	95% CI
Baseline model						
Without predictors					0.45***	[0.39, 0.52]
Model 1 (separate analyses for each predictor)						
Both parents not working	1.22	[0.96, 1.54]	0.00	[0.00, 0.01]	0.45***	[0.39, 0.52]
Not living with both biological parents	1.42***	[1.24, 1.63]	0.01	[0.00, 0.02]	0.45***	[0.39, 0.51]
READ personal competence (1–5)	0.74***	[0.68, 0.80]	0.00	[−0.01, 0.01]	0.45***	[0.39, 0.51]
READ social competence (1–5)	0.85***	[0.78, 0.93]	0.02**	[0.01, 0.03]	0.44***	[0.39, 0.51]
READ structured style (1–5)	0.75***	[0.69, 0.80]	0.00	[−0.01, 0.02]	0.45***	[0.39, 0.51]
Mental health problems (1–4)	1.60***	[1.46, 1.75]	0.10***	[0.07, 0.12]	0.40***	[0.35, 0.46]
Alcohol intoxication (1–6)	1.34***	[1.27, 1.42]	−0.14***	[−0.17, −0.11]	0.51***	[0.44, 0.59]
Number of alcohol-related problems (0–50)	1.09***	[1.08, 1.10]	−0.12***	[−0.14, −0.09]	0.50***	[0.43, 0.58]
Use of illicit drugs	2.16***	[1.81, 2.59]	0.00	[−0.01, 0.01]	0.45***	[0.39, 0.51]
READ social resources (1–5)	0.73***	[0.66, 0.80]	0.04***	[0.02, 0.05]	0.43***	[0.37, 0.50]
Parenting style–care (0–3)	0.64***	[0.57, 0.71]	0.00	[−0.01, 0.01]	0.45***	[0.39, 0.52]
Parenting style–overprotection (0–3)	1.55***	[1.38, 1.74]	−0.02***	[−0.04, −0.01]	0.46***	[0.40, 0.53]
Family violence	2.21***	[1.88, 2.56]	−0.08***	[−0.11, −0.06]	0.49***	[0.43, 0.56]
Ever had a girlfriend/boyfriend	1.60***	[1.35, 1.88]	−0.07***	[−0.10, −0.05]	0.48***	[0.42, 0.56]
No close friends	1.02	[0.63, 1.56]	0.00	[−0.01, 0.01]	0.45***	[0.39, 0.52]
Model 2 (all variables with trends in accordance to physical aggression included simultaneously)						
Alcohol intoxication (0–6)	1.07	[0.99–1.15]	−0.03	[−0.06, 0.00]		
Number of alcohol-related problems (0–50)	1.08***	[1.06–1.09]	−0.10***	[−0.13, −0.08]		
Parenting style–overprotection (0–3)	1.30***	[1.14–1.47]	−0.01**	[−0.03, −0.01]		
Family violence	1.92***	[1.62–2.27]	−0.07***	[−0.09, −0.05]		
Ever had a girlfriend/boyfriend	1.32**	[1.11–1.56]	−0.04**	[−0.07, −0.02]	0.57***	[0.49, 0.66]

OR odds ratio, b unstandardized indirect effect, 95% CI 95% confidence interval

<sup>a</sup> Indirect effect (mediation effect) of the association between survey year and aggression via potential explanatory variables. Indirect effects provide as such information about whether included explanatory variables statistically reduce the estimate of change in aggression from 2007 to 2015

<sup>b</sup> The change in aggression from 2007 to 2015 is estimated by the OR of the association between survey year and aggression

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001

## Discussion

Although previous research has identified declining levels of physical aggression among adolescents in many parts of the world (Pickett et al. 2013), empirical studies examining potential explanations for such time trends are scarce. This study contributes to filling this knowledge gap by investigating the importance of concurrent time trends in potential risk and protective factors for understanding trends in aggressive behavior. The results in this article showed a considerable decline in the perpetration of physical aggression among Norwegian adolescents from 2007 to 2015. The most common victims of adolescent aggressive acts for both genders were adolescent acquaintances. Boys further

reported frequent use of aggression against unknown adolescents, whereas girls more frequently reported aggressive acts against romantic partners and siblings. The most prominent explanatory factors for the decline in aggression were an observed decline in the frequency of alcohol intoxication and the number of alcohol-related problems, particularly among boys. Furthermore, declines in reported family violence and the proportion of participants ever having had a girlfriend/boyfriend were related to a reduction in physical aggression. Factors related to sociodemographic background, personality characteristics, and mental health problems did not contribute to explaining the time trends in the perpetration of physical aggression; nor did the use of illicit drugs or most factors related to social relationships.

The observed developmental trend in physical aggression is consistent with a US study by Finkelhor et al. (2014), who reported a 46% decline in hitting, slapping, or pushing other children among 6–17-year-olds from 2003 to 2011, with a 26% decline in just three years from 2008 to 2011. However, other studies measuring physical fighting found less extensive declines in this type of aggressive behavior in both US samples (Kann et al. 2016) and cross-national studies (Pickett et al. 2013). Thus, the results indicate a considerable reduction in a broad range of aggressive behaviors such as clawing, pulling hair, slapping, hitting, kicking, and pushing, whereas the reduction may be more moderate in some specific forms of aggression, such as physical fighting. The present study indicates that examining a variety of forms of aggressive acts is important to obtain detailed information about time trends in aggression among adolescents.

The nature of the assessment of physical aggression may also be important with regard to gender differences. As in studies of physical fighting (Pickett et al. 2013), the present study found a substantially higher prevalence of hitting and kicking among boys than among girls. However, clawing, pulling hair, and slapping were more frequently reported by girls than boys in both 2007 and 2015. The results accord with the notion of a gendered pattern of aggressive behavior, where more serious physical aggression is a typically male domain, whereas girls are socialized into learning that such actions are unfeminine and inappropriate for girls (Baxendale et al. 2012). Instead, girls may participate in other forms of aggressive behavior, such as relational and indirect aggression (Herrman and Silverstein 2012), as well as in physical aggression that fits into a stereotypical female gender role, such as clawing and pulling hair. The higher proportion of aggressive acts from girls directed against romantic partners and siblings may also indicate that girls' express relational aggression to a greater degree than boys. Thus, physical aggression may not only be a male phenomenon, but the nature, severity, and choice of victim may differ between boys and girls.

The most prominent explanatory factor for the decline in physical aggression was problematic alcohol use, measured by the frequency of alcohol intoxication and number of alcohol-related problems experienced during the previous year. The substantial decline in alcohol use in this study is consistent with trends observed in previous reports from both Norway (Pedersen and von Soest 2015) and Denmark (Andersen et al. 2014), especially those concerning problematic use of alcohol (Pedersen and von Soest 2015). Given the well-established relationship between alcohol use and aggression (Tomlinson et al. 2016), it is not surprising that problematic alcohol use stands out as an important explanation for declining levels of physical aggression among adolescents. First, a decline in the frequency of

alcoholic intoxication may lead to fewer situations in which adolescents show aggressive behavior because of the negative effects of alcohol on inhibition and decision-making. Second, adolescents typically consume alcohol in crowded places among unknown and intoxicated peers, which may increase the risk of aggression. Nonetheless, this study is the first to provide statistical indications for the role of alcohol use in explaining time trends in the perpetration of physical aggression.

Another explanatory factor was experiences with violence in the family. In contrast to research showing rather stable levels of physical abuse from parents in the past two decades (Gilbert et al. 2012), the present study showed a substantial decline in the proportion of adolescents reporting being hit by a family member. Nevertheless, previous studies have shown a relationship between exposure to abuse at a young age and adolescents' own aggressive behavior (Braga et al. 2017), which is typically explained by social learning of aggression as being an appropriate action in various situations (Braga et al. 2017). As with alcohol use, the observed decline in the incidence of being hit by a family member, which is an established risk factor for a person's own aggressive behavior, may be a viable explanation for some of the reduction in physical aggression.

Finally, a decline in the proportion of adolescents reporting having ever had a girlfriend/boyfriend explained some of the reduction in the perpetration of physical aggression. Likewise, a reduction in the proportion of girls with overprotective parents explained some of the reduction in aggressive acts, but the effects were small. The results indicate that social and relational factors may be important for explaining time trends in physical aggression, particularly among girls.

Several of the variables did not contribute to explaining the time trends in physical aggression. Mental health problems and use of illicit drugs showed opposite time trends as the perpetration of physical aggression. Furthermore, including mental health problems in the analyses significantly strengthened the relationship between physical aggression and survey year for both genders, as did use of illicit drugs among boys. This finding indicates that the included factors, instead of providing a statistical explanation for the relationship between aggression and time, actually suppressed time trends in aggression. The results thus indicate that levels of physical aggression could have been even lower if mental health problems (and illicit drug use among boys) had not increased from 2007 to 2015. Thus, even though mental health problems and use of illicit drugs did not explain the time trends in aggressive behavior in this study, reductions in mental health problems and illicit drug use among adolescents may still be related to reductions in the perpetration of aggressive acts. The

analyses showed few or no significant changes in socio-demographic factors, personality factors, and most measures of social relationships among Norwegian adolescents, making the measures included in this study unsuitable explanations of changes in physical aggression.

The explanatory factors in this study only partially explain the observed relationship between the perpetration of physical aggression and survey year, indicating that other unobserved factors are important for explaining changes in aggression over time. It has been supposed that declining levels of problem behaviors among adolescents may be caused by adolescents now spending less time outdoors or in the company of other adolescents than previously (Finkelhor et al. 2014), but no empirical research has yet examined this potential explanation. New technology and social media have provided the adolescents of today with new ways of communicating and making arrangements, so that adolescents simply do not “hang out” to the same degree as they used to do. This new form of interaction among adolescents may reduce the number of encounters where many forms of problem behavior are likely to occur, for example, situations where adolescents meet and grow bored outside of adult control (Hoeben et al. 2016). Examining changes in communication and interaction patterns between adolescents, and how such changes influence the prevalence of aggression and other forms of problem behavior, are an important future research focus.

Using data from large-scale, nationally representative samples of Norwegian adolescents at two time points with identical recruitment procedures is a major strength, but the study also has limitations. First, the causal direction of the relationship between the perpetration of aggression and the potential risk or protective factors could not be definitely established because of the cross-sectional nature of the surveys at both time points. The issue of reverse causal directions may be of particular importance for potential risk factors such as harsh parenting, where aggressive behavior among adolescents may influence parental behavior toward offspring. A second limitation is that the present study is based on data from only two time points. More time points would allow more detailed descriptions of time trends. A third limitation is the lower response rate in 2015 compared with 2007. Even though analyses of the response rates at the participating schools showed no significant relationship between physical aggression and response rates, it is possible that the observed decline in aggressive acts is partly a result of selection bias because of the diminishing response rates. Fourth, the change from paper to online questionnaires may also have an implication for the results, even though previous studies have shown that switching from paper to online questionnaires does not affect data content or data quality (Denscombe 2006). Fifth, using a sample of students in the last year of high school may influence the

estimated level of physical aggression. It is likely that the incidence of problem behavior is lower in the participating samples than in the general adolescent population, because of the selection of adolescents who attend the final year of high school in Norway. Finally, a limitation is the possibility that adolescents may have changed their view and conception of aggressive acts and that aggression may be conceived as more socially undesirable in 2015 than 2007. This may lead to an increased rate of underreporting of aggressive acts.

## Conclusions

The present study is the first to examine how time trends in physical aggression among adolescents may be statistically explained by concurrent trends in a variety of potential risk and protective factors. Moreover, the study provides new knowledge about gender differences in aggressive behavior. The study showed an about 50% reduction in the self-reported perpetration of physical aggression among Norwegian adolescents in just eight years. Further, boys more frequently reported using physical aggression against acquaintances or unknown adolescents, while girls more frequently reported aggression towards adolescent acquaintances, romantic partners, or siblings. Most important, the study provides new knowledge for understanding time trends in physical aggression among adolescents. The findings indicate that reducing the level of alcohol use among adolescents may be important for reducing the general level of physical aggression in this age group. The analyses also show that the level of exposure to violence in the family is related to a decline in adolescents' own aggressive behavior. Nonetheless, other unidentified causes contributed to some of the reduction in the perpetration of physical aggression, warranting further research on the topic of time trends in aggressive behavior. Of special interest is the influence of contemporary changes in adolescents' communication and social lives on the prevalence of both aggressive behavior and other forms of problem behavior.

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**Data Sharing Declaration** The data that support the findings of this study are available from Norwegian Social Research (NOVA) but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available.



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### Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no competing interests.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All ethical aspects of the study were approved by the Regional Committees for Medical and Health Research Ethics and the Norwegian Centre for Research Data.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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