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Longitudinal Examination of Physical and Relational Aggression as Precursors to Later Problem Behaviors in Adolescents

Todd I. Herrenkohl,

Social Development Research Group, School of Social Work, University of Washington

Richard F. Catalano,

Social Development Research Group, School of Social Work, University of Washington

Sheryl A. Hemphill, and

Centre for Adolescent Health, Murdoch Childrens Research Institute, Department of Paediatrics, The University of Melbourne and School of Psychology, Deakin University

John W. Toumbourou

Centre for Adolescent Health, Murdoch Childrens Research Institute and School of Psychology, Deakin University Geelong, Victoria, Australia

Abstract

Research has addressed the consequences of being a victim of physical and relational aggression, but less so the consequences of being an aggressor during adolescence. Consequently, relatively little is known about the extent to which aggression in early adolescence increases the risk of later aggression and other psychosocial problems. This study involves a representative sample of 7th- and 9th-grade students from Washington State ($N = 1,942$). Students were surveyed upon recruitment, and then again 1 and 2 years later, to learn about ongoing behavior problems, substance use, depression, and self-harm behaviors. Surveys also included measures of several hypothesized promotive factors: attachment to family, school commitment, and academic achievement. Findings suggest that being physically and/or relationally aggressive in Grades 7–9 increases the risk of aggression and possibly other problem behaviors after accounting for age, gender, race, and a prior measures of each outcome. Independent promotive effects were observed in most analyses, although family attachment appeared a less robust predictor overall. Implications for prevention include reducing aggression and enhancing promotive influences to lessen the risk of ongoing problems.

Keywords

physical aggression; relational aggression; adolescence

INTRODUCTION

Physical aggression (violence) among adolescents has received considerable attention from researchers, who have examined the developmental precursors of the behavior as well as some potential consequences (Farrington, 1989; Hawkins et al., 1998; Herrenkohl, Maguin et al., 2000; Loeber & Stouthamer-Loeber, 1998). Loeber (1996) has argued that there is a general tendency for physical violence to worsen over time, with behaviors like minor aggression giving way to more serious behaviors, including assault, rape, and robbery in those who initiate

early. Broidy et al. (2003), as well as others (see Herrenkohl, Maguin et al., 2000; Tolan & Gorman-Smith, 1998; Tremblay & LeMarquand, 2001; Tremblay et al., 2004), have shown that, among boys, early physical aggression predicts an elevated risk of physical violence in adolescence, as well as nonviolent forms of delinquency.

Relational aggression – also called “indirect bullying” or “social aggression” – is a related, but less understood behavior among school-age children and adolescents (Crick, Ostrov, & Werner, 2006).¹ Existing evidence suggests that relational aggression, like physical aggression and violence, can result in emotional harm to victims. Outcomes include a range of psychosocial problems (Crick, Casas, & Nelson, 2002; Crick & Grotpeter, 1995; van der Wal, de Wit, & Hirasing, 2003). For example, in one study of primary school students (ages 9–13) conducted in Amsterdam, the Netherlands, van der Wal et al. (2003) found a significantly higher risk of later depression and suicidality for those youth who had been “indirectly” bullied by their peers (e.g., ignored, kept from interacting with others, and gossiped about by others). Further, in their nationally representative survey of U.S. youth, Nansel and colleagues (2001) found that youth who were bullied by others (which included being repeatedly teased or told “nasty or unpleasant” things) experienced worse psychosocial functioning, including lower social and emotional adjustment; poorer relationships with peers; and more loneliness. Other studies find similar effects (Crick & Grotpeter, 1995). An added concern among some researchers who study relational aggression is the potential for retaliatory violence and other outward manifestations of the emotional pain experienced by those who have been victimized (Leary, Kowalski, Smith, & Phillips, 2003).

Tactics used by relationally aggressive youth include excluding peers from one’s group activities, withdrawing affection, and threatening to tell lies or rumors about another child to cause him or her emotional harm. Relational aggression and physical aggression both appear motivated by an aggressor’s need for dominance and control (Pellegrini & Long, 2002).

In addition to documenting how aggression affects those who are victimized, it is important to establish impacts on the aggressor (bully/perpetrator) (Marini, Dane, Bosacki, & YLC-CURA, 2006; Nansel et al., 2001; van der Wal et al., 2003). There has been some research on the topic. One finding is that aggressive children face an increased risk of peer rejection and maladaptive relationships with others whose behaviors resemble their own (Crick et al., 2006). Associating with other aggressive youth can promote further use of aggression and an increased risk of other antisocial behaviors, as well as substance use and, potentially, mental health disorders (Catalano & Hawkins, 1996).

Werner and Crick (2004) examined the roles of peer rejection and peer affiliation in their study of elementary school children (second to fourth grades). Their analyses showed an increase in girls’ relational aggression associated with their having experienced peer rejection and peers’ use of relational aggression. For boys and girls both, peer rejection and friends’ use of physical aggression increased their own physical aggression. Laird et al (2001) found that peer rejection in middle childhood (ages 6–9), more than youths’ involvement with antisocial peers in early adolescence, predicted an increase in later externalizing behaviors (age 14) after accounting for stability in externalizing behaviors from ages 5–13. Ongoing and repeated acts of rejection by one’s peers appeared to most increase the likelihood of ongoing problems for youth.

Several other studies also document the adverse effects of aggression on later functioning. For example, van der Wal et al.’s (2003) cross-sectional study in the Netherlands showed that

¹Bullying, which can include physical, verbal, and relational forms of aggression is a chronic behavior in which there is an imbalance of power between the aggressor and victim. Here, we differentiate between relational and physical forms of aggression because we are interested in knowing whether these behaviors carry different consequences for youth. Others, too, have examined these as separable behaviors, although they are commonly analyzed together as indicators of general bullying.

physically and/or relationally aggressive youth were at higher risk for depression, suicidal ideation, and subsequent delinquent behavior. Crick and colleagues (2006) found that relational and physical aggression (especially the combination of the two) among third-grade boys and girls increased their risk of concurrent and future (1 year later) social-psychological adjustment problems, including internalizing (e.g., anxiety/depression) and externalizing (e.g., aggression, delinquency) behaviors. In another study (Murray-Close, Ostrov, & Crick, 2007), results showed a positive association between childhood (Grade 4) relational aggression and internalizing symptoms of the Teacher Child Behavior Checklist (Achenbach, 1991). Although not examined in these studies, an increased likelihood of alcohol and other drug use also is possible (especially for older youth), given the overlap in risk factors for substance use and the previously investigated outcomes (Hawkins, Catalano, & Miller, 1992; Herrenkohl, McMorris, Catalano, Hemphill, & Toumbourou, 2007).

Research to establish the developmental consequences of relational and physical aggression requires longitudinal data, which provide the means to establish a temporal ordering among variables. However, few studies to date are prospective by design (Nansel et al., 2001). Also needed are representative studies of adolescents to extend the findings of research already conducted on children in elementary school (Murray-Close et al., 2007; Werner & Crick, 2004). These are aims of the current study.

In addition to our longitudinal analyses of aggression outcomes, we conduct exploratory analyses of three variables hypothesized to protect youth from ongoing aggression and other problems: youths' attachment to family, school commitment, and academic achievement (Catalano & Hawkins, 1996; Institute of Medicine, 1994). According to the social development model (Catalano, Oxford, Harachi, Abbott, & Haggerty, 1999), youths' attachment (bonding) to family and school should lessen the potential for problem behaviors among youth by increasing their motivation to act in ways that are consistent with the rules and expectations of those within these prosocial settings, parents and teachers primarily. Academic achievement is another indicator of school success that reinforces prosocial behavior and lessens antisocial behavior within and outside the school context.

Variables for this part of the analysis were examined as interactions with aggression and "main effect" variables to understand their role as predictors of later outcomes. For consistency with the language used by other scholars, we reserve the term "protective factor" to describe variable-by-risk interactions and "promotive factor" to describe variables analyzed as main effect predictors (Stouthamer-Loeber, Wei, Loeber, & Masten, 2004). Protective and promotive factors are thought to have "positive" (inverse) relations with negative outcomes, indicating a lessening in risk associated with more of that variable (Catalano et al., 1999; Resnick, 2000; Resnick et al., 1997).

In sum, goals of this study are: (a) to investigate developmental consequences of physical and relational aggression among adolescents, including the continuation of aggression and link to substances, depression, and self-harm (i.e., suicide attempts); and (b) to examine hypothesized promotive factors as predictors and possible targets for prevention efforts focused on reducing the consequences of aggression in youth. We expected a pattern of worse outcomes for physically and relationally aggressive youth compared to nonaggressive youth. We also expected a reduction in risk for continued aggression and other outcomes associated with family attachment, school commitment, and academic achievement.

METHODS

Procedure

The data were collected as part of the International Youth Development Study (IYDS) initiated in 2002 (McMorris, Hemphill, Toumbourou, Catalano, & Patton, 2007). The larger study includes statewide representative samples of approximately 1,000 students at each of three grades 5, 7, and 9 in each of two states: Washington State, United States (U.S.) and the state of Victoria in Australia. Analyses in the current study use data from U.S. students originally sampled in seventh and ninth grade only to limit cross-national differences that could compete with study findings on within-individual changes in behavior (Beyers, Evans-Whipp, Mathers, Toumbourou, & Catalano, 2005). Comparative analyses of the U.S. and Australian data are being planned. Data from the youngest U.S. cohort (Grade 5) were not included because of the low prevalence overall of antisocial behavior in that age group. Youth participants in the analysis sample were assessed a second time, 1 year after the initial survey, as 8th- and 10th-grade students. Ninety-nine percent of those originally surveyed were included in this follow-up assessment. Students of the original seventh-grade cohort only were assessed a third time, 1 year after the second assessment. For this third wave of the study, 951 of the 961 youth participants were surveyed.

Active parental consent was required of all participating students. Standard data collection protocols were approved by the human subjects review board at the University of Washington. Protocol for the student survey consisted of a self-report instrument, adapted and extended from the Communities that Care (CTC) Youth Survey, which has shown good reliability and validity in large samples (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Glaser, Van Horn, Arthur, Hawkins, & Catalano, 2003). The instrument included instructions on how to answer the questions and assurances of confidentiality that were reviewed prior to survey administration by trained study staff. Surveys were first administered in classrooms during a 45- to 60-minute period in the winter and spring of 2002. Students absent from school on the day the survey was scheduled completed self-administered surveys later, under the supervision of school personnel (3%), or, in a small percentage of cases (1.8%), completed the survey by telephone.

Participants

The IYDS sample was recruited using a 2-stage cluster design. Schools were selected in the first stage and a class within each school was selected in the second stage. Within each grade, public and private schools were chosen using a probability proportional to size (PPS) sampling procedure; 60 single classes per grade level were chosen at random from within each selected grade. Permission to recruit participants was first sought from Washington State school districts containing the selected classes. To reach the goal of recruiting 1,000 students in 50 classes at each grade level, replacement classes were added to the recruitment pool. When districts or schools refused to participate, another randomly selected school was approached. In sum, 155 classes in 153 schools agreed to participate in the study, which represents a 42% participation rate for eligible classes selected in Washington and a 73% participation rate of students for schools with district approval. Seventh- and ninth-grade classes make up 101 of the 155 classes in the IYDS school sample.

Data in the initial assessment were collected from 961 seventh-grade students and 981 ninth-grade students, yielding a total sample of 1,942, 78% of those from participating school classrooms. Students who comprise the seventh-grade sample averaged 13.1 years of age at the time of assessment. Ninth-grade students averaged 15.1 years of age. The combined sample contains 975 (50.2%) females. Youth participants identified themselves as White (1,278, 66.5%); as Hispanic or Latino (262, 13.6%), as African American (75, 3.9%), as Native

American/Alaskan Native (103, 5.4%), as Asian/Native Hawaiian/Pacific Islander (155, 8.1%), and as “other” (49, 2.5%). Compared with Washington State enrollment figures, the IYDS sample slightly overrepresents non-White races, in particular Native American and Hispanic students in seventh grade. The sample underrepresents private school students in seventh grade; private school students are, however, slightly overrepresented in the ninth grade (Washington State Office of the Superintendent for Public Instruction, 2006).

Measures

Analyses focused on short-term (1-year) outcomes of youth-reported physical and relational aggression in the combined seventh- and ninth-grade samples, and 2-year outcomes for the seventh-grade cohort alone. *Physical aggression* was operationalized as having (in the past year) “attacked someone with the idea of seriously hurting them,” “beat up someone so badly that they needed to see a doctor or nurse,” or having “threatened someone with a weapon” ($\alpha = .62$). *Relational aggression* includes having “gotten back at another student by not letting them be in your group of friends” or having “told lies or started rumors about other students to make other kids not like them” ($r = .57$). These indicators of physical and relational aggression are comparable to those used in other studies (Bauer et al., 2006; Crick & Grotpeter, 1995; Nansel et al., 2001; van der Wal et al., 2003). Items were recoded from past-year frequencies to dichotomous indicators and then summed to form a variety measure of each behavior (Farrington & Loeber, 2000).

In the analysis, a positive response for any one indicator resulted in a youth being categorized as having been violent, relationally aggressive, or both in a given year. Coding of the Grades 7–9 (Year 1) data resulted in four mutually exclusive groups: (1) nonaggressive youth ($n = 1,519$, 78.7%); (2) physically aggressive youth ($n = 115$, 6.0%); (3) relationally aggressive youth (230, 11.9%); and (4) youth who were both physically and relationally aggressive ($n = 65$, 3.4%). The percentage of youth in the relational aggression category is similar to that of other studies in which the behavior has been studied as a form of peer bullying (Nansel et al., 2001), although one might expect a higher percentage of youth in the physical aggression category (Eaton et al., 2006). For example, results of the 2005 Youth Risk Behavior Survey (YRBS) indicated that 35.9% of high school students had been in a physical fight. However, the fact that the measure here includes more severe forms of assault--and that youth violence has been shown elsewhere to peak in prevalence later in adolescence-- may explain why the percentage of physically aggressive youth is lower in this sample (Herrenkohl, Maguin et al., 2000).

Recent binge drinking was measured with responses to the following question: “Think back over the last two weeks. How many times have you had five or more drinks in a row?” Responses were recoded from: 1 = none; 2 = once; 3 = twice; 4 = 3 to 5 times; 5 = 6 to 9 times; and 6 = 10 or more times to no use (0) versus some use (1). The sample mean prior to recoding was 1.26 ($SD = .76$). *Past-year tobacco use* also was assessed with a single question on frequency of use: “Have you smoked cigarettes in the past year?” (1 = never; 2 = once or twice; 3 = once in a while but not regularly; 4 = regularly, but less than everyday; 5 = almost every day or every day). The variable was again recoded to reflect no use (0) versus some use (1). The sample mean on this variable before recoding was 1.42 ($SD = .95$). *Past-year marijuana use* was measured by the question: “In the past year (12 months), on how many occasions (if any) have you used marijuana (pot, weed, grass)?” Responses were recoded from: 1 = never; 2 = 1 or 2 times; 3 = 3 to 5 times; 4 = 6 to 19 times; 5 = 20 to 29 times; 6 = 30 to 39 times; 7 = 40+ times to no use (0) versus some use (1). The sample mean on this variable originally was 1.60 ($SD = 1.52$). *Recent depressive symptoms* was assessed by asking respondents about 13 symptoms of depression (e.g., “I felt miserable or unhappy”; “I didn’t enjoy anything at all”) (Angold et al., 1995). Responses (1 = not true; 2 = sometimes true; 3 = true) applied to

the last 30 days and averaged ($\alpha = .91$). Here, scores on the variable below one standard deviation above the mean were coded 0. Those at 1 SD or above were coded 1. The sample mean on the original variable was 1.55 (SD = .47). Finally, *past-year self-harm* (coded 0 = no; 1 = yes) was measured with the question: “In the past year, have you ever deliberately hurt yourself or done anything that you knew might have harmed you or even killed you?” Approximately 7% of the sample responded affirmatively.

Measures of later outcomes (Grades 8 - 10 for the combined sample and Grade 9 for the original seventh-grade cohort), including subsequent aggression, are from self-reports of adolescents. The data were examined as both continuous and dichotomous (binary categorical) variables, although findings reported are for the binary variables only. We chose to use the categorical variables because scores in most cases did not conform to a normal distribution. An added advantage of using binary variables is that a consistent logistic regression format could be used in all analyses and odds ratios could be tallied to establish the strength of association between predictors and outcomes.² Common outcome measures at the two time points subsequent to the initial (Grade 7–9) assessment were positively correlated and highly significant ($p < .001$): (binge drinking, $r = .33$; tobacco use, $r = .58$; marijuana use, $r = .44$; depression, $r = .38$). Correlations among all other outcome variables were moderately positively correlated and highly significant (range for Year 2: $r = .12$ to $r = .51$; for Year 3: $r = .14$ to $r = .51$; and for Year 2 to Year 3: $r = .09$ to $r = .42$).

Putative protective/promotive factors include family attachment, school commitment, and academic achievement, all measured in the second assessment to capture proximal influences on youths' behavior. *Family attachment* averaged responses (1 = NO!; 2 = no; 3 = yes; 4 = YES!) to the following four questions: “Do you feel very close to your mother?”; “Do you share your thoughts and feelings with your mother?”; “Do you feel very close to your father?”; “Do you share your thoughts and feelings with your father?” The scale alpha for the family attachment scale is .73. *School commitment* combines responses to seven items with different response options. Examples include: “How often do you feel that schoolwork you are assigned is meaningful and important?” and “How interesting are most of your school subjects to you?” All variables were coded to reflect more favorable perceptions of a youth's schooling, standardized, and then averaged ($\alpha = .79$). *Academic achievement* combines responses to two questions about a youth's academic grades: “Putting them all together, what were your grades like last year?” (scores were reversed so that 1 = very poor; 2 = poor; 3 = average; 4 = good; 5 = very good) and “Are your school grades better than the grades of most students in your class?” (reversed scored so that 1 = NO!; 2 = no; 3 = yes; 4 = YES!). Items were standardized and then averaged ($r = .58$). Correlations among the promotive factors were moderate ($r = .22$ to $.38$, $p < .05$).

Analysis

Logistic regression models were used to examine the relation between Year 1 (Grades 7–9) group status (physically aggressive, relationally aggressive, physically and relationally aggressive) and subsequent problem behaviors, controlling for youth demographics (gender and race) and measures of the problem behavior at the first assessment (models of later physical and relational aggression did not contain additional control variables apart from the group status indicators); zero-order associations of group indicators of physical and relational aggression

²It is important to note that analyses were done on the originally coded outcome variables and very similar results were achieved; results of analyses with dichotomous outcomes are reported because they were considered more appropriate to the scoring format and distribution of scores on the variables. Odds ratios derived from logistic regression are useful for understanding the strength of association between predictors and outcome and are easily understood in the context of predictive modeling. Although some information may be lost when the data are transformed, research suggests the loss of information due to rescaling of the data does not appreciably affect the substantive finds that emerge (Farrington & Loeber, 2000).

in the initial and subsequent assessments also are shown in a descriptive cross-tabulation of results. Variables of attachment to family, school commitment, and academic achievement were added to each model, initially as interactions with each aggression measure. However, the large majority of interaction tests were nonsignificant. In fact, tests of interactions showed that only 2 of 63 (9 tests per outcome, 7 outcomes total) possible interactions were significant ($p < .05$), which is within the range of significant values one would expect from chance alone; additionally, the change in r-square with the addition of any interaction set (i.e., main effect and separate interactions for each of the three aggression variables and promotive/protective variables) was in each case very small (approximately .02 or less). Models were thus rerun with interaction terms removed and promotive variables entered only as main effects. Results without interaction terms are shown in the tables that follow.

A final set of descriptive analyses examined the continuity in aggression from Year 1 to Year 2 in relation to Year 3 outcomes. These analyses were conducted to determine whether the data show a trend toward worse outcomes for consistently aggressive youth in comparison to those who were aggressive in 1 year only. Small group numbers, due the reduced sample size for Year 3 of the study, did not permit rigorous statistical comparisons of the groups in this final test.

RESULTS

Table 1 is a cross-tabulation of the initial and Year 2 measures of physical and relational aggression group status. Results show a relatively strong correspondence between behaviors across the 2-year period, as well as some changes over time in group status. The large majority of nonaggressive youth remained nonaggressive at first follow-up (84.2%). However, a small percentage of these nonaggressive youth became physically aggressive in Year 2 (4.1%); 10.3% of nonaggressive youth became relationally aggressive; and 1.3% of youth became both physically and relationally aggressive a year later. Those who were physically aggressive at the start were somewhat more divided among the other groups in Year 2, including 43.6% of youth who reported no subsequent aggression. Over half of the youth in the Year 1 physical aggression group either remained physically aggressive (40.0%) or transitioned to physical and relational aggression combined (12.7%). Relatively few adolescents who were physically aggressive in Year 1 changed to being only relationally aggressive the following year (3.6%). Of those who were relationally aggressive initially, half (50.4%) became nonaggressive and just over a third (34.4%) continued as relationally aggressive. Smaller percentages of the relationally aggressive youth moved to physical aggression only or combined with relational aggression (6.3% and 8.9%, respectively). Finally, of the youth who were both physically and relationally aggressive in Year 1, 31.1% later became nonaggressive; 27.9% transitioned to relational aggression alone; 21.3% continued with both behaviors; and 19.7% were only physically aggressive 1 year later. These differences in group status over the 1-year period are statistically significant overall ($\chi^2(9) = 488.82, p < .001$).

Findings in Table 2 correspond to tests of initial group status in Year 1 and later physical and relational aggression in Year 2. However, here, demographics and the three promotive variables of family attachment, school commitment, and academic achievement were added to the analysis. Year 1 aggression was modeled as a series of group comparisons: physical aggression versus no aggression; relationally aggression versus no aggression; and physical and relational aggression versus no aggression. Consistent with the results of Table 1, there is continuity in aggressive behavior over the 1-year time period. After accounting for all other variables in the model, physical aggression in Year 1 was a strong, significant predictor of physical aggression in Year 2 (OR: 15.26). Similarly, Year 1 relational aggression predicted Year 2 relational aggression (OR: 5.81). Year 1 physical aggression did not, however, predict Year 2 relational aggression; yet, Year 1 relational aggression did significantly predict later

physical aggression (OR: 3.17). The combination of physical and relational aggression in Year 1 predicted both outcomes of physical and relational aggression in Year 2 (ORs: 8.64 and 7.56, respectively). For relational aggression as an outcome, the combined behaviors in Year 1 were more strongly predictive than the behavior by itself.

Tests of the three promotive factors resulted in significant main effects for family attachment and relational aggression; for school commitment and physical aggression; and for academic achievement and physical aggression (academic achievement also appeared a significant predictor of relational aggression, although the association was in the opposite direction; the bivariate correlation of these variables was nonsignificant, suggesting this is an anomalous finding).

In all, findings of Tables 1 and 2 suggest that, while there is some evidence of behavior change from one type of aggression to the other, the more likely is a continuation of the same behavior, or a shift over time to nonaggression. While relational aggression may increase the risk of physical aggression, it appears less likely that physical aggression leads to relational aggression. Promotive effects differ according to the tested outcome and family attachment was the only significant predictor of relational aggression after accounting for all other variables.

In Table 3, results are given for the other Year 2 outcomes of recent binge drinking, past-year tobacco use, past-year marijuana use, past-year depression, and past-year self-harm. For the remaining analyses, a prior measure of the same outcome behavior was added to each model to account for chronic conditions that could confound the association between Year 1 aggression and later consequences.

Results of Table 3 suggest there is relatively little effect on Year 2 outcomes of Year 1 aggression. Relational aggression predicted Year 2 binge drinking, increasing the odds of that outcome by 1.73 times. And, physical aggression predicted Year 2 marijuana use (OR: 1.77). All other adjusted effects of Year 1 aggression were nonsignificant.

The promotive variables of family attachment, school commitment, and academic achievement were significant, but generally inconsistent across outcomes. Here, school commitment was the only significant promotive variable in all models. High academic achievement predicted Year 2 tobacco use, marijuana use, and depression after accounting for all other variables. Family attachment was only uniquely predictive of Year 2 depression.

Prior measures of each outcome (e.g., Year 1 binge drinking for Year 2 binge drinking) were in all models the strongest predictors overall, with odds ratios that ranged from 2.60 for binge drinking to 16.55 times for past-year tobacco use. Older age was a predictor of Year 2 binge drinking and past-year marijuana use. For depression and self-harm, younger age increased risk. And, female gender uniquely predicted the likelihood of past-year depression. Race was not consistently associated with the outcomes under study.

Extended Longitudinal Analysis

To examine the extent to which results extend to Year 3 outcomes, analyses were conducted again using a reduced sample (seventh-grade cohort) for which data were available in all 3 years. Variables were defined the same as in Year 2, although self-harm was not assessed and, therefore, not included. Results for binge drinking, tobacco use, marijuana use, and depression are shown in Table 4. Results for aggression in Year 3 are reported in the text below but not tabled.

Consistent with prior analyses, results for Year 3 outcomes show a continuity in each form of aggression over time. Yet, here the risk of continued aggression was highest for those in Year 1 in the combined group. The odds of physical aggression as an outcome in Year 3 were nearly 4 times greater for youth who were physically aggressive in Year 1 (OR: 3.88) than for nonaggressives. The odds of later physical aggression were even higher for those in the combined physical and relational aggression group (OR: 5.68). For relational aggression as an outcome, the risk was again highest for those in the combined group (OR: 4.53), although those who were only relationally aggressive in Year 1 also were at risk (OR: 2.82). However, those who were physically aggressive alone in Year 1 were not at significantly greater risk for relational aggression in Year 3 when compared to nonaggressives. As for the promotive effects for physical aggression as an outcome, only academic achievement was a significant predictor. In the analyses of Year 3 relational aggression, none of the three hypothesized promotive factors was significant.

For the remaining Year 3 outcomes, some interesting differences from Year 2 emerged (Table 4). For example, while it did not predict Year 2 binge drinking, the combination of physical and relational aggression in Year 1 predicted Year 3 binge drinking (OR: 2.86). Relational aggression also predicted Year 3 binge drinking in the analysis (OR: 2.71), as it had in Year 2. Family attachment and school commitment both predicted a lower risk of later binge drinking, whereas only school commitment had been significant for that outcome previously.

For Year 3 tobacco use, Year 1 relational aggression was significant (OR: 2.44), although it had not been significant for tobacco use in Year 2. School commitment and high academic achievement were both significantly related to the outcome, which is consistent with the prior Year 2 analysis.

For Year 3 marijuana use and depression, there were no unique effects of Year 1 aggression, although physical aggression was a predictor of marijuana use at Year 2. Promotive effects of family attachment and school commitment were significant for marijuana use; and, family attachment predicted depression.

Continuity in Aggression and Year 3 Outcomes

A final set of exploratory analyses compared Year 3 outcomes for those who were physically and/or relationally aggressive in Years 1 and 2. Although numbers are small due to the reduced sample in Year 3, results show a trend toward worse outcomes (binge drinking, tobacco use, and marijuana use) for youth who were aggressive in both years. For example, of the 13 youth who were physically aggressive in both Years 1 and 2, six (46%) reported recent binge drinking in Year 3 (compared to 28% and 23% of youth who were physically aggressive in Year 1 or Year 2 only); 9 of 13 (69%) reported past-year tobacco use (compared to 28% and 33% of those who were physically aggressive in Year 1 or Year 2 only); and 8 of 13 (62%) reported past-year marijuana use (compared to 44% and 43% of those who were physically aggressive in Year 1 or Year 2 only). A similar pattern was shown for those who were relationally aggressive, although overall percentages of relationally aggressive youth who used substances in Year 3 were smaller when compared to those who were physically aggressive. For example, 13 of 41 (32%) youth who were relationally aggressive in the 2 prior years reported Year 3 binge drinking. This compares to 23% (12 of 52) of relationally aggressive youth in Year 1 only and 8% (7 of 88) of relationally aggressive youth in Year 2 only. A general pattern of worse outcomes also was shown for youth who were both physically and relationally aggressive in both years.

For past-year depression in Year 3, there was no apparent increase in risk associated with the continuity of aggression in Years 1 and 2, although numbers are again very small and hard to

compare. An equal percentage of youth who were aggressive in one or both prior years were found to have been depressed in Year 3 (approximately 17%).

DISCUSSION

Results suggest that the perpetration of physical and relational aggression increases the risk of the same behavior measured 1 and 2 years later. There also appears to be some impact of aggression on risk of later substance use, including binge drinking, for which relational aggression emerged a unique predictor. The combination of physical aggression and relational aggression in Year 1 also predicted binge drinking, but only in Year 3. Physical aggression alone, while a notably strong predictor of later aggression, was linked only to Year 2 marijuana use after controlling for other variables. Results, thus, appear to suggest that relational aggression, while possibly less alarming to adults who hear or even witness youth engaged in these behaviors, may be a marker for later problems that are as or more harmful than the aggression itself.

Findings support those of earlier studies showing an effect of aggression on later psychosocial adjustment of youth (Crick et al., 2006; van der Wal et al., 2003), although less convincing of the impact of aggression on internalizing behaviors per se. In Crick et al.'s (2006) study of third-grade children, findings of univariate and multivariate tests showed effects of relational and physical aggression on later teacher-reported withdrawal and anxiety/depression. Several differences between the current study and the early study by Crick and colleagues may account for the inconsistency in these findings, namely the age of youth participants; data sources used to measure aggression and outcomes (e.g., peer-nomination versus youth reports); and method of analysis. However, these differing results raise the possibility that outcomes of aggression differ by age, which should be investigated further.

Crick and colleagues (2006) found a particularly strong effect on outcomes (externalizing and internalizing) of physical and relational aggression combined. Although regression results of Year 2 outcomes did not show this "comorbid" group to be at higher risk of outcomes other than aggression, initial group comparisons did show that fewer comorbid youth transitioned to being nonaggressive after 1 year. In fact, the large majority (69%) of youth with comorbid behavior in Year 1 were still engaging in some form of aggression in Year 2; whereas, up to half of youth in the physical or relational aggression categories transitioned to nonaggression. In addition, prediction of Year 3 aggression showed a much stronger risk of ongoing problems for the comorbid group. Thus, while the risk of outcomes other than aggression (i.e., substance use and depression/self-harm) for this group may be no higher, their risk of ongoing aggression generally appear greater.

Findings of this study show a strong promotive influence of family and school factors, although it is unclear the extent to which these factors actually buffer the effects of aggression as measured. Preliminary analyses examined the interactions of these variables and aggression type, although findings were largely nonsignificant and analyses were rerun without the interaction variables included. The fact that the interactions of these variables were not significant suggests that these family and school factors may lessen negative outcomes independent of aggression, or interact with aggression only when measured over a longer duration or analyzed with other promotive factors in an additive or cumulative fashion (Pollard, Hawkins, & Arthur, 1999). In either case, further analysis of these and related variables is needed to establish more fully how protection from aggression consequences does emerge.

While findings reported are for noninteractive effects of these promotive variables, there is evidence that the likelihood of certain outcomes is reduced, raising the prospect of prevention targets. Evidence appears to suggest that interventions could be used to reduce various

consequences of aggression, including those that seek to change teaching practices as a way to promote student engagement and positive work habits conducive to academic success (Hawkins et al., 1992; Herrenkohl, Hawkins, Chung, Hill, & Battin-Pearson, 2000). Formal and informal programs could be used to enhance students' problem-solving and communication skills; empathy for others impacted by aggression; and prosocial ways of relating to peers (Wasserman & Miller, 1998). However, it is unclear the extent to which previously tested interventions for physical aggression-- which have focused primarily on males-- will have similar effects on relational aggression in mixed groups or among girls apart from boys (Crick et al., 2006).

In conclusion, findings of this study are important given the shortage of information on the consequences of physical and relational aggression for youth in early and mid adolescence. Although distinct aggression groups were formed at one point in time, behavior shift occurred in Year 2 and many youth who were initially aggressive became nonaggressive at that later point. However, those who remained aggressive represent a strong minority. Outcomes, not limited to the behavior itself, may continue beyond the point aggression is initially measured. Intervening with youth who engage in relatively normative practices of social exclusion, teasing, and gossiping about others is warranted given the apparent risk associated with these and related behaviors.

Limitations of the study include a relatively short, 1-year study duration for the full sample, and 2 years for a smaller subgroup. However, the duration of this study is longer than most other studies on relational aggression and represents a step forward in assessing outcomes of aggression at longer intervals (Crick et al., 2006). Additionally, the representative, gender-balanced sample of the IYDS is a strength and an improvement over other studies on aggression and bullying that focus almost exclusively on boys. The study is limited by the small number of indicators used in measures of physical and relational aggression and the sole reliance on youth reports to assess predictors and outcomes (Werner & Crick, 2004). The analysis of distinct (mutually exclusive) subgroups of adolescents and the examination of promotive factors, although small in number and exploratory, make this study unique and valuable for prevention planning.

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TABLE 1

Cross-Tabulation of Group Status Variables

Group Status in Grades 7-9	Group Status in Grades 8-10					Total
	No aggression	Physical Aggression	Relational Aggression	Physical and Relational Aggression		
No aggression	N 1262 84.2 % of Initial Group	62 4.1	155 10.3	20 1.3		1499
Physical Aggression	N 48 43.6 % of Initial Group	44 40.0	4 3.6	14 12.7		110
Relational Aggression	N 113 50.4 % of Initial Group	14 6.3	77 34.4	20 8.9		224
Physical and Relational Aggression	N 19 31.1 % of Initial Group	12 19.7	17 27.9	13 21.3		61
Total	N 1442 76.1 %	132 7.0	253 13.4	67 3.5		1894 100.0

(χ^2 (9) = 488.82, $p < .001$)

TABLE 2

Prediction of Year 2 Physical and Relational Aggression--Full Sample

	Past-Year Physical Aggression		Past-Year Relational Aggression	
	B(SE)	OR	B(SE)	OR
Group Status				
Phys Aggression	2.73(.25) ***	15.26	.29(.31)	1.34
Relat Agg	1.15(.24) ***	3.17	1.76(.16) ***	5.81
Phys/Relat Agg	2.16(.32) ***	8.64	2.02(.30) ***	7.56
Age	-.05(.08)	.95	-.23(.07) ***	.80
Gender	-.51(.19) **	.60	.08(.14)	1.08
Race/Ethnicity				
Latino	.51(.25) *	1.67	-.12(.20)	.89
African Amer	.53(.40)	1.70	-.17(.37)	.84
Native Amer	-.14(.41)	.87	.16(.30)	1.17
Asian/Pac Isl	-.09(.38)	.91	-.29(.27)	.75
Other	.63(.50)	1.88	.32(.41)	1.37
Family Attach	-.25(.13)	.78	-.31(.10) **	.74
School Commit	-.62(.16) ***	.54	.09(.12)	1.09
Academ Achiev	-.28(.11) *	.75	.18(.09) *	1.20

Note: all are unstandardized coefficients;

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

Phys Aggression is "physical aggression"; Relat Agg is "relational aggression"; Phys/Relat Agg is "physical and relational aggression"; Race/Ethnicity categories are Latino, African American, Asian/Pacific Islander; Family Attach is "family attachment"; School Commit is "school commitment"; and Academ Achiev is "academic achievement".

TABLE 3
Prediction of Year 2 Outcomes From Year 1 Aggression--Full Sample

	Recent Binge Drinking		Past-Year Tobacco Use		Past-Year Marijuana Use		Past-Year Depression		Past-Year Self-Harm	
	B(SE)	OR	B(SE)	OR	B(SE)	OR	B(SE)	OR	B(SE)	OR
Group Status										
Phys Aggression	.19(.29)	1.20	.24(.26)	1.27	.57(.27)*	1.77	.31(.30)	1.37	.15(.40)	1.16
Relat Agg	.52(.21)*	1.73	.07(.21)	1.07	.08(.21)	1.08	.08(.22)	1.08	.55(.29)	1.73
Phys/Relat Agg	.56(.37)	2.14	.58(.33)	1.79	-.01(.38)	.99	-.45(.39)	.64	-.12(.50)	.88
Age	.25(.07)**	1.37	.04(.06)	1.04	.33(.07)***	1.40	-.14(.07)*	.87	-.24(.10)*	.78
Gender	.18(.16)	1.09	.17(.14)	1.19	.10(.14)	1.10	1.01(.17)***	2.74	.12(.22)	1.13
Race/Ethnicity										
Latino	.29(.23)	1.07	.36(.20)+	1.44	.05(.21)	1.05	-.12(.24)	.89	.14(.32)	1.15
African Amer	-.31(.49)	.54	-.04(.36)	.96	-.42(.40)	.66	.04(.43)	1.04	-.71(.75)	.49
Native Amer	.16(.34)	1.12	.55(.27)*	1.74	.31(.29)	1.36	.07(.33)	1.07	.61(.39)	1.84
Asian/Pac Isl	-.53(.36)	.60	-.03(.28)	.97	-.56(.31)	.57	.13(.29)	1.14	.02(.46)	1.02
Other	.64(.44)	1.65	.35(.42)	1.42	-.48(.48)	.62	.60(.45)	1.82	1.29(.51)*	3.63
Prior behavior	1.02(.14)***	2.60	2.81(.27)***	16.55	2.30(.22)***	9.93	2.07(.17)***	7.93	1.77(.24)***	5.88
Family Attach	-.15(.12)	.86	-.17(.10)	.85	-.16(.10)	.85	-.48(.11)***	.62	-.30(.16)+	.75
School Commit	-.82(.14)**	.44	-.62(.12)***	.54	-.84(.12)***	.43	-.45(.14)**	.64	-.59(.18)**	.55
Academ Achiev	-.07(.10)	.93	-.55(.09)***	.58	-.32(.09)***	.73	-.24(.09)*	.79	-.22(.13)	.80

Note: all are unstandardized coefficients;

* p<.05,

** p<.01,

*** p<.001;

Phys Aggression is "physical aggression"; Relat Agg is "relational aggression"; Phys/Relat Agg is "physical and relational aggression; Race/Ethnicity categories are Latino, African American, Asian/Pacific Islander; Family Attach is "family attachment"; School Commit is "school commitment"; and Academ Achiev is "academic achievement". Prior behavior is an earlier measure of the same outcome (e.g., prior binge drinking; prior tobacco use, etc.).

TABLE 4
Prediction of Year 3 Outcomes from Year 1 Aggression--Middle Cohort Only

Group Status	Recent Binge Drinking		Past-Year Tobacco Use		Past-Year Marijuana Use		Past-Year Depression	
	B(SE)	OR	B(SE)	OR	B(SE)	OR	B(SE)	OR
Phys Aggression	.60(.40)	1.81	.64(.38)	1.90	.45(.40)	1.56	.33(.42)	1.38
Relat Agg	1.00(.26)***	2.71	.89(.25)***	2.44	.46(.26)	1.58	.05(.29)	1.06
Phys/Relat Agg	1.05(.41)*	2.86	.57(.42)	1.76	.04(.45)	1.05	-.06(.48)	.95
Age	.10(.25)	1.10	.28(.23)	1.33	-.31(.24)	.74	.17(.26)	1.19
Gender	.14(.21)	1.15	.28(.20)	1.32	-.17(.19)	.85	1.41(.24)***	4.00
Race/Ethnicity								
Latino	.67(.26)*	2.00	.05(.27)	1.05	.42(.25)	1.53	.01(.29)	1.01
African Amer	-.21(.64)	.81	.70(.45)	2.01	-.04(.52)	.96	.35(.52)	1.42
Native Amer	.05(.45)	1.06	.23(.38)	1.26	.61(.36)	1.83	-.40(.48)	.67
Asian/Pac Isl	-.30(.52)	.74	-.91(.56)	.40	-.72(.53)	.49	-.10(.45)	.90
Other	.45(.64)	1.57	.59(.58)	1.80	.41(.65)	1.51	-.69(.60)	2.00
Prior behavior	1.01(.34)*	2.76	2.03(.46)***	7.61	2.81(.51)***	16.61	1.61(.22)***	5.02
Family Attach	-.30(.15)*	.74	-.25(.14)	.78	-.31(.14)*	.74	-.37(.15)*	.69
School Commit	-.46(.18)*	.63	-.66(.17)**	.52	-.63(.16)***	.53	-.09(.19)	.92
Academ Achiev	-.19(.13)	.83	-.35(.12)**	.70	-.22(.12)	.81	-.02(.13)	.98

Note: all are unstandardized coefficients;

* p<.05,

** p<.01,

*** p<.001;

Phys Aggression is "physical aggression"; Relat Agg is "relational aggression"; Phys/Relat Agg is "physical and relational aggression"; Race/Ethnicity categories are Latino, African American, Asian/Pacific Islander; Family Attach is "family attachment"; School Commit is "school commitment"; and Academ Achiev is "academic achievement". Prior behavior is an earlier measure of the same outcome (e.g., prior binge drinking; prior tobacco use, etc.).