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ORIGINAL CONTRIBUTION

Impulsivity-hyperactivity and subtypes of aggression in early childhood: an observational and short-term longitudinal study

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Abstract This short-term longitudinal study ($N = 112$) was conducted to explore the concurrent and prospective associations between teacher-reported impulsive-hyperactive behavior and observed relational and physical aggression during early childhood ($M = 45.54$ months old, $SD = 9.07$). Multiple informants and methods including observational methods (i.e., 160 min per child) were used to assess aggression and impulsivity-hyperactivity. All measures were found to be valid and reliable. Prospective hierarchical regression analyses revealed that impulsivity-hyperactivity was associated with increases in observed physical aggression across time, controlling for initial relational aggression and gender. These findings add to the growing developmental psychopathology literature that suggests that distinguishing between subtypes of aggression during early childhood may be important for understanding the course of impulsivity-hyperactivity in young children. Implications for practice are discussed.

Keywords Relational aggression · Physical aggression · Impulsivity · Early childhood · Observation

Introduction

The study of peer directed aggression now encompasses a wider array of behaviors and subtypes, which better account for the behavioral problems of both boys and girls across development [11]. Two main subtypes of aggression have received recent attention by developmental psychologists and psychopathologists. They include physical aggression, which includes the intent to hurt, harm or injure another using physical means of force and appears to be more commonly observed in boys across development (see [12]). The second subtype of aggression, relational aggression, has been defined as using the removal or the threat of the removal of the relationship as the means of harm (e.g., threatening the removal of a friendship, maliciously excluding a peer [7]).

Past research has documented that relational aggression during middle childhood and adolescence has been associated with internalizing problems (e.g., [24]), substance abuse (e.g., [32]), borderline personality disorder features [8, 34] as well as significant externalizing problems [10]. Zalecki and Hinshaw [36] discovered among school-aged girls attending a summer camp that ADHD-C (i.e., combined subtype) children were more relationally aggressive than ADHD-I (i.e., inattentive subtype) or control children. Finally, Prinstein et al. [30] found that relational aggression during adolescence was associated with externalizing symptoms (i.e., ODD and CD; see also [17]).

Despite efforts at exploring possible antecedents of relational aggression such as the role of early family life and parent-child relationship qualities (e.g., [26]), to date, few studies have identified theoretically supported antecedents or predictors of relational aggression. The identification of early risk factors and developmental antecedents is crucial for understanding the mechanisms underlying the on-set and course of relational aggression, which may then be used to create more effective interventions. The present study was designed to explore impulsivity-hyperactivity as a possible developmental antecedent of both relational and physical aggression. Impulsivity-hyperactivity is a major behavioral problem

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associated with peer difficulties in young children [1]. When impulsive and hyperactive behavior leads to disruptions in following directions, negotiating peer relationships, and acquiring social competence it is predictive of maladaptive outcomes including peer rejection among boys and problematic friendships among girls [3, 16]. To date most research on the study of aggression and impulsivity-hyperactivity has been focused on physical aggression and samples comprised of boys only (see [33]). Researchers have recognized the need for research across developmental periods and have called for further investigations of disruptive behavior and aggression during early childhood [5, 15]. Given that in current theoretical accounts, hyperactive behavior is often viewed as a precursor to physical aggression (e.g., [25]) we posit that impulsive-hyperactive behavior may also predict future relational aggression.

There are several theoretically driven and empirically based hypotheses in the current study. Based on the available research and theory [11, 25], we hypothesize (hypothesis 1) impulsivity-hyperactivity will predict increases in physical aggression. This first goal will replicate the extant literature, but also extend past findings by controlling for relational aggression and gender. We also predict that impulsivity-hyperactivity will be associated with increases in relational aggression, controlling for physical aggression and gender (hypothesis 2). We explore for the possibility that the association between aggression subtypes and impulsivity is moderated by gender. Based on past findings demonstrating the role of gender as a moderator between relational aggression and salient adjustment outcomes (e.g., [31, 37]), we hypothesize that gender will moderate associations between impulsivity-hyperactivity and aggression subtypes. Specifically, relational aggression will only be significant for girls (hypothesis 3); whereas the association of impulsivity-hyperactivity and physical aggression will only be significant for boys (hypothesis 4). To test these hypotheses we conducted a short-term longitudinal study in early childhood and obtained teacher-reports and observations of aggression and impulsivity-hyperactivity.

Method

Participants

A total of 112 (65 girls) preschool children ($M = 45.54$ months old, $SD = 9.07$) were recruited from three nationally accredited and university affiliated early childhood schools (four locations) located in a northeastern city of the US. This ongoing project was approved by the local Social and Behavioral Sciences IRB and written parental consent was obtained for all participating children. Teachers also provided written consent prior to completing teacher-report packets. Children were from relatively diverse ethnic backgrounds (13.4% African American, 14.3% Asian, 60.7% Caucasian, 3.6% Indian, 2.7% Latino, 0.9% Native American, and 4.5% Multicultural). Based on available demographics children ranged from lower to upper middle class with the majority coming from educated middle class families. Two cohorts were recruited from the same schools 1 year apart and were merged together for the final sample. There were no differences in the demographic information or other characteristics relevant to the present study between the cohorts. Attrition from time 1 to 2 (15%) was due to children moving out of the country or changing schools. The resulting final sample at time 2 was 95 (56 girls). Prior publications from this on-going longitudinal study contain further details (reference corresponding to [28]).

Measures

Observations of aggression

Naturalistic observations of children's relational and physical aggression were conducted during free-play using an adaptation of procedures [9] of the Early Childhood Observational System developed by Ostrov and Keating [27]. Using a focal child sampling with continuous recording approach, each child was observed for 10 min per assessment by a trained observer (19 male and female advanced undergraduate students and three graduate students). At each time point, over an eight-week period, each child was observed eight times (a total of 160 min total per child in the study). During each 10-min assessment interval, observers recorded the focal child's engagement in the following including a full description of what occurred and the gender of all children involved: (a) physical aggression (e.g., hitting, shoving, taking objects); (b) relational aggression (e.g., excluding from an activity, using friendship withdrawal as a threat; giving the "silent treatment," covering ears to signal ignoring, malicious secret spreading). Separate behaviors were recorded based on temporal breaks in the interactions during the observation. Behaviors were summed to yield total behavior scores for each time period (for additional details see [9]).

Evidence for favorable inter-rater reliability of this observational measure has been demonstrated [9, 27]. Inter-rater reliability was assessed at each time point on 15% of observations, spread across the eight-week observation period. This observational method has demonstrated acceptable validity in the past [9, 27]. Reliability was

acceptable for relational aggression and physical aggression (ICC's > 0.72) across the study.

Observations of impulsivity-hyperactivity

At the conclusion of each 10 min focal child observation session, the observers completed a few ratings on each child. These ratings on a scale from one (definitely does not apply) to five (definitely applies) asked each observer to rate how often the child engaged in these behaviors during the past 10 min session. If a child was impulsive-hyperactive for the majority of the session or for at least 7 min then the child would have received a rating of "5". The rating was found to be reliable based on 15% of observations (ICC's > 0.73) at each time point.

Teacher-report of impulsivity-hyperactivity

The child behavior scale (CBS; [19]) was completed by participating teachers. The CBS is a psychometrically sound measure of young children's social behavior and adjustment. The 35 item CBS is comprised of six subscales, but only hyperactive-distractible (four items, e.g., "Restless. Runs about or jumps up and down. Doesn't keep still") was used. In the present study, this subscale demonstrated appropriate internal consistency: Cronbach's $\alpha > 0.80$ at each time point.

Procedure

Observations were begun during the fall (time 1) and were initiated approximately 2 months after the children began attending school for that year. Observations at time 2 were initiated approximately 4 months after the conclusion of time 1. Teachers received an honorarium ($25 gift certificate) each time they completed teacher-report packets, which were distributed several weeks after observations were initiated.

Results

Preliminary tests of skewness (range from 1.05 to 2.58) and kurtosis (<8) suggested that nonnormality of the data was not a concern [18]. In support of the validity of the impulsivity-hyperactivity measure, the teacher-report and observational-report of impulsivity-hyperactivity were significantly correlated at time 1, $r = 0.46$, $P < 0.001$. Teacher-report of impulsivity-hyperactivity at time 1 was also associated with observational-report of impulsivity-hyperactivity at time 2, $r = 0.37$, $P < 0.001$. Teacher-reports of impulsivity-hyperactivity were moderately stable (see Table 1). Observations of aggression were also moderately stable, but arguably low enough to suggest changes in behavior across the study. Observations of impulsivity-hyperactivity were also stable, $r = 0.49$, $P < 0.001$.

Bivariate correlations (see Table 1) revealed that teacher-reported impulsivity-hyperactivity was associated with both concurrent observed relational and physical aggression.[1] The time 2 concurrent findings only revealed significant associations between impulsivity-hyperactivity and physical aggression and this association was moderate. Impulsivity-hyperactivity was associated with future physical aggression but not relational aggression. Although not a central goal of the study, it is also interesting to note that both types of aggression were associated with future impulsivity-hyperactivity.

To explore the unique prospective associations between impulsivity-hyperactivity and aggression subtypes two hierarchical regression models were tested. In both regression models, observed physical or relational aggression at time two was the outcome variable. Gender and both subtypes of observed aggression at time one were entered at step 1 and impulsivity-hyperactivity at time one was entered at step two.[2] Interaction terms with gender were entered at step 3. The models did not demonstrate any gender moderation effects and thus for ease of communication they are not presented. Model one revealed that initial relational aggression predicted future relational aggression, controlling for gender and physical aggression. Model two found that gender was a significant effect with boys displaying higher amounts of physical aggression at time 2 than girls (see Table 2). In addition, model two revealed that initial physical aggression predicted future physical aggression, controlling for gender and relational aggression. Moreover, at step two and consistent with predictions, impulsivity-hyperactivity predicted increases

[1] Although not a central goal of the study, two concurrent regression models were conducted to test if impulsivity-hyperactivity at time 1 was uniquely associated with relational and physical aggression at time 1. Impulsivity-hyperactivity ($\beta = 0.25$) accounted for a significant amount of unique variance in the association with relational aggression, controlling for physical aggression and gender, $\Delta F(1, 101) = 5.94$, $P = 0.017$, $\Delta R^2 = 0.06$). In the next model, impulsivity-hyperactivity ($\beta = 0.20$) tended to account for a unique (but not significant) amount of variance in the association with physical aggression, controlling for relational aggression and gender, $\Delta F(1, 101) = 3.61$, $P = 0.06$, $\Delta R^2 = 0.03$).

[2] A socioeconomic status (SES) index was created based on available information on household income and highest parental education level for each parent/adult living in the home. SES was entered at step 1 in the regression models as a covariate and the findings were virtually identical. Thus, for ease of communication these findings are not reported.

Table 1 Correlations between key study variables and descriptive statistics

	1.	2.	3.	4.	5.	6.
1. Impulsivity-hyperactivity (TR) T1	X					
2. Relational aggression (O) T1	0.24**	X				
3. Physical aggression (O) T1	0.27**	0.12	X			
4. Impulsivity-hyperactivity (TR) T2	0.60***	0.23*	0.31**	X		
5. Relational aggression (O) T2	−0.03	0.39***	0.03	0.01	X	
6. Physical aggression (O) T2	0.44***	0.14	0.45***	0.39***	0.18	X
M	6.02	1.08	2.50	5.64	1.71	2.08
SD	2.39	1.53	2.50	2.09	2.47	2.49
Range	4–12	0–7	0–13	4–12	0–14	0–11

O Observations, *TR* teacher report, *T1* time 1, *T2* time 2

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Table 2 Descriptive statistics by gender

	Boys			Girls		
	M	SD	Range	*M*	SD	Range
1. Impulsivity-hyperactivity (TR) T1	6.98	2.38	4–12	5.37	2.18	4–12
2. Relational aggression (O) T1	1.09	1.50	0–7	1.08	1.56	0–7
3. Physical aggression (O) T1	3.15	2.91	0–13	2.03	2.09	0–9
4. Impulsivity-hyperactivity (TR) T2	6.28	2.30	4–12	5.18	1.82	4–10
5. Relational aggression (O) T2	1.28	1.75	0–9	2.00	2.85	0–14
6. Physical aggression (O) T2	3.10	2.86	0–10	1.38	1.91	0–11

O observations, *TR* teacher report, *T1* time 1, *T2* time 2

in physical aggression over time, above and beyond the variance associated with relational aggression and gender (see Table 3).[3]

[3] In order to extend the relevancy of the current findings to clinical practice, we also examined our findings using a categorical approach. A small percentage of children were high on both initial aggression and impulsivity-hyperactivity (7.2% overall; 2.7% of physically aggressive children, 2.7% of relationally aggressive children, and 1.8% of the both physically and relationally aggressive group). Although the cell sizes were very small, given the potential clinical interest in these categorical comparisons we thus conducted a 2 (focal child gender) × 4 (co-morbid status: nonaggressive and nonimpulsive–nonhyperactive; physically aggressive and impulsive-hyperactive; relationally aggressive and impulsive-hyperactive; and physically aggressive, relationally aggressive and impulsive-hyperactive) ANOVA with impulsivity-hyperactivity at time 2 serving as the dependent variable. A main effect for co-morbid status was found, $F(4, 89) = 6.54$, $P < 0.001$, $\eta_p^2 = 0.18$. Bonferonni post-hoc tests indicated, not surprisingly, that the physically and relationally aggressive group that was also high on impulsivity-hyperactivity was significantly ($P < 0.005$) more impulsive and hyperactive at time 2 ($M = 10.00$; SE = 1.32) than was the nonaggressive and nonimpulsive–nonhyperactive group ($M = 5.47$; SE = 0.20). No other significant effects or differences emerged.

Discussion

This study was the first known multi-informant, multi-method, short-term longitudinal exploration of the association between impulsivity-hyperactivity and relational and physical aggression during early childhood. The present study is also the first known examination of the unique prospective associations between both subtypes of aggression and future impulsivity-hyperactivity, while controlling for the potential influence of the other subtype of aggression. Past studies have not explored the prospective association between impulsive-hyperactive behavior and relational aggression so the lack of prospective associations using dimensional analyses between impulsivity-hyperactivity and relational aggression, controlling for physical aggression, should be replicated. This is particularly important since the present study as well as past concurrent findings have documented an important association between ADHD symptoms and relational aggression [3, 36] as well as oppositional defiant disorder (ODD) and conduct disorder (CD) symptoms and relational aggression in older children and adolescents [17, 30]. In fact, Keenan and colleagues documented that children who met criteria for CD were 17 times more likely to be identified as relationally aggressive by caregivers (i.e., 1 SD above the mean [17]).

In exploring trajectories of the development of physical aggression in boys, Nagin and Tremblay [25] found that high hyperactivity and high opposition in kindergarten were important predictive factors in being on a high, persistent physical aggression trajectory through early to mid-adolescence. In addition, recent findings also suggested that ADHD severity in childhood (6- to 13-years-old) uniquely predicted future CD symptoms in adolescence [35]. In keeping with this theory and past empirical work, we found that impulsivity-hyperactivity was associated with increases in observed physical aggression, controlling

Table 3 Hierarchical multiple regressions: unique associations between impulsivity-hyperactivity and changes in aggressive behavior subtypes over time

Outcome, step, predictors	β	F, ΔF	R^2	ΔR^2
I. Relational aggression T2 (O)				
1. Gender	0.16	(3, 86) = 6.63, $P < 0.001$	0.19	
Physical aggression T1 (O)	−0.016			
Relational aggression T1 (O)	0.41***			
2. Impulsivity-hyperactivity T1 (TR)	−0.12	(1, 85) = 1.21, $P = 0.27$		0.011
II. Physical aggression T2 (O)				
1. Gender	−0.25**	(3, 86) = 10.06, $P < 0.001$	0.26	
Physical aggression T1 (O)	0.37***			
Relational aggression T1 (O)	0.08			
2. Impulsivity-hyperactivity T1 (TR)	0.28**	(1, 85) = 7.70, $P = 0.007$		0.061

O observations, *TR* teacher report, *T1* time 1, *T2* time 2

** $P < 0.01$, *** $P < 0.001$

for the influence of relational aggression and gender. It is conceivable that different developmental pathways are relevant for physical and relational aggression and impulsivity-hyperactivity, which is consistent with the extant developmental psychopathology literature (e.g., [11]) and thus, it may not be too surprising that similar findings did not hold for relational aggression.

The role of biological mechanisms involved in the on-set and course of both physically and relationally aggressive behavior is an important topic for future research. Past studies have documented that dysregulated serotonergic function assessed during childhood was associated with subsequent development of antisocial personality disorder [13], which may suggest an important biological link between childhood behavior and adult psychopathology. It is, however, conceivable that an entirely different biological mechanism is implicated in relational aggression and arguably more research is needed to understand these possible processes. Recent evidence that cardiovascular reactivity (i.e., systolic blood pressure) is heightened among girls after a relational provocation stressor suggests that relational aggression may be associated with physiological arousal and possibly dysregulation [23]. The study of functions of aggression may be important in further elucidating the possible biological factors implicated in the on-set and course of relational aggression. In this regard, reactive or impulsive functions of relational aggression are arguably associated with more impulsive control problems like borderline personality features [8, 34] and proactive functions of relational aggression are associated with psychopathy [22] and specifically callous-unemotional traits [20].

There was no evidence of statistical moderation by gender in the regression models. These findings underscore the need to continue to study both forms of aggressive behavior in boys and girls. Despite past evidence that relational aggression is predictive of adjustment problems and peer status for girls [6, 31, 37] not all studies with school-aged children have found evidence for moderation by gender (e.g., [24]). However, it is important to note that hyperactivity among young girls, especially when co-morbid with physical aggression, may place the child at increased risk for staying on a maladaptive pathway. Specifically, a recent longitudinal study on girls' hyperactivity and physical aggression documented that for some girls those that continue on high developmental trajectories of both hyperactivity and physical aggression are more likely to have a host of maladaptive outcomes including physical aggression within romantic relationships, early pregnancy and substance use problems in emerging adulthood [14]. Further work is needed to explore the potential negative effects of co-morbid impulsivity-hyperactivity with relational and physical aggression for both girls and boys across development.

Despite the strengths of the current study, which include a multi-method and multi-informant approach to avoid shared-method variance concerns, there are some limitations. First, the current sample is primarily middle class and from schools affiliated with universities in an urban area and thus the findings may not generalize to children from lower SES backgrounds or to all types of early childhood centers. As noted, SES was a covariate in our models but since researchers have documented that higher SES groups may be at greater risk for displaying relationally aggressive behavior [4, 21], future research is needed among children from diverse SES, ethnic and cultural backgrounds. Second, the present study used a short interval (4–5 months) between the two time points and future long-term prospective studies are needed to examine stability of behavior across longer time periods. Third, our

assessment was limited to the school setting and future work is needed to explore the link between impulsivity-hyperactivity and relational aggression in multiple contexts. This is particularly important given that our stability findings for aggression subtypes and impulsivity-hyperactivity are not context-free. Thus, caution should be exercised when interpreting the present findings since the behaviors were all assessed at school with peers. Fourth, the present model suggests a mono-causal pathway from ADHD symptoms to aggressive behavior. However, there were 4.4% of children who were above 1 SD on impulsivity-hyperactivity and were not "classified" in one of the three aggression categories and likely will continue to be non-aggressive over time. In addition, it is entirely possible that aggressive behavior, which may be reactive or impulsive in nature, may lead to future impulsivity-aggression. In fact, the bivariate correlations indicate that both physical and relational aggression were associated with future impulsivity-hyperactivity. Finally, given that a nonclinical measure of impulsivity-hyperactivity was used in the present community sample, future research with both typical and atypical samples using a clinically sensitive instrument [29] should explore the link between ADHD symptoms and relational aggression during early childhood.

This study has several implications for practice. The current study provides further evidence of the need for the development of evidence-based intervention and prevention efforts. Future research and clinical practice should involve collaborative work between psychologists and other practitioners and may be guided by a model of intervention developed by Bierman [2] in which clinicians would assess multiple levels of influence including the child's self system (e.g., social cognitions), social behaviors (e.g., aggression), peer context (e.g., reputation), and peer relations (e.g., peer rejection, friendship status). A comprehensive assessment and an understanding of both typical and atypical development may inform the creation of appropriate intervention strategies for relational aggression with young children. In addition, scholars have recently posited if relational aggression should be included in DSM-V [17]. The tentative conclusion was that additional research on the predictive utility of relational aggression was needed in samples with high incidence of disorder and with multiple diagnostic assessments [17]. Moreover, these scholars have asserted that overlap with both ODD and CD will make it difficult to determine where in the DSM-V classification system relational aggression may be most appropriate [17]. In the context of other existing studies (e.g., [9, 10, 20, 22, 24, 28 [36]) and the present findings we echo the call for future research on the predictive utility of relational aggression.

In conclusion, future research is called for to explore the mechanisms underlying the documented associations and to investigate additional developmental antecedents of relational and physical aggression in young children.

References

1. Bagwell CL, Molina BSG, Pelham WE, Hoza B (2001) Attention-deficit hyperactivity disorder and problems in peer relations: Predictions from childhood to adolescence. J Am Acad Child Adolesc Psychiatry 40:1285–1292
2. Bierman KL (2004) Peer rejection: developmental processes and intervention strategies. Guilford Press, New York
3. Blachman DR, Hinshaw SP (2002) Patterns of friendship among girls with and without attention-deficit/hyperactivity disorder. J Abnorm Child Psychol 30:625–640
4. Bonica C, Arnold DH, Fisher PH, Zeljo A, Yershova K (2003) Relational aggression and language development in preschoolers. Soc Dev 12:551–561
5. Brame B, Nagin DS, Tremblay RE (2001) Developmental trajectories of physical aggression from school entry to late adolescence. J Child Psychol Psychiatry 42:503–512
6. Crick NR (1996) The role of overt aggression, relational aggression, and prosocial behavior in the prediction of children's future social adjustment. Child Dev 67:2317–2327
7. Crick NR, Grotpeter JK (1995) Relational aggression, gender, and social psychological adjustment. Child Dev 66:710–722
8. Crick NR, Murray-Close D, Woods KA (2005) Borderline personality features in childhood: A shorter-term longitudinal study. Dev Psychopathol 17:1051–1070
9. Crick NR, Ostrov JM, Burr JE, Jansen EA, Cullerton-Sen C, Ralston P (2006) A longitudinal study of relational and physical aggression in preschool. J Appl Dev Psychol 27:254–268
10. Crick NR, Ostrov JM, Werner NE (2006) A longitudinal study of relational aggression, physical aggression and children's social-psychological adjustment. J Abnorm Child Psychol 34:131–142
11. Crick NR, Zahn-Waxler C (2003) The development of psychopathology in females and males: current progress and future challenges. Dev Psychopathol 15:719–742
12. Dodge KA, Coie JD, Lynam D (2006) Aggression and antisocial behavior in youth. In: Damon W (Series ed), Eisenberg N (vol ed) Handbook of child psychology, vol 3. Social, emotional, and personality development, 6th edn. Wiley, New York, pp. 719–788
13. Flory JD, Newcorn JH, Miller C, Harty S, Halperin JM (2007) Serotonergic function in children with attention-deficit hyperactivity disorder: relationship to later antisocial personality disorder. Br J Psychiatry 190:410–414
14. Fontaine N, Carbonneau R, Barker ED, Vitaro F, Hebert M, Cote SM, Nagin DS, Zoccolillo M, Tremblay RE (2008) Girls' hyperactivity and physical aggression during childhood and adjustment problems in early adulthood. Arch Gen Psychiatry 65:320–328
15. Gresham FM, Lane KL, Beebe-Frankenberger M (2005) Predictors of hyperactive—impulsive-inattention and conduct problems: a comparative follow-back investigation. Psychol Sch 42:721–736
16. Hinshaw SP, Melnick S (1995) Peer relationships in boys with attention deficit—hyperactivity disorder with and without comorbid aggression. Dev Psychopathol 7:627–647
17. Keenan K, Coyne C, Lahey BB (2008) Should relational aggression be included in DSM-V? J Am Acad Child Adolesc Psychiatry 47:86–93
18. Kline RB (2005) Principles and practice of structural equate modeling, 2nd edn. Guilford Press, New York

19. Ladd GW, Profilet SM (1996) The child behavior scale: a teacher-report measure of young children's aggressive, withdrawn, and prosocial behaviors. Dev Psychol 32:1008–1024
20. Marsee MA, Frick PJ (2007) Exploring the cognitive and emotional correlates to proactive and reactive aggression in a sample of detained girls. J Abnorm Child Psychol 35:969–981
21. McNeilly-Choque MK, Hart CH, Robinson CC, Nelson L, Olsen SF (1996) Overt and relational aggression on the playground: correspondence among different informants. J Res Child Educ 11:47–67
22. Miller JD, Lynam DR (2003) Psychopathy and the five-factor model of personality: a replication and extension. J Pers Assess 81:168–178
23. Murray-Close D, Crick NR (2007) Gender differences in the association between cardiovascular reactivity and aggressive conduct. Int J Psychophysiol 65:103–113
24. Murray-Close D, Ostrov JM, Crick NR (2007) A short-term longitudinal study of growth of relational aggression during middle childhood: associations with gender, friendship intimacy, and internalizing problems. Dev Psychopathol 19:187–203
25. Nagin DS, Tremblay RE (2001) Parental and early childhood predictors of persistent physical aggression in boys from kindergarten to high school. Arch Gen Psychiatry 58:389–394
26. Nelson DA, Hart CH, Yang C, Olsen JA, Jin S (2006) Aversive parenting in China: associations with child physical and relational aggression. Child Dev 77:554–572
27. Ostrov JM, Keating CF (2004) Gender differences in preschool aggression during free play and structured interactions: an observational study. Soc Dev 13:255–277
28. Ostrov JM, Ries EE, Stauffacher K, Godleski SA, Mullins AD (2008) Relational aggression, physical aggression and deception during early childhood: a multimethod, multi-informant short-term longitudinal study. J Clin Child Adolesc Psychol 37:664–675
29. Pelham WE, Milich R, Murphy DA, Murphy HA (1989) Normative data on the IOWA Conners teacher rating scale. J Clin Child Psychol 18:259–262
30. Prinstein MJ, Boergers J, Vernberg EM (2001) Overt and relational aggression in adolescents: social-psychological adjustment of aggressors and victims. J Clin Child Psychol 30:479–491
31. Rys GS, Bear GG (1997) Relational aggression and peer relations: gender and developmental issues. Merrill Palmer Q 43:87–106
32. Storch EA, Werner NE, Storch JB (2003) Relational aggression and psychosocial adjustment in intercollegiate athletes. J Sport Behav 26:155–167
33. Waschbusch DA (2002) A meta-analytic examination of comorbid hyperactive- impulsive-attention problems and conduct problems. Psychol Bull 128:118–150
34. Werner NE, Crick NR (1999) Relational aggression and social psychological adjustment in a college sample. J Abnorm Psychol 108:615–623
35. Whittinger NS, Langley K, Fowler TA, Thomas HV, Thapar A (2007) Clinical precursors of adolescent conduct disorder in children with attention-deficit/hyperactivity disorder. J Am Acad Child Adolesc Psychiatry 46:179–187
36. Zalecki CA, Hinshaw SP (2004) Overt and relational aggression in girls with attention deficit hyperactivity disorder. J Clin Child Adolesc Psychol 33:125–137
37. Zimmer-Gembeck MJ, Geiger TC, Crick NR (2005) Relational and physical aggression, prosocial behavior, and peer relations: Gender moderation and bidirectional associations. J Early Adolesc 25:421–452