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The Additive and Interactive Roles of Aggression, Prosocial Behavior, and Social Preference in Predicting Resource Control in Young Children

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Abstract

Distinguishing between physical and social aggression, this study examined whether the predictive effect of aggression on resource control a) is moderated by prosocial behavior and b) corresponds to a linear or a curvilinear trend. Moderating effects of children's social preference among peers and child sex in this context were also tested. Based on a sample of 682 kindergarten children (348 girls; average age 72.7 months, 3.6 *SD*), multilevel regressions revealed additive linear effects of social preference and prosociality on resource control. Moderate (but not high) levels of social aggression also facilitated resource control for disliked children. There was no such threshold effect for well liked children, who increasingly controlled the resource the more socially aggressive they were. In contrast, physical aggression hampered resource control unless used very modestly.

Keywords: Resource control, physical and social aggression, prosocial behavior, social preference

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Developmental and educational psychology has traditionally associated aggression with socio-cognitive deficits and negative developmental outcomes. Consequently, early aggression research focused mainly on problems in social information processing skills such as hostile attribution bias or lack of control, as well as peer rejection and victimization (e.g., Coie, Dodge & Kupersmidt, 1990; Dodge, 1986). However, recent research indicates that aggression, if combined with prosocial behavior, can be effective for resource control and may actually be linked to positive peer regard (Bukowski, 2003; Hawley, 1999, 2002; Pellegrini, 2008; Sutton, Smith & Swettenham, 1999a; 1999b; 2001; Underwood, 2003). Socially competent behavior may counterbalance the costs of aggressive resource control strategies. Socially competent behavior is the ability to meet one's own needs while maintaining positive social relationships with others.

Although aggressive strategies may be highly functional in very early childhood, with the entry to preschool, children are progressively expected to develop alternative and more prosocial strategies such as friendly cooperation or reciprocation (I help you now, you help me later) (Trivers, 1971). Accordingly, whereas many infants have been found to use physical aggression spontaneously to control resources (e.g. toys), the frequency of aggression peaks at around 2.5 years of age and, for most children, declines thereafter as children are socialized to omit aggressive behavior and to develop alternative strategies to solve conflicts and access resources (Tremblay & Nagin, 2005). By late preschool or kindergarten, children have refined their verbal and social cognitive abilities to coordinate and cooperate with peers (Hawley, 1999). Adopting a strategy-based approach for the study of aggression in resource control in young children, Hawley (1999, 2002) proposed that successful children employ both aggressive and prosocial strategies to control resources. In other words, a combination of high aggression *and* high prosociality (affiliation, helping, cooperation,

reciprocity and persuasion) should be the most successful strategy in resource control for young children (i.e., ages 3 to 6 years old). This perspective suggests that the effectiveness of aggression should depend on the level of concomitant prosociality, such that only those aggressive individuals that are also highly prosocial would be successful. The notion of an interactive effect of aggression and prosociality is concordant with findings that purely aggressive children tend to be rejected, whereas aggressive children who also use prosocial behavior tend to be rather well liked (Hawley, 2003). However, even when balanced by prosociality, aggressive behavior may be effective and socially rewarded only under specific circumstances, depending on the extent of aggression used, the nature (i.e., form) of the aggressive behavior, and the social preference of the child in the peer group. Considering these issues, the main goal of the present study was to investigate the role of aggressive and prosocial behavior in predicting resource control in kindergarten children.

The Cost of Aggressive Behaviors – To What Extent is Aggression Adaptive?

For prosocial behavior, the notion that more should be better is supported by the fact that highly prosocial children, who take initiative, have good verbal abilities, understand other people, show empathy, maintain group cohesion, are generally very well liked by others and usually have a high level of resource control (van Vugt, 2006). The role of aggression for resource control may not be as straightforward and linear, however. Individuals have to balance their own needs with the needs of the social group (Roseth et al., 2011). In the short term, aggressive behaviors may be effective, but they may also endanger social relationships and jeopardize the functioning of the social group. Excessive use of aggressive resource control strategies by an individual and the bypassing of others' needs may come at a high cost. It strains relationships and threatens group functioning. Many tasks can be solved only by cooperation, particularly in situations where resources are limited (Axelroad, 1984). Thus, children have to find a delicate equilibrium between competition and cooperation in order to competently and satisfactorily coordinate their social interactions. It has been

suggested that successful resource control behavior may be best achieved by a sophisticated balance between *moderately* aggressive and *highly* prosocial strategies (Bukowski, 2003; Prinstein & Cillessen, 2003). The effect of aggression may therefore be curvilinear rather than linear, such that moderate levels of aggressive behavior may lead to the best control over a limited resource, whereas very low or high levels of aggression may impede resource control. Thus, we expected that young children with a moderate level of aggression and a high level of prosociality would achieve most control over a limited resource. However, aggressive behavior can take different forms (Crick, Casas & Mosher, 1997), and even moderate levels of aggressive behavior may be less effective when it comprises physical assaults rather than more subtle aggressive strategies.

Physical Versus Social Aggression

Dodge and Coie (1987) distinguished two functions of aggressive behavior: Proactive-instrumental aggression is conceptualized as planned, cold-blooded and goal directed behavior, whereas reactive aggression is considered to be hot-blooded, affective and impulsive (Dodge & Coie, 1987). Theoretical perspectives on resource control suggest that it is instrumental-proactive -- not hostile-reactive -- aggression that is most successful for resource control (Bukowski, 2003; Hawley, 1999; Prinstein & Cillessen, 2003). The literature makes no distinction with respect to the forms of aggressive behaviors. However, with age, physical forms of aggression are progressively replaced by more subtle forms such as social, relational or indirect aggression. *Indirect aggression* refers to a behavior where the identity of the perpetrator may not be known (i.e. the anonymous placement of "gum on a chair") (Björkqvist, Lagerspetz & Kaukiainen, 1992). *Relational aggression* is a behavior where the victim is circuitously harmed through social-manipulative behaviors such as rumor spreading or social exclusion (Crick et al., 1997; Österman et al., 1998). Finally, *social aggression* (Galen & Underwood, 1997, 589) is a behavior which is ‘‘directed toward damaging another’s self-esteem, social status, or both, and may take such direct forms as verbal rejection, negative facial

expressions or body movements, or more indirect forms such as slanderous rumors or social exclusion". Despite the slight differences in focus, all of these terms describe highly related and overlapping constructs (Coyne, Archer & Eslea, 2006). Consequently, since the construct assessed in the present study refers to behaviors that are directed to damaging others' social status, we use the term social aggression, but our literature review covers contributions from all approaches.

Socially aggressive behaviors begin to appear in children's behavioral repertoires at relatively young ages, i.e. already during the preschool years (Vaillancourt, Brendgen, Boivin & Tremblay, 2003). Because social aggression is often rather diffuse, it carries a much lower risk of retribution and punishment by adults and by peers than physical aggression (Colwell, Mize, Pettit & Laird, 2002; Werner, Senich & Przepyszny, 2006). Social aggression may even offer potential rewards for the perpetrators and has been linked to perceived popularity (Cillessen & Mayeux 2004; Leadbeater, Boone, Sangster & Mathieson, 2006), affording the perpetrator a measure of social power over others. In contrast to *sociometrically popular* children, who are well liked by their peers, *perceived popular* children are not necessarily well liked but are considered as central in the group and therefore receive positive attention from peers (Cillessen & Rose, 2005). It is thus conceivable that children who use social aggression stand a greater chance of dominating social interactions and controlling limited resources than children who use physical aggression, especially if these strategies are also paired with prosocial behavior. The differential value of social versus physical aggression for resource control may be especially pronounced in girls, for whom physical aggression is less normative than for boys (Tremblay, 2004).

The Role of Social Preference in the Peer Group

According to theoretical perspectives of resource control, access to a limited resource should be to a significant extent explained by a child's behavior, although cognitive and linguistic skills are likely also involved (Bukowski, 2003; Hawley & Little, 1999; Prinstein & Cillessen, 2003). It is

possible, however, that a child who is well liked in the peer group may have privileged access to a limited resource solely by virtue of his/her social position. Moreover, the efficacy and relative importance of aggressive or prosocial behavior for resource control may vary depending on a child's social preference (i.e., the degree of being liked versus disliked) in the peer group. For example, peers have been found to be more tolerant when aggressive behaviors are perpetrated by well liked children than when they are perpetrated by disliked children (Hymel, Wagner & Butler, 1990; Waas & Honer, 1990). This positive reputational bias favoring well liked children may be especially pronounced when it comes to overt, physical forms of aggression that are viewed as less socially acceptable than more social forms of aggression among young children (Goldstein, Tisak & Boxer, 2002). As a result, especially physical aggressive strategies may yield social gains (if any) only for well liked children but not for disliked children.

Furthermore, the moderating effect of social preference in the peer group may depend on children's sex. For instance, because the use of physical aggression is usually considered more acceptable among young boys than girls (Sebanc, Pierce, Cheatham, & Gunnar, 2003), the hypothesized moderating effect of social preference in the link between physical aggression and resource control may apply mainly to boys. In contrast, physical aggression may harm rather than help girls' access to resources, regardless of their social preference among peers. Instead, prosocial behavior seems to be of greater importance for social functioning in girls than in boys (LaFontana & Cillessen, 2002; Lease, Kennedy & Axelrod, 2002). As a consequence, prosocial behavior may play a greater role in compensating for low social preference in girls than in boys when it comes to having access to a limited resource. The possible interactive effects of social preference and behaviors in predicting resource control, as well as potential moderating effects of child sex in this context, still remain to be examined, however.

The Present Study

In sum, the goal of the present study was to assess the relative roles of physical and social aggression, prosociality, and social preference in predicting resource control among young children. Of specific interest was to test 1) whether the predictive effect of aggression (while distinguishing between physical and social subtypes) on resource control is moderated by prosocial behavior; 2) whether the optimal level of aggression that predicts resource control corresponds to a linear or a curvilinear trend; 3) whether social preference plays a further moderating role in this context, and 4) whether these associations vary between girls and boys. Our main hypotheses were that aggression may be adaptive for controlling resources in normal social situations if 1) coupled with prosocial behavior, 2) used moderately, and not extremely, and 3) involving social rather than physical strategies. In other words, we expected that there would be a curvilinear rather than a linear effect of (mainly social) aggression on resource control and that this curvilinear effect will interact with prosocial behavior, such that moderate levels of social aggression together with high levels of prosocial behavior should yield greater access to the resource. Furthermore, we expected that aggressive behavior – especially physical aggression – may predict resource control more for well liked than disliked children and more for boys than for girls.

To test these hypotheses, we used a sample of 6 year-old children who were observed in kindergarten in a competitive situation with three peers. The kindergarten period was chosen because at this age a differentiation of resource control strategies takes place and children have refined their abilities to coordinate and cooperate with peers (Hawley, 1999). The target children were based on a convenience sample that was part of an ongoing longitudinal study of twins. Twin samples have been used in previous studies on children's social and behavioral development even when genetic effects were not the focus of the research question (e.g. Arseneault et al., 2006; Lamarche et al., 2007). Importantly, empirical evidence from the same data set used in this study suggests that twins' peer relations (e.g., social preference or friendship relations) do not differ from those of non-twin children

(Brendgen et al., 2009). Moreover, twin samples and singleton samples do not differ with respect to social-psychological and behavioral adjustment (Pulkkinen, Vaalamo, Hietala, Kaprio & Rose, 2003).

Method

Sample

The 682 children (348 girls) participating in this study were part of a population-based sample of twins from the greater Montreal area in the Province of Quebec, Canada. Families were originally recruited right after the twin's birth between November 1995 and July 1998 (N= 648 twin pairs, i.e., 1296 children). Eighty percent of the families spoke French, whereas the remaining families spoke English. Eighty-four percent of the families were of European descent, 3% were of African descent, 2% were of Asian descent, and 2% were Native North Americans. The remaining families (9%) did not provide ethnicity information.

The demographic characteristics of the twin families were compared to those of a sample of single births that is representative of the large urban centers in the province of Quebec (SantéQuébec, Jetté, Desrosiers & Tremblay, 1998) when the children were 5 months of age. The results showed that the same percentage (95%) of parents in both samples lived together at the time of birth of their child(ren), 44% of the twins compared to 45% of the singletons were the first born children in the family, 66% of the mothers and 60% of the twins' fathers were between 25 and 34 years old compared to 66% of mothers and 63% of fathers for the singletons, 17% of the mothers and 14% of the twins' fathers had not finished high school compared to 12% and 14% of mothers and fathers respectively for the singletons, the same proportion of mothers (28%) and fathers (27%) in both samples held a university degree, 83% of the twin parents and 79% of singleton parents were employed, 10% of the twin families and 9% of the singleton families received social welfare or unemployment insurance, finally 30% of the twin families and 29% of the singleton families had an

annual total income of less than CAN$30,000, 44% (42%) had an annual total income between CAN$30,000 and CAN$59,999, and 27% (29%) had an annual total income of more than CAN$60,000. These results indicate extremely similar socio-demographic profiles in the twin sample and the representative sample of single births.

The sample was followed longitudinally at 5, 18, 30, 48, and 60 months focusing on a variety of child-related and family-related characteristics. A sixth wave of data collection was completed to assess children's social adaptation in kindergarten. This assessment was conducted in the spring (i.e., May) of the kindergarten year. The present paper describes findings from the data collection in kindergarten. The average age at assessment in the spring of the kindergarten year was 72.7 months (3.6 *SD*). To be included in the present study, twins needed to have participated in the observational task in kindergarten (i.e., n = 682 children). Twins participating in the observational task did not differ from those who did not participate in regard to child temperament or any of the socio-demographic measures mentioned previously at 5 months. The study was approved by the University of Montreal ethics committee.

Measures and Procedure

All instruments were administered in either English or French, depending on the most commonly spoken language by the parents (see description of measures below). Following the procedure suggested by Vallerand (1989) instruments that were administered in French but were originally written in English were first translated into French and then translated back into English. Bilingual judges verified the semantic similarity between the back-translated items and the original items in the questionnaire.

Observation of resource control by the Movie Viewer task. Charlesworth and LaFreniere (1983) created a semi-structured laboratory play situation, i.e., the Movie Viewer, in order to elicit both competitive and cooperative strategies to gain access to a limited but highly attractive resource.

The movie viewer is a box, which consists of an eye piece, a carton cassette, and an electric bulb to illuminate the cartoon strip. In order to *exploit the potential resource* the cooperation of three participants is required. Only one child at a time can view a cartoon (viewer position), but in order to do so, a second child has to press two buttons to keep a light on, and a third has to operate a crank (helping positions). The fourth child is relegated to a non-participating position. The task took place in the spring of the kindergarten year and involved one twin of each twin pair (the twins were never in the movie viewer situation together, only one at a time) and three other children from the same kindergarten class: the twin's best friend (who was the same sex as the twin) and two other peers from the twin's class (a boy and a girl).

To identify the twin children's friend for this task we used sociometric procedures in the twins' classrooms. Booklets of photographs of all children in a class were handed out to each child in the class. Each child was asked to nominate up to three friends in their class. If a twin's first friendship nomination was reciprocated (i.e., the nominated friend had in turn nominated the twin as his or her first, second, or third best friend), that friend was chosen for the social interaction task, otherwise the twin's next nominated reciprocal friend was chosen. When a twin did not have a reciprocal friend, his or her first nominated friend was chosen. Limiting friendship nominations to the classroom probably did not overly restrict selection of friends because the vast majority of elementary school children select a best friend among their classmates even when given the opportunity to nominate a friend outside the classroom (Kupersmidt, Burchinal & Patterson, 1995). The two other 'neutral' peers were neither friends nor enemies of the twin and his or her best friend. Specifically, the 'neutral' peers had not nominated the twin or the twin's friend as among their friends and the neutral peers were also not nominated by the twin or by the twin's friend as friends. In addition, the 'neutral' peers had not been chosen by the twin or by the twin's friend as being disliked nor had the 'neutral' peers chosen the twin or the twin's friend as disliked (based on the

disliking nomination of the social preference measure described below). The 'neutral' peers were also not friends or enemies with each other. With this group composition we wanted the situation to reflect as much as possible the natural classroom context of the children, which typically also comprises peers that a child is friends with and other classmates that a child is not friends with. The combination of participants was constant for all target participants (i.e, twins), independent of the participants' behavioral characteristics.

In the present study, only data from the target participants (i.e., the twins) were reported, because the teacher rated behavioral characteristics (see description below) were not available for the 'neutral' peers involved in the Movie Viewer. However, to ensure that our findings are not limited to twins, we performed additional comparisons to see whether the target twins differed from their singleton counterparts (i.e., either the friends or the neutral peers) in the movie viewer situation on the dimension of resource control or other behavioral characteristics (aggression and prosocial behavior, for friends only). Using Pillai's trace, Repeated Measures ANOVA, performed separately for two samples each comprising one member of each twin pair to control for data interdependence due to twinship, revealed no differences between twin children, their friends and their non-friends in regard to access to the resource (Twin sample #1: $V = .002$, $F(3, 338) = 0.19$, $p = .91$ and Twin sample #2: $V = .002$, $F(3,338) = 0.19$, $p = .90$). Similarly, Repeated Measures MANOVA found no difference between twin children and their friends in regard to prosociality, physical aggression or indirect aggression (Twin sample #1: $V = .001$, $F\ (3, 326) = 0.15$, $p = .93$, and Twin sample #2: $V = .001$, $F(3, 326) = 0.60$, $p = .98$).

At the beginning of the task, an assistant explained the movie viewer and demonstrated how it operated. Then, the assistant left the room and started a chronometer. Children had seven minutes to play with the MV box and were videotaped. Two video cameras were mounted at approximately 12 meters from the movie viewer and an omni-directional microphone was suspended on the ceiling.

The recordings were coded with the software Observer in an event-sampling procedure (Fassnacht, 1982). In order to access inter-coder reliability a randomly selected group of children representing 4% of the total sample were coded by a second observer. By means of the behaviour observation system we classified data into the following categories: 1. Viewing position (*kappa*=1.00; *ME* = 0.25 (= 25% of total time), *SD* = 15) 2. Helping position (*kappa*=0.92; *ME* = 0.16, *SD* = 15) 3. Non participant (*kappa*=0.94; *ME* = 0.37, *SD* = 23). Percent of total time spent in the Viewing position was used as an index of resource control.

Aggressive and prosocial behavior. Social and physical aggression as well as prosocial behavior were assessed through teacher ratings using items from the Preschool Social Behavior Scale (Crick et al., 1997), from the Direct and Relational Aggression Scales (Björkqvist, Lagerspetz & Kaukiainen, 1992), and from the Preschool Behavior Questionnaire (Tremblay, Desmarais-Gervais, Gagnon & Charlebois, 1987). Teachers are considered a valid source for evaluating child behavior during the developmental period under study (Bonica, Arnold, Fisher, Zeljo & Yershova, 2003; Crick et al., 1997; 2006). Abbreviated versions of the physical aggression, social aggression, and prosocial behavior scales were used. The three items used for *social aggression* were: “tried to get others to dislike another child”, “became friends with another child as revenge”, and “encouraged others to bully another child”. The three items used for *physical aggression* were: “physically attacked other children”, “hit, bit, or kicked other children” and “purposely destroyed other children’s things”. Similar three-item scales of physical and social aggression have been used in other studies (Kokko, Tremblay, Lacourse, Nagin & Vitaro, 2006; Vaillancourt et al, 2003; Vaillancourt, Miller, Fagbemi, Côté & Tremblay, 2007). Moreover, an exploratory factor analysis on these six aggression items yielded a two-factor solution with an Eigenvalue over one. The three physical aggression items loaded on the first factor, which explained 53% of the total variance, whereas the three social aggression items loaded on the second factor, which explained 23% of the

total variance. The three items used for *prosocial behavior* were: "volunteered to clean up a mess that someone else has made", "comforted a child who was crying or upset", and "helped other children who were feeling sick". These three items were chosen based on the strongest factor loadings from a study on the validity of the full prosocial behavior scale (Tremblay, Vitaro, Gagnon, Piché & Royer, 1992), and similar restricted scales have been used in other studies (Crick, 1996; Lamarche et al., 2007).

Teachers were asked to indicate how frequently the child had displayed each behavior during the past three months. Response scales ranged from 0 (never), 1 (sometimes), to 2 (often). For each behavior, the three respective items were averaged to form a global scale varying between 0 and 2. Reliability was satisfactory with Cronbach's alphas of: α = .88 for physical aggression (*ME* = .20, *SD* = .40); α = .83 for social aggression (*ME* = .17, *SD* = .34); and α = .81 for prosocial behavior (*ME* = .90, *SD* = .50).

In addition to teacher ratings, peer nominations were obtained for the twins' level of social and physical aggression as well as prosocial behavior. For this purpose, booklets of photographs of all the children in a given class were handed out. Classroom size ranged from 5 to 26 pupils (*ME* = 15.2, *SD* = 3.1), with a minimum of 70% of children in a given class participating in the peer nomination procedure. Two research assistants ensured that all children recognized the photos of all their classmates by presenting them individually. The children were then asked to circle the photos of up to three children who best fit a behavioral descriptor. On the following page, children were asked to circle the faces of up to three children who best fit another behavioral descriptor, and so forth. Two behavioral descriptors were used for *social aggression* ('tells others not to play with a child' and 'tells mean secrets about another child') and two others for *physical aggression* ('gets into fights' and 'hits, bites, or kicks others'). One item was also used to index *prosocial behavior* ('shares toys'). For each behavior scale, the total number of nominations received for the respective descriptors was

calculated for each child and *z*-standardized within classroom to account for differences in classroom size (*M* = -.16, *SD* = .70, Cronbach's alpha = .62 for the total social aggression score; *M* = -.13, *SD* = .80, Cronbach's alpha = .87 for the total physical aggression score; and *M* = .03, *SD* = .97, for the total prosociality score).

Teacher and peer reports of the different child behaviors were positively, albeit modestly, correlated with each other (*r* = .32 for social aggression, *r* = .52 for physical aggression, and *r* = .14 for prosociality). The low concordance between teacher and peer reports of prosociality is in line with previous findings showing considerably lower interrater concordance for prosociality than for other types of behaviors such as aggressive behavior (Crick, 1996; Junttila, Voeten, Kaukiainen & Vauras, 2006; Renk & Phares, 2004; Tremblay, Vitaro, Gagnon, Piché & Royer, 1992). However, because the perspectives of both raters provide important and complementary information about the behavioral characteristics of each child, teacher and peer ratings were *z*-standardized in the study sample to create a common scale and then combined into global scores of social aggression, physical aggression, and prosociality, respectively.

Social preference in the peer group. Participants' social preference in the peer group (i.e., an index of sociometric popularity) was assessed through peer nominations. Using the same booklets as for the behavioral descriptors, the children in the class were asked to circle the photos of three classmates they liked most to play with (positive nominations) and three classmates they least liked to play with (negative nominations). Again, a different page was used for each item descriptor to avoid confusion. The total number of positive and negative nominations, respectively received by each twin were calculated and *z*-standardized within classroom to account for variability in classroom size (Coie, Dodge & Coppotelli, 1982). .A composite score of peer social preference was then created by subtracting negative nominations from positive nominations, which was again *z*-

standardized within the classroom. A higher score on this variable thus indicates more popularity in the peer group and a lower score indicates more rejection (Coie et al., 1982).

Results

Preliminary Analyses

Correlations between the study variables, derived from a multivariate within twin-pair correlation matrix, are presented in Table 1. As can be seen, physical aggression was positively correlated with social aggression and negatively correlated with prosocial behavior and social preference among peers. Social aggression was also negatively correlated with social preference and prosocial behavior. In turn, prosocial behavior was positively correlated with social preference. Finally, social preference, prosociality as well as social and physical aggression were all positively related to resource control. Compared to girls, boys were less popular, less prosocial and more physically and socially aggressive. No sex difference emerged with regard to resource control.

Main Analyses

Using multi-level regression analyses with the Mplus Version 6 software package (Muthén & Muthén, 1998–2010), we next examined the additive and interactive effects of child sex, social aggression, physical aggression, prosociality, and social preference on children's extent of resource control. In a two-level model, a hierarchy consists of lower-level observations (i.e., level 1 unit of analysis) nested within higher-level observations (i.e., level 2 unit of analysis). In the context of the present study, each individual child (level 1) is nested within a twin pair (level 2). Level 1 predictors were included as fixed effects. A series of consecutive models of increasing complexity were estimated where each subsequent model was compared to the preceding one to evaluate whether the inclusion of additional predictors provided a better fit to the data. Goodness of fit for each model was evaluated based on the –2log likelihood estimate and a likelihood ratio test was used to evaluate the difference in fit between subsequent models. The Likelihood ratio test is equivalent to a standard

nested χ^2-difference test in structural equation modeling (Purcell, 2002). For each model, the fixed effects of the predictor variables, the level 1 and level 2 variance parameters, the model fit (i.e., –2log likelihood), and the likelihood ratio are provided. To facilitate interpretation and to minimize problems due to multicollinearity in the regression analyses with multiple interaction terms, all of the study variables except sex were *z*-standardized within the study sample prior to creating interaction terms. As a consequence, the effect sizes of the fixed effect regression parameters are interpretable in a similar way as standardized regression parameters in OLS regression. Table 2 presents the results from the first series of multilevel analyses predicting resource control. For each model, the level 1 and the level 2 variances, the model fit and the likelihood ratio as well as the fixed effects of the predictor variables added to each model are provided.

The first model (Model 1) was the unconditional model that did not include any predictors and that served as the comparison for the following model (i.e., Model 2). Model 2 included the level 1 (i.e., child-specific) predictors as main effects. As can be seen, higher levels of social preference (b = .13, p < .001), of prosocial behavior (b = .10, p < .05), and of social aggression (b = .15, p < .001) were all related to a higher level of resource control. In contrast, child sex and physical aggression were not uniquely related to resource control. In the next model (Model 3a), we included two interaction terms (i.e., “prosociality x social aggression” and “prosociality x physical aggression”). None of these interaction effects were significantly associated with resource control, however. In the next model (3b), we removed the previous nonsignificant interaction terms and instead included the quadratic terms of social aggression and physical aggression, respectively. The results still showed a significant linear effect (b = .15, p < .05, not shown in the table), but no quadratic effect, of social aggression. For physical aggression, however, there were both a significant linear effect (b = .17, p < .05, not shown in the table) and a quadratic effect (b = -.06, p < .05) on resource control.

In the following model (Model 4a) we kept the quadratic terms of social and physical aggression of the previous model (Model 3b) and examined the potential moderating effect of social preference on the linear effect of prosociality. The interaction "popularity x prosociality" was not significant. In an alternative model (Model 4b), we tested the potential moderating effect of social preference on the linear and quadratic effects of social and physical aggression. For this purpose, we added the two-way interactions "popularity x linear social aggression", "popularity x linear physical aggression" "popularity x quadratic social aggression", and "popularity x quadratic physical aggression". The results showed no moderating effect of social preference on the linear or quadratic effects of physical aggression. However, both the linear effect (b = -.13, p < .05) and the quadratic effect (b = .07, p < .05) of social aggression on resource control varied significantly by level of social preference. In another alternative model (not shown in Table 2 for parsimony), we tested the potential moderating effect of sex on the linear and quadratic effects of social and physical aggression. Finally, we also tested potential triple interactions between sex, social preference, and the linear and quadratic effects of prosociality and social and physical aggression. None of these interactions were significant.

Figure 1 illustrates the curvilinear effect of physical aggression on resource control. As can be seen in Figure 1, the use of very modest levels of physical aggression facilitated resource control. At higher levels of physical aggression, however, children's chances of accessing the limited resource diminished drastically. A very different pattern emerged for social aggression, however. Figure 2 illustrates the curvilinear effect of social aggression for disliked children (social preference at 1 SD below the mean), for moderately liked children (social preference at the mean), and for well liked children (social preference at 1 SD above the mean). As shown in Figure 2, if used moderately, social aggression facilitated resource access somewhat for disliked children. Higher levels of social aggression did not lead to more resource control for disliked children, but it did not hamper their

resource control either. In contrast, no such "threshold effect" of social aggression was found for moderately liked children and for highly liked children. The more socially aggressive these children were, the more likely they were to control the resource.

Discussion

The present study had four major goals: First, to test whether the predictive effects of aggression (while distinguishing between physical and social subtypes) and prosocial behavior on resource control are multiplicative (i.e., interactive) rather than additive; second, to investigate whether (physical and social) aggression has a linear or a curvilinear effect on resource control; third, to examine the potential moderating role of social preference in this context. Finally, potential moderating effects of child sex were also tested. It was expected that aggression may be adaptive for controlling access to a rare but attractive resource if it is coupled with high levels of prosocial behavior and used moderately, not extremely. In other words, we expected that there would be a curvilinear rather than a linear effect of aggression on resource control and that this curvilinear effect would interact with prosocial behavior, such that moderate levels of aggression (especially social aggression) together with high levels of prosocial behavior should yield greatest access to the resource. Furthermore, any predictive effect of physical aggression on resource control was expected to be observed more for well liked than for disliked children and more for boys than for girls. The results supported some, albeit not all of these hypotheses.

The Success of Prosociality and Social Aggression and the Failure of Physical Aggression in Gaining Resource Control

Not surprisingly, and in line with other studies (Charlesworth, 1996; Charlesworth & LaFreniere, 1983; Hawley, 2002; LaFreniere & Charlesworth, 1987), prosocial behavior was related to more resource control. Prosocial children not only take initiative during social interactions but they also use highly effective strategies such as reciprocal altruism, where a child begins to help

another with the expectation that the other will reciprocate the friendly gesture (Trivers, 1971). As a result of these positive behaviors, prosocial children are not only highly successful in achieving resource control but also very well liked by others (Hawley, 2002). Controlling for prosociality, the results also revealed that aggressive behavior can be effective for gaining access to the limited resource. The effectiveness of aggressive behavior, however, depends on the specific type of aggression. Indeed, only social aggression afforded greater resource control in our sample. In contrast, while a very modest level of *physical aggression* seemed to facilitate resource control somewhat, children's chances of gaining access to the Movie Viewer were drastically reduced when physical aggression exceeded a low level. *Social aggression* allows pursuing egoistic goals while often maintaining at least an appearance of niceness (Underwood, 2003). As a consequence, social aggression is not only deemed more acceptable and is less frequently punished than physical aggression (Colwell et al., 2002; Werner et al., 2006); it has also been shown to offer tangible social rewards such as increased perceived popularity and the receipt of positive attention by peers (Cillessen & Mayeux 2004; Leadbeater et al., 2006). It is thus not surprising that children who employ social aggression have considerable power in controlling group processes.

The present findings emphasize the importance of distinguishing the effects of physical and social forms of aggression and provide further evidence that social but not physical aggression may be an efficacious tool for increased resource control. From a phylogenic perspective, aggressive behavior generally conveys a developmental advantage that evolved through natural selection. Old phylogenetic patterns such as the flight-fight reaction paid off developmentally as a quick and protective reaction from danger. However, with the emergence of social group living, individuals' impulsive and aggressive behavior endangered social relationships and jeopardized the social system. Correspondingly, in most social groups an individual's obvious, direct aggressive behavior is classified as undesirable and penalized. Therefore, less obvious aggressive strategies, although

undesirable from a moral perspective, may still be successful in order to control resources. Our findings thus lend further support to the notion that not all forms of aggression are necessarily an indicator of low *social competence* (Sutton, Smith & Swettenham, 1999). In fact, several studies have shown that social (but not physical) aggression is related to elevated socio-cognitive skills in children, particularly to measures of social intelligence, theory of mind, and moral understanding (Gasser & Malti, 2012; Renouf et al., 2010). As suggested by Gasser and Malti (2012), children with high levels of social aggression may use their advanced social cognitive skills for strategic purposes, and these skills may be especially relevant when competing for access to limited resources as in the present study.

Contrary to expectations, findings showed that social aggression and prosocial behavior combine *additively*, not interactively, in predicting increased resource control. In other words, while a bistrategic approach employing both social aggression and prosociality still affords the best chances of accessing limited resources, a monostrategic behavior involving social aggression also seems to afford some measure of success in this regard. It is possible, however, that monostrategic behaviors that are entirely based on social aggression are more effective at a young age, when such behavior is not yet as common as in older children and is most likely to be used by children with advanced socio-cognitive skills such as social intelligence, theory of mind, and moral understanding (Gasser & Malti, 2012; Renouf et al., 2010). At later ages, social aggression may need to be coupled with prosocial behavior in order to guarantee privileged access to limited resources. Further research is needed to examine potential age differences in this context.

The Role of Social preference in Resource Control

Controlling for children's behavior, our results suggest that children who are liked by others may also gain access to the resource solely by virtue of their high social status in the group. At least for some children, recourse to prosocial or socially aggressive behavioral strategies may thus not be a

necessary prerequisite to enjoy social or material advantages. This finding is in line with anthropological and primate research (de Waal, 1982; Van Vugt, 2006). Human and nonhuman primates regulate social exchange processes through more or less subtle signals. Relative stable relationships and hierarchies fulfill an important economical function. Specifically, as the formation of alliances and the distribution of power are marked by these signals, it becomes evident for all group members who do not have to renegotiate their relative status during every interaction. Thus, highly accepted children may simply not need to make the extra effort to be aggressive or cooperative in order to gain access to the resource. For these children, characteristics other than aggressive or prosocial behavior may contribute to resource control. For example, in girls there is evidence that external characteristics such as attractiveness or affluence are strongly related to social dominance and a high status in the peer group (de Bruyn & Van den Boom, 2005; Lease et al., 2002). Furthermore factors like language skills, social intelligence and the capacity of establishing and maintaining effective alliances may also be requisites to achieving a central position in the group (Gertner, Rice & Hadley, 1994). These characteristics may not only have contributed to children's social preference but also explain at least in part well liked children's access to the limited resource in our sample.

As expected, social preference in the peer group was not only directly related to increased access to the limited resource, but it also moderated the relative role of aggression in this regard. Contrary to hypotheses, however, it was social aggression that was moderated by social preference, whereas physical aggression impeded rather than fostered resource access. Specifically, for *disliked children*, resource access was facilitated somewhat when they were moderately socially aggressive. Higher levels of social aggression were of no further benefit in this regard, although a high level of social aggression did not notably impede disliked children's resource control, either. In contrast, no such threshold effect of social aggression was found for *moderately or highly liked children*. The

more socially aggressive these children were, the more likely they were to control the resource. One possible explanation is that social aggression may be more socially acceptable when displayed by children with high social preference. In line with this notion, elementary-school aged children have been shown to evaluate and respond to well liked children's aggressive behavior less negatively than when the same behavior is displayed by disliked children (Hymel et al., 1990). Similarly, Jones, Manstead and Livingstone (2012) showed that children who like their peers well continue to do so even when their peers behave negatively. This favorable reputational bias may compel well liked children to use socially aggressive strategies more often in competitive situations, simply because they may so easily 'get away with it'. Alternatively, it is also conceivable that there are qualitative differences in the socially aggressive behavior of well liked and disliked children. Perhaps the former use more subtle and covert strategies than the latter, which may convey significant advantages in complex social situations that involve competition for resource control. More research exploring such possible qualitative differences is needed.

In sum, in line with theoretical perspectives of resource control (Bukowski, 2003; Hawley, 2002; Prinstein & Cillessen, 2003), the results from the present study provide further evidence for the effectiveness of both prosocial and aggressive behavior for gaining access to a limited resource. In terms of aggressive behavior, however, our results suggest that its usefulness may depend on the specific type of aggression used, who uses it, and to what extent it is used. The counterproductive effect of intermediate and high levels of physical aggression and the critical threshold effect of social aggression in disliked children clearly support the notion of a curvilinear role of aggression (Bukowski, 2003; Prinstein & Cillessen, 2003). Our findings thus provide an extension of previous theoretical propositions by demonstrating the importance of distinguishing between physical and social aggression and of considering the moderating role of social preference for understanding dominance and resource control. A final point that deserves mentioning concerns the role of child

sex in the link between behavior and resource control. In line with findings from other studies (e.g., Fabes & Eisenberg, 1998; Ostrov & Crick, 2007), the girls in our sample were on average more prosocial but less physically and socially aggressive than boys. Despite such mean differences, and contrary to expectations, the predictive associations of these variables with resource control did not vary by child sex. It is possible that the specific context of the MV situation or a potential lack of statistical power to detect significant triple interactions involving sex may explain the lack of sex moderation in the present study. More research is needed to examine whether the associations examined in the present study vary between girls and boys.

Strengths, Limitations, and Conclusions

The present study has a number of positive features. First, the distinction between physical and social aggression improves our understanding of the relation between aggression and social competence and sketches a more differentiated picture of the role of different forms of aggression in resource control. Second, this study combines the concept of resource control with the concept of social preference and investigates curvilinear effects of aggression. Third, the direct observation of resource control in the Movie Viewer increases the internal validity of this study.

Despite the strengths of the present study, some limitations need to be pointed out along with suggestions for future research. The first point refers to the fact that information on children's aggressive and prosocial strategies was not based on their specific behavior in the Movie Viewer situation but was instead derived from teacher and peer ratings. This decision was based on the desire to examine how children's generalized behavioral tendencies across a variety of situations would predict resource control in a specific social context based on a variety of perspectives. Nevertheless, future research should assess whether these predictive associations are mediated by observed situation-specific behavioral strategies. It would also be useful to examine whether similar findings are obtained when using other sources (e.g., mother reports or self-reports) for assessing

children's aggressive and prosocial behavior. Aggressive behavior reflects, in part, children's socio-cognitive and socio-moral abilities as well as socio-emotional regulation. The investigation of these factors, along with other social-cognitive and social-emotional dimensions was beyond the scope of the current study. However, we believe that this could be a fruitful area of research. A further limitation refers to the ecology of the movie viewer situation, as the effectiveness of different resource control strategies may depend on the demands of the specific task. The Movie Viewer task is characterized by the absence of mediating adults and a limited interaction duration. Thus, the Movie Viewer situation represents only a snap-shot of the child's behavior in a competitive-cooperative situation. Furthermore, the very constrained context of the Movie Viewer task cannot be generalized to the standing in the group. In contrast, everyday life social interactions typically involve longer series of interactions (Wettstein & Jakob, 2010) and potential negative effects of social aggressive strategies may be buffered by reconciliation and peacemaking (Pellegrini, 2008). Therefore it is important to study these complementary processes alongside social aggression in longitudinal research designs (Roseth et al., 2011). In addition, it should be noted that friendship group processes, where pre-defined boundaries may exist between group membership / non-membership, cores, and cliques, were not explicitly explored in the present study. Investigating such friendship group processes would be important in future research. Finally, caution needs to be exercised in trying to generalize the present results to other samples, sociocultural contexts or beyond the assessed age. We used a twin sample and the results may not necessarily generalize to children issued from single births. However, comparisons between the twin children with their friends and non-friends participating in the MV situation showed no differences in regard to resource control or in regard to aggressive or prosocial behavior. Other research has also shown no difference between twin samples and singleton samples with respect to social-psychological adjustment (e.g., Pulkkinen et al., 2003). It should be kept in mind, however, that the associative patterns found in this

study are comparable to those observed in other studies based on singleton samples. Another limitation concerns the fact that our results are limited to the specific developmental period of early childhood and strategies may differ when children grow older. Linear relationships, especially in regard to those found with regard to the predictive effect of prosocial behaviour, might become non-linear with further development. With age, highly prosocial individuals might increasingly chose to refrain from controlling resources, perhaps because they think it is unfair, or because they strongly sympathize with others who do not have access to resources. Further research might address the question whether the patterns of prosocial and aggressive strategies in resource control are the same in older samples.

Notwithstanding these limitations, the present study illustrates the effectiveness of emerging prosocial and social aggressive strategies for social and material gains in kindergarten children. Although modest in magnitude, the results demonstrated significant additive effects of high prosociality and social aggression in resource control while highlighting the particular interactive effect between social preference and social aggression.

Children who engage primarily in social aggression – while avoiding physical forms of aggression – may be highly successful in resource control and have therefore little motivation to suppress this effective strategy. This poses a challenge for pedagogical praxis since deterring these children from using social aggression may be difficult (Smith, Rose & Schwarz-Mette, 2009). We propose a twofold strategy. On the one hand, rather than punishing social aggression, educational strategies that promote specifically the use of equally effective prosocial strategies might prove to be successful with these children over the long term. On the other hand, as pointed out by Sutton, Smith and Swettenham (2001), instead of trying to suppress individual aggressive behavior it may be more promising to attempt modifying social norms as part of the classroom curriculum such that all forms of aggressive behaviors are unlikely to be rewarded. In this regard, evidence suggests that aggressive

behavior is least prevalent in classrooms where both peers and teachers consistently disapprove of aggressive behavior (Henry & Guearra, 2000). Efforts to help teachers provide consistent behavioral feedback may thus prove most effective in reducing aggressive behaviors in all its forms.

Implications for practice and theory

- Psychology has traditionally associated aggression with deficits. The effectiveness of aggressive behavior however, depends on the specific type of aggression.
- Social but not physical aggression is an efficacious tool for increased resource control. Because social aggression is often rather diffuse, it carries a much lower risk of retribution and punishment by adults and by peers than physical aggression.
- Children who engage primarily in social aggression while avoiding physical forms of aggression may be highly successful in resource control and have therefore, little motivation to suppress this effective strategy.
- Rather than punishing social aggression, educational strategies has to promote specifically the use of equally effective prosocial strategies and modify the social norms and the educational settings.

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Table 1

Bivariate Correlations Between Study Variables

		a	b	c	d	e	f
a-	Sex	-	.35***	.12**	-.20***	-.15**	-.04
b-	Physical aggression		-	.68***	-.21**	-.36***	.08*
c-	Social aggression			-	-.09*	-.34***	.13***
d-	Prosociality				-	.34***	.13***
e-	Social Preference					-	.10*
f-	Resource Control						-

Note. n = 682. Sex is coded 0 = girls, 1 = boys. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2

Multilevel Analyses Predicting Resource Control

Model	Predictors	Fixed effect	Standard error	-2Log likelihood (np)	Likelihood ratio (df)
1	Unconditional model			1917.22 (3)	
2				1883.18 (8)	34.04*** (5)
	Sex	.05	.08		
	Social Preference	.13**	.04		
	Prosociality	.10*	.04		
	Social aggression	.15**	.05		
	Physical aggression	.05	.06		
3a				1882.75 (10)	0.43 (2)
	Prosociality x				
	Social aggression	.02	.05		
	Prosociality x				
	Physical aggression	.01	.05		
3b				1878.48 (10)	4.70 ^{T} (2)
	Social aggression^2	.00	.03		
	Physical aggression^2	-.06*	.03		
4a				1878.49 (11)	0.01 (1)
	Social Preference x Prosociality	.00	.04		
4b				1870.42 (14)	8.06 ^{T} (4)
	Social Preference x				
	Social aggression	-.13*	.07		
	Social Preference x				
	Social aggression^2	.07*	.03		
	Social Preference x				
	Physical aggression	.03	.07		
	Social Preference x				
	Physical aggression^2	-.04	.03		

n = 682. Sex is coded 0 = girls, 1 = boys. np = number of parameters, df = degrees of freedom, * $p <$ .05; ** $p <$ .01; *** $p <$ .001; ^{T} = $p <$ .10. Model 2 is compared with the unconditional model (Model 1). All subsequent models are compared with the previous best-fitting model.

Figure 1. Curvilinear Effect of Physical Aggression on Resource Control

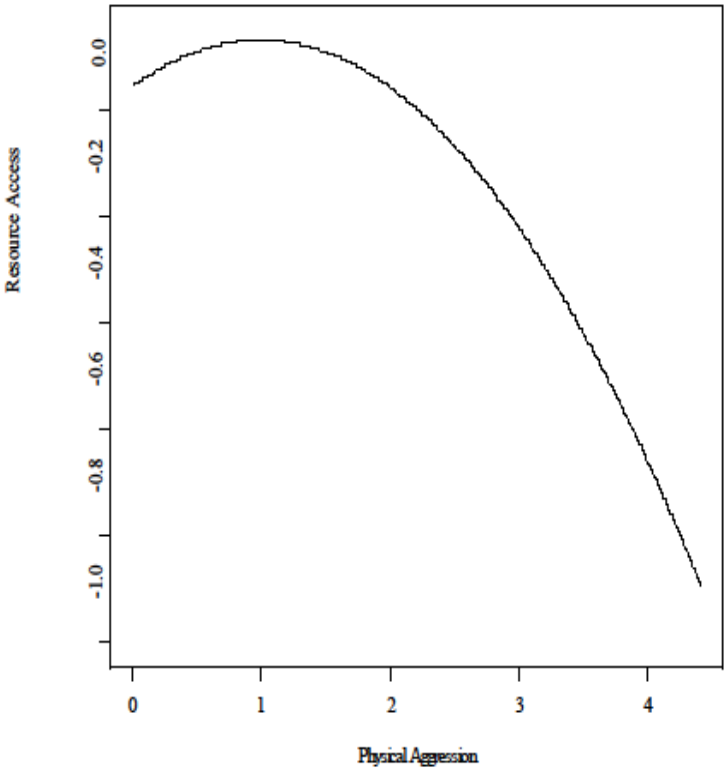

Figure 2. Curvilinear Effect of Social Aggression on Resource Control as Moderated by Social preference