

Trajectories of physical and relational aggression across early childhood: Relations with peer risk factors

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Abstract

The goal of the current study was to examine trajectories of relational and physical aggression in early childhood and evaluate peer predictors of these trajectories (i.e., peer rejection, relational victimization, and physical victimization). The study spanned three-time points (T1 in the spring, T2 in the fall, and T3 in the spring) in early childhood ($N = 300$; 44.0% girls; $M_{\text{age}} = 44.70$ months, $SD = 4.38$; 3.0% African American/Black, 7.6% Asian/Asian American/Pacific Islander, 1.0% Hispanic/Latinx, 11.3% multiracial, 62.1% White, and 15.0% missing/unknown). Observations of peer victimization and teacher report of peer rejection were collected at T1, and teacher report of aggression was collected at all time points. Results from piecewise latent growth models demonstrated that both forms of aggression decreased from T1 to T2 as children entered a new classroom and increased from T2 to T3 as they remained in that classroom. The increase in physical aggression from T2 to T3 was only significant for boys. Peer rejection at T1 emerged as a predictor of both intercepts and slopes from T1 to T2, and physical victimization predicted the physical aggression intercept and physical aggression slope from T1 to T2. Children high on these peer risk variables had higher initial levels of aggression, followed by a greater decrease in aggression from T1 to T2. Results underscore the importance of studying incremental change in aggression in early childhood and suggest that children who experience negative peer treatment have greater fluctuations in aggression over time.

KEYWORDS

early childhood, peer rejection, peer victimization, physical aggression, relational aggression

1 | INTRODUCTION

Children in early childhood experience rapid changes in neurological, biological, social, psychological, and cognitive functioning (Rose-Krasnor & Denham, 2009). Importantly, children are first learning how to navigate peer relations in this developmental period

(Rose-Krasnor & Denham, 2009) and these peer skills set the stage for subsequent academic, psychological, and social functioning even into young adulthood (i.e., Darling-Churchill & Lippman, 2016; Jones et al., 2015). One key behavioral feature of children's peer relationships in early childhood is their aggressive behavior, which is behavior that is harmful to others (Malti & Ruben, 2018). Early childhood is a

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unique time for the development of aggression, as relational aggression is just beginning to develop and physical aggression is still somewhat prevalent (Crick et al., 2006). Physical aggression refers to the intent to hurt, harm, or injure through physical means or the threat of physical harm and includes behaviors such as, hitting, kicking, and biting (e.g., Ostrov et al., 2018). Relational aggression refers to the intent to hurt, harm, or injure through the relationship and includes behaviors such as, malicious ignoring, exclusion, gossip, and friendship withdrawal threats (i.e., "I won't be your friend unless....") Ostrov et al., 2018). Therefore, the current study focused on examining individual change in aggressive behavior across early childhood.

1.1 | Trajectories of aggressive behavior in early childhood

The first aim of the current study was to examine trajectories of relational and physical aggression across early childhood. Researchers have found that physical aggression typically peaks in toddlerhood (i.e., 18–30 months) and then decreases across early childhood (Tremblay, 2000; Vitaro & Brendgen, 2011). Relational aggression is first observable at around 30 months of age (Crick et al., 2006) and becomes more prevalent in middle childhood with a peak in early adolescence (Fite & Pederson, 2018). However, researchers have not previously examined short-term trajectories of change in relational aggression in early childhood. Based on increased cognitive, language, and social capacities, relational aggression should increase across early childhood. Relational aggression and physical aggression have demonstrated variable stability in early childhood within year across teacher and observer reports of behavior (e.g., Doumen et al., 2008; Evans et al., 2019; Perry & Ostrov, 2018). For example, one study found that when examining four time points over 2 years there was evidence of moderate stability for teacher reports of relational aggression ($r = .28, p < .07$) and weak evidence for stability of physical aggression ($r = .17, ns$). For boys, there was weak to moderate evidence for stability of relational aggression ($r = .22, ns$) and stronger evidence for stability of physical aggression in early childhood ($r = .46, p < .01$; Crick et al., 2006). These statistics suggest that aggression may change rapidly across time, context, and rater in this developmental period, emphasizing the need for evaluating short-term change in aggressive behavior to identify optimal periods of intervention. Based on this work it was hypothesized that there would be a linear decrease in physical aggression across early childhood and a linear increase in relational aggression across early childhood when evaluating change across 6-month increments.

1.2 | Peer risk factors and aggressive behavior

Children's peer interactions are a complex phenomenon with peers exerting an influence at multiple levels. At the dyadic level, children can experience negative interactions by being the recipient of

aggression (i.e., peer victimization). There are different forms of peer victimization, where relational victimization is defined as being the recipient of relational aggression and physical victimization is defined as being the recipient of physical aggression (Crick et al., 1999). At the group level, children can be rejected (i.e., a general dislike of the child by the group; Buhs et al., 2006). These dyadic and group-level variables have moderate correlations, suggesting that they are related but distinct constructs (Buhs et al., 2006; Salmivalli & Isaacs, 2005). Therefore, the second aim of the current study was to examine whether relational and physical victimization and peer rejection predicted change in relational and physical aggression.

There is robust literature linking peer victimization to externalizing problems (for a meta-analysis see Reijntjes et al., 2011). The specificity hypothesis of aggression, based in social learning theory, posits that the specific form of victimization is related to the development of that form of aggressive behavior. Children's own interactions with peers impact the behaviors they subsequently use (Ostrov, 2010). If a child experiences relational victimization from a peer, they may model that behavior and be reinforced for that behavior within hostile peer interactions over time (Ostrov, 2010). Children who experience higher levels of relational victimization have more exposure to that behavior over time and therefore, are more likely to model that behavior in subsequent peer victimization experiences. Therefore, it was hypothesized that relational victimization would be related to relational aggression and physical victimization would be related to physical aggression.

Peer rejection has long been identified as a risk factor for aggressive behavior in boys (French, 1988) and may be a better predictor of externalizing problems in early compared to later developmental periods (Ladd, 2006). Most of this prior research does not examine both peer victimization and rejection in the same model. Given the moderate relation between the two constructs (i.e., Bierman et al., 2015; Godleski et al., 2015), it is unclear whether one type of peer treatment drives these effects. It was hypothesized that relational victimization would be related to increases in relational aggression and physical victimization would be related to changes in physical aggression consistent with the specificity hypothesis of aggression (i.e., Ostrov, 2010). There is evidence that peer rejection is a risk factor and consequence of being moderate to high on both forms of aggressive behavior in middle childhood (Ettekal & Ladd, 2015) and therefore, it was hypothesized that peer rejection would predict increases in both forms of aggressive behavior.

1.3 | Gender

Gender has also been identified as an important differentiating factor in trajectories of relational and physical aggression (Fite & Pederson, 2018). Therefore, the third aim of the current study was to determine whether these trajectories and associations varied by gender. Prior research in middle childhood to early adolescence found that the number and type of relational and physical aggression trajectories varies for girls and boys (Ettekal & Ladd, 2015).

Specifically, girls in a high relational aggression group had higher levels of relational aggression than boys in a high relational aggression group (Ettekal & Ladd, 2015). Conversely, boys in a high physical aggression group had higher levels of physical aggression than girls in their respective high physical aggression group (Ettekal & Ladd, 2015). Therefore, it was hypothesized that boys may experience less of a decrease in physical aggression relative to girls, and girls may experience a greater increase in relational aggression relative to boys. Additionally, gender was examined as a moderator of the relations between peer risk factors and change in aggressive behavior. Theoretical models, such as the gender-informed social information processing model (Ostrov & Godleski, 2010), posit that a child's gender identity informs the type of aggression they display. Accordingly, girls may be more likely to respond with relational aggression and boys may be more likely to respond with physical aggression to the same peer stressor. This is in contrast to the specificity hypothesis that posits that the form of victimization may be the most salient risk factor for predicting the type of aggressive behavior displayed (Ostrov, 2010). Therefore, in the peer risk factor model, both types of victimization were included to determine whether there were specificity effects (e.g., relational victimization predicts relational aggression) or nonspecific effects (e.g., relational victimization predicts physical aggression).

2 | METHOD

2.1 | Participants

The longitudinal sample included 300 children (44.0% girls; $M_{\text{age}} = 44.70$ months, $SD = 4.38$) from four cohorts (see Ostrov et al., 2022). The sample was somewhat diverse (3.0% African American/Black, 7.6% Asian/Asian American/Pacific Islander, 1.0% Hispanic/Latinx, 11.3% multiracial, 62.1% White, and 15.0% missing/unknown) and was similar to the larger county from which the sample was drawn (79.3% White, 14.0% Black, 4.5% Asian or Asian American or Pacific Islander, 2.1% multiracial, 5.8% Hispanic or Latinx; US Census Bureau, 2021). Parental occupation was gathered at enrollment and was coded using Hollingshead's (1975) four-factor index 9-point scoring system (i.e., 9 = executives and professionals, 1 = service workers). Parents had the opportunity to enter two occupations, in which case the higher occupation code was taken. Parents' education was not taken and thus was not included in the total factor score. Values ranged from 2 to 9 with a 7.72 average, indicating that a typical family in our sample was from the second to third highest occupation group (i.e., 7 = small business owners, farm owners, managers, minor professionals; 8 = administrators, lesser professionals, proprietors of medium-sized businesses), which suggests our sample was on average, middle to upper middle class. Children were recruited from 10 National Association for the Education of Young Children (NAEYC) accredited or recently accredited early childhood education centers.

Due to the longitudinal nature of the study across school years (i.e., children changed schools for free or reduced-cost universal prekindergarten programs or attended kindergarten in some cases),

missing data were expected. At T2 (fall of year 2), there was missing data for 29.2% of the sample. From T2 to T3 (spring of year 2) retention was strong with only three children missing data (98.6% retention). It was expected that data would be missing at random (MAR) given that missingness was not randomly assigned based on the study design, which is usually necessary to achieve data missing completely at random (i.e., MCAR; Baraldi & Enders, 2010). Therefore, we found sources of systematic missingness within our data set and included those variables in the model to facilitate the maximum likelihood process (Baraldi & Enders, 2010). The MAR assumption was tested using *t*-tests for continuous variables and χ^2 tests for categorical variables to examine if missing data were related to any of the pertinent study variables and the size of this missing data effect. In the event that missing data were related to any of these variables, they were included in the model as covariates (Little, 2013). Missing data were accommodated using full information maximum likelihood (FIML) estimation.

2.2 | Procedures

Data collection began when children were 3–4-years old in the spring in May (Time 1, T1) and for all available participants continued into their prekindergarten year in the fall in December (Time 2, T2) and spring in May (Time 3, T3). Observations of victimization and teacher reports of peer rejection, relational aggression, and physical aggression occurred in the spring (T1). Teacher reports of aggression were subsequently collected for all participating children in the fall (T2) and following spring (T3) approximately a year after the initial data collection. A consent form was distributed to parents at T1. Teacher consent was obtained before teacher report completion. Teachers received \$5–\$30 based on the number of enrolled children in their classrooms. All procedures in the study were approved by the Institutional Review Board (IRB).

2.3 | Measures

2.3.1 | Aggression, peer rejection, and peer acceptance teacher report

At T1, T2, and T3, physical and relational aggression were measured using teacher reports of the physical and relational aggression subscale from the Preschool Social Behavior Scale-Teacher Form (PSBS-TF, Crick et al., 1997). Each scale is composed of six items rated on a 5-point Likert scale (1—*never or almost never true* to 5—*always or almost always true*). The relational aggression subscale included items such as, "This child tells a peer that they won't play with that peer or be that peer's friend unless they do what the child asks." The physical aggression subscale included items such as, "This child hits or kicks others." Items from each subscale were summed to compute a final score. Higher scores indicate greater aggression. The measure has demonstrated acceptable reliability and validity in

previous studies (e.g., Crick et al., 1997). The physical aggression (Cronbach's $\alpha > .86$) and relational aggression (Cronbach's $\alpha > .90$) subscales demonstrated acceptable reliability at all three-time points.

At T1 peer rejection was measured using a revised version of the PSBS-TF (Ostrov et al., 2004). The scale is composed of two items rated on a 5-point Likert scale (1—*never or almost never true* to 5—*always or almost always true*) which were summed to compute a final score. Higher scores indicate greater rejection. The peer rejection scale includes items such as “This child is disliked by same sex peers.” This measure has demonstrated acceptable reliability in previous studies (e.g., Godleski et al., 2015; Ostrov et al., 2004) and was reliable in the current study (Cronbach's α 's = .92).

2.3.2 | Observations of victimization

Observations of relational and physical victimization were collected at T1. Trained undergraduate and graduate research assistants collected systematic naturalistic observations using a focal child sampling with continuous recording procedure as outlined in the early childhood observation system (Ostrov & Keating, 2004). Before classroom entry, observers underwent stringent training by completing readings, discussing behavior via videotape, completing six standard observation sessions using videotape, and passing a written vignette test assessing their knowledge of the constructs. Observers were trained to identify relational and physical aggression and victimization (Ostrov & Keating, 2004). Typically, there were two to three observers per classroom. Observations were undertaken in a 2-month period, with the goal of completing eight, 10-min observation sessions per child. On average, each child had a total of 7.75, 10-min observations at the end of the 2-month period. Observers spent a minimum of 2 days in the classroom before beginning observations to reduce reactivity to their presence and to conduct a live practice reliability session and pass a name test with the trainer. The average reactivity (i.e., child looking at observer, talking to observer, or talking about observer) was 2.82 over the total eight sessions, which suggests that children were minimally reactive or not reactive at all to the observers. Reliability sessions were collected for 16.5% of observations and these sessions demonstrated that observations of physical and relational victimization were at an acceptable level of reliability (Relational victimization ICC = 0.80, Physical victimization ICC = 0.85). To examine peer victimization, a sum of relational and physical victimization was divided by the total number of observations to account for any variability in the total number of observations.

2.4 | Data analysis

Descriptive statistics and zero-order correlations were examined for all study variables. Skewed values were adjusted to ± 3 standard deviations from the mean and skew and kurtosis statistics were assessed. As stated below, a model estimator was used that can handle skewness. Bivariate correlations were examined among all

variables used in the study. Age and cohort were included as covariates in the structural model.

All models were estimated in Mplus version 8.7 (Muthén & Muthén, 1998–2022) using the maximum likelihood with robust standard errors (MLR) estimator to account for any skewness. For all models, model fit was evaluated using the likelihood ratio χ^2 test of overall model fit where $p > .05$ indicates good model fit. Alternative fit indices were also used to determine model fit. The comparative fit index (CFI), where values greater than 0.90 suggest adequate fit and values greater than 0.95 suggest good fit, the standardized root mean-square residual (SRMR) fit index where values less than 0.08 represent adequate model fit and values less than 0.05 represent good model fit, and the root mean square error of approximation (RMSEA) where values greater than 0.10 represent poor fit, values less than 0.08 represent mediocre fit, and values less than 0.05 represent close fit, were considered (Hu & Bentler, 1999). To test comparisons in model fit, the Satorra-Bentler Scaled χ^2 was used.

To examine Aim 1, latent growth modeling (LGM) was used. First, the longitudinal measurement invariance of the relational and physical aggression subscales was examined. In the event that the factor loadings and intercepts were fully or partially invariant across time, a composite of the aggression items at each time point was used as an indicator to estimate the latent growth models. LGM techniques were used to evaluate the average physical and relational aggression trajectories (fixed effects) and the variability in these trajectories (random effects). Change was modeled as a function of timepoint given that data collection was consistent across child. Univariate relational and physical aggression models were tested, followed by a multivariate model with both relational and physical aggression included. Initially, a linear model was specified to the data but given problems with model fit a free-loading model was used, which does not impose a shape on the data (Bollen & Curran, 2006).

The equivalence of the intercept and slope means were tested across gender. Wald tests were used to determine if means differed across gender. Finally, a conditional latent growth model was used to evaluate whether relational victimization, physical victimization, and peer rejection at T1 predicted changes in relational and physical aggression across early childhood using a multigroup analysis. Relational victimization, physical victimization, and peer rejection were time-invariant covariates as they were only measured at T1. The random intercept and slope factors were regressed on the peer risk factors.

3 | RESULTS

3.1 | Preliminary analyses

Bivariate correlations and descriptive statistics for the key variables in the entire sample are provided in Table 1. For the key variables, skew values (0.88–1.51) and kurtosis values (–0.44 to 3.23) were slightly skewed. Gender was considered as a categorical covariate, coded as 1 = boys, 2 = girls. Child gender was related to physical victimization observations at T1 [$F(1, 291) = 7.61$, $p = .006$, adjusted $R^2 = .02$],

TABLE 1 Full sample descriptive statistics and correlations.

	1.	2.	3.	4.	4.	6.	6.	7.	9.	9.
1. Ragg TR T1	—									
2. Pagg TR T1	.54**	—								
3. Peer reject TR T1	.44**	.46**	—							
4. Rvict Obs T1	.12*	.17**	.06	—						
5. Pvict Obs T1	.07	.24**	.07	.27**	—					
6. Ragg TR T2	.43**	.32**	.22**	.10	.01	—				
7. Pagg TR T2	.30**	.60**	.31**	.12	.15*	.49**	—			
8. Ragg TR T3	.53**	.31**	.26**	.08	.05	.60**	.31*	—		
9. Pagg TR T3	.26**	.60**	.25**	.15*	.18**	.28**	.64**	.42**	—	
10. Age (months)	.14*	-.05	.00	-.004	-.18**	.05	-.05	.12	-.02	—
M	9.82	8.85	3.41	0.12	0.22	8.60	7.54	9.92	8.39	44.70
SD	4.61	3.48	1.77	0.16	0.21	3.95	2.48	4.19	3.34	4.38
Range	6.00–23.82	6.00–20.00	2.00–8.76	0.00–0.61	0.00–0.87	6.00–20.87	6.00–16.48	6.00–22.89	6.00–18.74	33.83–61.97

Abbreviations: OBS, observation; Pagg, physical aggression; Peer Reject, peer rejection; Pvict, physical victimization; Ragg, relational aggression; Rvict, relational victimization; T1, Time 1; T2, Time 2; T3, Time 3; TR, teacher report.

* $p < .05$; ** $p < .01$.

relational aggression teacher report at T1 [$F(1, 291) = 8.84, p = .003$, adjusted $R^2 = .03$], and physical aggression teacher report at T1 [$F(1, 291) = 15.71, p < .001$, adjusted $R^2 = 0.05$], T2 [$F(1, 209) = 17.53, p < .001$, adjusted $R^2 = .07$], and T3 [$F(1, 206) = 27.42, p < .001$, adjusted $R^2 = .11$]. At T1, boys had higher physical victimization and lower relational aggression scores than girls. At all three time points, boys had higher physical aggression scores than girls.

In terms of missing data, relational aggression at T1 was related to missing data at T2 [$F(1, 291) = 5.39, p = .02$, adjusted $R^2 = 0.02$] and T3 [$F(1, 291) = 5.67, p = .02$, adjusted $R^2 = .02$], such that children with lower relational aggression scores at T1 were more likely to have missing data at T2 and T3. No other study or demographic variable was related to missing data.

Both the relational and physical aggression scales demonstrated partial longitudinal measurement invariance. For relational aggression, in the metric model the factor loading for item 24 at T3 was freed to provide no difference in model fit with the configural model [$\Delta\chi^2(9) = 11.90, p = .22$] and in the scalar model the intercept for item 12 at T1 was freed to provide no difference in model fit with the metric model [$\Delta\chi^2(8) = 12.43, p = .14$]. For physical aggression, there was no difference between the configural and metric model [$\Delta\chi^2(10) = 5.81, p = .83$] and in the scalar model the intercept for item 4 at T2 was freed to provide no difference in model fit with the metric model [$\Delta\chi^2(8) = 9.20, p = .33$].

3.2 | Longitudinal latent growth curve model

A multivariate model was estimated which included relational and physical aggression in the same model. The constraints from initial univariate models (i.e., the residual variance for relational aggression at T2 was constrained to 0.08 to account for the portion of unreliability in the T2 relational aggression scale) were retained and correlations were allowed between the residual variances for physical

and relational aggression at each timepoint. The model provided a good fit to the data [$\chi^2(4) = 2.95, p = .56$, CFI = 1.00, SRMR = 0.03, RMSEA = 0.00], but the residual variance for physical aggression at T2 was small and nonsignificant ($p = .79$). This residual variance was constrained to 0.13 to account for the portion of unreliability in the T2 physical aggression scale (i.e., Cronbach's $\alpha = .87$). The model with this residual variance constrained provided a good fit to the data [$\chi^2(5) = 3.20, p = .67$, CFI = 1.00, SRMR = 0.02, RMSEA = 0.00] and no difference in model fit with the previous model [$\Delta\chi^2(1) = 0.19, p = .67$]. The model estimated means are presented in Figure 1.

Results demonstrated that there was a significant relational aggression intercept factor mean and variance ($M = 9.93, p < .001$; $\sigma^2 = 10.69, p < .001$) and a significant relational slope factor mean with a nonsignificant variance ($M = -0.38, p = .02$; $\sigma^2 = 0.71, p = .27$). In terms of physical aggression, there was a significant intercept factor mean and variance ($M = 8.88, p < .001$; $\sigma^2 = 8.39, p < .001$) and a significant slope factor mean with a non-significant variance ($M = -0.60, p < .001$; $\sigma^2 = 0.87, p = .11$). The covariances between the relational and physical aggression intercept terms (covariance = 4.46, $p < .001$) and the physical aggression intercept and slope terms were significant (covariance = -1.52, $p = .04$).

The model estimated means appeared to take a U-shaped quadratic effect, such that relational and physical aggression decreased from T1 to T2 when children transitioned into a new classroom and then increased from T2 to T3 as children remained in the same classroom. Therefore, a piecewise latent growth model was examined which allowed for a slope estimate from T1 to T2 and a slope estimate from T2 to T3 for both physical and relational aggression. The slope variances and covariances were constrained to zero given that change was modeled across two timepoints for each slope term. This model provided an acceptable fit to the data [$\chi^2(9) = 20.27, p = .02$, CFI = 0.97, SRMR = 0.06, RMSEA = 0.07], and the model estimated means suggested there was a significant relational aggression ($M = 9.81, p < .001$; $\sigma^2 = 8.88, p < .001$) and

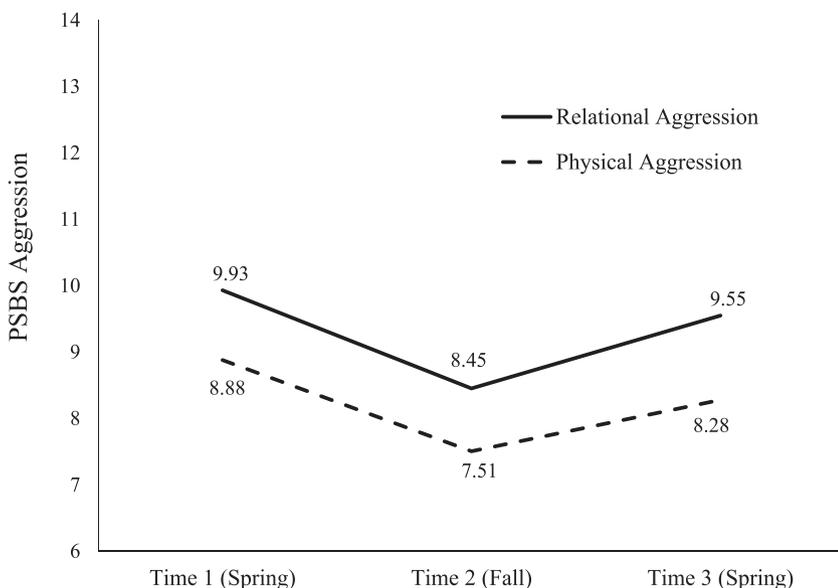


FIGURE 1 Estimated means for relational and physical aggression from the latent growth model in the entire sample. The PSBS aggression subscales are sums of six items and the Y-axis scaling reflects the minimum to approximately one standard deviation above the mean in the sample (6–14). This figure illustrates estimated means from the latent growth model. PSBS, Preschool Social Behavior Scale-Teacher Form.

physical aggression ($M = 8.84$, $p < .001$; $\sigma^2 = 5.05$, $p < .001$) intercept factor mean and variance, a significant decrease in relational aggression ($M = -1.37$, $p < .001$) and physical aggression ($M = -1.33$, $p < .001$) from T1 to T2 followed by a significant increase in relational ($M = 1.30$, $p < .001$) and physical ($M = 0.82$, $p < .001$) aggression from T2 to T3. There was a significant covariance between the relational and physical aggression intercepts (covariance = 3.32, $p < .001$).

As a post-hoc test, we examined whether mean level change differed for relational and physical aggression using Wald tests. There was no difference in change in relational and physical aggression from T1 to T2 [Wald $\Delta\chi^2(1) = 0.01$, $p = .91$], but from T2 to T3 there was a marginally larger increase in relational relative to physical aggression [Wald $\Delta\chi^2(1) = 3.76$, $p = .05$] suggesting that from the fall to the spring of prekindergarten, relational aggression may be increasing at a faster rate than physical aggression.

3.3 | Longitudinal growth model across gender

A multigroup model was examined which allowed the latent growth means to be freely estimated for both girls and boys. Wald tests were used to test whether the means varied by gender. The model provided an acceptable fit to the data [$\chi^2(18) = 46.54$, $p < .001$,

CFI = 0.93, SRMR = 0.09, RMSEA = 0.10]. The intercept varied by gender for relational [Wald $\Delta\chi^2(1) = 8.77$, $p = .003$] and physical [Wald $\Delta\chi^2(1) = 17.42$, $p < .001$] aggression, such that boys had higher physical aggression intercept values than girls (boys: $M = 9.54$, $p < .001$; girls: $M = 7.95$, $p < .001$) and girls had higher relational aggression intercept values than boys (boys: $M = 9.10$, $p < .001$; girls: $M = 10.70$, $p < .001$). The slope from T1 to T2 did not vary by gender for relational [Wald $\Delta\chi^2(1) = 0.74$, $p = .39$] or physical [Wald $\Delta\chi^2(1) = 0.95$, $p = .33$] aggression. The slope from T2 to T3 did not vary by gender for relational aggression [Wald $\Delta\chi^2(1) = 0.47$, $p = .49$] but did vary for physical aggression [Wald $\Delta\chi^2(1) = 7.68$, $p = .005$]. Specifically, for boys, there was a significant increase in physical aggression from T2 to T3 ($M = 1.24$, $p < .001$), but for girls, there was no change in physical aggression from T2 to T3 ($M = 0.29$, $p = .16$). Finally, the covariance between the intercepts did not vary across gender [Wald $\Delta\chi^2(1) = 0.30$, $p = .58$]. See Figure 2 for mean differences for boys and girls.

3.4 | Conditional growth model

A multigroup conditional growth model was specified with the relational and physical aggression intercept and slope variables

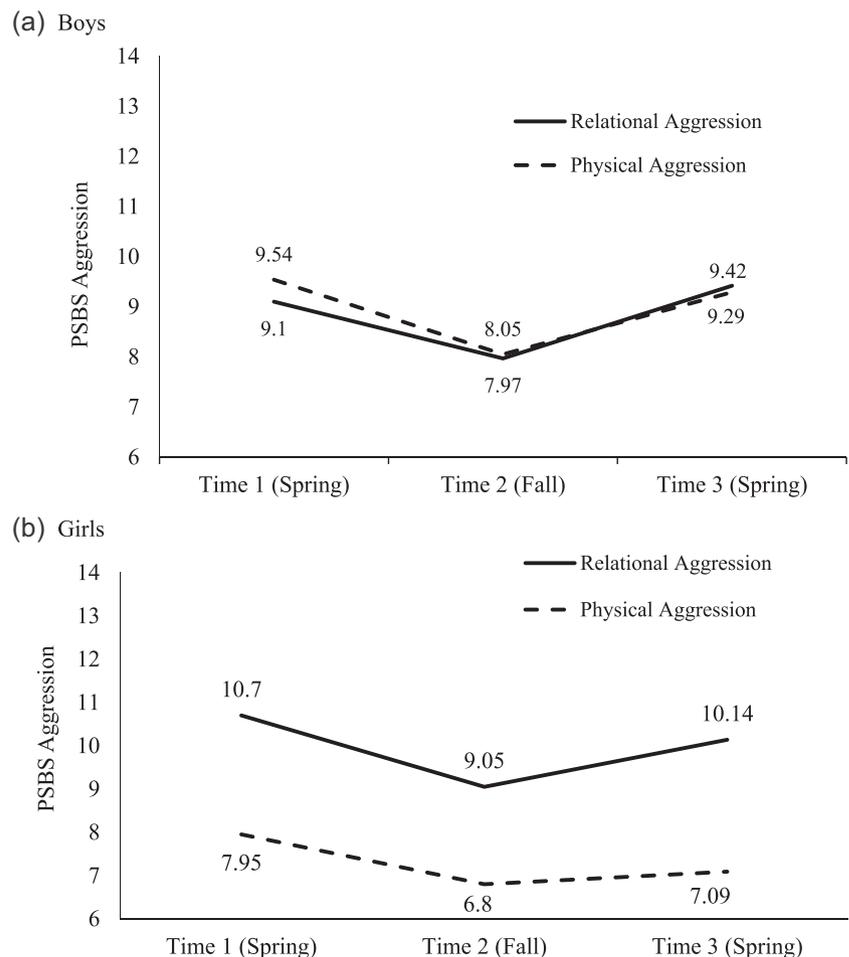


FIGURE 2 Estimated means by gender. (a) Boys. (b) Girls. This figure illustrates estimated means from the latent growth model for boys and girls. PSBS, Preschool Social Behavior Scale-Teacher Form.

regressed on T1 peer risk variables as well as gender and age. The T1 variables were allowed to correlate and were regressed on the covariates. The intercept means and the physical aggression slope mean from T2 to T3 were free to vary across gender but all other means were constrained to equivalence. First, a model with the regression paths free to vary across gender was estimated. The model provided a good fit to the data [$\chi^2(67) = 106.88, p = .001, CFI = 0.95, SRMR = 0.06, RMSEA = 0.06$]. Next, a model with the regression paths constrained to equivalence was estimated. This model provided an acceptable fit to the data [$\chi^2(85) = 138.06, p < .001, CFI = 0.93, SRMR = 0.08, RMSEA = 0.07$], but a significantly worse fit than the previous model [$\Delta\chi^2(18) = 31.09, p = .03$]. The modification index (MI) for the relation between peer rejection and the physical aggression intercept was the highest (MI = 13.58). A model with this relation freed but all other regression paths constrained provided an acceptable fit to the data [$\chi^2(84) = 126.33, p = .002, CFI = 0.94, SRMR = 0.08, RMSEA = 0.06$] and no difference in model fit with the free to vary model [$\Delta\chi^2(17) = 19.23, p = .32$]. See Figure 3 for path estimates.

Age emerged as a predictor of the relational aggression intercept (boys: $\beta = .17, p = .01$; girls: $\beta = .15, p = .01$), such that older children had higher initial levels of relational aggression. Physical victimization at T1 predicted the physical aggression intercept (boys: $\beta = .24, p = .001$; girls: $\beta = .30, p = .001$) and the physical aggression slope from T1 to T2 (boys: $\beta = -.50, p = .03$; girls: $\beta = -.44, p = .03$), suggesting that physical aggression decreases at a faster rate from T1 to T2 for children high on physical victimization at T1. Peer rejection at T1 predicted the relational aggression intercept (boys:

$\beta = .57, p < .001$; girls: $\beta = .54, p < .001$). Peer rejection at T1 was also associated with the physical aggression intercept and was significantly different across gender, with a stronger association for boys (boys: $\beta = .63, p < .001$; girls: $\beta = .51, p < .001$). Additionally, peer rejection at T1 emerged as a predictor of physical aggression (boys: $\beta = -.76, p < .001$; girls: $\beta = -.78, p < .001$) and relational aggression (boys: $\beta = -.75, p < .001$; girls: $\beta = -.75, p < .001$) slope from T1 to T2, suggesting that aggression decreases at a faster rate from T1 to T2 for children high on peer rejection at T1. None of the T1 peer risk variables emerged as a correlate of the aggression slopes from T2 to T3.

4 | DISCUSSION

The goal of the current study was to examine change in relational and physical aggression across early childhood and evaluate peer predictors of these trajectories. To our knowledge, this represents the first investigation of these trajectories using piecewise LGM during this period of development (i.e., approximately 3.5–5 years of age). Results demonstrated that there was a significant decrease in both relational and physical aggression from T1 to T2 followed by a significant increase from T2 to T3. There were gender differences in the intercept factors and the physical aggression T2 to T3 slope factor. Finally, peer rejection emerged as a predictor of both aggression slopes from T1 to T2, and physical victimization emerged as a predictor of the physical aggression slope from T1 to T2.

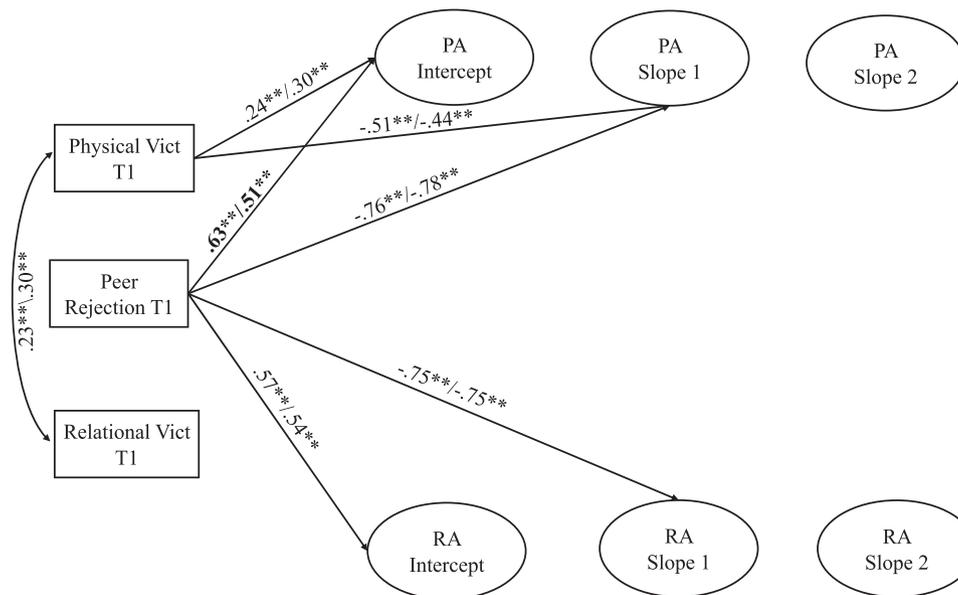


FIGURE 3 Conditional growth model. The coefficients for boys are presented before the diagonal and the values for girls are presented after the diagonal. Aggression and peer rejection are teacher reports, physical and relational victimization are observations. The slope 1 factor reflects change from T1 to T2 and the slope 2 factor reflects change from T2 to T3. Correlations among all peer risk variables and covariates were included, but are only shown if they were significant for ease of interpretation. Age and cohort were controlled. Bolded values indicate a significant difference between boys and girls. * $p < .05$. ** $p < .01$. PA, physical aggression; RA, relational aggression; T1, Time 1; Vict, victimization.

Change in relational and physical aggression in early childhood followed a U-shaped trajectory, with a significant decrease in aggression from T1 to T2 and a significant increase from T2 to T3. The increase in aggression from T2 to T3 was larger for relational relative to physical aggression ($p = .05$), consistent with hypotheses that relational aggression becomes more prevalent at the end of early childhood. Moreover, the increase in physical aggression from T2 to T3 was only significant for boys, congruent with gender-informed models of aggression (Ostrov & Godleski, 2010). This suggests that boys may be at a greater risk for aggression at the end of the preschool period, which has been associated with reduced peer acceptance and higher levels of conflict with teachers as children transition to kindergarten (Gower et al., 2014).

There is limited work that has examined change in aggression over time in early childhood using 6-month increments. Research in middle childhood examining 6-month incremental change found that for girls, there was a marginally significant linear increase over time with an increase in relational aggression within year (i.e., from fall of grade 4 to the spring of grade 4) and then a slight decrease when transitioning into a new classroom (i.e., from the spring of grade 4 to the fall of grade 5; Murray-Close et al., 2007). This work is consistent with findings from the current study as there was an increase in relational and physical aggression within year (i.e., T2–T3) and a decrease when transitioning to a new classroom (i.e., T1–T2). However, in this prior work, boys experienced no change in relational aggression, and physical aggression was not examined (Murray-Close et al., 2007). Based on our findings, it would be beneficial for researchers to consider using 6-month increments instead of yearly assessments when examining change in aggressive behavior. This can help answer questions about how individual child aggression changes within a classroom throughout the school year, which influences the overall classroom environment and has an impact on peer relations and academic focus (Barth et al., 2004). Therefore, even if children return to their initial level of aggression within a year, there may still be a negative impact of their heightened aggression at 6-months through changes to the overall classroom environment.

There are several models, such as the general learning model (see Gentile & Gentile, 2021), and the more specific general aggression model (GAM; see Allen & Anderson, 2017), which emphasize the bidirectionality between person-centered processes and situational processes in the learning process. Specifically, in addition to person-centered processes, a child draws on their previous history in an environment and the current aspects of a situation to determine how to act (Allen & Anderson, 2017; Gentile & Gentile, 2021). In the GAM, after a child has acted, they receive feedback on that action, which influences their knowledge structures that inform their actions in subsequent situations (Allen & Anderson, 2017). Results from the current study suggest that these situational learning factors unfold over time with an increase in aggression within a school year and a return to a baseline person-centered aggression within a new classroom. These findings are aligned with research demonstrating that bully-victim ties are more likely to be present among students in stable classrooms than unstable classrooms, suggesting that chronic victimization and bullying

may develop over time, as children develop knowledge structures related to their current classroom (Rambaran et al., 2019). Research on the transition to middle school suggests that when youth enter a new setting there is a renegotiation of social groups and hierarchies, which may lead to less negative peer treatment, such as less aggression towards peers or exclusion (Shell et al., 2014). The GAM also hypothesizes that long-term changes in personality can occur with repeated learning trials that favor aggression (Allen & Anderson, 2017). If children are exposed to more aggressive classrooms over several years, they may experience a change in their person-centered level of aggression. This once again underscores the importance of having short-term increments in aggressive behavior to determine whether continued 6-month change in aggressive behavior eventually leads to a long-term more stable change.

However, the findings from this study are in conflict with the large extant literature on social dominance theory, which posits that children should display more aggressive behavior after the transition to a new peer context which should then decrease as social hierarchies are established (Pellegrini & Long, 2002). It should be noted that in the current study teacher report at T2 was collected in December, a few months after the initial transition to the new classroom and therefore, aggression may have been elevated immediately after the transition to a new classroom in September. Additionally, the type of assessment may matter in determining the shape of change in aggressive behavior, as teacher perceptions of children's behavior may change across the school year. For example, a three-time point study in kindergarten, found that teacher ratings of child-aggressive behavior at the start of the year (October–December), predicted higher levels of teacher-child conflict in the middle of the year (January–March), which subsequently predicted higher teacher ratings of child aggressive behavior at the end of the year (April–June; Doumen et al., 2008).

4.1 | Peer predictors of aggression trajectories

The second aim of the current study was to examine a model where relational victimization, physical victimization, and peer rejection predict changes in relational and physical aggression across early childhood. A sizable body of prior work has examined relations between these predictors and aggression (e.g., Ettekal & Ladd, 2015; Ostrov, 2010; Reijntjes et al., 2011) and therefore it was expected that these peer risk factors would place children at a greater risk for increases in relational and physical aggression across time. Consistent with a specificity hypothesis of aggression, it was hypothesized that relational victimization would be related to changes in relational aggression and physical victimization would be related to changes in physical aggression (Ostrov, 2010). There was evidence to support this hypothesis, such that physical victimization was related to the physical aggression intercept and the physical aggression slope from T1 to T2 (Ostrov, 2010). However, there was no evidence that relational victimization was associated with the relational aggression intercept or slope, possibly because the incidence of observed relational

victimization events was relatively low in the present study, which may have made it challenging to detect an effect. Contrary to hypotheses, higher levels of physical victimization at T1 were associated with a greater decrease in physical aggression from T1 to T2. Moreover, peer rejection was associated with higher initial levels of relational and physical aggression and a greater decrease in both forms of aggression from T1 to T2. These findings may suggest a regression to the mean, such that children who are initially high on peer risk are also higher on initial levels of aggression (i.e., significant association between peer risk factors and aggression intercepts), move closer to the overall mean of aggression over time and therefore, experience a greater decrease in aggression from T1 to T2. Additionally, children high on peer rejection at T1 may change their behavior over time to address this rejection, resulting in a lower level of aggression at T2. These children may also benefit from a new peer group congruent with research which found that rejected children experience more positive peer treatment and less negative peer treatment when they transition to a new setting (e.g., Shell et al., 2014).

Time 1 peer risk factors did not predict change in aggression from T2 to T3. This suggests that proximal peer predictors may be more influential than a child's history of peer predictors in determining their current level of aggressive behavior. Other work has found evidence for relations between peer victimization and aggression within the same school year and peer context in early childhood (Ostrov, 2010) and in late childhood to preadolescence (Cooley & Fite, 2016; Yeung & Leadbeater, 2007). Therefore, there appears to be more robust evidence for victimization to influence subsequent aggressive behavior within a school year, when the peer group is intact. Future research should evaluate previous and current peer treatment to tease apart these associations.

In accordance with gender-informed models of aggressive behavior, we evaluated gender as a moderator of relations between peer risk factors and aggressive behavior. Results demonstrated that the association between peer rejection at T1 and the physical aggression intercept was moderated by gender such that this positive association was stronger for boys relative to girls. Interestingly, associations between the specific forms of victimization and aggression were not moderated by gender. Peer rejection is a broader, group-level variable that is not composed of specific behaviors. In contrast, peer victimization refers to a set of specific behaviors (e.g., physical victimization occurs when a child is hit, kicked, or pinched). Therefore, modeling can occur when a child is victimized but not when they are rejected. Rejected children may default to their modal forms of aggression, which would be physical aggression for boys (Ostrov & Godleski, 2010), consistent with results from this study.

4.2 | Limitations and future directions

Despite numerous strengths of the study, including the longitudinal design and the use of multiple methods and informants there are a number of important limitations. First, in terms of the piecewise

growth models, the variances of the slope factors had to be constrained to zero to facilitate model identification. Future work should use at least four timepoints of data to address this limitation. The same informant was used to test relations between peer rejection and aggressive behavior, which likely increased the magnitude of these results. Finally, due to the school-based nature of the data collection, missing data were expected given that children frequently change preschools. As was anticipated due to changes in schools or the transition to formal schooling, there was attrition for approximately a third of the sample, but the sample with complete data across all three timepoints was still sizeable ($n = 209$). Missing data were accommodated using FIML, but there is still a possibility that missing data had an effect. In terms of demographic sample limitations, children were recruited from high quality childcare centers. The sample was representative of the broader county, but was not particularly diverse and was middle to upper-middle class. Additionally, the sample was typically developing, and therefore, results are not necessarily generalizable to other geographic regions or other groups.

Given the findings from this novel study, more research is needed to determine the shape of change in aggression in early childhood and disentangle the impact of peer factors on aggressive behavior. First, future research should include more time points when assessing change in aggression across early childhood. It would be helpful to examine children's aggression right as they enter a new classroom and then follow them through multiple timepoints within the school year and into the next school year. This would allow for researchers to examine how aggression ebbs and flows within and across school years. Additionally, it would be beneficial to have multiple informants and methods of aggression so that factors such as teacher bias in reports could be examined. It would also be beneficial to replicate path analysis results from the current study using a different informant for peer rejection and aggressive behavior because there was shared method variance among these measures. Future research should examine whether significant findings from this study may be better explained by other individual, peer, teacher, or school-level variables. Moreover, future research should address how individual (e.g., physiological factors), dyadic (e.g., friendship), and group (e.g., peer acceptance) level factors interact to confer or buffer risk in the development of aggressive behavior.

4.3 | Conclusions

The overarching goals of the current study were to examine change in relational and physical aggression across early childhood and evaluate peer predictors of these trajectories. Results demonstrated that there was change in aggression over early childhood, such that there was a significant decrease in both forms of aggression from T1 to T2, followed by a significant increase from T2 to T3. Change from T2 to T3 was marginally greater for relational relative to physical aggression and only boys experienced an increase in physical aggression from T2 to T3. Peer rejection at T1 emerged as a predictor

of the intercepts and T1 to T2 slopes for both forms of aggression, and physical victimization emerged as a predictor of the physical aggression intercept and T1 to T2 physical aggression slope. Specifically, children high on these peer risk variables had higher initial levels of aggression, followed by a greater decrease in aggression from T1 to T2. The peer risk variables did not predict a change in aggression from T2 to T3. This work may inform future basic developmental research on the precursors of aggressive behavior and over time this literature may inform future intervention efforts. Specifically, proximal peer factors may be important intervention targets for aggressive behavior and boys may be at an increased risk for physical aggression toward the end of early childhood.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

- Allen, J. J., & Anderson, C. A. (2017). General Aggression Model. In P. Roessler, C. A. Hoffner, & L. van Zoonen (Eds.), *International Encyclopedia of Media Effects*. Wiley Blackwell. <https://doi.org/10.1002/9781118783764.wbieme0078>
- Baraldi, A. N., & Enders, C. K. (2010). An introduction to modern missing data analyses. *Journal of School Psychology, 48*(1), 5–37. <https://doi.org/10.1016/j.jsp.2009.10.001>
- Barth, J. M., Dunlap, S. T., Dane, H., Lochman, J. E., & Wells, K. C. (2004). Classroom environment influences on aggression, peer relations, and academic focus. *Journal of School Psychology, 42*(2), 115–133. <https://doi.org/10.1016/j.jsp.2003.11.004>
- Bierman, K. L., Kalvin, C. B., & Heinrichs, B. S. (2015). Early childhood precursors and adolescent sequelae of grade school peer rejection and victimization. *Journal of Clinical Child & Adolescent Psychology, 44*(3), 367–379. <https://doi.org/10.1080/15374416.2013.873983>
- Bollen, K. A., & Curran, P. J. (2006). Latent curve models: A structural equation approach. In *Wiley series on probability and mathematical statistics*. Wiley Intersciences.
- Buhs, E. S., Ladd, G. W., & Herald, S. L. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *Journal of Educational Psychology, 98*(1), 1–13. <https://doi.org/10.1037/0022-0663.98.1.1>
- Cooley, J. L., & Fite, P. J. (2016). Peer victimization and forms of aggression during middle childhood: The role of emotion regulation. *Journal of Abnormal Child Psychology, 44*(3), 535–546. <https://doi.org/10.1007/s10802-015-0051-6>
- Crick, N. R., Casas, J. F., & Ku, H.-C. (1999). Relational and physical forms of peer victimization in preschool. *Developmental Psychology, 35*(2), 376–385. <https://doi.org/10.1037/0012-1649.35.2.376>
- Crick, N. R., Casas, J. F., & Mosher, M. (1997). Relational and overt aggression in preschool. *Developmental Psychology, 33*(4), 579–588. <https://doi.org/10.1037/0012-1649.33.4.579>
- Crick, N. R., Ostrov, J. M., Burr, J. E., Cullerton-Sen, C., Jansen-Yeh, E., & Ralston, P. (2006). A longitudinal study of relational and physical aggression in preschool. *Journal of Applied Developmental Psychology, 27*(3), 254–268. <https://doi.org/10.1016/j.appdev.2006.02.006>
- Darling-Churchill, K. E., & Lippman, L. (2016). Early childhood social and emotional development: Advancing the field of measurement. *Journal of Applied Developmental Psychology, 45*, 1–7. <https://doi.org/10.1016/j.appdev.2016.02.002>
- Doumen, S., Verschueren, K., Buyse, E., Germeijs, V., Luyckx, K., & Soenens, B. (2008). Reciprocal relations between teacher-child conflict and aggressive behavior in kindergarten: A three-wave longitudinal study. *Journal of Clinical Child & Adolescent Psychology, 37*(3), 588–599. <https://doi.org/10.1080/15374410802148079>
- Ettekal, I., & Ladd, G. W. (2015). Costs and benefits of children's physical and relational aggression trajectories on peer rejection, acceptance, and friendships: Variations by aggression subtypes, gender, and age. *Developmental Psychology, 51*(12), 1756–1770. <https://doi.org/10.1037/dev0000057>
- Evans, S. C., Frazer, A. L., Blossom, J. B., & Fite, P. J. (2019). Forms and functions of aggression in early childhood. *Journal of Clinical Child & Adolescent Psychology, 48*(5), 790–798. <https://doi.org/10.1080/15374416.2018.1485104>
- Fite, P. J., & Pederson, C. A. (2018). Developmental trajectories of relational aggression. In S. M. Coyne, & J. M. Ostrov (Eds.), *The development of relational aggression* (pp. 49–60). Oxford University Press.
- French, D. C. (1988). Heterogeneity of peer-rejected boys: Aggressive and nonaggressive subtypes. *Child Development, 59*(4), 976–985. <https://doi.org/10.2307/1130264>
- Gentile, D. A., & Gentile, J. R. (2021). Learning from <https://doi.org/10.1017/9781108966511>
- Godleski, S. A., Kamper, K. E., Ostrov, J. M., Hart, E. J., & Blakely-McClure, S. J. (2015). Peer victimization and peer rejection during early childhood. *Journal of Clinical Child & Adolescent Psychology, 44*(3), 380–392. <https://doi.org/10.1080/15374416.2014.940622>
- Gower, A. L., Lingras, K. A., Mathieson, L. C., Kawabata, Y., & Crick, N. R. (2014). The role of preschool relational and physical aggression in the transition to kindergarten: Links with social-psychological

- adjustment. *Early Education and Development*, 25(5), 619–640. <https://doi.org/10.1080/10409289.2014.844058>
- Hollingshead, A. B. (1975). *Four factor index of social status*. Unpublished manuscript, Yale University, New Haven, CT.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1–55. <https://doi.org/10.1080/10705519909540118>
- Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health*, 105(11), 2283–2290. <https://doi.org/10.2105/AJPH.2015.302630>
- Ladd, G. W. (2006). Peer rejection, aggressive or withdrawn behavior, and psychological maladjustment from ages 5 to 12: An examination of four predictive models. *Child Development*, 77(4), 822–846. <https://doi.org/10.1111/j.1467-8624.2006.00905.x>
- Little, T. D. (2013). *Longitudinal structural equation modeling*. Guilford Press.
- Malti, T., & Rubin, K. H. (2018). Aggression in childhood and adolescence: Definition, history, and theory. In T. Malti, & K. H. Rubin (Eds.), *Handbook of child and adolescent aggression* (pp. 3–19). The Guilford Press.
- Murray-Close, D., Ostrov, J. M., & Crick, N. R. (2007). A short-term longitudinal study of growth of relational aggression during middle childhood: Associations with gender, friendship intimacy, and internalizing problems. *Development and Psychopathology*, 19(1), 187–203. <https://doi.org/10.1017/S0954579407070101>
- Muthén, L. K., & Muthén, B. O. (1998–2022). *Mplus user's guide* (8th ed.). Muthén & Muthén.
- Ostrov, J. M. (2010). Prospective associations between peer victimization and aggression. *Child Development*, 81(6), 1670–1677. <https://doi.org/10.1111/j.1467-8624.2010.01501.x>
- Ostrov, J. M., Blakely-McClure, S. J., Perry, K. J., & Kamper-DeMarco, K. E. (2018). Definitions—The form and function of relational aggression. In S. M. Coyne, & J. M. Ostrov (Eds.), *The development of relational aggression* (pp. 13–28). Oxford University Press.
- Ostrov, J. M., & Godleski, S. A. (2010). Toward an integrated gender-linked model of aggression subtypes in early and middle childhood. *Psychological Review*, 117(1), 233–242. <https://doi.org/10.1037/a0018070>
- Ostrov, J. M., & Keating, C. F. (2004). Gender differences in preschool aggression during free play and structured interactions: An observational study. *Social Development*, 13(2), 255–277. <https://doi.org/10.1111/j.1467-9507.2004.000266.x>
- Ostrov, J. M., Murray-Close, D., Perry, K. J., Blakely-McClure, S. J., Perhamus, G. R., Mutignani, L. M., Kesselring, S., Memba, G. V., & Probst, S. (2022). The development of forms and functions of aggression during early childhood: A temperament-based approach. *Development and Psychopathology*, 1–7. <https://doi.org/10.1017/S0954579422000177>
- Ostrov, J. M., Woods, K. E., Jansen, E. A., Casas, J. F., & Crick, N. R. (2004). An observational study of delivered and received aggression, gender, and social-psychological adjustment in preschool: “This White crayon doesn't work”. *Early Childhood Research Quarterly*, 19(2), 355–371. <https://doi.org/10.1016/j.ecresq.2004.04.009>
- Pellegrini, A. D., & Long, J. D. (2002). A longitudinal study of bullying, dominance, and victimization during the transition from primary school through secondary school. *British Journal of Developmental Psychology*, 20(2), 259–280. <https://doi.org/10.1348/026151002166442>
- Perry, K. J., & Ostrov, J. M. (2018). The reciprocal relations between female and male play partners and aggression in early childhood. *Child Development*, 90(1), 127–135. <https://doi.org/10.1111/cdev.13178>
- Rambaran, J. A., van Duijn, M. A. J., Dijkstra, J. K., & Veenstra, R. (2019). Peer victimization in single-grade and multigrade classrooms. *Aggressive Behavior*, 45(5), 561–570. <https://doi.org/10.1002/ab.21851>
- Reijntjes, A., Kamphuis, J. H., Prinzie, P., Boelen, P. A., van der Schoot, M., & Telch, M. J. (2011). Prospective linkages between peer victimization and externalizing problems in children: A meta-analysis. *Aggressive Behavior*, 37(3), 215–222. <https://doi.org/10.1002/ab.20374>
- Rose-Krasnor, L., & Denham, S. (2009). Social-emotional competence in early childhood. In K. H. Rubin, W. M. Bukowski, & B. Laursen (Eds.), *Social, emotional, and personality development in context. Handbook of peer interactions, relationships, and groups* (pp. 162–179). The Guilford Press.
- Salmivalli, C., & Isaacs, J. (2005). Prospective relations among victimization, rejection, friendlessness, and children's self- and peer-perceptions: peer adversities and self- and peer-perceptions. *Child Development*, 76(6), 1161–1171. <https://doi.org/10.1111/j.1467-8624.2005.00841.x-i1>
- Shell, M. D., Gazelle, H., & Faldowski, R. A. (2014). Anxious solitude and the middle school transition: A diathesis × stress model of peer exclusion and victimization trajectories. *Developmental Psychology*, 50(5), 1569–1583. <https://doi.org/10.1037/a0035528>
- Tremblay, R. E. (2000). The development of aggressive behaviour during childhood: What have we learned in the past century? *International Journal of Behavioral Development*, 24(2), 129–141. <https://doi.org/10.1080/0165025000383232>
- U.S. Census Bureau. (2021). *QuickFacts Erie County*. New York. <https://www.census.gov/quickfacts/eriecountynewyork>
- Vitaro, F., & Brendgen, M. (2011). Subtypes of aggressive behaviors: Etiologies, development and consequences. In T. Bliesener, A. Bellmann, & M. Stemmler (Eds.), *Antisocial behavior and crime: Contributions of theory and evaluation research to prevention and intervention* (pp. 17–38). Hogrefe.
- Yeung, R. S., & Leadbeater, B. J. (2007). Does hostile attributional bias for relational provocations mediate the short-term association between relational victimization and aggression in preadolescence? *Journal of Youth and Adolescence*, 36(8), 973–983. <https://doi.org/10.1007/s10964-006-9162-2>

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