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Testing a Higher Order Model of Internalizing and Externalizing Behavior: The Role of Aggression Subtypes

Kristin J. Perry¹ · Jamie M. Ostrov¹

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Abstract This study assessed how the forms and functions of aggression fit into a higher order model of internalizing and externalizing behavior, for children in early childhood ($N=332$, M age=47.11 months, $SD=7.32$). The lower order internalizing factors were depressed affect, anxious-fearfulness, and asocial behavior (i.e., social withdrawal) and the lower order externalizing factors were deception and hyperactivity. The forms and functions of aggression were crossed to create four factors: reactive relational, reactive physical, proactive relational, and proactive physical aggression. Seven confirmatory factor models were tested. Results supported a two-factor externalizing model where reactive and proactive relational aggression and deception loaded on one externalizing factor and reactive and proactive physical aggression and hyperactivity loaded on another externalizing factor.

Keywords Early childhood · Factor analysis · Relational aggression · Physical aggression · Child psychopathology

Introduction

The internalizing and externalizing behavior constructs are often used to measure type and severity of behavior problems in typical and atypical populations and may be the most uniform classification of psychopathology across all developmental periods, including early childhood [1].

There has been a wide consensus among researchers on the existence of the broadband internalizing and externalizing constructs from early childhood into adulthood [1, 2]. These constructs are used among researchers, educators, and practitioners in a number of different domains to compute an index of problem behavior for children. Internalizing behavior problems can be operationalized as a lack of control that is internal in nature, including anxiety, depression, feelings of inferiority or worthlessness, social withdrawal, and dependency [1, 3]. Externalizing behavior problems can be operationalized as behavior that is directed outward and comprises behaviors such as delinquency, aggression, irritability, and rule breaking, which often cause problematic interactions with others [1, 3].

Research has consistently found a high comorbidity rate between internalizing and externalizing behavior problems and generally studies of the hierarchical structure of behavior problems have postulated a two factor co-occurring model of internalizing and externalizing behavior [1, 3]. Researchers have proposed a hierarchical lifespan theory of the internalizing and externalizing spectra, where disinhibition distinguishes between internalizing and externalizing behavior and negative affect accounts for co-occurrence among internalizing and externalizing behavior [4]. There are three principles of this theoretical framework, where cumulative risk influences the level of internalizing and externalizing behavior a child exhibits, internalizing and externalizing behavior predict the level of a child's adaptive functioning, and symptoms of psychopathology are a result of a child's level of risk on the normal distribution of internalizing and externalizing behavior [4]. This lifespan theory of the internalizing and externalizing spectra of behavior presents two future directions that are pertinent to the current study. First, the authors posit that future

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research should focus on identifying lower level facets of the broadband internalizing and externalizing spectra [4]. Second, the authors recommend that the hierarchical model be tested for developmental coherence [4]. This study strives to address these points by examining novel lower order facets, such as the forms and functions of aggression and deception in early childhood, a developmental period where there is limited research on the structure of psychopathology.

The current research on internalizing and externalizing behavior has generally conceptualized aggression as a unidimensional construct evaluated by measures of physical aggression. Traditional broadband aggression measures such as the Child Behavior Checklist [CBCL; 5], address some aspects of physical aggression, but neglect relational aggression and the function of the aggressive behavior. Decades of research has elucidated that aggression is a multidimensional construct that includes both the forms and functions of aggression [6–8]. Specifically, researchers have suggested that by ignoring relational aggression in the study of externalizing behavior, there may be an underreporting of externalizing behavior problems, particularly for females, who may engage in relationally aggressive forms of behavior more and physically aggressive behaviors less [6, 7]. No research to date has evaluated how the functions of aggression may fit into an internalizing and externalizing behavior model. As we discuss below, this is particularly problematic because there is evidence that when aggression is measured as a multidimensional construct, the forms and functions of aggression may not always align exclusively with other externalizing behaviors. The goal of this paper was to evaluate models of co-occurring internalizing and externalizing behavior that includes the subtypes of aggression for typically developing children in early childhood (i.e., in the present study 3–5 years-old) to give researchers the tools to more effectively examine trajectories, predictors, and outcomes of behavior problems throughout childhood.

Most of the literature examining the structure of child psychopathology has done so with children in middle childhood, preadolescence, or adolescence, and findings from these studies are often generalized to other developmental periods, such as early childhood [1, 9]. It is important to study the structure of behavior problems in early childhood because this developmental period is a unique time for behavior development as many children are engaging and interacting with peers (a voluntary and horizontal relationship structure) for the first time [10] and children in early childhood are more malleable and develop new behavior at a faster rate than children in middle childhood and adolescence [1]. This makes early childhood an ideal time to intervene in the development of children's behavior problems [1]. Accordingly, we examined the structure

of behavior problems including the forms and functions of aggression in an early childhood sample.

Forms and Functions of Aggression

Aggression is generally defined as the intent to harm, injure, or hurt others [7, 11]. Relational and physical aggression are related but unique forms of aggression that are associated with different behaviors and psychosocial outcomes [12–14]. Physical aggression is the attempt to harm or control others through physical acts [e.g., hitting, kicking; 7, 11]. Relational aggression is the intent to harm by damaging an individual's relationships through non-physical behaviors such as malicious gossip, social exclusion, and threats to terminate the relationship [6, 7, 15, 16]. Relational and physical aggression are associated with adjustment difficulties, such as behavior and friendship problems, in unique ways [17].

Reactive and proactive aggression are two distinct functions of aggression that address why a child uses aggression. Reactive aggression is defensive, impulsive, and is often a response to a perceived threat or provocation [8, 16]. Proactive aggression is goal oriented and may be the result of social learning where the child learns that aggression leads to control and dominance over others [8]. A meta-analysis on proactive and reactive aggression found that the functions of aggression co-occur at a high level [$r = .68$; 18].

Certain characteristics of aggression in early childhood are unique to the developmental period. Relational aggression is quite common in preschool children, is fairly unsophisticated because children are still developing social and social-cognitive skills, and is often an immediate response to solve a problem [19]. Second, when assessing aggression in early childhood, it is important to distinguish rough and tumble play and assertion, which are associated with social competence, from aggression, which is the result of a child's intent to harm [20–22]. Lastly, children in early childhood may exhibit higher levels of aggression because they have low regulatory control and are still learning social norms regarding aggression [22].

Forms of Aggression and Links to Behavior Problems

Physical aggression has consistently been considered a part of externalizing constructs as evidenced by physical aggression items on externalizing broadband scales such as the CBCL [5]. Relational aggression is a comparatively newer construct and therefore, one important area of research has focused on whether relational aggression is also a part of the externalizing behavior construct. Recent studies have suggested that relational aggression is an externalizing behavior. For example, a study of youth (i.e.,

6–18 years-old), found that relational aggression loaded on a general antisocial behavior factor alongside rule breaking and physical aggression [23] and in college students, the related construct of social aggression was found to be a distinct form of antisocial behavior [24].

Prior research has also found that the different forms of aggression are associated with specific components of externalizing behavior. Hyperactivity is one facet of externalizing behavior problems, and prior research has discerned that girls with ADHD characterized by inattention and hyperactivity have higher relational aggression scores than girls with ADHD characterized by only inattention [25]. Additionally, in early childhood, impulsive-hyperactive behavior was predictive of increases in physical aggression over time [13]. Deception and lying, other markers of early conduct problems [26], have been found to be positively associated with physical and relational aggression during early childhood [27, 28] and relational aggression has been found to predict increases in deception over time [28]. Additionally, researchers have found that relational aggression is associated with grandiose and lying behavior, over and above callous-unemotional traits and impulsive need for stimulation in 5-year-olds [29]. Deception may be another way that relational aggression is linked to the externalizing behavior construct.

Functions of Aggression and Links to Behavior Problems

Research on proactive aggression, both relational and physical forms, has found that proactive aggression is related both concurrently and longitudinally to externalizing problems. However, reactive aggression may not fit perfectly into the internalizing or externalizing domain, but may be associated with both. Several, prior studies have found that reactive aggression is associated with internalizing problems, concurrently and over time whereas proactive aggression is not. Card and Little's meta-analysis on the functions of aggression found that when controlling for proactive aggression, reactive aggression was still positively associated with internalizing and externalizing behavior outcomes [18]. However, when controlling for reactive aggression, proactive aggression was only associated with select externalizing outcomes [18]. Similarly, in a study of children in middle childhood to adolescence, reactive aggression was associated with increases in internalizing behavior whereas proactive aggression was associated with increases in attention deficits and delinquency [14]. Mathieson and Crick found that reactive aggression was associated with an increase in internalizing problems over time for both the relational and physical forms of aggression [15]. Externalizing problems may be related to internalizing problems through reactive aggression as one study

of high school students found that hyperactivity-impulsivity was related to peer rejection, which has been found to be predictive of internalizing symptoms, indirectly through reactive aggression but not proactive aggression [30]. Lastly, these findings are present in high-risk samples. In a sample of children 6- to 12-years-old in a psychiatric inpatient unit, reactive aggression was uniquely correlated with internalizing problems but proactive aggression was only related to internalizing problems in the presence of certain risk factors [31]. Additionally, in a sample of detained male adolescents, when controlling for proactive aggression, reactive aggression was related to depressed/anxious behavior, suicidal ideation, and substance use problems, whereas when controlling for reactive aggression, proactive aggression was only related to substance use problems [32]. This literature provides evidence that reactive aggression is related to internalizing and externalizing behavior problems but proactive aggression may only be related to externalizing behavior problems.

Forms and Functions Approach

There are generally two approaches to the study of forms and functions of aggression. The first approach uses structural equation modeling (SEM) to construct pure components of aggression [33] and the second approach crosses the forms and functions of aggression [34]. The pure components of aggression approach is a statistically advantageous method for researchers, but has reduced utility when assessing the child's aggression in reality because there is never form without function for aggressive acts [35]. Conversely, crossing the forms and functions, by computing reactive relational, reactive physical, proactive relational, and proactive physical aggression scores, has more utility for generalizing results to real life scenarios but results may be harder to disentangle because the functions of aggression may still be moderately to highly associated [16]. Studies using the crossed forms and functions approach has found that they are predictive of unique longitudinal outcomes [16, 34]. In this study, the crossed forms and functions approach will be used so the results are generalizable to real-life patterns of aggression and their relation to internalizing and externalizing behavior.

The Present Study

In this study we used Confirmatory Factor Analysis (CFA) to test a variety of alternative factor models of problem behavior. CFA has commonly been used to model the internalizing and externalizing constructs of measures such as the CBCL [36]. Higher order factor models were used in this study. Higher order factor models are intended to measure how several distinct lower order factors contribute to a

general higher order factor [37] and are commonly used in personality and psychopathology research [2, 38].

In this study, several higher order factor models were tested based on prior research on aggression, internalizing behavior problems, and externalizing behavior problems. In the first higher order model, we assessed whether the lower order factors, asocial behavior (i.e., social withdrawal), depressed affect, anxious-fearful, reactive physical aggression, reactive relational aggression, proactive physical aggression, proactive relational aggression, hyperactivity, and deception, load on one general behavior factor with no distinction between internalizing and externalizing behavior. In the subsequent five models, the higher order internalizing and externalizing factors were allowed to covary as research has consistently found a high comorbidity rate between internalizing and externalizing behavior problems and generally studies of the hierarchical structure of behavior problems have postulated a two factor co-occurring model of internalizing and externalizing behavior [36, 39]. In model two, a traditional internalizing and externalizing model was tested where the lower order factors, asocial behavior (i.e., social withdrawal), depressed affect, and anxious-fearful, load on the higher order internalizing factor and the lower order factors, proactive relational,

proactive physical, reactive relational, and reactive physical aggression, deception, and hyperactivity load on the higher order externalizing factor. In the third model, because of the link between reactive functions of aggression and internalizing behavior problems, a model was tested where the reactive physical and relational aggression lower order factors load on both the higher order internalizing and externalizing factors (Fig. 1). In the fourth model, to rule out whether aggression in general loads on the both the internalizing and externalizing factors, a model was examined that tests whether reactive and proactive functions of relational and physical aggression load on both higher order internalizing and externalizing factors. The fifth model tested whether the reactive functions of aggression load on the internalizing factor but not the externalizing factor, while the proactive functions of aggression load only on the externalizing factor. Lastly, the sixth model tested whether the relational forms of aggression load on the internalizing and externalizing factor, while the physical forms of aggression load only on the externalizing factor. Because these models are nested, they were statistically compared using chi-squared difference tests. It is hypothesized that model three, where only the reactive functions of aggression load on both the internalizing and externalizing higher

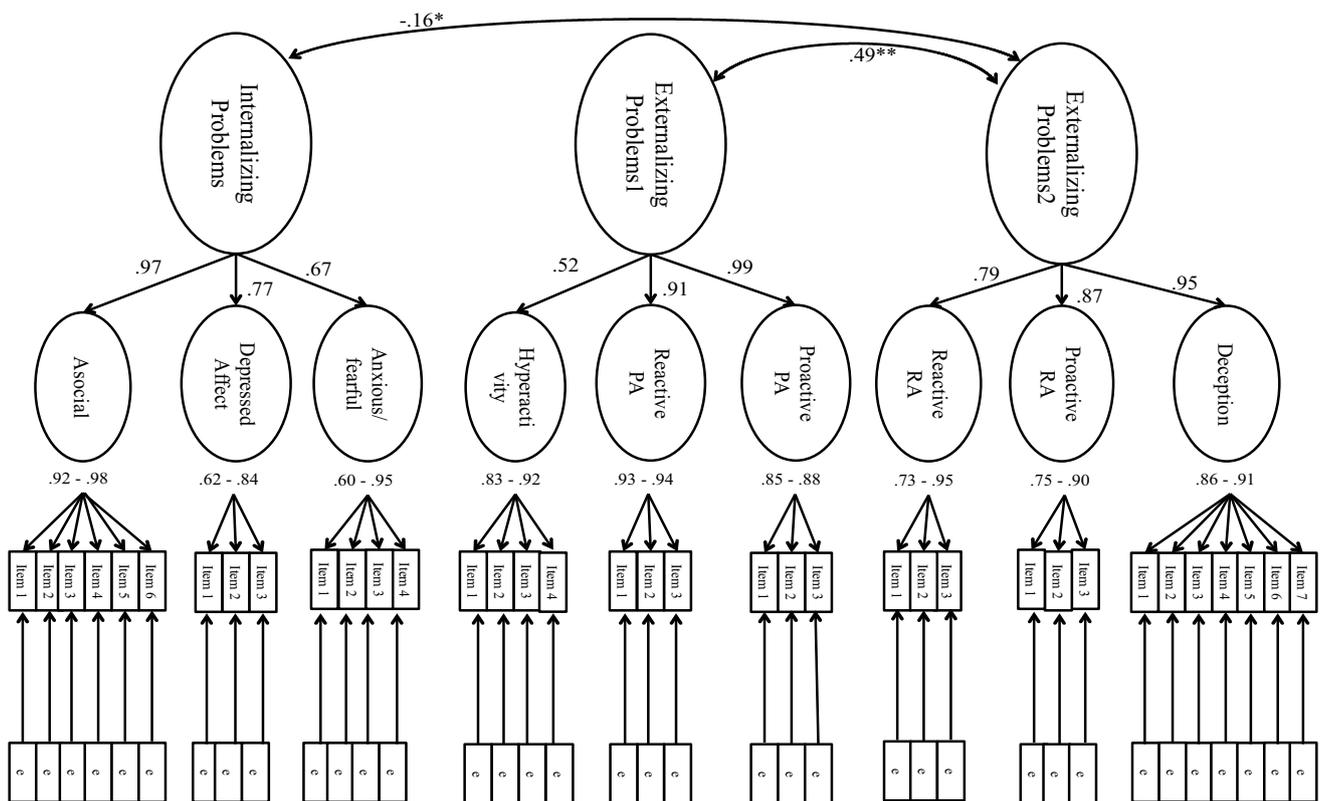


Fig. 1 Overall best fitting model. * $p < .05$, ** $p < .001$. All factor loadings are significant at $p < .001$. PA Physical aggression, RA Relational aggression, Asocial Social withdrawal

order factor, will be the best model fit of behavior problems based on prior developmental research [14–16]. In the current study, we make hypotheses based on the literature, but due to the novelty of the work, we still consider this study to be exploratory in nature.

Method

Participants

This study included 332 participants (M age = 47.11 months, SD = 7.32 months; 47.4% girls) from three separate studies conducted over a four-year period. Children were from relatively diverse backgrounds (4.6% African American, 11.4% Asian/ Pacific Islander/ Indian, 67.3% White, 2.8% Hispanic/Latino, 0.3% Native American, 13.6% multiracial). 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; 40]. Parents had the opportunity to enter two occupations, in which case the higher occupation code was taken. Parents' education was not assessed and thus was not included in the total factor score. Values ranged from 2 to 9 with a 7.00 average, indicating that a typical family in our sample was from the third highest occupation group (i.e., 7 = small business owners, farm owners, managers, minor professionals), which suggests our sample is on average, middle class. Children were recruited from nine National Association for the Education of Young Children (NAEYC) accredited or recently accredited early childhood education centers in a large northeastern city (31 classrooms). Schools were diverse in location, with suburban and urban schools where four of the schools were university affiliated and five were community based. NAEYC accredited schools were used to ensure that schools were similar in quality, therefore reducing the likelihood of confounding school level variables. The first sample used data from Time 1 (T1) of a two cohort longitudinal study where data was collected during the fall (n = 97, M age = 45.52 months, SD = 6.99, 43.3% girls). The second sample used data from T1 of an intervention study, prior to randomization and intervention implementation, and was conducted in the fall approximately a year after the first study (n = 141, M age = 45.53 months, SD = 7.29, 47.5% girls). The last study was conducted with children who were not in the intervention study, approximately a year and a half after the intervention study, in the spring (n = 95, M age = 51.13 months, SD = 7.02, 51.6% girls). There were not expected crossover effects from the intervention into the last study because of the time lag between the studies (a year and a half) and the independence of the samples. There were no differences between the three samples for

ethnicity [χ^2 (14) = 13.38, p = .50], or gender [χ^2 (2) = 1.32, p = .52], but the third sample was significantly older than the prior two samples, likely because data was collected in the spring, rather than the fall like the prior two samples [F (2, 305) = 15.53, p < .001, η^2 = 0.09]. Therefore, the final model will be tested while controlling for age.

Procedures

All children in participating classrooms were invited to participate and parents provided written consent for their children's participation prior to beginning the study. Across the full sample, parental consent was obtained for 79% of eligible children. Head teachers also provided written consent prior to report completion. This study was approved by the local social and behavioral sciences institutional review board (IRB). Teachers were compensated \$10–\$25 dollars depending on their class size. Initially, trained undergraduate and graduate research assistants collected naturalistic observations using a focal child sampling with continuous recording procedure. There were a total of 37 trained undergraduate observers and nine graduate observers. Prior to 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, in addition to prosocial behavior [41]. Typically, there were two to three observers per classroom. Observations were undertaken in a two-month period, with the goal of completing 8, 10-minute observation sessions per child. On average, each child had a total of 7.49 ten-minute sessions, for an average of 75 min of observation for each child at the end of the two-month period. Overall, observers spent approximately 9 h a week or 72 h total in the classroom. After completing behavioral observations, one undergraduate observer from each classroom was randomly selected to complete standard reports for each participant that comprise the observer ratings of behavior, which are used in the present study.

Measures

Observer Ratings of Behavior

Observer ratings of behavior were used for all measures in this study. The undergraduate observers were not privy to the study hypotheses or predictions. Prior research has validated the use of observer reports and their high associations with teacher reports and significant overlap with the naturalistic observations [16, 42]. When available, validity correlations of the observer reports with teacher reports

are provided below. Observer reports will be used in lieu of naturalistic observations because naturalistic observations result in one indicator of behavior (e.g., total number of aggressive acts) rather than multiple indicators which make this data impractical as an indicator for the subtypes of aggression in a CFA.

Forms and Functions of Aggression

The forms and functions of aggression were measured using observer reports of the Preschool Proactive and Reactive Aggression-Observer Report [PPRA-OR; 42]. The PPRA-OR contains 14 questions that comprise four subscales measuring proactive relational aggression (three items; e.g., “to get what s/he wants, this child often tells others that s/he won’t be their friend anymore”), proactive physical aggression (three items; e.g., “this child often hits, kicks, or pushes to get what he/she wants”), reactive relational aggression (three items; e.g., “when this child is upset with others s/he will often ignore or stop talking to them”), reactive physical aggression (three items; e.g., “if other children anger this child, s/he will often hit, kick, or punch them”), and two questions that are positively toned. Observers responded using a 5-point Likert scale (1- “Never or almost never true” to 5- “Always or almost always true”). The PPRA-OR has been used to measure the forms and functions in prior work [16, 42]. In this sample, the four subscales were significantly positively correlated with naturalistic observations [reactive physical aggression ($r=.33, p<.001$), proactive physical aggression ($r=.44, p<.001$), reactive relational aggression ($r=.20, p=.005$), and proactive relational aggression ($r=.32, p<.001$)]. Additionally, the four subscales were significantly positively correlated with teacher reports of the PPRA-TR [reactive physical aggression ($r=.53, p<.001$), proactive physical aggression ($r=.46, p<.001$), reactive relational aggression ($r=.33, p<.001$), and proactive relational aggression ($r=.37, p<.001$)]. The scales demonstrated good internal consistency in this sample (all Cronbach’s α ’s >0.87).

Asocial with Peers, Hyperactive-Distractible, and Anxious-Fearful

The Child Behavior Scale [43] is a teacher report measure of young children’s behavior towards peers in classroom contexts. The measure is composed of 59 items that ask how often a child’s behavior occurs towards peers and is rated on a three-point scale (1—“Doesn’t apply” to 3—“Certainly applies”). Three of the six subscales were used in the present study: asocial with peers (six items; e.g., “prefers to play alone”), which the authors [40] use synonymously with social withdrawal, anxious-fearful

(four items; e.g., “is worried, worries about many things”), and hyperactive-distractible (four items; e.g., “squirmy, fidgety child”). The remaining subscales (i.e., excluded by peers, aggressive with peers, and prosocial with peers) were not used in the present study. Prior research suggests that the subscale scores are internally consistent, relatively stable, and distinct over time [43]. In this study, observer reports of the CBS were used (CBS-OR). In prior studies, the CBS-OR hyperactive-distractible subscale has been correlated with a teacher report of the CBS hyperactive-distractible subscale [$r=.46, p<.001$; 13]. In the current study, for a subset of participants ($n=97$) for which there are teacher and observer reports of the CBS, correlations between informants were evaluated and were significantly positively correlated [anxious-fearful ($r=.36, p<.001$), asocial ($r=.21, p=.04$), hyperactivity ($r=.29, p=.003$)]. In this study the asocial with peers (i.e., social withdrawal) and anxious-fearful subscales were used as part of the internalizing behavior construct and the hyperactive-distractible subscale were used as part of the externalizing behavior construct. The subscales demonstrated good internal consistency in this sample (all Cronbach’s α ’s >0.81).

Depressed Affect

Depressed affect was measured using observer reports of the depressed affect subscale from the Preschool Social Behavior Scale-Observer Report [PSBS-OR, 44]. The scale includes three items, “the child looks sad,” “the child smiles at other kids,” and “the child doesn’t have much fun,” rated on a 5-point Likert scale (1—“Never or almost never true” to 5—“Always or almost always true”). Item 2 was reverse coded. Observer reports have previously been highly correlated with teacher reports of the PSBS [44] and in the current sample, the depressed affect subscale of the PSBS-OR was significantly positively correlated with the depressed affect subscale of the PSBS teacher report ($r=.32, p<.001$). The subscale was internally consistent in this sample (Cronbach’s $\alpha=0.79$).

Deception

The Children’s False Statement-Observer Report [CFS-OR; 27, 28] consists of seven items that are answered on a Likert scale (1—“Never or almost never true” to 5—“Always or almost always true”). Items ask about the child’s current deception and lying behavior with items such as “she/he avoids responsibility for her/his actions by making false statements,” “she/he uses deception to manipulate his/her peers during play,” and “child falsely accuses others of inappropriate behavior”. The scale has demonstrated high concurrent validity, and construct validity [27, 28]. Observer reports of deception have previously been

significantly correlated with teacher reports of the CFS, with correlations ranging from 0.24 to 0.37 [28]. In this sample, the scale demonstrated excellent internal consistency (Cronbach's $\alpha=0.96$).

Data Analysis Plan

First, descriptive data of the measures were obtained, including means, standard deviations, and an analysis of outliers. Outliers were modified by adjusting the outlier value to +/- three standard deviations from the mean. There were a small number of outlier values per variable (i.e., less than 10). Skew statistics were assessed, after adjusting for any outliers, where skew values between -3 and 3 and kurtosis values from 0 to 8 indicate that any non-normality does not have an impact on estimation [45].

All models were estimated in Mplus version 7.4 [46]. In addition to the likelihood ratio χ^2 test fit indices were used to determine adequacy of model fit. The comparative fit index (CFI) is an indicator of model fit, where values greater than 0.90 suggest adequate fit and values greater than 0.95 suggest good fit [47]. A second fit index that was considered is the root mean square error of approximation [RMSEA; 48], where values less than 0.08 are good and values less than 0.05 are better [49]. Chi square differences tests were used to statistically compare the nested models with values at $p < .05$ representing significant differences in model fit. If there were not significant differences in model fit, the more parsimonious model was considered the better fitting model.

Missing data was minimal (8 missing items), nonetheless, full information maximum likelihood (FIML) was

used so that all cases were included in our analyses. One assumption of maximum likelihood estimation (ML), the default estimator for CFA, is multivariate normality of continuous variables. In this study, several of our indicators were ordinal in nature with three categories and therefore, the weighted least square mean and variance adjusted estimator (WLSMV) was used in this study, which allows for ordinal and continuous variables to be used as indicators [50].

Results

Preliminary analyses

Descriptive statistics are included in Table 1. After adjusting for outliers, skew statistics ranged from 0.75 to 1.83 and kurtosis statistics ranged from -0.29 to 2.88, suggesting that violations of normality were not a concern [45]. The zero order correlations among the subscales from SPSS are included in Table 1.

Analyses Using the Weighted Least Squares Mean and Variance Estimator (WLSMV)

Model 1, where all lower order factors load on one higher order behavior problem factor, provided a poor fit to the data [$\chi^2(585)=3370.91, p < .001, CFI=0.71, RMSEA=0.12$].

Model 2, the traditional internalizing and externalizing model, provided an adequate fit to the data, [$\chi^2(584)=1601.49, p < .001, CFI=0.90, RMSEA=0.07$].

Table 1 Descriptive statistics and correlations

	1	2	3	4	5	6	7	8	9
1. Proactive PA	3 (0.90)								
2. Reactive PA	0.92**	3 (0.95)							
3. Proactive RA	0.32**	0.29**	3 (0.87)						
4. Reactive RA	0.30**	0.28**	0.90**	3 (0.87)					
5. Depressed affect	0.19**	0.17*	0.04	-0.01	3 (0.79)				
6. Anxious-Fearful	0.12*	0.07	0.09	-0.01	0.63**	4 (0.82)			
7. Asocial	-0.02	-0.06	-0.27**	-0.28**	0.61**	0.46**	6 (0.94)		
8. Hyperactivity	0.45**	0.46**	0.14*	0.11*	0.08	0.10	0.03	4 (0.85)	
9. Deception	0.48**	0.30**	0.72**	0.64**	0.07	0.07	0.21**	0.30**	7 (0.96)
Mean	1.46	1.77	1.81	1.99	2.12	1.35	1.55	1.45	1.65
SD	0.75	1.02	0.79	0.87	0.82	0.47	0.59	0.51	0.76
Range	1-4.12	1-4.88	1-4.14	1-4.87	1-5	1-3	1-3	1-3	1-3.97

Number of items and Cronbach alpha values in parentheses for each scale are provided in the diagonal. Means, SDs, and ranges are derived from the average scale scores for each participant

RA Relational aggression, PA Physical aggression, Asocial Social withdrawal

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

The correlation between the higher order internalizing and externalizing factors was not significant ($r = -.07, p = .25$) and therefore a model was tested constraining this association to zero. This constraint did not result in a significant decrement in model fit [$\Delta\chi^2(1) = 1.80, p = .17$], hence this constraint was retained, and the final model provided an acceptable fit to the data [$\chi^2(585) = 1320.15, p < .001, CFI = 0.92, RMSEA = 0.06$]. Standardized factor loadings of indicators on the lower order factors ranged from 0.62 to 0.98. Standardized factor loadings of the lower order factors on the higher order factors are shown in Table 2.

Model 3, where reactive relational and physical aggression load on both the internalizing and externalizing higher order factors, provided a poor fit to the data [$\chi^2(582) = 1636.03, p < .001, CFI = 0.89, RMSEA = 0.07$]. Constraining the association between the internalizing and externalizing factors to zero provided an adequate model fit to the data [$\chi^2(583) = 1401.69, p < .001, CFI = 0.92, RMSEA = 0.07$]. Standardized factor loadings of indicators on the lower order factors ranged from 0.62 to 0.98. Standardized factor loadings of the lower order factors on the higher order factors are shown in Table 2. Reactive relational and reactive physical aggression had standardized factor loadings of -0.17 and 0.06 on the internalizing factor which did not meet our threshold of 0.30 for standardized factor loadings and therefore, these indicators were dropped from the internalizing factor resulting in a model that is equivalent to model 2.

Model 4, where all the subtypes of aggression load on both the internalizing and externalizing higher order factors, provided a poor fit to the data [$\chi^2(580) = 1637.02, p < .001, CFI = 0.89, RMSEA = 0.07$]. Constraining the association between the internalizing and externalizing factors to zero provided an adequate model fit [$\chi^2(581) = 1480.57, p < .001, CFI = 0.91, RMSEA = 0.07$]. Standardized factor loadings of indicators on the lower

order factors ranged from 0.63 to 0.98. Standardized factor loadings of the lower order factors on the higher order factors are shown in Table 2. Reactive relational and physical aggression and proactive relational and physical aggression had standardized factor loadings of $-0.17, 0.07, -0.15,$ and $0.10,$ respectively, on the internalizing factor which did not meet our threshold of 0.30 for standardized factor loadings and therefore, these indicators were dropped from the internalizing factor resulting in a model that is equivalent to model 2.

Model 5, where the reactive physical aggression and reactive relational aggression lower order factors load only on the internalizing factor and not the externalizing factor, provided a poor fit to the data [$\chi^2(584) = 2211.85, p < .001, CFI = 0.83, RMSEA = 0.09$]. There was a significant association between the internalizing and externalizing factors so no model was tested that constrained this association.

Model 6, where reactive and proactive relational aggression load on both the internalizing and externalizing higher order factors, provided an adequate fit to the data [$\chi^2(582) = 1596.78, p < .001, CFI = 0.90, RMSEA = 0.07$]. Constraining the association between the internalizing and externalizing factors to zero provided an adequate model fit [$\chi^2(583) = 1366.12, p < .001, CFI = 0.92, RMSEA = 0.06$]. Standardized factor loadings of indicators on the lower order factors ranged from 0.62 to 0.98. Standardized factor loadings of the lower order factors on the higher order factors are shown in Table 2. Reactive relational and proactive relational aggression had standardized factor loadings of -0.19 and -0.15 on the internalizing factor, which did not meet our threshold of 0.30 for standardized factor loadings and therefore, these indicators were dropped from the internalizing factor resulting in a model that is equivalent to model 2.

After examining the correlations among the lower order constructs, it was apparent that deception and relational

Table 2 Standardized higher order factor loadings from adequate fitting models

	Model 2		Model 3		Model 4		Model 6	
	Intern	Extern	Intern	Extern	Intern	Extern	Intern	Extern
Asocial	0.73		0.76		0.80		0.84	
Depressed affect	0.96		0.93		0.91		0.87	
Anxious-Fearful	0.84		0.81		0.78		0.76	
Deception		0.88		0.88		0.87		0.88
Hyperactivity		0.40		0.40		0.40		0.40
Reactive RA		0.72	-0.17^a	0.72	-0.19^a	0.72	-0.19^a	0.72
Proactive RA		0.79		0.79	-0.15^a	0.79	-0.15^a	0.79
Reactive PA		0.58	0.06^a	0.58	0.07^a	0.59		0.58
Proactive PA		0.65		0.65	0.10^a	0.65		0.65

Intern Internalizing behavior problems, Extern Externalizing behavior problems, RA Relational aggression, PA Physical aggression, Asocial Social withdrawal

^aFactors were dropped from a higher order factor if they had a standardized factor loading less than 0.30

aggression clustered together and physical aggression and hyperactivity clustered together. Additionally, these correlations are consistent with results from prior research suggesting that deception/lying is related to relational aggression concurrently and over time [28, 29]. Therefore, a seventh post-hoc model was tested that separates the externalizing factor into two factors. The model tested whether the lower order factors hyperactivity, reactive physical, and proactive physical aggression load on a first externalizing factor and the lower order factors deception, reactive relational and proactive relational aggression load on a second externalizing factor. This model was an adequate fit to the data, [χ^2 (582)=1393.85, $p < .001$, CFI=0.92, RMSEA=0.07]. The correlation between the first externalizing factor and the internalizing factor was not significant, so a model was tested that constrained this association to zero. This constraint did not result in a significant reduction in model fit [$\Delta\chi^2$ (1)=1.51, $p = .22$], hence this constraint was retained, and the final model provided a good fit to the data [χ^2 (583)=1279.19, $p < .001$, CFI=0.93, RMSEA=0.06]. Standardized factor loadings of indicators on the lower order factors ranged from 0.62 to 0.97. When comparing models 2 and 7, model 7 provided a significantly better fit to the data [$\Delta\chi^2$ (3)=24.75, $p < .001$]. Figure 1 contains an image of model 7 with significant factor loadings.

Controlling for age in model 7, the best fitting model, led to similar model fit [χ^2 (616)=1292.76, $p < .001$, CFI=0.92, RMSEA=0.06]. When controlling for age the negative association between the internalizing factor and the second externalizing factor became non-significant ($p = .10$), but the pattern of results stayed the same for other associations and the magnitude of the factor loadings.

Discussion

There is a paucity of research that examines the structure of psychopathology in early childhood as prior approaches have viewed psychopathology in early childhood as a “downward extension” of problems in other developmental periods [1, 9; p. 3]. Furthermore, to our knowledge, this is the first study that assesses how the forms and functions of aggression fit into an internalizing and externalizing framework for children in any developmental period. Understanding how the forms and functions of aggression fit into the general psychopathology framework is important because it helps researchers understand how aggression relates to the broader pattern of maladaptive behavior, which in turn could inform interventions. Additionally, relational aggression has generally been neglected in the study of the broadband behavior constructs which may have resulted in an inaccurate broadband externalizing construct, particularly

for girls, for whom relational aggression is the modal form of aggression [7].

Seven models were tested, one of which was added post-hoc. It was hypothesized that the third model, in which reactive relational aggression and reactive physical aggression load on both the internalizing and externalizing higher order factor, would be the best fitting model. This was not the best fitting model, which may have occurred because there was a high association between the functions of aggression within form. A seventh post-hoc model, where reactive relational aggression, proactive relational aggression, and deception load on an independent externalizing factor, separate from an externalizing factor comprised of reactive physical aggression, proactive physical aggression, and hyperactivity was the best fit to the data.

This study strove to examine novel lower order facets of behavior in a unique developmental period within a lifespan theory of the internalizing and externalizing spectra of behavior. Results suggest that in early childhood, when deception and relational aggression are included in the lower order spectrum of behavior, the higher order facets of behavior problems may be best represented by a three-factor structure. Negative affect may still be the link between the internalizing and two externalizing spectrums of behavior as research has shown that in children, relational aggression is related to negative emotionality traits over and above physical aggression [51]. Results from this study are not necessarily inconsistent with the internalizing and externalizing spectrum theory as the third factor comprised of deception, and reactive and proactive relational aggression may not be representative of externalizing behavior. It is also possible that since researchers do not usually study deception and relational aggression when examining conferred risk of psychopathology across the lifespan, these factors have never emerged as potential facets of the internalizing and externalizing spectra of behavior.

In the context of prior genetic and social-cognitive research showing differential associations with physical and nonphysical subtypes of aggression [52, 53] the present findings also suggest that relational aggression and physical aggression may be components of different facets of the externalizing behavior spectrum that in turn may be predictive of different trajectories and different outcomes. Physical aggression, but not relational aggression has been found to be associated concurrently with substance use outcomes in preadolescence [54] and predictive of increased antisocial behavior from kindergarten to first grade [55]. Relational aggression, but not physical aggression has been found to be associated with less openness and more compulsivity, indicating lower levels of positive affect, in middle childhood and adolescence [51]. This research indicates that relational aggression and physical aggression are associated with and predict separate outcomes, which support

the notion that these subtypes of aggression are related but distinct constructs that represent unique facets of externalizing behavior.

One of the other novel findings of this study was the classification of deception as a part of the third externalizing behavior factor with relational aggression. Two recent studies using item response theory of children in early to middle childhood identified lying/cheating as an indicator of clinical or sub-clinical externalizing or disruptive behavior problems [56, 57]. Results from the current study suggest that deception may be a part of a different facet of externalizing behavior along with relational aggression, than physical aggression and hyperactivity, which are two more traditionally classified externalizing behaviors [1]. This second externalizing factor may represent a more indirect form of externalizing behavior. Indirect acts are characterized by covert behavior, where the child doing the acts may remain unidentified [58]. As previously mentioned relational aggression is not necessarily indirect, particularly with children in early childhood [19]. Additionally, deception at this age generally takes the form of lying, which is not very sophisticated as the lies that children tell are often implausible [59]. This suggests that for children in early childhood, deception and relational aggression are often direct even if the child intends for the behavior to be indirect. However, where relational aggression and deception become more indirect compared to physical aggression and hyperactivity, is in parent and teacher responses to these behaviors. Parents are less likely to discipline or intervene in relational compared to physical aggression [60, 61] and teachers report that they are more likely to intervene in physically than relationally aggressive acts [62]. Additionally, up to 30% of parents either ignore their preschool child's lie or believe the child's lie, so much so that some even punish the transgression of the non-lying child [59]. This suggests that relational aggression and deception by children in early childhood may not appear to be covert to adults, but the child may consider them covert because they are less likely to be punished for these behaviors. In this way, the second externalizing factor may represent indirect externalizing behavior. However, this second externalizing factor may better be conceptualized as a unique construct and future research should focus on its convergent and discriminant validity.

Limitations

Despite the numerous strengths of this paper, including the novelty of the work (i.e., the integration of the forms and functions of aggression into the internalizing and externalizing behavior framework), the unique age group,

and the use of different measures within each higher order construct, there are several limitations to this study. First, we used one informant, observers, and one method to measure behavior problems. Even though it is conceivable that observers may be less biased than teachers because they do not interact with the children, using one informant can inflate associations in the data. Second, we used a general measure of social withdrawal, but researchers have now identified distinct profiles of social withdrawal, some of which may not represent abnormal functioning [i.e., social disinterest; 62]. Third, data for this study were collected at preschools from one region, SES was generally middle to upper middle class, and the majority of participants were Caucasian. This reduces the generalizability of our findings. There would be utility in a cross-validation sample, which would increase the generalizability and validity of the model. Fourth, we were limited in our statistical methodology because of the categorical nature of a portion of the data. Lastly, this study tested a model of psychopathology in a typically functioning, early childhood sample and therefore, this model may not be applicable to higher risk samples or samples from different developmental periods.

Future developmental research should focus on elucidating the similarities and differences between the two externalizing constructs. The two externalizing constructs may be characterized by differential developmental trajectories, predictive of unique psychosocial outcomes, and more prevalent in individuals with different trait profiles. Researchers should replicate these results using different measurement techniques (i.e., different informants and/or measures) and should examine whether this pattern of maladaptive behavior holds for individuals in different developmental periods. There may also be utility in examining whether there are gender differences in this newly proposed model of psychopathology, which we were unable to test due to the complexity of the model and our limited sample size. Additionally, consistent with examining whether the second externalizing factor of behavior is a part of the internalizing and externalizing spectra of behavior throughout the lifespan, there may be utility in testing whether this factor follows the principles of this theory. It will be important to test whether the second externalizing factor is a result of cumulative risk, predicts adaptive functioning, and whether those at high risk experience subsequent psychopathology. Lastly, researchers may want to consider whether a bifactor model is a better representation of a two-factor externalizing model. Bifactor models have been used to assess whether relational or social aggression fits onto the antisocial behavior construct in children [23] and in adults [24].

Summary

Prior research on children in early childhood has neglected the study of the forms and functions of aggression within a broadband maladaptive behavior model. This study contributes to the literature by testing a novel conceptualization of the broadband behavior constructs that is inclusive of the forms and functions of aggression within early childhood. Seven models were tested using confirmatory factor analysis. Results from the best fitting model suggest that the externalizing facets of behavior in early childhood may be best represented by a two factor model, in which, reactive physical aggression, proactive physical aggression, and hyperactivity load on one externalizing factor and reactive relational aggression, proactive relational aggression, and deception load on a distinct externalizing factor. Researchers have neglected the second externalizing factor, comprised of relational aggression and deception, when examining the development and outcomes of psychopathology in early childhood. Thus, it is imperative that future research focus on identifying the underlying mechanisms of this second externalizing factor, so they can be targeted in future interventions aimed at reducing the externalizing behavior of children in early childhood.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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