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Differential Risk for Late Adolescent Conduct Problems and Mood Dysregulation Among Children with Early Externalizing Behavior Problems

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Abstract To investigate the differential emergence of antisocial behaviors and mood dysregulation among children with externalizing problems, the present study prospectively followed 317 high-risk children with early externalizing problems from school entry (ages 5–7) to late adolescence (ages 17–19). Latent class analysis conducted on their conduct and mood symptoms in late adolescence revealed three distinct patterns of symptoms, characterized by: 1) criminal offenses, conduct disorder symptoms, and elevated anger ("conduct problems"), 2) elevated anger, dysphoric mood, and suicidal ideation ("mood dysregulation"), and 3) low levels of severe conduct and mood symptoms. A diathesis-stress model predicting the first two outcomes was tested. Elevated overt aggression at school entry uniquely predicted conduct problems in late adolescence, whereas elevated emotion dysregulation at school entry uniquely predicted mood dysregulation in late adolescence. Experiences of low parental warmth and peer rejection in middle childhood moderated the link between early emotion dysregulation and later mood dysregulation but did not moderate the link between early overt aggression and later conduct problems. Thus, among children with early externalizing behavior problems, increased risk for later antisocial behavior or mood dysfunction may be identifiable in early childhood based on levels of overt aggression and emotion dysregulation. For children with early emotion dysregulation, however, increased risk for mood dysregulation characterized by anger, dysphoric mood, and suicidality – possibly indicative of disruptive mood dysregulation disorder – emerges only in the presence of low parental warmth and/or peer rejection during middle childhood.

Keywords Externalizing · Conduct problems · Peer rejection · Parental warmth · Mood

Children who enter elementary school with elevated externalizing behaviors are a high-risk group, and their development is characterized by divergent long-term outcomes (Reef et al. 2010). Although some show decreased behavior problems by adolescence, some remain aggressive and develop a pattern of serious and chronic antisocial conduct problems (e.g., fighting, rule-breaking, and criminal activity; Moffitt 1993). Others develop affective pathology (Reef et al. 2010), including depression and mood dysregulation characterized by chronic emotional volatility and negativity.

For children with a history of early externalizing problems, later mood dysregulation is an outcome of particular interest. Researchers have speculated that emotion dysregulation in early childhood, defined as the inability to effectively modulate the experience or expression of emotions, may increase aggressive responding and undermine social adjustment (Cappadocia et al. 2009). The Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5; American Psychiatric Association 2013) recently introduced a new diagnosis of disruptive mood dysregulation disorder (DMDD) to characterize severe emotion dysregulation with prominent irritable/angry and dysphoric affect. Initial research suggests that DMDD is frequently co-morbid with externalizing and internalizing disorders in childhood (Brotman et al. 2006; Copeland et al. 2013), making it a particularly pertinent type of mood dysregulation to examine in children with early externalizing problems. Moreover, mood dysregulation characterized by prominent anger and dysphoria may signal risk

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for a range of adult disorders, including depression, bipolar, and borderline personality disorders (Brotman et al. 2006; Paris 2005; Rudolph and Lambert 2007). These are costly disorders associated with interpersonal difficulties, increased risk for suicidal behaviors, and impaired adult functioning (Yen et al. 2003). Understanding the different developmental predictors of adolescent mood dysregulation versus adolescent conduct problems among children showing early externalizing problems may provide insight to guide preventive interventions.

To examine the developmental pathways leading to these divergent outcomes, this study utilized longitudinal data from the Fast Track prevention program to examine the late adolescent outcomes of children with early externalizing behavior problems. Based on the literature reviewed below, the study examined the emergence of two adolescent symptom profiles that may indicate high risk for long-term psychopathology among children with early externalizing problems. One profile was characterized by antisocial behaviors, and the other was characterized by mood dysregulation with dysphoric affect, reactive anger, and suicidality.

The Developmental Pathway from Early Aggression to Adolescent Conduct Problems

Extensive research has documented the link between early overt aggression, which involves harming others through physical damage or threats to do so, and later conduct problems (Coie and Dodge 1998). Overt aggression normatively emerges and peaks during toddlerhood and decreases to relatively low levels by age 7 years. Children who do not show this decrease and enter school with elevated aggression are at high risk for chronic behavioral problems (Coie and Dodge 1998). Indeed, overt aggression shows rank-order stability (Broidy et al. 2003) and is one of the strongest predictors of adolescent conduct problems (Nagin and Tremblay 1999).

The progression from childhood externalizing problems to adolescent antisocial behavior has been described as a negative cascade, in which multiple risk factors, including interpersonal difficulties with parents and peers, accumulate to impair adaptive socialization (Dodge et al. 2008). Extensive developmental research suggests that early childhood aggression is associated with harsh, ineffective discipline and parent–child conflict. Recurrent, coercive parent–child interactions reinforce the child's aggressive responding and also lead to parental withdrawal and decreased warmth (Haapasalo and Tremblay 1994). Corresponding reductions in parental monitoring leave children vulnerable to deviant peer affiliations that provide opportunity and support for antisocial activity (Granic and Patterson 2006). Child aggression also alienates peers, reducing opportunities for normative peer socialization and increasing exposure to deviant peers (Dodge et al. 2008). The longitudinal evidence supporting this cascade model suggests that early overt aggression may be a powerful behavioral diathesis for later conduct problems, and low parental warmth and peer rejection may further amplify its risk (Dishion et al. 2010).

However, overt aggression is just one behavioral symptom within the broad-band of externalizing problems. Many children with externalizing behaviors also show emotional dysregulation, especially of reactive anger (e.g., tantrums, irritability, difficulty calming down; Zeman et al. 2006). Differences in emotion regulation capacities are linked to divergent developmental outcomes (Beauchaine et al. 2009; Cappadocia et al. 2009). Whereas some children with early and chronic aggressive behaviors show attenuated physiological reactivity and display fearlessness and insensitivity to threats (Frick 2012), others show hyper-reactivity of the stress response system and display high emotional reactivity and impulsivity (Beauchaine et al. 2009). The latter group of children may exhibit heightened vigilance and reactivity to perceived threats (Stieben et al. 2007), often expressed as reactive aggression.

Early Emotion Dysregulation and its Link to Adolescent Mood Dysregulation

Those children with a combination of externalizing behavior and high levels of emotional reactivity may be at heightened risk for later mood dysregulation. Co-occurring externalizing and internalizing symptoms show rank-order stability across childhood, with internalizing symptoms possibly increasing over time (Fanti and Henrich 2010). Additionally, children with marked irritability and hyperarousal are at increased risk for depressive disorder in young adulthood, even more so than children with depression (Brotman et al. 2006). In the present study, we focused especially on mood dysregulation characterized by dysphoria, reactive anger, and suicidality. These symptoms were of particular interest, based on longitudinal research showing that negative emotional reactivity (e.g., angry outbursts and irritability) in childhood is a behavioral diathesis for later difficulty regulating anger (Crawford et al. 2009) and for aggression directed towards the self (Sourander et al. 2006). Moreover, in adolescence, dysphoric mood is linked with concurrent suicidality (Pelkonen et al. 2005) and predict later depression and suicidality (Gjerde and Westenberg 1998).

Conceptually, early emotion dysregulation in children with externalizing problems poses risk for later mood dysregulation primarily in the absence of supportive socialization by parents and peers (Fruzzetti et al. 2005; Rogosch and Cicchetti 2005). Empirical research also suggests that relational difficulties with parents and/or peers can increase risk for continued dysregulation (Fanti and Henrich 2010; Oland and Shaw

2005). The child's irritability and frequent expressions of distress may perturb parents, evoking parental hostility or detachment (Scaramella and Leve 2004). When parents show little warmth, they may increase the child's insecurity and impede the development of self-regulatory capacities that typically emerge through co-regulation (Hughes et al. 2012).

In addition to compromised relationships with their parents, aggressive children with emotion dysregulation are especially at risk for peer rejection (Bierman et al. 2004). In turn, peer dislike and social exclusion are linked with increased child distress, including negative emotions (e.g., anger, loneliness, depressed mood; Sentse 2009), aggressive responding (Coie et al. 1995), and suicidal ideation (Prinstein et al. 2000). These studies suggest that emotion dysregulation in children with externalizing behavior problems may uniquely predict later mood dysregulation, including intense and reactive anger, dysphoria, and suicidal ideation, especially in the presence of low levels of parental warmth and/or exposure to peer rejection.

In sum, existing theoretical models and developmental studies suggest that there are diverse adolescent outcomes among children with externalizing problems, depending on the severity of their early aggressive behaviors and emotion dysregulation. Elevated overt aggression in early childhood appears to increase risk for later antisocial behavior, whereas elevated emotion dysregulation appears to increase risk for later mood dysregulation. These developmental pathways may be strengthened by exposure in middle childhood to low levels of parental warmth and/or to peer rejection.

The Present Study

To better understand the differential emergence of conduct problems and mood dysregulation in children with early externalizing behaviors, this study followed 317 children from school entry (ages 5–7) to late adolescence (ages 17–19). They were recruited from communities characterized by poverty and high crime, which placed them at high risk for long-term maladjustment. At school entry, participating children exhibited a heterogeneous array of aggressive, disruptive, and oppositional behaviors. In grades 1–4, low levels of parental warmth and rejection by peers were tracked. In late adolescence, conduct and affective problems were assessed with youth and parent reports.

The study tested three hypotheses. The first hypothesis was that high-risk children with early externalizing problems would exhibit divergent patterns of maladjustment by late adolescence, including one characterized by chronic conduct problems and another characterized by mood dysregulation (dysphoria, reactive anger, and suicidality). To test this hypothesis, latent class analysis was applied to identify different profiles of late adolescent symptoms based on five indicators of conduct and affective problems (index offenses, conduct disorder symptoms, depressed mood, suicidality, and reactive anger). The second hypothesis was that early overt aggression would uniquely predict later conduct problems, whereas early emotion dysregulation would uniquely predict later mood dysregulation. The third hypothesis was that experiences of low parental warmth and peer rejection in middle childhood would moderate and strengthen the hypothesized links between early childhood difficulties and late adolescent outcomes. Taken together, a diathesis-stress model depicted in Fig. 1 was tested.

Method

Participants

Participants were members of the high-risk control group of the Fast Track project, a multi-site, longitudinal study of children at risk for conduct problems. They did not receive any Fast Track prevention services. They were recruited from 27 schools that were located in areas selected for elevated levels of poverty and neighborhood crime, at four study sites (Durham, North Carolina; Nashville, Tennessee; Seattle, Washington; rural central Pennsylvania). These schools were randomized to intervention or control conditions. In the first stage of the screening process, teachers in participating schools rated aggressive-disruptive behavior of all of their kindergarten students. Parents of children with elevated scores were contacted, and those who consented provided ratings of aggressive-disruptive child behaviors at home. Teacher and parent ratings were combined into a total screen score, and children were recruited into the study sequentially based on the severity of this score until desired sample sizes for each cohort, site, and condition were reached (for further details, see Lochman 1995). Of the 446 children who were recruited into the high-risk control sample, 317 (71 %) had adequate data for inclusion in the present study. This sample included 110 girls (35 %) and 207 boys (65 %), primarily of European American (48 %) or African American (50 %) race/ethnicity. The mean child age at study enrollment was 6.52 years (SD= 0.47). Median annual household income fell in the range of $14,001–$20,000. The majority (54 %) of the households earned below $20,000 annually and nearly half (44 %) were single-parent households. In addition to this high-risk sample, a normative sample (n= 387) was recruited from the control schools across the four Fast Track study sites to represent children with population-normative range of symptoms, based on teacher ratings obtained during the screening procedure. This normative sample was used to establish cut-offs (one standard deviation from its mean) to indicate elevations in symptoms.

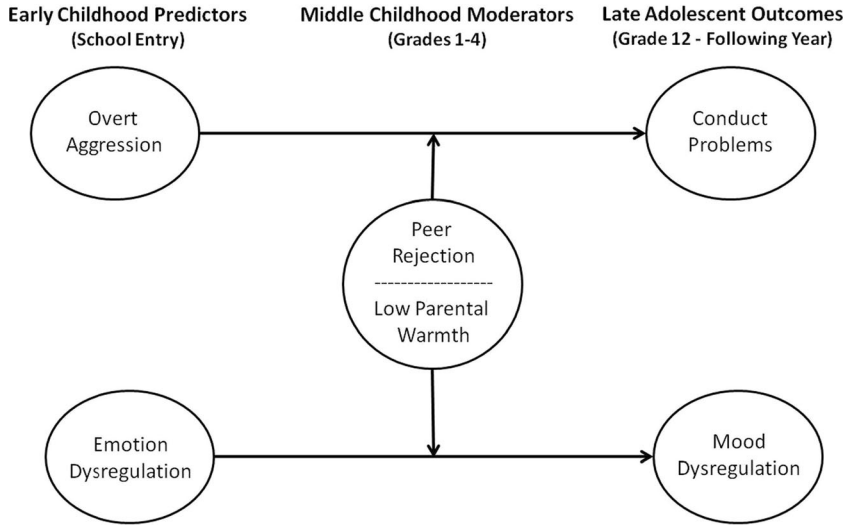

Fig. 1 Conceptual diagram of the hypothesized diathesis-stress model. A diathesis-stress model with early childhood difficulties as the behavioral diatheses (*predictors*) and peer rejection and low parental warmth in grades 1–4 as the stressors (*moderators*) is depicted. Peer rejection and low parental warmth are hypothesized, independently of one another, to moderate the associations between the early childhood predictors (overt aggression and emotion dysregulation) and their unique late adolescent outcomes (conduct problems and mood dysregulation, respectively)

Procedures

Teachers completed and returned measures to the Fast Track project after research assistants delivered and explained rating forms to them at school. Parents and children were interviewed separately during annual home interviews by trained research staff members, who read through all questionnaires and recorded responses. In adolescence, youth interviews were computer-administered to increase privacy and confidentiality. Teachers, parents, and children received financial compensation for their participation.

Measures

To reduce biases associated with reporter effects, constructs were assessed using different reporters for each period (school entry, middle childhood, and late adolescence). To obtain the most robust measurement of study constructs, efforts were made to use multiple measures and, if available, multiple time points, to assess each construct. Early overt aggression and emotion dysregulation, the main predictors, were assessed by teacher ratings in kindergarten and first grade. Low parental warmth and peer rejection, the moderators, were assessed annually using observer report and sociometric nominations, respectively, during grades 1–4. Late adolescent outcomes were assessed by youth and parent reports in twelfth grade and the subsequent year (ages 17–19 years). Detailed descriptions of all measures are available at the Fast Track study website, http://www.fasttrackproject.org/data-instruments.php.

Early Childhood Difficulties To obtain a stable estimate of overt aggression and emotion dysregulation at school entry, teacher reports were obtained in kindergarten and first grade and averaged. Overt aggression was measured using the Teacher's Report Form (TRF; Achenbach 1991). Teachers indicated the presence of child behavior problems on a 3-point scale (0 = *Not True*; 1 = *Somewhat/Sometimes True*; 2 = *Very True or Often True*). A narrow-band scale for overt aggression (α=0.86), validated as a distinct dimension of externalizing behavior (Rains 2003), was used. Items were: bragging, boasting; cruelty, bullying, meanness to others; gets in many fights; physically attacks people; teases a lot; threatens people. Emotion dysregulation was assessed using the emotion regulation subscale of the Social Health Profile (CPPRG 2003). Four items were rated on a 6-point Likert scale (ranging from *Not at All* to *Almost Always*), reverse-scored, averaged, and standardized (α=0.82). Items were: controls temper in a disagreement; expresses needs and feelings appropriately; thinks before acting; calms down when excited or wound up.

Adverse Social Experiences Low parental warmth was assessed annually in grades 1–4 using interviewer ratings on the Post-Visit Reaction Inventory (CPPRG 1990), after the interviewer had spent 2 hours talking with the parent and observing parent–child interactions in the home. Interviewers were trained to a minimum of 70 % agreement with the criterion observer at each site through manualized instruction, role play, and guided and videotaped practice (CPPRG 1999). Three warm parental behaviors directed at the child were rated on a

3-point scale (1 = *Didn't Occur*; 2 = *Occurred Once*; 3 = *Occurred More than Once*), and ratings were summed for a total score reflecting parental warmth (α=0.87). Items were: mother spoke to child with positive tone; gave attention when child talked; positively reinforced positive child behaviors. Low parental warmth was coded as occurring for that year if the total score for warmth fell one standard deviation or more below the mean of the normative sample.

Peer rejection was assessed using sociometric nominations. In the spring of grades 1–4, children with parental informed consent participated in individual interviews at school. Average class-level participation rate was 74 %. Children provided nominations for classmates that they "liked most" and "liked least." Nominations received by each child were summed and standardized within the classroom. Using guidelines by Asher and Dodge (1986), a child was classified as rejected that year if his/her: a) standardized "liked most" minus "liked least" score was at least one standard deviation below the class mean; b) standardized "like least" score was above the class mean; and c) standardized "like most" score was below the class mean.

The conceptual framework of this study called for an assessment of the length of exposure to low parental warmth and peer rejection. Length of exposure was summarized across grades 1–4 as follows: 0 = never, 1 = only 1 year, and 2=2 or more years.

Late Adolescent Outcomes Five outcomes were assessed using adolescent and parent reports in 12th grade and the subsequent year. To assess for chronic conduct problems, the occurrence of index offenses (delinquent activities) and symptoms of conduct disorder were assessed. To assess for mood dysregulation, symptoms of dysphoric mood, suicidality, and reactive anger were assessed. Index offenses were assessed using two measures: 1. The Self-Report of Delinquency (Elliott et al. 1985), on which adolescents indicated whether they had committed each of the 13 index offenses (e.g., property damage, theft, assault) in the past year; and 2. The Parental Report on Child Delinquency (CPPRG 1997), on which parents reported whether the youth had committed each of the four index offenses. Items were coded dichotomously (0 = *No*; 1 = *Yes*) and averaged to create a total summary score (α=0.82).

Symptoms of conduct disorder were assessed using youth and parent reports on the Diagnostic Interview Schedule for Children (DISC; Shaffer and Fisher 1997). The DISC is a structured interview assessing symptoms of DSM-IV disorders and was administered to adolescents in a computerized form on a laptop computer and to parents in an interview during 12th grade. Adolescents and parents reported on the occurrence of 15 symptoms of conduct disorder in the previous year. Items were coded dichotomously (0 = *Absent*; 1 = *Present*) and averaged for the total score (α=0.61).

Depressed or dysphoric mood was assessed using four related items from the DISC (e.g., "depressed mood or irritable mood"; "worthlessness or guilt") and five items (e.g., feeling "blue"; "no interest in things") from the Brief Symptom Inventory (BSI; Derogatis 1975). On the BSI, youths rated symptoms in the past week using a 5-point Likert scale ranging from *Not at All* to *Extremely*. Items rated Moderately or higher were coded as elevated. The nine dichotomously coded items were then averaged to obtain a total score (α=0.75).

Suicidality was also assessed with the DISC and the BSI. Two items from the DISC assessed suicidal ideation ("thoughts of death, suicidal ideation, suicide attempt, or plan"; "talked seriously about killing self"). One item on the BSI ("How often were you distressed by thoughts of ending life?") was coded as elevated if the item was rated Moderately or higher. The three dichotomous items were then averaged to create a total score (α=0.52).

Finally, reactive anger was assessed using five items concerning expressions of anger (e.g., "angry and resentful"; "loses temper"; "touchy or easily annoyed"; "actively defies or refuses adults"; "argues with adults"; "argue or talk back to an adult") on the DISC and one item from the Parent Daily Report (PDR; Chamberlain and Reid 1987), administered on three separate occasions during the summer after 12th grade. On the PDR, parents indicated whether the youth had "argued or talked back to an adult" in the previous 24 hours. Presence of such argumentative behavior on at least two of the three reports was coded as elevated. The six dichotomously coded items from the DISC and the PDR were then averaged to create the total score (α=0.81).

Dichotomizing Adolescent Outcomes To obtain dichotomous indicators of elevated symptoms for latent class analysis, the scores for the five adolescent outcomes (index offenses, conduct disorder symptoms, depressed mood, suicidality, and reactive anger) were dichotomized using a cutoff of one standard deviation above the mean of the normative sample.

Results

Descriptive Analyses

First, missing data were examined. Of the 446 eligible participants in the high-risk control sample, 444 had data for early childhood difficulties, 387 (87 %) had data for low parental warmth and peer rejection, and 350 (78 %) had at least partial data for adolescent outcomes. In all, 317 (71 %) cases had adequate data for the estimation of the latent class analysis models. These children and the 129 excluded children were compared on demographic variables. No significant differences emerged, except for site, $\chi^2(3, N=446)=34.62$,

$p<0.001$. Excluded children tended to be from Seattle (39 % of those excluded) or Nashville (33 %) rather than central Pennsylvania (16 %) or Durham (12 %). They also had higher initial levels of overt aggression, $F(1, 443)=3.97$, $p=0.05$, and emotion dysregulation, $F(1, 442)=4.72$, $p=0.03$.

Next, descriptive analyses were conducted (see Table 1). To contextualize the sample, the mean overt aggression score suggested that, on average, participants received a rating of Somewhat/Sometimes True for four items or Very/Often True for two items out of six items. The mean emotion dysregulation score indicated that participants scored one-third standard deviation higher, on average, than children in the normative sample. Between grades 1–4, approximately half of the sample had no exposure to peer rejection ($n=143$; 45.1 %) or low parental warmth ($n=150$; 47.3 %), one-third had 1 year of exposure ($n=95$, 30 % for peer rejection; $n=109$, 34.4 % for low parental warmth), and the remainder had exposure of more than 1 year ($n=79$, 24.9 % for peer rejection; $n=58$, 18.3 % for low parental warmth).

Correlations were also computed to assess associations among the variables (Table 1). Significant inter-correlations were found in expected directions among early childhood difficulties and late adolescent outcomes. However, peer rejection and low parental warmth in middle childhood were associated with early childhood difficulties but not adolescent outcomes.

Latent Class Analysis Models of Adolescent Symptom Patterns

Latent class analysis (LCA; Collins and Lanza 2010) was conducted to identify patterns in late adolescent symptoms and to test the hypothesis that conduct problems and mood dysregulation would emerge empirically as differentiated outcomes. LCA is a person-oriented analytic approach that identifies latent groups based on observed categorical variables. Analyses were conducted in SAS 9.2 using the proc lca procedure (Lanza et al. 2010). LCA models with two to five latent classes were run and compared on indicators of model fit (Table 2). The 3-class solution provided the best fit to the data, as indicated by the lowest AIC, highest entropy R-squared, and a relatively low BIC, and was readily interpretable. The Lo-Mendell-Rubin adjusted likelihood ratio test (obtained using Mplus 7.0; Lo et al. 2001) indicated that the 3-class solution had improved model fit compared to the 2-class solution (adjusted 2LR=31.70, $p<0.001$), whereas the 4-class solution did not, compared to the 3-class solution (adjusted 2LR=5.42, $p=0.38$). Thus, the 3-class solution was chosen as the best fitting model.

The item-response probabilities, or probabilities that members of a class would have an elevated score in each variable, are summarized in Table 3. The largest class (78.2 % membership probability) was characterized by low probabilities and was labeled the "lower-problem" class. Another class (15.3 %) showed high probabilities of elevated reactive anger, index offenses, and conduct disorder symptoms and was labeled the "conduct problem" class. The third class (6.5 %) had high probabilities of elevated depressed mood, suicidality, and reactive anger, and was labeled the "mood dysregulation" class. Thus, the hypothesis that conduct problems and mood dysregulation would emerge as differentiated outcomes was supported, though reactive anger was a shared symptom. Potential demographic covariates for this model were

Table 1 Descriptive statistics and intercorrelations for the study variables

Variable	1	2	3	4	5	6	7	8	9
Early childhood difficulties (grades K-1)									
1. Overt aggression	0.61 (48)								
2. Emotion dysregulation	0.61**	0.30 (0.77)							
Adverse social experiences (grades 1–4)									
3. Peer rejection	0.24**	0.31**	0.98 (1.16)						
4. Low parental warmth	0.07	0.11*	0.10	0.76 (0.86)					
Late adolescent outcomes (grade 12 and following year)									
5. Depressed mood	0.02	0.11*	0.06	0.00	57 (18.0 %)				
6. Suicidality	0.12*	0.14**	0.10	0.04	0.36**	27 (8.5 %)			
7. Reactive anger	0.08	0.12*	0.08	0.04	0.26**	0.32**	70 (22.1 %)		
8. Index offenses	0.13*	0.08	0.07	0.04	0.08	0.06	0.18**	39 (12.3 %)	
9. Conduct problems	0.14*	0.05	0.07	0.05	0.16**	0.07	0.34**	0.43**	43 (13.6 %)

$n=317$. Diagonals present means and standard deviations for continuous variables and frequency (n and % of the sample) for dichotomous variables. Pearson correlations are given for variables 1–2, and point-biserial correlations are given for correlations between continuous (variables 1–2) and dichotomous (variables 5–9) variables, Spearman rank correlations are given for correlations between continuous (1–2) and ordinal (3–4) variables, and phi correlations are given for correlations among dichotomous (5–9) variables.

*$p<0.05$. **$p<0.01$

Table 2 Comparison of latent class analysis models

Model fit indicator	Number of latent classes			
	2	3	4	5
AIC	71.52	51.18	57.78	67.72
BIC	112.87	115.08	144.24	176.73
Entropy R-Squared	0.67	0.83	0.70	0.57

AIC, Akaike Information Criterion; *BIC*, Bayesian Information Criterion. Better model fit is indicated by lower AIC and BIC and higher entropy R-squared.

examined using a test of measurement invariance (Lanza et al. 2010), which revealed that item-response probabilities did not differ by child sex, race, or site and suggested that the model was valid for the entire sample.

Prediction of Adolescent Profiles from Early Childhood Difficulties

LCA was also used to test the hypothesis that early childhood difficulties would differentially predict late adolescent outcomes. The two predictors (overt aggression and emotion dysregulation) were centered and entered simultaneously as covariates into the model, which permitted the estimation of their effect on the overall model fit and the odds of belonging in one class over a pre-specified reference class. In this analysis, the "lower-problem" class was used as the reference class. Overt aggression significantly improved model fit, $\chi^2(2, N=317)=5.90$, $p=0.05$, as did emotion dysregulation, $\chi^2(2, N=317)=6.63$, $p=0.04$. Overt aggression predicted significantly higher odds of membership in the conduct problem class over the lower-problem class, $\beta=1.11$, $t(314)=2.26$, $p=0.02$, $OR=3.03$, but did not affect odds of membership in the mood dysregulation class, $\beta=-0.34$, $t(314)=-0.48$, $p=0.63$, $OR=0.70$. In contrast, emotion dysregulation predicted significantly higher odds of membership in the mood dysregulation class compared to the lower-problem class, $\beta=1.36$, $t(314)=2.31$, $p=0.02$, OR=3.90, but did not affect the odds of conduct problem class membership, $\beta=-0.06$, $t(314)=-0.20$, $p=0.84$, $OR=0.94$. These findings supported the hypothesis that early overt aggression specifically predicts later conduct problems, whereas early emotion dysregulation specifically predicts later mood dysregulation. These effects were present even after controlling for the other early childhood difficulty.

Moderation by Low Parental Warmth To test the hypothesis that exposure to low parental warmth moderates the links found between early childhood difficulties and adolescent outcomes, low parental warmth and its interaction with each early childhood variable were added to the LCA model. The results are presented in Table 4 (top half). The interaction term between low parental warmth and overt aggression was not significant. However, the interaction term between low parental warmth and emotion dysregulation significantly improved model fit, $\chi^2(2, N=317)=7.42$, $p=0.02$, and increased the probability of membership in the mood dysregulation class, $\beta=2.53$, $t(311)=2.31$, $p=0.02$. This effect is graphed in Fig. 2 (top panel). The moderating effect applied to children with above average levels of emotion dysregulation and increased with longer exposure to low parental warmth. Emotion dysregulation itself was no longer a significant predictor after accounting for its interaction with low parental warmth.

Moderation by Peer Rejection Experiences The next analysis examined the moderation effects by exposure to peer rejection (Table 4, bottom half). The interaction term between overt aggression and peer rejection reached a trend, $\chi^2(2, N=317)=4.87$, $p=0.09$, but did not significantly predict membership in either adolescent class. In contrast, the interaction term between emotion dysregulation and peer rejection significantly improved model fit, $\chi^2(2, N=317)=10.61$, $p=0.01$, and significantly increased the probability of membership in the mood dysregulation class, $\beta=2.41$, $t(311)=2.78$, $p=0.01$. This effect is graphed in Fig. 2 (bottom panel). Again, the moderating effect applied to children with above average levels of emotion dysregulation, with risk increasing with longer exposure to peer rejection. Emotion dysregulation

Table 3 Item-response probabilities of elevated symptoms, based on class

Adolescent Outcome	Latent class		
	Lower-problem (78.2 %)	Conduct problems (15.3 %)	Mood dysregulation (6.5 %)
Depressed mood	0.10	0.35	0.77
Suicidality	0.01	0.15	0.78
Reactive anger	0.11	0.66	0.76
Index offenses	0.06	0.53	0.01
Conduct disorder symptoms	0.03	0.81	0.02

Item-response probability refers to the probability that a member of a class has an elevation (rather than not) in the outcome variable. Percentages listed for each class indicate the membership probability, or the proportion of the sample that is estimated to belong to each class.

Table 4 Odds of class membership as moderated by adverse social experiences

Covariate	Class				
	Conduct problems		Mood dysregulation		
	OR	95 % CI	*OR*	95 % CI	*p*
Moderation by low parental warmth					
Overt aggression	3.14	[0.73, 13.47]	0.61	[0.08, 4.66]	0.22
Emotion dysregulation	0.93	[0.40, 2.14]	1.53	[0.52, 4.47]	0.69
Low parental warmth	1.24	[0.76, 2.04]	0.29	[0.06, 1.27]	0.07
Overt aggression x low parental warmth	0.96	[0.26, 3.58]	0.61	[0.05, 7.29]	0.89
Emotion dysregulation x low parental warmth	1.01	[0.39, 2.64]	12.53*	[1.47, 107.24]	0.02
Moderation by peer rejection					
Overt aggression	3.29	[0.85, 12.77]	4.59	[0.49, 42.80]	0.10
Emotion dysregulation	1.10	[0.46, 2.65]	0.82	[0.22, 3.07]	0.91
Peer rejection	1.31	[0.81, 2.09]	0.39	[0.11, 1.42]	0.14
Overt aggression x peer rejection	0.84	[0.26, 2.74]	0.16	[0.03, 0.85]	0.09
Emotion dysregulation x peer rejection	0.74	[0.34, 1.63]	11.12**	[2.03, 60.81]	0.01

N=317. The p-values correspond to the chi-square test, χ^2 (2, N=317), for the significance of each covariate in improving the overall model fit. Other columns show the impact of each covariate on the odds of class membership, compared to membership in the reference (lower-problem) class.

*p<0.05. **p<0.01

was no longer a significant predictor after accounting for its interaction with peer rejection.

Discussion

The present study examined the development of conduct problems and mood dysregulation in a sample of children at risk due to elevated externalizing behavior problems at school entry. By late adolescence, these children diverged into three latent groups: One group (15 %) exhibited severe conduct problems (e.g., criminal behaviors and conduct disorder symptoms), a second group (7 %) exhibited elevations in mood dysregulation (e.g., depressed mood, suicidality, and reactive anger), and a third group (78 %) was distinguished from the other two groups by their lower levels of conduct and mood symptoms. It is important to note that this third group is not necessarily well-adjusted. A prior study of the youths in the high-risk control group of the Fast Track project, from which the present sample was drawn, found significant maladjustment by age 18 (e.g., 48 % had arrest records, 45 % had dropped out of school, and 30 % of the girls had experienced pregnancy; CPPRG 2010). Thus, it would be misleading to conceptualize many of the adolescents in the lower-problem class as exhibiting successful adaptation and resilience to their high-risk backgrounds. However, the results of our analyses suggest that, even among high-risk adolescents, subgroups of adolescents with particularly severe conduct problems and mood dysregulation can be identified empirically.

Membership in these adolescent subgroups was predicted by behavioral diatheses in early childhood. Children with high levels of early overt aggression had increased odds of belonging to the group with conduct problems, whereas those with high levels of early emotion dysregulation had increased odds of belonging to the group characterized by mood dysregulation. Contrary to expectations, neither low parental warmth nor peer rejection in middle childhood affected the pathway toward later conduct problems. However, both experiences strengthened the pathway toward later mood dysregulation among children with above average levels of emotion dysregulation. These moderation effects were cumulative, with risk increasing dramatically with increased years of exposure to low parental warmth and peer rejection.

Development of Conduct Problems

The Fast Track project was predicated on the assumption that children with externalizing behaviors at school entry are at elevated risk for serious conduct problems (Coie and Dodge 1998). Consistent with this assumption, a profile characterized by features of serious conduct disorder emerged in late adolescence, including youth and parent-reported criminal, aggressive, and antisocial behaviors, and angry, oppositional behaviors. Teacher-rated overt aggression at school entry predicted these symptoms 12 years later, even after accounting for the child's early emotion dysregulation and experiences of peer rejection and low parental warmth during grades 1–4. These findings are consistent with research indicating that children with the highest levels of aggression are at greatest

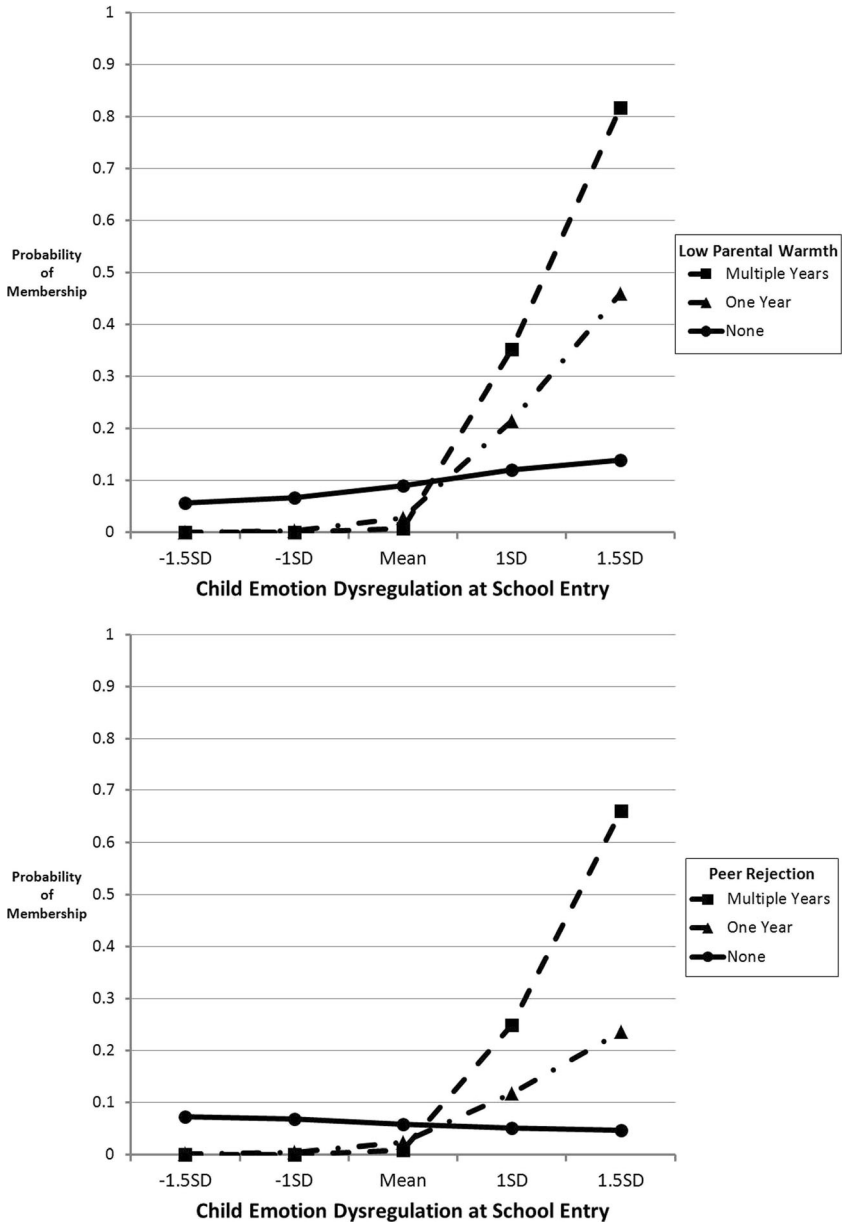

Fig. 2 Moderating effects of low parental warmth and peer rejection in the prediction of mood dysregulation class membership. Figures illustrate the moderating effects of exposure to low parental warmth (*top panel*) and peer rejection (*bottom panel*) between grades 1–4 on the relationship between child emotion dysregulation at school entry (*x*-axis) and the probability of membership in the mood dysregulation class in late adolescence (*y*-axis)

risk for persisting in their trajectories, developing serious conduct problems (Broidy et al. 2003; Reef et al. 2010), and possibly developing antisocial personality disorder, an adulthood disorder characterized by pervasive and chronic disregard for and violation of rights of others (Moffitt 1993).

To our surprise, adverse social experiences did not moderate the link between early overt aggression and later adolescent conduct problems. The absence of a moderation effect by low parental warmth in this study may reflect limited assessment of parenting, and a more thorough assessment that included harsh parenting or maltreatment may have found significant effects. With regard to peer relations, the absence of a moderating effect by peer rejection in this study may be due to its longer time frame. Peer processes more proximal to late adolescence, such as involvement with deviant peers in early adolescence, may have linked early childhood aggression to antisocial behaviors in adolescence (Dishion et al. 2010; Dodge et al. 2008).

Development of Mood Dysregulation

A small subset of the children with early externalizing behaviors (7 % of the sample) exhibited a distinct profile of mood dysregulation in late adolescence, characterized by depressed mood, suicidality, and reactive anger. This finding is consistent with existing research suggesting that some children with co-morbid early externalizing problems and emotional dysregulation experience socialization difficulties and later mood dysregulation (Brotman et al. 2006; Fanti and Henrich 2010). This adolescent outcome, characterized by dysphoric mood,

suicidal ideation or attempts, and intense, volatile, inappropriate, and/or reactive anger, may reflect a particularly severe form of mood disorder (Stringaris et al. 2013). Furthermore, these symptoms may be consistent with DMDD, although the measures included in this longitudinal study did not allow for a direct comparison with the DSM-5 diagnostic criteria for DMDD.

This profile of mood dysregulation is of particular interest because it may indicate increased risk for serious affective disturbances in adulthood. For instance, Copeland et al. (2014) have found that children and adolescents meeting criteria for DMDD experience depression in young adulthood at higher rates than those with other psychiatric diagnoses. Adolescents with irritability and subclinical depressive symptoms who were followed prospectively were at increased risk for adulthood suicidality as well (Pickles et al. 2010). Although this profile of mood dysfunction is tied especially to increased risk for later depression, among adolescents whose affective symptoms are episodic rather than chronic in nature, it may indicate elevated risk for later bipolar disorder (Rao 2014). Of note, a combination of inappropriate and intense negative affect, chronic dysphoria, and suicidal ideation or attempts may also indicate increased risk for adulthood borderline personality disorder (Beauchaine et al. 2009; Rogosch and Cicchetti 2005; Stepp et al. 2013). These studies suggest that early intervention for this cluster of angry, dysphoric, and suicidal mood symptoms is important for preventing serious affective disturbances in adulthood.

Although there is as of yet limited research on the predictors of adolescent DMDD, the present study found that early emotion dysregulation interacted with adverse social experiences to predict mood dysfunction in adolescence. The findings are consistent with existing research on the role of interpersonal rejection in the prediction of depressive mood symptoms in children followed prospectively into adolescence (Brendgen et al. 2005; Nolan et al. 2003). Particularly for girls, a developmental trajectory characterized by increases in depressive symptoms has been predicted by an interaction between negative reactivity in early childhood and problematic peer relations in ages 11–13 (Brendgen et al. 2005). Among children with early externalizing problems, the emergence of later DMDD or similar mood dysfunction may also be predicted by the interaction between early emotional dysregulation and interpersonal difficulties. Dual-focused interventions targeting the child's emotion regulation capacities and improved relations with parents and peers may be important in preventing this costly long-term outcome.

Divergence in Pathways toward Conduct Problems and Mood Dysregulation

Teacher-rated overt aggression and emotion dysregulation were correlated in the present sample. This finding is consistent with existing research suggesting that emotional dysregulation often accompanies aggressive behaviors (Cappadocia et al. 2009), though the association may have been partially accounted for by the use of the same reporter for both characteristics. Nonetheless, developmental pathways diverged among the children with high levels of these two characteristics. Two speculative hypotheses regarding this divergence emerge from the present study's findings. First, although they share such correlates as impulsive-disruptive behavior, difficulty complying with rules, and frequent interpersonal conflict, distinct outcomes predicted by early overt aggression and emotion dysregulation suggest that these early difficulties may reflect different underlying behavioral and affective tendencies. Early overt aggression may be fueled by high sensitivity to reward and insensitivity to punishment (Frick 2012), whereas early emotion dysregulation may reflect elevated anxiety, vigilance, and hyper-reactivity to interpersonal threat (Cappadocia et al. 2009). Either may activate feelings of reactive anger that were shared between the two adolescent groups. For youth in the conduct problem class, frequent anger may be ignited by perceived goal blocking or limited access to desired rewards, which fuel aggressive reactions to control those rewards. For youth in the mood dysregulation class, frequent anger may be ignited by perceptions of interpersonal threat that trigger feelings of insecurity. Future studies might test these theory-based speculations.

A second mechanism contributing to the diverging pathways may be related to the different socialization experiences evoked by or associated with early aggression and emotion dysregulation. Early aggression has been linked with homophily in peer relations–a tendency to select similarly aggressive children as playmates, along with a tendency to alienate mainstream peers and rebel against parents (Dishion et al. 2010). Over time, the socialization experiences of highly aggressive youth thereby involve heightened exposure to aggressive social models and relatively fewer sanctions for antisocial behavior. In contrast, early emotion dysregulation may be associated with inconsistent and insensitive parental responding that interferes with the development of effective emotion regulation capacities and a stable, secure sense of self and others (Levy 2005). Interpersonal difficulties associated with emotion dysregulation may limit opportunities for deviant peer affiliation and antisocial activities but may increase exposure to rejection, aggravating intense, reactive anger and dysphoria associated with interpersonal insecurity. Again, future research is needed to test these speculative hypotheses.

Limitations and Future Directions

The present study had several limitations. First, the present study focused on children with elevated externalizing problems in early childhood, and two-thirds of the sample was male. Thus, findings do not necessarily extrapolate to more

normative or representative populations, and our sampling likely prevented the detection of a purely internalizing profile in adolescence.

Second, measures of emotion dysregulation and parental warmth were created specifically for the Fast Track project and contained few items. As such, the findings in this study will need to be replicated with other validated measures of the study constructs. Particularly for low parental warmth, a more complex and comprehensive measure of the construct may have allowed detection of its influence on the link between overt aggression and conduct problems. Moreover, because measures of DMDD were not available in the Fast Track project, measures of depressed mood, suicidality, and expressions of reactive anger were used to assess related mood features. Assessment of DMDD using available measures of depressed mood and reactive anger has been conducted elsewhere (e.g., Copeland et al. 2013), but our assessment was incomplete. Future research using measures developed specifically for DMDD is needed, to validate some of our interpretations and speculations regarding the mood outcomes identified in this study. Finally, more items assessing delinquent activities and depressed mood were available for adolescents than for parents. Because these symptoms are often covert and hidden from parents' view, obtaining more adolescent report may be warranted. However, adolescent reports may have added measurement biases, such as reporting of symptoms unreflective of functional impairment (Youngstrom et al. 2000).

Third, the present study tested a diathesis-stress model. Although the model found some support, causality cannot be established, as the childhood variables could not be systematically manipulated or controlled for throughout children's development. Moreover, although adverse social experiences were conceptualized as the moderators in this study, early childhood difficulties may have instead moderated the effects of such experiences. For instance, some studies have suggested that child temperamental characteristics moderate the impact of negative parenting practices on child adjustment (e.g., Lengua 2008). Also, externalizing problems at school entry may have reflected problematic early caregiving experiences not assessed in this study. Finally, transactional effects between child characteristics and socialization experiences could not be modeled. Future studies might test and compare these alternate models.

Finally, as with many longitudinal studies, there was a significant amount of missing data. Sufficient data were available for only 71 % of the original sample. Although the current sample size was sufficient to detect small effect sizes, children with inadequate data had higher levels of overt aggression and emotion dysregulation than those included in the study. Because attrition of highest-risk children reduces power for detecting significant effects of behavioral problems, effects not found in the study may have been due to attrition. However, significant effects were nonetheless detected in the present study and may reflect relatively robust developmental processes.

Conclusion

The findings of this study suggest the importance of early intervention in the prevention of conduct problems and mood dysregulation in late adolescence. Prevention of these adolescent outcomes may, in turn, reduce the risk for serious adulthood psychopathology, including antisocial personality disorder, mood disorder, and possibly borderline personality disorder. Especially for children who exhibit high levels of overt aggression and/or emotion dysregulation at school entry, targeted interventions promoting behavioral self-regulation, emotion regulation, and effective social functioning are crucial for preventing future conduct and mood problems. Moreover, especially for children with significant emotion dysregulation, multi-component interventions promoting warmer, more sensitive parenting and improved peer relations may be indicated. Overall, among children with externalizing problems, long-term risk for conduct and affective problems appears to be identifiable in early childhood. Early intervention may be crucial for the prevention of those pathologies and the destruction, loss, and suffering they bring about, for children fortunate enough to receive and respond to such intervention.

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

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