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Parental psychopathology levels as a moderator of temperament and oppositional defiant disorder symptoms

in preschoolers

Zayra Antúnez · Nuria de la Osa · Roser Granero · Lourdes Ezpeleta

Z. Antúnez

Department of Clinical and Health Psychology. Universitat Autònoma de Barcelona, Barcelona, Spain

University Health Centre. Universidad Austral de Chile, Valdivia, Chile.

N. de la Osa · Lourdes Ezpeleta

Unit of Epidemiology and Diagnosis in Developmental Psychopathology (2014 SGR 312). Department of Clinical and Health Psychology. Universitat Autònoma de Barcelona, Barcelona, Spain

R. Granero
Unit of Epidemiology and Diagnosis in Developmental Psychopathology (2014 SGR 312). Department of Psychobiology and Methodology of Health Sciences. Universitat Autònoma de Barcelona, Spain
Oppositional Defiant Disorder (ODD) is among the most prevalent disorders in preschoolers. It has been linked to temperament, since characteristics such as elevated surgency and negative affect, as well as low levels of effortful control, contribute to the development of this disorder. Evidence also indicates that parental psychopathology can accentuate temperamental traits. Our aim was to assess whether the levels of psychopathology of mothers and fathers acts as a moderator of the relationship between temperament and ODD symptoms in preschoolers, both cross-sectionally at ages 3, 4 and 5, and longitudinally between ages 3 and 5. The sample included 550 children evaluated at ages 3, 4 and 5 through questionnaires and a semi-structured diagnostic interview with parents. Parents also answered a questionnaire about their own psychopathology. The results indicated that negative affect and effortful control are associated with higher levels of ODD symptoms in preschoolers. At child age 5, higher levels of paternal depression and anxiety increased the effect of low effortful control on ODD. High levels of negative affect and low levels of effortful control at age 3 were statistical predictors of ODD levels at age 5, and this relationship was also moderated by paternal anxiety and depression. The results have important clinical implications for the proper orientation of interventions, suggesting that interventions should integrate the paternal caregiver in the treatment.

**Keywords:** Oppositional defiant disorder · parental psychopathology · preschool · temperament

**Corresponding author:**
Zayra Antúnez
Department of Clinical and Health Psychology, Edifici B. Universitat Autònoma de Barcelona
08193 Bellaterra (Barcelona), Spain.

E-mail: ZayraAntunez@uach.cl
Telephone number: +34 935 868 259
Oppositional Defiant Disorder (ODD) is among the most prevalent disorders in childhood with rates varying between 6.9% and 13.4% in preschoolers (Ezpeleta, de la Osa, & Doménech, 2014; Lavigne, Lebailly, Hopkins, Gouze, & Binns, 2009). It is described as a persistent pattern of anger and irritability, along with oppositional, defiant and hostile behavior toward adults and authority figures (American Psychiatric Association, 2013). The symptoms of ODD include behaviors such as acting out of spite or revenge, blaming others for the consequences of one's actions or problems, presenting deficits in self-control, and displaying patterns of behavior characterized by emotional instability (Burke, Rowe, & Boylan, 2014; Melegari et al., 2015).

Individual differences in behavior patterns, emotional reactivity and self-regulation have been identified as some of the earliest biological differences emerging in children, factors that explain why people may respond differently to the same stimulus (Derryberry & Rothbart, 1997; Rothbart & Posner, 2006). The concept of temperament refers to the individual differences already manifest in the period between infancy and early school years (Stringaris, Maughan, & Goodman, 2010).

There is a general consensus among previous studies regarding the stability of temperament throughout the lifespan, with support from genetic and biological models (Buss & Plomin, 1975; Derryberry & Rothbart, 1997; Goldsmith & Campos, 1982; Thomas & Chess, 1977). However, the expression and development of temperament can be mitigated, intensified or modified according to interactions with the environment (Rothbart & Bates, 2006; Thomas & Chess, 1977).
Rothbart, Ahadi, Hershey and Fisher (2001) proposed a three-part model of temperament, involving surgency (positive emotionality and extraversion), negative affect (high levels of negative emotions) and effortful control (planning and self-regulation of behavior). Evidence suggests that the individual dimensions of temperament proposed in this model may differentially contribute to the risk for ODD in young children (Lavigne, Gouze, Hopkins, Bryant, & LeBailly, 2012; Stringaris & Goodman, 2009). For instance, studies on preschoolers suggest that children with high levels of negative affect and low levels of effortful control are at risk for temperamental difficulties. In particular, they would have trouble regulating intense emotional reactivity (Stringaris et al., 2010), as well as modulating behavior and attention in a flexible and adaptive way (Crawford, Schrock, & Woodruff-Borden, 2011; Nigg, 2006), all of which would increase the risk of displaying more externalizing symptoms (Rothbart & Bates, 2006), such as ODD symptoms (Lavigne et al., 2012) or behavioral problems (Dougherty et al., 2011; Eisenberg et al., 2009). Researchers have also found associations between high surgency and symptoms of defiance (Lavigne et al., 2012; Martel, Gremillion, & Roberts, 2012; Stringaris et al., 2010).

Despite the demonstrated biological nature of temperament, environmental factors such as parental psychopathology create gene-environment interactions that significantly affect the developing temperament (Burnette, Oshri, Lax, Richards, & Ragbeer, 2012). Since parents not only transmit genetic information, but also shape the rearing environment (Jaffee, Moffitt, Caspi, & Taylor, 2003), the poor mental health and behavior of parents has been demonstrated to adversely affect the mental health of children and accentuate traits associated with
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a difficult temperament (Childs, Fite, Moore, Lochman, & Pardini, 2014; Weitzman, Rosenthal, & Liu, 2011; Yoo, 2014). For example, parents with mental health problems such as depression are likely to have a relationship with their children characterized by tough or distant parenting. These parental attitudes may create a cooler rearing environment, which could influence child behavioral problems (Lovejoy, Graczyk, O’Hare, & Neuman, 2000).

Researchers have also looked separately at the effect of maternal and paternal psychopathology on child temperament and behavior problems. There is extensive support in the literature for the notion that maternal mental health and child care quality have a significant impact on child development (Goelman, Zdaniuk, Boyce, Armstrong, & Essex, 2014). The evidence suggests that both maternal negative affect and maternal psychopathology may predict increased internalizing and externalizing problems in children, behavior problems in particular (Crawford et al., 2011; Goelman et al., 2014), especially, in children characterized by high surgency or negative affect (Chen, Deater-Deckard, & Bell, 2014). Negative affect and greater negative emotionality of the mother can put children at risk for low self-regulation (Gartstein, Bridgett, Young, Panksepp, & Power, 2013).

Mother’s psychopathology — in particular depression — may influence children’s behavior problems, which may increase or decrease depending on the severity of maternal symptoms (Nicholson, Deboeck, Farris, Boker, & Borkowski, 2011). Maternal depression may also cause children to have a greater negative affect and undergo more
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general psychopathology (Goodman et al., 2011).

Although fathers have been vastly underrepresented in the literature on parent psychopathology and their
influence on children, previous research also indicates that paternal psychopathology can have important
implications for the mental health of the children. Like the mother-child relationship, the father-child relationship may
affect a child’s cognitive and socio-emotional development (Brown, McBride, Bost, & Shin, 2011; Goelman et al.,
2014). It has been found that more father engagement was related to fewer externalizing problems (Flouri,
Midouhas, & Narayanan, 2015). And conversely, fathers’ aggressive behavior seems to have an impact on the
development of aggressive and hostile behavior in children, increasing the symptoms of ODD (Davies, Sturge-
Apple, Cicchetti, Manning, & Vonhold, 2012; Trepat, Granero, & Ezpeleta, 2014).

In addition, paternal psychopathology and especially depression has been associated with displays of greater hostility toward children, and consequently, with increases in child adjustment problems (Reeb, Conger, &
Wu, 2010). As a result, paternal depression and anxiety may also be significant predictors of behavior problems and
ODD symptoms in preschoolers (Breaux, Harvey, & Lugo-Candelas, 2013; Gross, Shaw, Moilanen, Kishion and
Wilson, 2008; Kashdan et al., 2004), and it continues to influence emotional and behavioral problems in older
children and adolescents (Davé, Sherr, Senior & Nazareth, 2008; Weitzman, Rosenthal & Liu, 2011).
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Furthermore, considering that maternal and paternal psychopathology may have different consequences in children with a difficult temperament and symptoms of oppositionism, the moderating role of parental psychopathology in the relationship between temperament and the ODD symptoms should be considered. Nevertheless, there is a lack of empirical evidence in this respect. However, there is some evidence that a mother's depression can be a significant moderator of effects in the child's conduct problems, and these children tend to respond better to intervention (Gardner, Hutchings, Bywater, & Whitaker, 2010). Regarding fathers, positive interaction with their children, specifically, their levels of engagement and accessibility can moderate the effect of intervention on the mental health of children with serious emotional disturbances (Bernard, Whitson, & Kaufman, 2015).

With this in mind, the aim of this study was to determine whether the type and/or severity of paternal or maternal symptomatology (specifically aggression, depression and anxiety) interacts with the relationship between child temperament (surgency, negative affect and effortful control) and the level of ODD in a community sample of preschoolers, both cross-sectionally and longitudinally, between the ages of 3 and 5. Based on research conducted to date, we formulated the following empirical hypotheses: a) levels of surgency, negative affect and effortful control would have an effect on ODD levels in preschoolers, in such a way that higher levels of surgency and negative
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affect and low levels of effortful control would be associated with greater ODD; b) Paternal and maternal aggression, depression and anxiety would moderate the relationship between ODD and temperament, in such a way that higher levels of parental aggression, depression and anxiety would be associated with a stronger effect of temperament (high surgency, high negative affect and low effortful control) on ODD symptoms.

Method

Participants

The sample was obtained as part of a longitudinal study investigating potential risk factors, interactions and mechanisms underlying the development of psychopathology in early childhood (Ezpeleta, de la Osa, & Domènech, 2014). Data was collected from participants using a double-phase design. In the first phase, an initial sample of 2,283 families of 3-year-old children from Barcelona were randomly contacted from those in the census (N = 13,578). In total, 1,341 families agreed to participate (58.7%) and 63 children were excluded on account of having difficulties understanding or using Spanish or Catalan, or because they presented a pervasive developmental disorder or intellectual disability.

In the second phase, a screening was used to identify children with possible psychological problems.

3-4) (Goodman,
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Parents of the remaining 1,278 children answered the Strengths and Difficulties Questionnaire (SDQ) 1997 and all families of children screening positive (with a raw score ≥ 4 on the SDQ 3-4 conduct problems scale, which corresponds with percentile 90, or with a response option of 2 -certainly true- in any of the 8 DSM-IV ODD symptoms) were invited to participate (n = 522), with 105 families declining. Additionally, of the 756 cases that screened negative on the SDQ 3-4, 235 (30%) were selected to continue in the study; 30 of them refused. The final sample included 622 children with an average age of 3.76 (SD = 0.32), of whom 310 were male (49.8%) and 554 identified as Caucasian (89.1%). The left side of Table 1 shows the sociodemographic characteristics of the initial sample, and the right side shows the prevalence of the most frequent DSM-IV disorders at follow-up.

--- Insert Table 1 ---

From the initial sample, subjects who possessed complete information for both the diagnostic interview and the analyzed questionnaires (n = 550 at 3 years, n = 540 at 4 years, and n = 496 at 5 years) were included in the statistical analysis. Parents answered about their own psychopathology at first follow-up (mothers: n = 599 and fathers: n = 561). There were no statistically significant differences between subjects included in the final analysis and subjects excluded due to incomplete information in terms of sex (p = .22), ethnicity (p = .09) or socioeconomic status (p = .24). Table 1 describes the sample of children who were part of the statistical analysis at the first followup.
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Procedure

The study was approved by the ethics committee of the authors’ home institution (Comissió d’Ètica en l’Experimentació Animal i Humana, Universitat Autònoma de Barcelona: CEEAH 1385). The families of children were contacted through recruitment at schools and invited to participate when the children were 3 years old; both parents and teachers were informed in detail about the investigation at the time of recruitment. After obtaining written parental consent, parents were asked to answer the SDQ at home and return the completed form to the school. Families who met the selection criteria were contacted by phone to be included in the study, and consenting parents participated in the diagnostic interview (DICA-PPYC) at the child’s school. The DICA-PPYC was administered by interviewers previously trained in the use of this diagnostic interview and in the other instruments applied. The intensive training period lasts one week and includes an overview about developmental psychology, children’s psychopathology and interviewing skills. Principally, future interviewers conducted practical training with role playing and then, observation and coding of live interviews. The criterion for being ready for the field is to obtain a mean agreement with an expert kappa ≥0.80 for all the questions in at least eight interviews. The other questionnaires were answered by the parents at home and then returned to be collected at the school.

Measures
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Diagnostic Interview for Children and Adolescents for Parents of Preschool and Young Children (DICA-PPYC) (Reich & Ezpeleta, 2009): The DICA-PPYC is a semi-structured interview used to assess child psychopathology according to DSM-IV-TR criteria (American Psychiatric Association, 2000). It was adapted and validated for the Spanish preschool population, and the Spanish preschool version presents adequate psychometric properties (Ezpeleta, de la Osa, Granero, Domènech, & Reich, 2011). The DICA-PPYC was answered by one (mother or father) or by both parents together, completing a single interview. In this situation they reach an agreement on the answer that best represents the opinion about the child's behavior. The average administration time is approximately 50 minutes. We used data collected from the DICA-PPYC at child ages 3, 4 and 5. At each follow-up, the number of ODD symptoms was used as a measure of ODD level. Additionally, the following diagnoses
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comorbid with ODD were defined as covariates in the analysis: Attention-deficit/hyperactivity disorder, conduct disorder, depression, separation anxiety, general anxiety, specific phobias and social phobia.

As regards the respondents, at child age 3, 367 (66.7%) mothers, 41 (7.5%) fathers and 142 (25.8%) both parents together, completed an interview. At child age 4, 378 (70.0%) mothers, 42 (7.8%) fathers and 120 (22.2%) both parents together answered the DICA-PPYC. At child age 5, 370 (74.6%) mothers, 36 (7.3%) fathers and 90 (18.1%) both parents together answered the interview.

Adult Self-Report (ASR) (Achenbach & Rescorla, 2003): The ASR evaluates emotional and behavioral problems in adults between the ages of 18 and 59. It features 126 items that inquire about the respondent’s own behavior over the past six months, plus some items related to interpersonal relationships, work and educational matters. The internalizing problems scale combines anxious/depressed, withdrawn/depressed and somatic complaints syndrome scores and the externalizing problems scale combines rule-breaking behaviors, aggressive behavior and intrusive syndrome scores. The measurement scale is ordinal, with 3 response options: 0 (not true), 1 (somewhat or sometimes true) and 2 (very true or often true). Mothers and fathers answered this questionnaire when the children were 3 years old, and for the purpose of this study, symptomatology levels of the anxiety, depression and aggressiveness (measured through anxious-depressed and aggressive behavior scales) were used for both mothers and fathers. The scales demonstrated high internal consistency in the sample: Maternal anxious-depressed, $\alpha = 0.81$; paternal anxious-depressed, $\alpha = 0.79$; maternal aggressive behavior, $\alpha = 0.80$ and paternal aggressive
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18 behavior, \( \alpha = 0.81 \).

19 *Children’s Behavior Questionnaire (CBQ)* (Rothbart et al., 2001): The CBQ is a parent-reported questionnaire that evaluates the temperament of children between the ages of 3 and 7. It has a 7 option Likert response format, ranging from 1 (“extremely untrue of your child”) to 7 (“extremely true of your child”), plus a response choice of “not applicable” when parents have not observed this situation. The items measure 15 dimensions of child temperament, structured in 3 second-order scales: surgency, negative affect and effortful control. The surgency scale includes the dimensions of activity level, high intensity pleasure, impulsivity and approach/positive anticipation. The negative affect scale includes the dimensions of anger/frustration, discomfort, soothability/falling reactivity, sadness, and shyness. The effortful control scale includes attentional focusing, inhibitory control, low intensity pleasure, perceptual sensitivity, and smiling or laughter. This study used the Spanish version, which has been proven to provide reliable and valid scores to evaluate temperament in preschool children (de la Osa, Granero, Penelo, Domènech, & Ezpeleta, 2013). There was high internal consistency in the study sample, with values at baseline equal to \( \alpha = 0.74 \) for surgency, \( \alpha = 0.71 \) for negative affect and \( \alpha = 0.79 \) for effortful control. The responses of parents at child ages 3, 4 and 5 were included in the analysis.

Data Analyses

We used the statistical software SPSS20 for Windows to perform data analysis. Since the data were collected using a double-phase screening design, all analyses were weighted in such a way that each subject was
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assigned an amount equal to the inverse probability of selection in the second phase of sampling. This weighted variable made it possible to generalize the results to the general population of origin. Independent variables included temperament scales (surgency, negative affect and effortful control), parental psychopathology (levels of symptoms in aggressive behavior and anxious-depressed scales), and the interaction of each temperament scale with parental aggressive behavior and parental anxiety or depression. The level of symptoms of the parents was defined with T scores. T score= 50 for normal clinical thresholds, T score= 65 for subclinical and T score= 70 for clinical.

The dependent variable was the ODD level, defined as the total number of symptoms of ODD in the diagnostic interview. Diagnoses in the DICA-PPYC were generated through computerized algorithms entered in EnDat, according to the DSM-IV-TR criteria. This helped to obtain both the diagnosis and the number of established symptoms of ODD, with which we dimensionally worked in this study.

Given the association between the variables analyzed in this work (ODD symptoms and levels of parental psychopathology) with children’s sex (especially at an early age) and the presence of other psychological disorders, to avoid bias in the results, the statistical analyses have been adjusted according to gender and the presence of other comorbid disorders. This is because ODD prevalence is similar in boys and girls at an early age (Ezpeleta, de la Osa, Granero, & Trepat, 2014), but different in older children (Munkvold, Lundervold, & Manger, 2011) and ODD
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can be comorbid with other disorders (Lavigne et al., 2009).

The data were analyzed using negative binomial regression modeling, an alternative to Poisson regression to count data whose distribution exhibits over-dispersion. The modeling was performed in three blocks: First, the control or adjustment variables were introduced. Second, we introduced temperament scores as measured by the CBQ and levels of parental psychopathology as measured by the ASR. Third, we included the interaction parameters of each scale of the CBQ with each scale of the ASR. To assess the relevance of all interaction parameters for each individual model, the following procedure was employed: a) when the chunk-test produced a value of $p > .10$, step 3 was omitted, and the main effects from step 2 were analyzed; b) when the test for combined interactions produced a value of $p < .10$, indicating the presence of significant interactions, the interactions were analyzed individually to determine which were significant, and only those that had a significant effect were retained in the model and tested.

Since the objective of this work is to screen for any possible interaction term, rather than testing for a hypothesized specific interaction, the $p$-value to value interaction terms has been fixed at $p < 0.10$ to avoid low statistical power and sensitivity (Kleinbaum, Kupper, Muller, & Nizam, 2013). By simultaneously entering information from the paternal and maternal reports into the ASR, regression models could be obtained that indicated the specific contribution of each parent.

The data were analyzed using both cross-sectional and longitudinal analyses. The cross-sectional analysis
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obtained independent results for paternal and maternal levels of psychopathology at child age 3, as well as CBQ temperament scores and ODD symptoms at ages 3, 4 and 5. In the longitudinal analysis, predictor variables included child CBQ scores at age 3, as well as the interaction between child temperament and parental levels of psychopathology at that same age; the dependent variable was defined as the number of ODD symptoms at child age 5.

Results

Table 2 includes the descriptive (mean and standard deviation) for the CBQ and ASR scales. Table 3 contains the bivariate correlation matrix for all the measures used. Due to the large sample size, and therefore the high statistical power, many correlations with low effect size were statistically significant, so coefficients with moderate to good effect size were marked.

The first block of Table 4 contains the negative binomial regression valuing the association between CBQ and ASR scores (defined as independent variables in the model) and the number of ODD symptoms (dependent
variable). The chunk test valuing the set of interaction terms achieved non-significant results ($p=.842$), so all the moderation effects between ASR and CBQ were excluded from the model and main effects were estimated and interpreted. The absence of relevant interaction parameters indicates that parents’ psychopathology levels (anxious-depressed and aggressive behavior) do not moderate the potential association between child temperament and ODD levels. At child age 3, high ODD severity levels were related to high scores on the temperamental dimension of negative affect and low scores on the dimension of effortful control. Additionally, the ODD level was higher for children whose mothers had higher aggressive behavior scores and whose fathers had higher anxious-depressed levels.

--- Insert Table 4 ---

The second block in Table 4 corresponds to the association between the CBQ scores (measured at child age 4), the ASR scores with the criterion number of ODD symptoms at child age 4. At this age, the block with the interaction parameters also obtained non-significant results ($p=.859$), and it was excluded from the final model. At this age, the highest levels of ODD were registered for children with high negative affect and low effortful control. Regarding parental psychopathology, only maternal aggressive behavior was related to higher levels of ODD symptoms at child age 4.

The third block of Table 4 contains the regression for the predictor CBQ scores at child age 5, ASR scores
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and the criterion number of ODD symptoms at child age 5. Since a value of $p=0.79$ was obtained in the chunk test for the block of interaction parameters, specific interaction terms were explored to determine which ones achieved significant results to be retained in the final model. A statistically significant result was achieved for the term effortful control by fathers’ anxious-depressed level ($p=.003$) so simple effects were estimated and interpreted for the effortful control scale across three paternal anxious-depressed levels (values $T=50$, $T=65$ and $T=70$, corresponding to normal clinical thresholds, subclinical and clinical). The final results showed that at child age 5, higher levels of ODD symptoms were detected in children with high scores on the negative affect scale and low scores on the scale relating to effortful control. Additionally, the effect of effortful control on ODD severity increased as paternal T-scores in anxious-depressed levels increased (as a consequence of the interaction).

The lower block of Table 4 shows the results of the longitudinal analysis, which assessed the association between child temperament scores at age 3, parental psychopathology levels (also recorded at child age 3), and ODD levels at child age 5. Again, there was a significant interaction between the effortful control scale of temperament and paternal ASR anxious-depressed scores ($p=0.040$). The final model showed that at child age 5, ODD levels were higher for children who at the start of preschool had scored higher on negative affect and lower on effortful control (and this effect of temperament on ODD increased according to paternal anxious-depressed levels).

Discussion
The results indicate that during the preschool period, the temperamental traits of negative affect and effortful control are cross-sectionally associated with higher levels of symptoms of ODD in children. Furthermore, this relationship is moderated by levels of paternal depression and anxiety toward the end of the preschool period (at child age 5). The level of the temperamental traits of negative affect and effortful control at age 3 were statistical predictors of ODD levels at age 5, and the levels of paternal anxiety and depression moderated the strength of the relationship. On the other hand, cross-sectional models indicated that maternal psychopathology (specifically, symptoms of depression, anxiety and aggression) does not moderate the relationship between child temperament and ODD level.

The current study suggests that levels of negative affect and low effortful control directly influence the development of oppositional defiant disorder in preschoolers, a result that concurs with previous findings from several authors (Burke et al., 2010; Dougherty et al., 2011; Eisenberg et al., 2009; Lavigne et al., 2012; Martel et al., 2012; Stringaris et al., 2010; Valiente et al., 2003). Additionally, we arrived at a number of more nuanced conclusions regarding the influence of parental symptomatology of anxiety, depression and aggressive behavior on children’s ODD symptoms. First, we found that between child ages 3 and 5 there is a differential effect of parental aggressive and anxious-depressed behavior on children’s ODD levels. Specifically, maternal high aggressive behavior influences the child’s ODD level, a result that is consistent with several studies linking maternal negativity
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and anger with behavioral problems in children (Chen et al., 2014; Goelman et al., 2014). Our results also coincide with those reported by authors such as Breaux et al. (2013), Davé et al. (2008), Kashdan et al. (2004), Meadows, McLanahan, & Brooks-Gunn (2007) and Weitzman et al. (2011), who have argued that children of parents with depression and anxiety may be more likely to have behavioral problems and develop oppositional defiant disorder.

Our findings regarding the specific moderating role of parental psychopathology in the relationship between child temperament and ODD levels is of particular importance, as it differentially highlights the role of each parent. Specifically, only paternal symptoms of depression and anxiety moderated the relationship between child temperament and ODD symptoms, whereas none of the maternal symptoms examined (aggression, depression and anxiety) served a moderating role. In light of empirical evidence regarding the impact of maternal psychopathology on self-regulation and behavior problems in children (Chen et al., 2014; Crawford et al., 2011; Gartstein et al., 2013; Goelman et al., 2014), we expected maternal psychopathology to be a significant moderator of the relationship between child temperament and ODD levels. Nevertheless, in our study, only paternal symptoms of depression and anxiety interacted with the specific temperamental dimension of low effortful control.

These results are in accordance with the findings of several authors, who argue that paternal psychopathology may have a more serious impact on a child’s psychological functioning than maternal psychopathology (Cimino, Cerniglia, & Paciello, 2014; Lovejoy et al., 2000). One explanation for this phenomenon
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focuses on the different roles that fathers and mothers play when their children are in preschool. For instance, research suggests that mothers spend more time with their children than fathers do during infancy, and much of this time is spent establishing limits. In comparison, fathers spend more time playing with their children, and as a result experience fewer difficulties and conflicts with the children than mothers (Driscoll & Pianta, 2011; Weaver, Shaw, Crossan, Dishion, & Wilson, 2014). Particularly toward the end of the preschool period, paternal involvement in child development intensifies, as fathers become closer to their children, engaging with them and behaving like a playmate (John, Halliburton, & Humphrey, 2012).

The presence of an involved father can have a major positive impact on a young child. In fact, there is evidence that this relationship is critical to a child’s development, promoting higher self-esteem and self-regulation (John et al., 2012; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008). By contrast, children with little paternal support would have more difficulty regulating their negative emotions (Hurrell, Hudson, & Schniering, 2015). In this vein, fathers with symptoms of psychopathology tend to show a reduced response level to their children, which can be a risk factor for the occurrence of maladaptive behaviors (Elgar, Mills, McGrath, Waschbusch, & Brownridge, 2007). Depressed fathers in particular present a reduced ability to regulate the emotions of their
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...children, which could affect the development of child temperament (Lovejoy et al., 2000). In this regard, depressed fathers would display more negative behaviors towards their children and reductions in monitoring, and this overly-permissive behavior would have an impact on child behavioral problems (Childs et al., 2014; Jewell, Krohn, Scott, Carlton, & Meinz, 2008). It is likely that a permissive father would be unable to properly control his child's behavior or prevent possible maladaptive behaviors (Braza et al., 2013). In theory, effortful control should increase during the preschool years (Liang, Zhang, Deng, Song, & Zheng, 2013); at the same time, there is evidence that having a father who is overly permissive and who demonstrates little acceptance or paternal engagement is a risk factor for poor self-regulation and effortful control (Braza et al., 2013; Liang et al., 2013).

The main limitations of the present study lie in the fact that a relatively low number of fathers provided complete responses to the Adult Self-Report compared to the number of mothers, and that all the data analyzed and interpreted was reported only by parents. Moreover, the study possesses a number of strengths: the availability of separate reports for psychopathology measures from fathers and mothers, performing longitudinal tests in a large and representative sample of preschoolers, measuring child psychopathology through diagnostic interview and the statistical control of all the analyses of other comorbid disorders with symptoms that differ from ODD symptoms (that is, the empirical association obtained between temperament, parental symptomatology and ODD levels can be specifically attributed to this diagnostic condition). These contributions in the methodological area involve an improvement compared to previous researches carried out in small-sized sample and with data reported only by
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The results of this study have important implications for the prevention and treatment of ODD symptoms. While much remains to be learned about the early risk factors for oppositional defiant disorder, the present study suggests that evaluating early temperamental traits in children may be an important first step, since the presence of high levels of negative affect and low levels of effortful control may be an early indicator of children at risk for developing ODD levels. Of particular importance is the fact that low effortful control is related to temperamental symptoms of ODD, as it raises the possibility of early intervention for ODD symptoms through the teaching of effortful control skills, as indicated by Lavigne et al. (2012).

Furthermore, it is important to address the moderating role of paternal symptoms of depression and anxiety, as few studies have focused on the influence of fathers in early child development. According to our findings, a child with low effortful control may be more or less likely to present ODD symptoms depending on whether his father suffers from mild, moderate or severe anxiety or depression. Evidently, this could have a number of consequences at the individual level (for children and for fathers) and at the family level. In terms of clinical
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evaluation, it is essential that clinicians integrate the family members of preschoolers who display behavioral or temperamental problems, inquiring in detail into present and past parental mental health. According to our results, it
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is very important to know about the father’s mental health especially, focusing on the symptoms of depression and anxiety.

At the environmental level, it is important to consider that a child with a difficult temperament and symptoms of ODD may have an impact on the emotional state of the father. Evidence suggests that raising a child with ODD levels is a major challenge for mothers and fathers (Burke, Pardini, & Loeber, 2008), but the fathers, particularly those who are involved in parenting, will face disciplinary obstacles when their children engage in difficult behaviors (Aviram, Atzaba-poria, Pike, Meiri, & Yerushalmi, 2015). Furthermore, there exists evidence that child behavioral problems may actually affect negative parental emotionality and behavior to a greater extent than parenting attitudes affect children (Childs et al., 2014; Larsson, Viding, Rijsdijk, & Plomin, 2008; Pardini, Fite, & Burke, 2008). Future studies will need to consider this child-to-father relationship, as it implies the possibility of a reciprocal effect of negative behavior and emotionality on mental health for children and fathers.

Finally, it is likely that fathers with higher levels of symptoms of depression and anxiety are probably more focused on their own difficulties and may be less available for their children. In terms of clinical intervention, then, fathers should be encouraged to address and treat their own symptomatology first, thus enhancing the mental health of the whole family unit.

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Table 1. Characteristics of the initial sample of participants and the sample of children who were part of the analysis at baseline.

<table>
<thead>
<tr>
<th>Sociodemographic</th>
<th>Total (n=622)</th>
<th>Analysis (n=550)</th>
<th>DSM-IV Disorders (weighted % at ages 3-4-5)</th>
<th>Total (n=622)</th>
<th>Analysis (n=550)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At baseline (3 years)</td>
<td></td>
<td></td>
<td>Disruptive disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>Mean (SD)</td>
<td></td>
<td>Mean (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.76 (0.32)</td>
<td>3.77 (0.34)</td>
<td>10.03</td>
<td>8.93</td>
<td>9.72</td>
</tr>
<tr>
<td>Sex; n (%)</td>
<td></td>
<td></td>
<td>ADHD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>312 (50.2)</td>
<td>285 (51.8)</td>
<td>3.70</td>
<td>5.10</td>
<td>4.33</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td>Oppositional defiant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>205 (33.0)</td>
<td>184 (33.5)</td>
<td>6.91</td>
<td>5.14</td>
<td>6.55</td>
</tr>
<tr>
<td>Mean-high</td>
<td>195 (31.4)</td>
<td>184 (33.5)</td>
<td>Conduct disorder</td>
<td>1.36</td>
<td>0.20</td>
</tr>
<tr>
<td>Mean</td>
<td>88 (14.1)</td>
<td>74 (13.5)</td>
<td>Depressive disorders</td>
<td>3.10</td>
<td>0.60</td>
</tr>
<tr>
<td>Medio-low</td>
<td>99 (15.9)</td>
<td>82 (14.9)</td>
<td>Anxiety disorders</td>
<td>8.33</td>
<td>6.70</td>
</tr>
<tr>
<td>Low</td>
<td>35 (5.6)</td>
<td>26 (4.7)</td>
<td>Separation anxiety</td>
<td>2.15</td>
<td>1.41</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>Generalized anxiety</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>White</td>
<td>554 (89.1)</td>
<td>499 (90.7)</td>
<td>Specific phobia</td>
<td>5.33</td>
<td>5.60</td>
</tr>
<tr>
<td>Hispanic</td>
<td>40 (6.4)</td>
<td>31 (5.6)</td>
<td>Social phobia</td>
<td>1.94</td>
<td>2.10</td>
</tr>
<tr>
<td>Other</td>
<td>28 (4.5)</td>
<td>20 (3.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SD: standard deviation.
Parental psychopathology, temperament and ODD

Table 2. Descriptives for the CBQ and ASR scales in the sample: means and standard deviations (SD).

<table>
<thead>
<tr>
<th></th>
<th>Age 3; n=550</th>
<th>Age 4; n=540</th>
<th>Age 5; n=496</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>CBQ-surgency</td>
<td>4.34</td>
<td>0.80</td>
<td>4.21</td>
</tr>
<tr>
<td>CBQ-negative</td>
<td>3.78</td>
<td>0.75</td>
<td>3.64</td>
</tr>
<tr>
<td>CBQ-effortful</td>
<td>5.26</td>
<td>0.63</td>
<td>5.33</td>
</tr>
<tr>
<td>ASR-anx-depressed (mother)</td>
<td>6.32</td>
<td>4.24</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Clinical range (T-score&lt;70)</td>
<td>5.6%</td>
<td></td>
</tr>
<tr>
<td>ASR-aggressive behavior (mother)</td>
<td>4.08</td>
<td>3.49</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Clinical range (T-score&lt;70)</td>
<td>4.5%</td>
<td></td>
</tr>
<tr>
<td>ASR-anx-depressed (father)</td>
<td>5.16</td>
<td>3.90</td>
<td>---</td>
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<tr>
<td></td>
<td>Clinical range (T-score&lt;70)</td>
<td>5.1%</td>
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<tr>
<td>ASR-aggressive behavior (father)</td>
<td>3.55</td>
<td>3.46</td>
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<tr>
<td></td>
<td>Clinical range (T-score&lt;70)</td>
<td>5.5%</td>
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--- Not assessed.

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Table 3. Correlation matrix for the variables of the study.

<table>
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<tr>
<th></th>
<th>Age 3; n=550</th>
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<th>Age 4; n=540</th>
<th></th>
<th>Age 5; n=496</th>
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</tr>
</thead>
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<tr>
<td></td>
<td>2 3 4 5 6 7 8</td>
<td>2 3 4 5 6 7 8</td>
<td>2 3 4 5 6 7 8</td>
<td>2 3 4 5 6 7 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 CBQ-surgency</td>
<td>-.16* .25* .02</td>
<td>.01 .04 .04 .10*</td>
<td>-.09* .26* .04</td>
<td>.06 .07 .09* .08</td>
<td>-.09* .20* .07</td>
<td>.07 .07 .08 .02</td>
</tr>
<tr>
<td>2 CBQ-negative</td>
<td>-.06 .15* .10*</td>
<td>.07 .04 .26*</td>
<td>-.09* .15* .14*</td>
<td>.00 -.02 .32*†</td>
<td>-.11* .12*</td>
<td>.08 .04 .08 .30*†</td>
</tr>
<tr>
<td>3 CBQ-effortful</td>
<td>-.06 -.15* .01</td>
<td>-.02 -.18*</td>
<td>-.06 -.13* -.01 -.05 -.23*</td>
<td></td>
<td>-.07 -.09* -.04 -.17* -.14</td>
<td></td>
</tr>
<tr>
<td>4 ASR-anx.-dep. (mother)</td>
<td>.58† .23* .20* .16*</td>
<td></td>
<td>.59† .23* .21* .13*</td>
<td></td>
<td>.57† .23* .20* .08</td>
<td></td>
</tr>
<tr>
<td>5 ASR-agress. (mother)</td>
<td>.23*.20* .19*</td>
<td></td>
<td>.23*.20*.22*</td>
<td></td>
<td>.22*.16*.12*</td>
<td></td>
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<tr>
<td>6 ASR-anx.-dep. (father)</td>
<td>.64† .15*</td>
<td></td>
<td>.64† .11*</td>
<td></td>
<td>.65† .15*</td>
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<tr>
<td>7 ASR-agress. (father)</td>
<td>.07</td>
<td></td>
<td>.10*</td>
<td></td>
<td>.10*</td>
<td></td>
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<tr>
<td></td>
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<td># of ODD-symptoms</td>
<td></td>
<td></td>
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<td>---</td>
<td>---</td>
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<tr>
<td>2</td>
<td>*Significant correlation. †High effect size for the correlation (</td>
<td>r</td>
<td>&gt; 0.30).</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
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</tbody>
</table>
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Table 4. Association between child temperament, paternal psychopathology and their interaction in ODD levels:

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE</th>
<th>95% CI for B</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transversal 3 years-old</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBQ-surgency</td>
<td>0.012</td>
<td>0.006</td>
<td>-0.001 - 0.024</td>
<td>3.237</td>
<td>.072</td>
</tr>
<tr>
<td>CBQ-negative</td>
<td>0.032</td>
<td>0.006</td>
<td>0.020 - 0.044</td>
<td>27.328</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CBQ-effortful</td>
<td>-0.018</td>
<td>0.007</td>
<td>-0.031 - 0.005</td>
<td>7.306</td>
<td>.007</td>
</tr>
<tr>
<td>ASR-anx-depressed (mother)</td>
<td>0.004</td>
<td>0.017</td>
<td>-0.031 - 0.038</td>
<td>0.042</td>
<td>.837</td>
</tr>
<tr>
<td>ASR-aggressive behavior (mother)</td>
<td>0.047</td>
<td>0.021</td>
<td>0.005 - 0.088</td>
<td>4.825</td>
<td>.028</td>
</tr>
<tr>
<td>ASR-anx-depressed (father)</td>
<td>0.043</td>
<td>0.020</td>
<td>0.003 - 0.082</td>
<td>4.475</td>
<td>.034</td>
</tr>
<tr>
<td>ASR-aggressive behavior (father)</td>
<td>-0.025</td>
<td>0.023</td>
<td>0.069 - 0.19</td>
<td>1.255</td>
<td>.263</td>
</tr>
</tbody>
</table>

*Chunk test for interactions* | 7.23 | .842 |

| Transversal 4 years-old CBQ-surgency | 0.007 | 0.007 | -0.007 - 0.021 | 1.029 | .310 |
| CBQ-negative | 0.047 | 0.007 | 0.033 - 0.061 | 44.629 | <.001 |
| CBQ-effortful | -0.027 | 0.007 | -0.041 - 0.012 | 13.411 | <.001 |
| ASR-anx-depressed (mother) | -0.019 | 0.020 | -0.058 - 0.021 | 0.879 | .348 |
| ASR-aggressive behavior (mother) | 0.075 | 0.023 | 0.030 - 0.120 | 10.579 | .001 |
| ASR-anx-depressed (father) | 0.017 | 0.022 | -0.027 - 0.060 | 0.563 | .453 |
| ASR-aggressive behavior (father) | 0.016 | 0.024 | -0.031 - 0.064 | 0.451 | .502 |

*Chunk test for interactions* | 6.97 | .859 |

| Transversal 5 years-old CBQ-surgency | 0.005 | 0.007 | -0.008 - 0.019 | 0.595 | .440 |
| CBQ-negative | 0.048 | 0.007 | 0.033 - 0.062 | 40.839 | <.001 |
| CBQ-eff.; anx-dep.:father T=50 | -0.268 | 0.087 | -0.438 - 0.098 | 9.528 | .002 |
| CBQ-eff.; anx-dep.:father T=65 | -0.355 | 0.116 | -0.582 - 0.028 | 9.399 | .002 |
| CBQ-eff.; anx-dep.:father T=70 | -0.384 | 0.126 | -0.630 - 0.013 | 9.368 | .002 |
| ASR-anx-depressed (mother) | -0.017 | 0.020 | -0.056 - 0.021 | 0.781 | .377 |
| ASR-aggressive behavior (mother) | 0.033 | 0.023 | -0.013 - 0.079 | 1.952 | .162 |
| ASR-anx-depressed (father) | 0.324 | 0.098 | 0.132 - 0.515 | 10.985 | .001 |
| ASR-aggressive behavior (father) | -0.004 | 0.026 | -0.056 - 0.047 | 0.028 | .867 |

*Inter.: CBQ-eff.;Anx-Det (father)* | 8.97 | .003 |

*Chunk test for interactions* | 19.43 | .079 |

| Longitudinal model CBQ-surgency | 0.006 | 0.007 | -0.008 - 0.019 | 0.686 | .407 |
| CBQ-negative | 0.033 | 0.007 | 0.019 - 0.046 | 21.325 | <.001 |
| CBQ-eff.; anx-dep.:father T=50 | -0.182 | 0.092 | -0.363 - 0.001 | 3.897 | .048 |
| CBQ-eff.; anx-dep.:father T=65 | -0.245 | 0.123 | -0.485 - 0.004 | 3.957 | .046 |
| CBQ-eff.; anx-dep.:father T=70 | -0.287 | 0.143 | -0.567 - 0.006 | 4.008 | .045 |
| ASR-anx-depressed (mother) | -0.015 | 0.019 | -0.053 - 0.022 | 0.657 | .418 |
| ASR-aggressive behavior (mother) | 0.023 | 0.023 | -0.022 - 0.068 | 1.009 | .315 |
| ASR-anx-depressed (father) | 0.235 | 0.103 | 0.033 - 0.438 | 5.174 | .023 |
| ASR-aggressive behavior (father) | 0.008 | 0.025 | -0.041 - 0.057 | 0.092 | .762 |

*Chunk test for interactions* | 10.985 | .001 |
<table>
<thead>
<tr>
<th>Chunk test for interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter.: CBQ-effAnx-Dep.(father)</td>
</tr>
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