Parent personality and depression, family conflict, and child temperament were examined in a family study design including two children 2.5–5.5 years of age. Sibling resemblance for temperament was also investigated. Parent personality and family conflict had minimal significance for child temperament outcomes. However, parent depression was associated with higher child activity level and anger, and lower inhibitory control. These findings were supported by more rigorous regression analyses that included parent depression, child gender, and age as predictors. Sibling resemblance for child activity, anger and inhibitory control was also present, supporting a genetic etiology for child temperament. These findings indicate that children of depressed parents may be at increased risk for experiencing behavioral maladjustment related to anger, hyperactivity, and impulse control.

Introduction

The family study research design presents researchers with the unique opportunity to compare family members on relevant behavioral phenotypes across multiple dyadic relationships, most commonly between siblings or parent to child. This study focuses on parent personality, depression symptoms, and relationship conflict, and how these parent- and family-level variables relate to child temperament development. Child temperament is defined as early emerging, relatively stable, biologically based behavioral, and emotional characteristics that make up the basis of adult personality (Goldsmith et al., 1987; Shiner et al., 2012). Research on child temperament spans most of the subdisciplines of behavioral science, including developmental, personality and clinical psychology, and neuroscience (Gagne, Vendlinski, & Goldsmith, 2009). Developmental scientists...
typically study early temperament traits because of predictive relations to important developmental outcomes including child behavior problems and psychopathology (Caspi, Roberts, & Shiner, 2005; Goldsmith, Lemery, & Essex, 2004). Therefore, investigating parent- and family-level behavioral phenotypes in the context of child temperament has important public health relevance. If children whose parents have increased levels of depression, negative personality traits and high levels of family conflict are at risk for more adverse temperaments, these family contexts can contribute to the development of subsequent child maladjustment and psychiatric diagnoses. Comprehensive family studies of temperament that include parent and child measures can help clarify these issues, leading to improved child and family assessment, earlier identification of risk factors, and more effective clinical interventions.

Temperament is not a unitary construct, as specific domains or dimensions of temperament represent different aspects of early developing behavior and emotion. Thomas and Chess, who are credited with being the first modern temperament theorists, defined nine temperament dimensions of activity, regularity, initial reaction, adaptability, intensity, mood, distractibility, persistence/attention span, and sensitivity in their theory (Chess & Thomas, 1984; Thomas, Chess, & Birch, 1968). Some of these dimensions have been empirically supported and persist in contemporary theory and research and others have fallen out of scientific favor. Currently, the most commonly studied temperament dimensions are activity level, anger/frustration, behavioral inhibition/fear, effortful or inhibitory control, and positive affect (Gagne et al., 2009). Activity level refers to vigor of movement; anger/frustration an approach-related negative affect; behavioral inhibition/fear is distress or wariness toward novel or threatening stimuli; effortful or inhibitory control is the ability to regulate impulses and activate appropriate behavioral responses; and positive affect is defined as the experience and expression of enjoyment. Most current research employs questionnaires whereby the parent’s perception of child behavior is used as the primary technique for temperament measurement. Parent rating questionnaires of temperament are typically based on a dimensional structure, and questionnaire items are organized into subscales that reflect these dimensions (Gagne, Saudino, & Asherson, 2011). In general, parent ratings of child temperament are reliable and valid, and are inexpensive and simple to use in a variety of studies (Gagne, Van Hulle, Aksan, Essex, & Goldsmith, 2011).

In this investigation, we use a dimensionally comprehensive parent rating with very specific questionnaire items to assess child temperament. One important reason for this assessment strategy is that parent ratings of temperament in family studies with siblings may be susceptible to contrast effects. These rater biases occur when a parent rater overestimates differences between siblings as demonstrated by very low or negative sibling correlations (Gagne, Van Hulle et al., 2011). Parents, in effect propose that their children are of opposing
temperaments when we know that child temperament is genetically influenced and therefore, there should be at least some level of sibling similarity across temperament dimensions (as evinced by positive sibling correlations). Several researchers have indicated that parent ratings of temperament that focus on very specific behaviors (vs. global items) are less likely to show these contrast effects (e.g., Goldsmith & Hewitt, 2003; Hwang & Rothbart, 2003; Saudino, 2003a; Saudino, 2003b; Seifer, 2003).

As previously noted, researchers study early temperament because it is considered developmentally significant, and there exists an extensive literature on cognitive development, education, and social development outcomes related to temperament (Gagne et al., 2009). With regard to public health impact, early child temperament is considered an important factor in the development of childhood psychopathology and behavior problems (Goldsmith et al., 2004). In general, low or high levels of temperament are shown to be risk factors for problem behavior that may lead to psychopathology. For example, high behavioral inhibition and fear dimensions have been consistently linked to internalizing behavior problems, and high anger/frustration, activity level, and low effortful/inhibitory control are related to externalizing behavior problems (Eisenberg et al., 2001; Fagot & O’Brien, 1994; Gjone & Stevenson, 1997; Rothbart & Bates, 1998). Although as described, some temperament research focuses on subclinical behavior problems in childhood, there are several investigations that assess specific psychiatric diagnoses in the context of temperament. These studies indicate that negative affect (i.e., anger and fear) and behavioral inhibition are related to anxiety, low positive affect and high negative affect are associated with depression, and high activity level and low effortful and inhibitory control are associated with attention deficit hyperactivity disorder (Biederman et al., 2001; Brown, 2007; Campbell & Ewing, 1990; Clark, Watson, & Mineka, 1994; Durbin, 2010; Gagne, Saudino et al., 2011; Hall, Halperin, Schwartz, & Newcorn, 1997; Kagan, 2001; Schachar, Tannock, Marriott, & Logan, 1995). Although we do not examine the relationship between child temperament and child psychopathology in the present study, these findings provide developmental and public health relevance, as well as a strong rationale for examining links between parent mental health (e.g., depression) and child temperament.

The study of individual differences in child temperament usually emphasizes the child’s behavior and emotion, focusing on the assessment of temperament dimensions in childhood samples. However, most researchers view the family context as an important factor in the etiology and development of temperament. When considering family effects on temperament, variables such as parent personality, parent affect, parent mental health, parenting style/sensitivity, family interactions, and family socioeconomic (SES) status have all been explored in the developmental literature. In this paper, parent personality, depression, and family conflict experienced by the children in the study will be examined as
predictors of child temperament. Generally, positive parent personality traits, low family conflict, and low parent depression predict more optimal levels of child temperament.

Studies of parent personality traits and child temperament dimensions have been somewhat limited, and many examine indirect effects or moderating variables. For example, maternal personality measures of negative control have been found to interact with child inhibitory control to affect externalizing behavior problems, such that children with low levels of inhibitory control who have mothers with higher negative control have increased externalizing problems (van Aken, Junger, Verhoeven, van Aken, & Deković, 2007). In a related study, paternal personality and parenting style interacted differentially depending on the level of effortful control in 36-month-old children (Karreman, van Tuijl, van Aken, & Deković, 2008). Also, higher maternal extraversion (in the positive direction) and lower parenting-related stress predict early childhood effortful control (Gartstein, Bridgett, Young, Panksepp, & Power, 2013; Komsi et al., 2008). Some research has suggested that parent views of their child’s temperament can affect their own personality development. Findings from one study indicated that parent personality changes occur prenatally to postnatally as a consequence of perceptions of their child’s temperament, with perceptions of positive temperament predicting positive personality change in mothers and fathers (Sirignano & Lachman, 1985). A more recent investigation examined a similar model, finding that infant positive affect resulted in increases in parent extraversion over a 5-year period, and infant activity level predicted decreases in parent neuroticism (Komsi et al., 2008).

Belsky has proposed an interactive “process model” of parenting wherein parent–child relationships are influenced by parent personality, child temperament, quality of marital relationship, social support, and career satisfaction (Belsky, Rosenberger, & Crnic, 1995). Based on this theory and other similar models, researchers have examined parent personality and child temperament as predictors of relationship and parenting outcomes. Parent personality and child temperament predict warmth in the parent–child relationship in adolescence (Denissen, van Aken, & Dubas, 2009) and shared parent–child positive affect and parental responsiveness in early childhood (Kochanska, Friesenborg, Lange, & Martel, 2004). Anger-prone children who have optimistic mothers and fathers high in openness receive more positive parenting (Koenig, Barry, & Kochanska, 2010), and fathers’ negative emotionality is associated with lower co-parenting quality if their child has a difficult temperament (Laxman et al., 2013). In addition, positive parent personality traits and child effortful control are both associated with positive dyadic child–parent interactions in 3- to 6-year-old children (Wilson & Durbin, 2012), and positive parenting style interacts with high effortful control to predict lower externalizing behavior problems in early adolescence (Eisenberg et al., 2005).
With regard to direct and indirect family conflict predictors of child temperament, there have been a small number of investigations. High marital conflict has been found to be directly associated with negative child temperaments, and low conflict is related to positive temperament (Gharehbaghy & Vafaie, 2009). Similar research showed that poor marital and family functioning was related to high active-emotional temperament traits in female children (Stoneman, Brody, & Burke, 1989). One of the few studies on this subject that used laboratory measures of child temperament indicated that interparental conflict was independently associated with subsequent lab-based assessments of behavioral inhibition (Pauli-Pott & Beckmann, 2007). Children with more difficult temperaments also have increased levels of problem behavior if they experience higher levels of family conflict (Ramos, Guerin, Gottfried, Bathurst, & Oliver, 2005). Relatedly, high interparental conflict and lower marital quality in the families of preschool children with lower effortful control predicted increased problematic peer relations (David, 2009; David & Murphy, 2007). Toddler studies show that marital hostility predicts increased levels of anger in children who experience more harsh parenting styles (Rhoades et al., 2011), and measures of child negative reactivity, activity level, and impulsivity are related to increased mother–toddler conflict (Laible, Panfile, & Makariev, 2008). The general pattern of findings in these studies illustrates that high family/interparental conflict is associated with increased negative emotionality, activity, and lower control in children.

In addition to parent personality and family conflict, parent depression has also been examined in the context of child temperament. Perhaps not surprisingly, depressed mothers (and their partners) are more likely to perceive their children as having a difficult temperament than nondepressed mothers and their partners (Edhborg, Seimyr, Lundh, & Widström, 2000; Ventura & Stevenson, 1986). At least one laboratory study showed that behavioral assessments of low positive affect in preschool were associated with a maternal history of depression (Hayden, Klein, & Durbin, 2005). Several studies of the interactive and moderating/mediating effects of parent depression, child temperament and related outcomes have also been conducted. One successfully fit a model of parent depression predicting anxiety and depression symptoms in 4-year-old children, as mediated by parenting style and effortful control (Hopkins, Lavigne, Gouze, LeBailly, & Bryant, 2013). Similarly, Gartstein and Fagot (2003) found that higher levels of parental depression and more coercive/controlling parenting style, as well as lower child effortful control, were related to externalizing behaviors in preschoolers. Measures of parental depressive vulnerability independent of actual symptoms also have direct and interactive effects (across parent) on low child effortful control (Pesonen, Räikkönen, Heinonen, Järvenpää, & Strandberg, 2006). Finally, longitudinal models of temperamental regulation and negative affect in infancy and parent depression status significantly predicted depression symptoms in toddlerhood (Gartstein & Bateman, 2008).
The Current Study

A series of research questions were addressed in this paper. The overarching goal was to examine parent- and family-level variables of depression, personality and relationship conflict in the context of child temperament. We examined mean gender differences for child temperament, and where appropriate, conducted analyses that take gender into account. We predicted that significant gender differences would be found for dimensions of child temperament that have previously shown these findings (see Gagne, Miller, & Goldsmith, 2013). For our main analyses, we investigated how parent personality, depression and family conflict are associated with one another, as well as with the child temperament outcomes. In general, negative parent personality, parent depression, and family conflict were hypothesized to be associated with negative temperament traits in children (e.g., anger, activity, low control). We also expected that our parent ratings of temperament would show sibling resemblance, indicating few parental contrast effects and supporting the theory that temperament runs in families. Based on the results of these findings and any gender differences in temperament, we then conducted regression analyses on parent/family predictors of child temperament.

Method

Participants

Participants included 188 children assessed between 2.5 and 5.5 years of age and their parents. The sample was derived from the Texas Family Study, an investigation focused on the multi-method assessment of temperament, executive functioning, and related behaviors in early childhood. All children were members of sibling pairs, and both monozygotic (MZ) and dizygotic (DZ) twin pairs were included in the sample (there was also one set of triplets, which were not included in most of the analyses). Fourteen participants were MZ twins (7 pairs), 54 were DZ twins (27 pairs), and 116 were full siblings (58 pairs). One child that exceeded our upper age range by at least 6 months was dropped from analyses. There were equal numbers of male and female (94: 94) participants and their mean age was 3.72 years ($SD = 1.03$). Mean age for the younger siblings was 3.14 ($SD = .81$) and for older siblings was 4.32 ($SD = .87$). The racial distribution of the children in the sample was 81.38% White, 7.45% Black, 0.53% Asian, 9.57% more than one race, and 1.06% other race (86.17% were non-Hispanic or Latino and 13.83% were Hispanic or Latino). Parent respondents were 98.9% mothers (although we had demographic data for both parents). The mean age of the mothers in our sample was 34.01 ($SD = 5.34$), and the mean age of the fathers was 36.90 ($SD = 6.50$). Mothers were 91.5% non-Hispanic or Latino and were categorized by race as 83% White, 7.4% Black, 2.1% Asian, 6.4% more than one race and
Fathers were 88.3% Non-Hispanic or Latino and were identified as 81.9% White, 9.6% Black, 1.1% Asian, 5.3% more than one race and 2.1% other. The average family income fell in the $60,001–70,000 category, and ranged from $20,001 to “over $200,000” (the highest response possible). The mean number of years of schooling was 15.62 ($SD = 2.33$) and 15.10 ($SD = 2.68$) for mothers and fathers, respectively.

Procedure

Families were enrolled by a staff of experimenters from the Department of Psychology at the University of Texas at Arlington beginning in late 2012. Participants were recruited through notices posted on campus, at pediatrician’s offices, daycare centers, etc.; internet posts; and telephone contact that had been previously solicited. Initially, participants submitted a screening online before data collection began. Once families were approved for the study and provided consent, one of the parents completed all questionnaires online via our secure website using SurveyMonkey. Online questionnaire data collection has shown to be a reliable substitute for paper-based administration (Carlbring et al., 2007; Vallejo, Jordan, Diaz, Comeche, & Ortega, 2007), and most of our participants subsequently participated in a laboratory visit on campus. Therefore, we were able to verify most all family data in-person and/or through verifying email and home addresses. There were three sets of surveys (parent and family assessment, sibling 1 assessment, sibling 2 assessment), and upon completion the family was compensated ($25 gift card). Only families who completed all three online surveys were included in analyses. Data from two parent assessments of child temperament, one parent personality inventory, one parent depression inventory, and a family conflict scale were used in the present study.

Parent Ratings of Temperament

Toddler Behavior Assessment Questionnaire (TBAQ). The TBAQ (Goldsmith, 1996) is a 120-item temperament questionnaire that contains 11 dimensional subscales of activity level, appropriate attentional allocation, interest, perceptual sensitivity, sadness, anger, inhibitory control, object fear, social fear, pleasure, and soothability. Unlike parent rating scales that use more global items, the TBAQ employs items that describe concrete behaviors observed in particular situations and asks the parent to rate these behaviors based on the frequency of occurrence over the previous month. All items are formatted in a 7-point Likert scale that ranges from 1 (never) to 7 (always) and includes an “N/A” option for the rater to select if the child was not in the described situation recently. Internal consistency reliability for the TBAQ subscales was moderate to
high, ranging from .62 to .92, with only activity level and sadness having estimates under .77. Typically, TBAQ alphas meet or exceed .80; therefore, our reliability is fairly consistent with published estimates (Goldsmith, 1996).

**Parent Ratings of Parent- and Family-Level Data**

**Big Five Inventory (BFI).** Parent ratings of their own personality were conducted using the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008), a self-report instrument that assesses five personality traits of extraversion, agreeableness, conscientiousness, neuroticism and openness. Using a 5-point scale (1 = disagree strongly, 5 = agree strongly), individuals indicate whether they agree or disagree with 44 statements about personal characteristics (e.g., “likes to cooperate with others”). Published reliabilities of the BFI scales range from .75 to .90 (John et al., 2008). In our sample, internal consistency reliability for the BFI ranged from .76 to .86.

**Center for Epidemiologic Studies Depression Scale (CES-D).** The CES-D (Radloff, 1977) is a 20-item self-report measure that assesses symptoms of depression experienced by the parent over the last week. CES-D items include cognitive, emotional, behavioral, and positive affect attributes rated on a 4-point scale from 0 (rarely or none of the time/less than 1 day) to 3 (most or all of the time/5–7 days). CES-D reliability in our sample was .83, with published internal consistencies ranging from .84 to .90 (Radloff, 1977).

**Family Conflict Scale (FCS).** The Overt Hostility/O’Leary-Porter Scale (Porter & O’Leary, 1980) was used by the parent to rate family conflict specific to each child in the study. This is a 10-item instrument with a 5-point Likert scale ranging from “never” to “very often.” It is designed to assess parent perception of positive and negative family interactions displayed by partners in the presence of the identified child. Internal consistency for this scale in our study was .74 (a previous estimate with a sample of 65 individuals was .86).

**Statistical Approach**

**Descriptive Statistics and Bivariate Correlations.** Prior to formal analyses, the data were screened for normality as well as univariate and multivariate outliers. CES-D depression was slightly positively skewed with two univariate outliers. Therefore, the depression variable was transformed using the square root function and this transformed variable was used in subsequent analyses. Screening for multivariate outliers revealed one participant who was consequently removed
from further analyses. Descriptive statistics, mean gender differences, and bivariate correlational analyses were calculated for all variables. Mean sex differences and correlations were corrected for the nested nature of twin/sibling data. Generalized estimating equation models were used to test for mean differences (Liang & Zeger, 1986; Zeger & Liang, 1986), and dyad-level correlations were calculated following procedures outlined by Griffin & Gonzalez (Griffin & Gonzalez, 1995; O’Connor, 2004). Effect sizes of mean gender differences were also estimated as Cohen’s $d$, which expresses group differences in standard deviation units.

Sibling Intraclass Correlations. Sibling intraclass correlations were calculated for the TBAQ and the FCS using a double-entry procedure. These analyses allow for the estimation of sibling resemblance on the various subscales of the TBAQ and the FCS. Positive intraclass correlations reflect resemblance, zero correlations reflect no resemblance, and negative correlations reflect opposing characteristics.

Results

Descriptive Statistics and Mean Gender Differences

The means and standard deviations of all parent-rated TBAQ temperament dimensions and overall FCS scores are presented in Table 1 by child gender. In addition, the effect sizes of mean differences between male and female children for each variable are also displayed estimated as Cohen’s $d$. Overall, the effect sizes indicate that differences between males and female temperament ratings and family conflict were low. There were no significant gender differences for the FCS. On the TBAQ, activity, interest, anger, and inhibitory control showed the largest differences (ranging from 26% to 40% of a standard deviation), reflecting what is typically seen in the literature. Males had higher levels of activity and anger, and females had higher interest and inhibitory control.

Bivariate Correlations

Correlations were calculated for both child temperament and parent personality, depression and family conflict variables and are displayed in Tables 2 and 3. Correlations between the parent/family variables of family conflict, parent personality and depression are shown in Table 2. Table 3 displays relations between the three parent/family-level variables and child TBAQ temperament. With regard to the parent and family variables, several interesting associations emerged (Table 2). Parents with higher levels of neuroticism and depression reported significantly higher levels of family conflict. More positive aspects of
Table 1

Sample Sizes, Means (and Standard Deviations), and Effect Sizes of Gender Differences for TBAQ Temperament Dimensions, and Family Conflict

<table>
<thead>
<tr>
<th></th>
<th>Mean males (SD) n = 94</th>
<th>Mean females (SD) n = 94</th>
<th>Effect size of gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBAQ activity</td>
<td>4.04 (.67)</td>
<td>3.76 (.74)</td>
<td>.40*</td>
</tr>
<tr>
<td>TBAQ attention</td>
<td>4.56 (.74)</td>
<td>4.66 (.80)</td>
<td>−.13</td>
</tr>
<tr>
<td>TBAQ interest</td>
<td>4.39 (.79)</td>
<td>4.63 (.82)</td>
<td>−.30*</td>
</tr>
<tr>
<td>TBAQ perceptual sensitivity</td>
<td>2.62 (.80)</td>
<td>2.70 (.85)</td>
<td>−.10</td>
</tr>
<tr>
<td>TBAQ sadness</td>
<td>3.58 (.86)</td>
<td>3.67 (.76)</td>
<td>−.11</td>
</tr>
<tr>
<td>TBAQ anger</td>
<td>3.60 (.99)</td>
<td>3.35 (.90)</td>
<td>.26*</td>
</tr>
<tr>
<td>TBAQ inhibitory control</td>
<td>4.13 (.95)</td>
<td>4.40 (.91)</td>
<td>−.29*</td>
</tr>
<tr>
<td>TBAQ object fear</td>
<td>2.49 (.80)</td>
<td>2.74 (.81)</td>
<td>−.31</td>
</tr>
<tr>
<td>TBAQ pleasure</td>
<td>5.70 (.76)</td>
<td>5.70 (.71)</td>
<td>0</td>
</tr>
<tr>
<td>TBAQ social fear</td>
<td>3.03 (1.15)</td>
<td>3.25 (1.14)</td>
<td>−.19</td>
</tr>
<tr>
<td>TBAQ soothability</td>
<td>5.20 (.83)</td>
<td>5.11 (.85)</td>
<td>.11</td>
</tr>
<tr>
<td>Family conflict</td>
<td>1.72 (.43)</td>
<td>1.81 (.43)</td>
<td>−.21</td>
</tr>
</tbody>
</table>

Note. Effect size estimated as Cohen’s d express group differences in standard deviation units.  
*p < .05.

Table 2

Bivariate Correlations: Parent Ratings of Personality, Family Conflict, and Depression Symptoms

<table>
<thead>
<tr>
<th></th>
<th>Family conflict</th>
<th>CES-D depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>BFI extraversion</td>
<td>−.12</td>
<td>−.15</td>
</tr>
<tr>
<td>BFI agreeableness</td>
<td>−.23*</td>
<td>−.29**</td>
</tr>
<tr>
<td>BFI conscientiousness</td>
<td>−.21*</td>
<td>−.18</td>
</tr>
<tr>
<td>BFI neuroticism</td>
<td>.31**</td>
<td>.39**</td>
</tr>
<tr>
<td>BFI openness</td>
<td>−.04</td>
<td>−.11</td>
</tr>
<tr>
<td>Family conflict</td>
<td></td>
<td>.26*</td>
</tr>
</tbody>
</table>

Note. *p < .05. **p < .01.
Table 3

Bivariate Correlations: TBAQ Parent Ratings of Temperament Dimensions With Parent Ratings of Personality, Family Conflict and Depression Symptoms

<table>
<thead>
<tr>
<th></th>
<th>BFI Extra</th>
<th>BFI Agree</th>
<th>BFI Consc</th>
<th>BFI Neuro</th>
<th>BFI Open</th>
<th>Family conflict</th>
<th>CES-D depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBAQ activity</td>
<td>—.01</td>
<td>—.10</td>
<td>—.13</td>
<td>.17</td>
<td>—.07</td>
<td>—.00</td>
<td>.30**</td>
</tr>
<tr>
<td>TBAQ attention</td>
<td>.14</td>
<td>.00</td>
<td>.20*</td>
<td>—.15</td>
<td>.07</td>
<td>—.03</td>
<td>—.18*</td>
</tr>
<tr>
<td>TBAQ interest</td>
<td>.15</td>
<td>.07</td>
<td>.13</td>
<td>—.13</td>
<td>.06</td>
<td>—.08</td>
<td>—.13</td>
</tr>
<tr>
<td>TBAQ perceptual sensitivity</td>
<td>—.14</td>
<td>—.00</td>
<td>—.23*</td>
<td>.19*</td>
<td>.02</td>
<td>.08</td>
<td>.24*</td>
</tr>
<tr>
<td>TBAQ sadness</td>
<td>—.18*</td>
<td>—.03</td>
<td>—.08</td>
<td>.09</td>
<td>—.06</td>
<td>.02</td>
<td>.15</td>
</tr>
<tr>
<td>TBAQ anger</td>
<td>—.07</td>
<td>.05</td>
<td>—.06</td>
<td>.07</td>
<td>—.15</td>
<td>—.09</td>
<td>.18*</td>
</tr>
<tr>
<td>TBAQ inhibitory control</td>
<td>.13</td>
<td>—.02</td>
<td>.19*</td>
<td>—.08</td>
<td>.13</td>
<td>—.03</td>
<td>—.20*</td>
</tr>
<tr>
<td>TBAQ object fear</td>
<td>—.09</td>
<td>—.03</td>
<td>—.05</td>
<td>.09</td>
<td>—.03</td>
<td>—.03</td>
<td>.13</td>
</tr>
<tr>
<td>TBAQ pleasure</td>
<td>.06</td>
<td>.13</td>
<td>.04</td>
<td>—.01</td>
<td>—.01</td>
<td>.03</td>
<td>.09</td>
</tr>
<tr>
<td>TBAQ social fear</td>
<td>—.05</td>
<td>.01</td>
<td>.07</td>
<td>.04</td>
<td>.01</td>
<td>—.06</td>
<td>—.04</td>
</tr>
<tr>
<td>TBAQ soothability</td>
<td>.05</td>
<td>.07</td>
<td>.10</td>
<td>.03</td>
<td>.06</td>
<td>—.01</td>
<td>—.16</td>
</tr>
</tbody>
</table>

Note. Extra = extraversion; Agree = agreeableness; Consc = conscientiousness; Neuro = neuroticism; Open = openness.
*p < .05. **p < .01.
personality were associated with minimal or low family conflict and fewer depression symptoms. Finally, the strongest association emerged for parent depression and neuroticism ($r = .39$). Generally, parents with more negative personality traits were more depressed and experienced more conflict in front of their children. Considering all of the parent/family variables in the context of child temperament (Table 3), family conflict and parent personality showed little consistent relationship with temperament dimensions. However, parent depression symptoms were significantly associated with TBAQ Activity, Attention, Perceptual Sensitivity, Anger, and Inhibitory Control. The children of depressed parents had higher levels of activity, perceptual sensitivity and anger, and lower attention and inhibitory control.

**Sibling Intraclass Correlations**

Sibling intraclass correlations (Table 4) for the FCS ranged from .93 to .99, suggesting substantial resemblance across the sibling categories of MZ and DZ twins and full siblings for family conflict. Although the parent rated each child separately, family conflict was almost identical across siblings in our sample. For the TBAQ temperament dimensions, both MZ and DZ correlations were moderate for all dimensions of temperament. For full siblings, intraclass correlations for the dimensions of activity, attention, interest, pleasure, social fear, and soothability were somewhat low, but none were negative. Therefore, both family conflict and temperament shows some resemblance across twins and full siblings.

**Regression Analyses**

We conducted a series of multiple regression analyses to explore post hoc hypotheses of whether parent depression significantly predicted child temperament based on the results of our correlational analyses. Given that research has shown that child temperament levels are influenced by the child’s age and gender, these two predictors were also included in the regression analyses. Therefore, three multiple regressions were used to examine whether parent depression, child age, and child gender significantly predict TBAQ activity level, anger and inhibitory control as outcome variables. We selected these TBAQ subscales as outcomes because of the fact that there is consistent evidence of links between these dimensions of temperament and important child maladjustment outcomes. A summary of individual predictors in all regression analyses is presented in Table 5. First, parent depression, child age, and child gender significantly predicted child anger, $F(3, 184) = 10.10$, $p < .001$, accounting for 14.14% of the variance in anger levels. Greater parent depression significantly predicted
increased child anger, while older age was significantly associated with decreased anger. However, the child’s gender did not uniquely predict anger levels. Second, parent depression, child age, and child gender significantly predicted child activity level, \( F(3, 184) = 16.95, p < .001 \), accounting for 21.65% of the variance in activity levels. Greater parent depression was significantly associated with increased activity level, while older age was significantly associated with decreased activity level. Gender was also a significant predictor of activity level, with boys having higher activity levels than girls. Lastly, parent depression, child age, and child gender significantly predicted child inhibitory control, \( F(3, 184) = 15.44, p < .001 \), accounting for 20.11% of the variance in inhibition levels. Greater parent depression was significantly associated with decreased inhibitory

Table 4

Sibling Intraclass Correlations: TBAQ Parent Ratings of Temperament Dimensions, and Family Conflict

<table>
<thead>
<tr>
<th></th>
<th>Monozygotic (MZ) twin intraclass correlations ((n = 14, 7) pairs)</th>
<th>Dizygotic (DZ) twin intraclass correlations ((n = 54, 27) pairs)</th>
<th>Full sibling (FS) intraclass correlations ((n = 116, 58) full pairs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBAQ activity</td>
<td>.88**</td>
<td>.64**</td>
<td>.15</td>
</tr>
<tr>
<td>TBAQ attention</td>
<td>.79**</td>
<td>.36**</td>
<td>.08</td>
</tr>
<tr>
<td>TBAQ interest</td>
<td>.89**</td>
<td>.26</td>
<td>.00</td>
</tr>
<tr>
<td>TBAQ perceptual sensitivity</td>
<td>.86**</td>
<td>.64**</td>
<td>.52**</td>
</tr>
<tr>
<td>TBAQ sadness</td>
<td>.81**</td>
<td>.58**</td>
<td>.22*</td>
</tr>
<tr>
<td>TBAQ anger</td>
<td>.79**</td>
<td>.60**</td>
<td>.29**</td>
</tr>
<tr>
<td>TBAQ inhibitory control</td>
<td>.93**</td>
<td>.46**</td>
<td>.23*</td>
</tr>
<tr>
<td>TBAQ object fear</td>
<td>.56*</td>
<td>.70**</td>
<td>.22*</td>
</tr>
<tr>
<td>TBAQ pleasure</td>
<td>.74**</td>
<td>.66**</td>
<td>.16</td>
</tr>
<tr>
<td>TBAQ social fear</td>
<td>.60*</td>
<td>.45**</td>
<td>.06</td>
</tr>
<tr>
<td>TBAQ soothability</td>
<td>.90**</td>
<td>.28*</td>
<td>.16</td>
</tr>
<tr>
<td>Family conflict</td>
<td>.99**</td>
<td>.93**</td>
<td>.93**</td>
</tr>
</tbody>
</table>

Note. *\( p < .05 \). **\( p < .01 \).
control, while older age was significantly associated with increased inhibition. Gender did not uniquely predict inhibitory control.

Discussion

This research examined parent and family variables of personality, depression and conflict, and child temperament outcomes in the context of a family study design. We employed standard parent rating questionnaires adapted for online administration in a sample of families with two children between the ages of 2.5 and 5.5 years. Although several investigations have examined these parent- and family-level variables as correlates/predictors of child temperament, none have compared across these three domains within a sibling study framework. As expected, parents who were depressed had higher levels of negative personality traits and family conflict, and lower levels of positive personality traits. Most importantly, depressed parents rated their children as having more negative temperaments in several important domains. Parent personality and family conflict were not consistently linked to child temperament outcomes, suggesting that parent depression may be a much more salient factor. This position was

Table 5

Summary Statistics for Individual Predictors in Multiple Regression Analyses

<table>
<thead>
<tr>
<th>Variable</th>
<th>B (SE)</th>
<th>t</th>
<th>p value</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBAQ activity level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CES-D depression</td>
<td>.20 (.04)</td>
<td>5.14</td>
<td>&lt;.001**</td>
<td>11.23%</td>
</tr>
<tr>
<td>Age</td>
<td>−.19 (.05)</td>
<td>−4.13</td>
<td>&lt;.001**</td>
<td>7.27%</td>
</tr>
<tr>
<td>Gender</td>
<td>−.11 (.05)</td>
<td>−2.37</td>
<td>.02*</td>
<td>2.40%</td>
</tr>
<tr>
<td>CES-D anger</td>
<td>.17 (.06)</td>
<td>3.02</td>
<td>0.003**</td>
<td>4.26%</td>
</tr>
<tr>
<td>Age</td>
<td>−.27 (.06)</td>
<td>−4.26</td>
<td>&lt;.001**</td>
<td>8.48%</td>
</tr>
<tr>
<td>Gender</td>
<td>−.1 (.06)</td>
<td>−1.51</td>
<td>0.13</td>
<td>1.06%</td>
</tr>
<tr>
<td>CES-D inhibitory control</td>
<td>−.20 (.05)</td>
<td>−3.80</td>
<td>&lt;.001**</td>
<td>6.26%</td>
</tr>
<tr>
<td>Age</td>
<td>.32 (.06)</td>
<td>5.34</td>
<td>&lt;.001**</td>
<td>12.39%</td>
</tr>
<tr>
<td>Gender</td>
<td>.10 (.06)</td>
<td>1.60</td>
<td>0.11</td>
<td>1.11%</td>
</tr>
</tbody>
</table>

Note. The variable indicating maternal depression has been square root transformed. *p < .05. **p < .01.
supported with subsequent regression analyses, as parent depression significantly predicted child activity level, anger, and inhibitory control in these models. In addition, sibling intraclass correlations showed familial resemblance for child temperament. These findings are somewhat novel, in that parent depression emerges as the most significant parent/family factor in predicting aspects of temperament that are relevant to child mental health in our study (parent personality and family conflict were less significant). Sibling resemblance supports the theory that genetic factors play an important role in the etiology of child temperament.

Several previous investigations found significant gender differences for child temperament dimensions (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006; Gagne et al., 2013), and child gender should be considered when examining relations with other variables. In our study, gender differences for temperament dimensions were fairly low (gender differences for family conflict experienced by the child were not present). The temperament dimensions of activity level, anger, interest, and inhibitory control were the only traits that showed significant sex differences in our sample, a finding that is consistent with previous research. Boys were rated as more active and angry, and girls were higher in interest and inhibitory control. The effect sizes for these gender differences were similar, but slightly lower than a twin study that focused on child temperament at age 3 (Gagne et al., 2013). Any sex differences that were present in our study informed subsequent analyses, and our regression models included gender and age as predictors.

The pattern of findings regarding relations across parent personality, depression, and conflict variables was consistent and as expected, parents with negative personality attributes had increased levels of depression and family conflict, and those with positive personality attributes showed the opposite effect. Specifically, parents who rated themselves as more neurotic also rated themselves as significantly more depressed ($r = .39$) and as displaying increased levels of conflict in the presence of their children ($r = .31$). Those that judged themselves to be higher on extraversion, agreeableness, conscientiousness, and openness were less depressed and conflicted. Parents who displayed increased family conflict behaviors in front of their children also showed significantly higher levels of depression.

When these domains of parent/family behavior were analyzed in the context of child temperament, differential associations were found. Although several studies have shown significant associations between the parent personality traits of extraversion, neuroticism, and openness with child temperament outcomes (Gartstein et al., 2013; Koenig et al., 2010; Komsi et al., 2008), we found few consistent, significant relations between parent personality and child temperament. Similarly, at least one previous study found a direct effect of high marital conflict on negative child temperament (Gharehbaghy & Vafaie, 2009), and several showed family conflict to be a significant moderator between child
temperament and outcome variables like behavior problems. Family conflict was not significantly related to any of the child temperament variables in our study. These results may be partly due to lack of variation, or to the fact that we examined direct effects of parent personality and family conflict on child temperament, rather than more complex mediation and interaction models that seem to be the predominant approach in other studies.

Parent ratings of their own depression symptoms did emerge as showing significant associations with the child temperament dimensions of activity, attention, perceptual sensitivity, anger, and inhibitory control. These correlations were fairly moderate, ranging from −.18 to .30. Parents with higher levels of depression rated their children as having higher activity level, anger, and perceptual sensitivity, and lower levels of attention and inhibitory control, indicating that parent mental health is associated with child temperament. Based on these findings and consistent evidence of activity level, anger and inhibitory control as important child temperament predictors of behavior problems and psychopathology (e.g., Brown, 2007; Campbell & Ewing, 1990; Clark et al., 1994; Eisenberg et al., 2001; Fagot & O'Brien, 1994; Gagne, Saudino et al., 2011; Gjone & Stevenson, 1997; Hall et al., 1997; Schachar et al., 1995), we pursued additional regression analyses using parent depression as a predictor and child activity level, anger, and inhibitory control as outcomes. The results of our gender differences analyses and concerns about developmental differences in temperament across age also informed these analyses. Age and gender were included as predictors in the regression models.

The results of our post hoc regression analyses confirm that in our sample, parent depression is the most relevant parent/family predictor for important areas of child temperament. Parent depression consistently and uniquely predicted child anger, activity level, and inhibitory control in these analyses. These findings occurred in the same direction as the correlational analyses (i.e., higher parent depression predicted higher anger). Gender effects were present for activity level only, with males showing higher activity level than females. Lastly, developmental effects were also present in that child age was a significant predictor of all three child temperament traits. Older children had lower activity level and anger, and higher inhibitory control. The gender and age findings are consistent with the view that gender differences in temperament are common in activity level, and older children tend to have less negative temperaments overall.

In addition to comparing parents and their children, our family study included biologically related siblings from the same family. This allowed for the analysis of sibling resemblance through the calculation of sibling intraclass correlations. The idea that temperament is genetically influenced or biologically based is a common thread in most contemporary theories and has been supported by adoption, twin, and family studies (Goldsmith et al., 1987; Shiner et al., 2012). If a trait is genetically influenced, family members who share genetic material
should resemble one another. However, several studies have shown patterns of full sibling or DZ twin correlations that are either very close to zero or negative, suggesting that these children have opposing temperaments. This phenomenon is a rater bias referred to as a contrast effect whereby parents overestimate differences between their children. Sibling intraclass correlations for temperament dimensions in our family study were moderate to high for both MZ and DZ twins. However, there were several low correlations for full siblings, suggesting possible contrast effects. This finding is consistent with a similar sibling study of temperament in children of the same age (Saudino, Wertz, Gagne, & Chawla, 2004). For the temperament dimensions that were associated with parent depression, full sibling correlations were positive and in most cases significant. Therefore, parents in our study were not employing this rater bias for the child traits that were most relevant to our research questions and analyses. Another important issue that was addressed by these analyses is that family resemblance for anger, activity level, and inhibitory control across siblings was present, implicating the possible role of genetic influences on these dimensions.

Our findings indicate that parent depression is meaningfully related to child temperament. However, the use of parent ratings of temperament as the sole strategy for assessment is somewhat limiting. A multi-method approach that includes laboratory observations could be advantageous and has been promoted by several temperament researchers (Goldsmith & Gagne, 2012). The fact that contrast effects are not evident in the temperament domains that we focused on is a positive sign, but our conclusions would be strengthened by similar results employing objective behavioral data. Another limitation of our study is that mothers were the primary respondents. Therefore, we cannot reasonably interpret our findings as relating to father depression. This is typical of most developmental research, and often researchers suggest that if mothers are the primary caregivers and the primary respondents, the association between maternal depression and child outcomes is most relevant. While we do not disagree with this notion, it would be preferable to have complete depression data for both mothers and father in our study. Lastly, our family study design does not allow us to draw specific conclusions about the genetic and environmental variance of temperament. Without sufficient numbers of MZ and DZ twins in our sample, more sophisticated quantitative genetic analyses are simply not possible. We do not view this as a large weakness, as many previous twin and adoption studies have found consistent significant genetic influences on temperament.

We view the results of this study as providing measured support for parent depression status as being relevant to several child temperament dimensions that are associated with mental health outcomes. The children of parents who are depressed may be at risk for behavioral issues related to experiencing higher levels of anger, hyperactivity, and poorer inhibitory ability. This study is not intended
to be definitive, but rather an initial contribution to research on specific contextual family factors in the etiology and development of temperament. Many temperament investigations have focused on either genetic or family environmental factors that contribute to etiology and development. Future goals for our study include the completion of laboratory assessments of temperament and executive functioning, DNA collection and candidate gene analysis, and expanded child and parent mental health assessments. This data will allow for more comprehensive multi-method and integrated gene by environment interaction analyses, ultimately leading to stronger conclusions about child temperament and important health sequelae.

References


David, K. M. (2009). Maternal reports of marital quality and preschoolers’ positive peer relations: The moderating roles of effortful control, positive


