Autism spectrum disorder (ASD) is a prevalent developmental disorder affecting 1 in 68 children in the United States (Center for Disease Control and Prevention (CDC), 2014). Parents of a child with ASD are at an elevated risk for experiencing increased depressive symptoms and negative affect (Ekas and Whitman, 2011; Estes et al., 2009). Furthermore, child symptom severity has been consistently identified as a predictor of mental health outcomes as well as parenting difficulties, including parenting stress (e.g. Davis and Carter, 2008; Ingersoll and Hambrick, 2011). Finally, the family system may also be impacted by having a child with ASD (Morgan, 1988). However, most studies use global, static measures to investigate these phenomena. In order to better understand how these global experiences can affect daily functioning, this study investigated the influence of parent depressive symptoms, child symptom severity, and family functioning on the daily experiences of mothers of a child with ASD utilizing outcome measures of both general affect and parenting-related interactions.

In this study, we use Belsky’s (1984) theory of parenting as a framework to understand how maternal mental health, characteristics of the child, and the quality of family functioning impact not only parenting interactions in a high-risk population (i.e. mothers of children with ASD) but also general daily mood. In this seminal theory, Belsky explains that there are three key factors that influence the quality of parenting: (1) individual factors related to the parent in question, (2) factors associated with the child, and (3) the larger context in which the parent and child exist. With respect to parent-related factors, Belsky stated that psychological functioning (e.g. depressive symptoms) was one of the most salient predictors of parenting. Indeed, a body of the literature in the general population supports this assertion (e.g. Lee et al., 2013; Pritchard et al., 2012). Similar to this previous research, we include maternal depressive symptoms as well as family rigidity were related to increased daily frustrating parenting interactions. Implications for interventions focused on the family system are discussed.

Keywords
autism spectrum disorder, daily diaries, family, parenting, well-being
depressive symptoms as a predictor of parenting. With respect to child characteristics, Belsky’s theory focused primarily on the effects of child temperament on parenting. However, this research has been expanded to include a variety of child characteristics, including child externalizing behaviors (Jackson, 2000; Scaramella et al., 2008). In this study, we expand this previous research to focus on the effects of child ASD symptomatology on parenting interactions. Finally, Belsky also discussed sources of stress and support as part of the larger environment in which the parent and child exist. For example, Belsky notes that the spouse and other relatives can serve as a source of support for parents. Therefore, the quality of functioning in the larger family system may be an important predictor of parenting interactions. In this study, we focus on two dimensions of family functioning, family cohesion and rigidity, as predictors of daily parenting interactions. Although Belsky’s theory was designed to describe the factors influencing parenting quality, in this study we also expand this theory to include mothers’ general daily mood as an outcome since behavior and affect are intrinsically related to one another (Magai, 2001).

Parent mental health as a predictor of well-being and parenting

Well-being is a term commonly used by researchers to describe a variety of outcomes including adjustment, quality of life, physical health, mental health, stress, and depression (for a scoping review of the varied use of this term among families of children with ASD, please see Tint and Weiss, 2015). Furthermore, there is also research that examines associations between these various aspects of well-being in parents of children with ASD (e.g. Weitlauf et al., 2014). Despite the varied use of the term, studies have consistently shown that mothers of children with ASD are at a heightened risk, above and beyond parents of a child with other developmental delays, for experiencing decreased well-being (e.g. Estes et al., 2009). However, most studies conducted with parents of children with ASD have focused on depression, one aspect of well-being, as an outcome instead of as a predictor of other outcomes (Bitsika et al., 2013). More recently, however, research conducted in the general population has established the predictive nature of depression. For example, depression history was associated with greater declines in positive affect on days of elevated stress (O’Hara et al., 2014). Furthermore, Bylsma et al. (2011) found that depression history was not only related to less positive affect but also related to increased negative affect on a daily level. In these studies, depression history referred to a diagnosis of depression at any time during the lifespan. However, recent research has focused on the current depressive symptoms, as opposed to diagnostic history, and their association with daily positive and negative affects. For example, Parrish et al. (2011) found a positive relationship between depressive symptoms and daily negative affect. Furthermore, O’Neill et al. (2004) found that depressive symptoms were positively related to average daily negative affect and negatively related to daily positive affect. It is important to note that negative affect and depressive symptoms are not the same construct. Although a diagnosis of depression is a risk factor for elevated negative affect (Bylsma et al., 2011), depressive symptoms are typically measured as a continuum of a myriad collection of thoughts and behaviors that occurred during the previous 1–2 weeks, including self-esteem, trouble sleeping, feeling fearful, trouble concentrating, and feeling sad. Therefore, although a person may report overall feelings of sadness, they may not experience those feelings every day. This may explain why the strength of the association between depressive symptoms and daily negative affect in previous studies is only moderate (O’Neill et al., 2004; Parrish et al., 2011). Not only may those with a depression history experience elevated negative affect (Bylsma et al., 2011) but also those who are highly reactive to negative affect may also be at risk for later developing depressive symptoms (Parrish et al., 2011). This study sought to examine the associations between depressive symptoms and daily affect in mothers of children with ASD, a population generally considered to be at risk for lower well-being.

In addition to lower well-being, parenting a child with ASD may present unique challenges that lead to greater parenting stress (Dabrowska and Pisula, 2010). However, many studies examine the impact of parenting stress on depression (e.g. Bitsika et al., 2013) and do not examine whether parents’ depressive symptoms spill-over and impact parenting experiences. This direction of effects may be particularly important to study, especially in light of Belsky’s (1984) influential theory of parenting that suggests that parent psychological well-being and psychological resources have a strong influence on parenting. Indeed, in the general population, studies have found that mothers experiencing postpartum depression report increased parenting stress (Guo et al., 2014; Pritchard et al., 2012). Although it has been shown in the general population that there is a relationship between depression and affect and parenting experiences, fewer studies have been conducted in the context of developmental disabilities. In parents of children with attention-deficit/hyperactivity disorder (ADHD), a history of maternal depression as well as depressive symptoms predicted less positive parenting interactions (Gamble et al., 2013; Lee et al., 2013). Furthermore, in children at risk for developmental problems, higher maternal depressive symptoms were related to elevated levels of parenting stress (Secco et al., 2006). Understanding the predictors of parenting experiences may be especially important due to the fact that better maternal well-being has been linked to lower levels of daily parenting stress across time in families of children with an intellectual disability (Gerstein et al., 2009).
Impact of child symptom severity on parent well-being and parenting

Although many variables are associated with parent well-being, for parents of children with ASD, their child’s symptom severity has been consistently linked to a variety of well-being outcomes (e.g. Ingersoll and Hambrick, 2011). For example, Ekas and Whitman (2010) found that children’s core symptoms and associated behavior problems were associated with decreased well-being as evidenced by increases in negative affect. Benson and Karlof (2009) also reported that ASD symptom severity was associated with increased parent anger and greater stress proliferation. In addition, children’s language, cognitive, and social impairments were related to greater parenting stress for parents of a child with ASD (Bebko et al., 1987; Davis and Carter, 2008; Firth and Dryer, 2013). When children display more severe ASD symptoms, various aspects of parent–child interactions may also be impacted, including lower communication, responsivity, and mood between the parent and child (Beukens et al., 2013). Taken together, these studies show that child symptom severity not only affects parents’ general well-being but also their experiences related to parenting their child with ASD. Less is known, however, about the impact of children’s symptoms on parents’ daily well-being.

Family functioning in the context of ASD

Although raising a child with ASD may impact parents’ mental health and parenting experiences, a family systems perspective (Morgan, 1988) suggests that the larger family unit may also be impacted. Belsky (1984) recognized the importance of the family in his theory and suggested that support from family members may impact parents. Olson (2000) identified three dimensions of the family: cohesion, flexibility, and communication. Cohesion refers to the emotional bond of the family and can range from families that are disengaged from one another to families that are enmeshed. An optimal level of cohesion occurs when families are separate but connected. Flexibility refers to the ability of the family to adapt and change aspects of the family and the rules within the family. The levels of flexibility can range from rigid to chaotic, and a balance between structured and flexible is optimal. Finally, communication facilitates the other two dimensions. Healthy families are typically characterized by balanced levels of cohesiveness and flexibility, and unhealthy families are characterized by extreme levels of disengagement, enmeshment, rigidity, or chaos.

Having a child with ASD in the family may be associated with lower family well-being (Karst and Van Hecke, 2012). For example, having a child with ASD has been associated with less family cohesion (Higgins et al., 2005) and less family adaptability, which is a measure of flexibility (Rodrigue et al., 1990). However, less is known about how family functioning impacts parent well-being and parenting interactions for parents of children with ASD. In one study of parents of children with ASD, parenting competence was related to both greater well-being and family quality of life, which is the degree of satisfaction with multiple dimensions of life including family interaction, emotional well-being, parenting, physical well-being, and support related to the disability (Pozo et al., 2014). In addition, Baker et al. (2011) found a concurrent, positive relationship between family adaptability and the mother–child relationship. Furthermore, they also reported a relationship between family adaptability and change in maternal well-being across a 3-year period, such that higher adaptability was associated with lower maternal depression. In other populations, and in the general population, family cohesion and adaptability are positively associated with parent well-being (Uruk et al., 2007; Vandeleur et al., 2009). Therefore, it appears that family functioning can play an important role in understanding the well-being of parents, including parents of children with ASD. However, further research is needed in this population with respect to other dimensions of family functioning, such as cohesion, that have been found to be negatively impacted by ASD (Higgins et al., 2005). In addition, there is no existing research examining the dimension of family rigidity among these families. Given that children with ASD may engage in behaviors that disrupt the most carefully laid plans, mothers in families that are characterized by rigidity may be especially affected by the demands of raising a child with ASD. Overall, research examining the impact of parent characteristics, child characteristics, and family characteristics on parent well-being and parenting needs to be extended to the ASD population. Using Belsky’s (1984) influential theory of parenting, we examined how maternal depressive symptoms, child ASD symptom severity, and family functioning impacted maternal daily functioning.

Daily experiences of parents of children with ASD

As previously discussed, raising a child with ASD has the potential to impact various domains of parent well-being and family functioning. The majority of the studies conducted with families of children with ASD use global, static measures to assess parent well-being and family functioning (e.g. Ingersoll and Hambrick, 2011; Karst and Van Hecke, 2012). However, these studies fail to capture the dynamics of the day-to-day life of parents. Fortunately, in recent years, researchers have begun to incorporate daily diary studies (e.g. Ekas and Whitman, 2011; Pottie et al., 2009; Smith et al., 2010) when studying families of children with ASD. The daily diary approach offers several advantages when studying well-being and family
functioning including the exploration of naturally occurring experiences and avoiding issues with retrospection (Bolger et al., 2003).

To date, only a few studies have utilized a daily diary approach with parents of children with ASD. The studies varied in length, from twice a week for 12 weeks (Pottie et al., 2009; Pottie and Ingram, 2008) to 8 consecutive days (Smith et al., 2010) to as long as 30 consecutive days (Ekas and Whitman, 2011; Lickenbrock et al., 2011). Some of the studies focused exclusively on relationships between daily measures (e.g. Ekas and Whitman, 2011; Lickenbrock et al., 2011; Pottie and Ingram, 2008; Smith et al., 2010) whereas other focused on how global characteristics impacted daily experiences (e.g. Pottie et al., 2009). For example, Pottie and Ingram (2008) examined the impact of daily stress and coping strategies on daily well-being. Smith et al. (2010) later documented the daily experiences, mood, and time use among mothers of a child with ASD. Furthermore, Ekas and Whitman (2011) explored the relationship between stress and negative affect on a daily level with positive affect as a buffer. Related to this study, Pottie et al. (2009) examined whether daily parent affect was affected by global characteristics such as child behaviors. In this study, child behavior problems, above and beyond child ASD symptoms, predicted daily parent well-being. This is consistent with previous studies examining associations between symptom severity and global measures of well-being (McStay et al., 2014). Although each of these studies provided an important contribution to our understanding of the daily lives of mothers of a child with ASD, they did not examine whether global ratings of parent mental health and family functioning affect daily well-being. Furthermore, there have been no studies examining whether daily parenting-related experiences are impacted by global ratings of parent mental health, child ASD symptom severity, or family functioning.

This study

In order to understand the complex relationships between maternal mental health, child characteristics, and family functioning within the context of ASD, this study utilized a daily diary method to capture the experiences of mothers of a child with ASD. This study used global characteristics (maternal depressive symptoms, child ASD symptom severity, and family functioning) to predict daily experiences of mothers. To expand on previous research using daily diaries with this population, this study measured both daily general affect and daily parenting interactions with their child with ASD. It was hypothesized that increased maternal depressive symptoms, greater child ASD symptom severity, and adverse family functioning would predict increased negative affect and negative parenting-related interactions and decreased positive affect and positive parenting-related interactions.

Method

Participants

Eighty-three mothers of a child with ASD participated in an online study. Participants were selected from a larger study of 136 mothers and fathers who indicated their child had a diagnosis of ASD. In order to qualify for this study, participants had to be female (n=99), they had to complete the initial assessment and the daily portion of the online study (n=85), and have no missing data on any time one scales (n=83). In the final sample, mothers ranged in age from 25 to 55 years (M=38.64 years, standard deviation (SD)=6.07 years), and their children were between the ages of 2 and 13 years (M=7.82 years, SD=2.59 years) and predominantly male (85.5%). Mothers were mostly Caucasian (89.4%) with the remaining mothers identifying as African American (1.2%), Hispanic (5.9%), Native American/Aleutian Islander (1.2%), Asian or Pacific Islander (1.2%), or other (1.2%). In addition, the majority of the mothers were married (84.3%), and the remaining were single (4.8%), separated (3.6%), or divorced (7.2%). For household income, 27.7% of mothers reported a household income of US $40,000–US $74,999. The remaining 48.2% of mothers reported a household income greater than US $74,999, and 24.1% reported a household income lower than US $40,000. Finally, most of the mothers had received at least a college degree (69.9%). The participants were recruited by contacting local ASD resources as well as national blogs. The study then spread via social media and word of mouth. Analyses were conducted to determine whether mothers included in the study (n=83) significantly differed from those who did not complete the daily portion (n=14) or had missing data (n=2). The mothers did not differ with respect to age, child age, education, or income. However, mothers who identified as Hispanic were less likely to complete the daily diary portion compared to Caucasian mothers.

Procedure

Participants were recruited nationally to participate in the study. After expressing interest, mothers were contacted with further information about the study and told that it was a two-part study that included an initial assessment as well as daily activities. Upon agreeing to participate, mothers were sent a link to the initial assessment. After reading and electronically signing the informed consent, mothers completed demographic information as well as questionnaires about their mental health, family, and child with ASD. After completing the initial assessment, mothers were reminded about the daily part and sent a link to the first day of the daily activities (M=52.89 days elapsed). Mothers were emailed a link each day and were instructed to complete the daily diary before going to sleep. There were a total of 14 days of daily activities, and the number
of days that mothers completed ranged from 3 to 14 days ($M=11.98$ days, $SD=2.58$ days). The total number of possible days across all mothers for the study was 1162 (83 mothers × 14 days of daily activities). The mothers in this study completed a total of 994 days, resulting in an 85.5% completion rate. This completion rate is similar to previous daily diary studies with this population (e.g., Ekas and Whitman, 2011). Mothers were sent gift cards following the initial assessment (US $10.00) and each day of daily activities (US $30.00 for completing 14 days or US $2.00 per day, whichever was greater). The authors’ university institutional review board approved this study.

**Measures**

**Maternal mental health.** In order to assess maternal mental health, mothers completed the Center for Epidemiologic Studies Depression Scale (CESD), which is a valid and established self-report measure of depressive symptoms (Radloff, 1977). The scale consists of 20 items that participants respond to on a 4-point Likert-type scale (0 = rarely or none of the time (less than 1 day) to 3 = most or all of the time (5–7 days)) based on how they felt during the past week. Sample items include, “I felt sad” and “I could not get going.” After reverse coding four items, sum scores were calculated where higher scores represented the presence of more depressive symptoms. A score of 16 or greater indicates clinical depression severity (Radloff, 1977). Internal consistency for the present sample was 0.91.

**Child ASD symptom severity.** In order to assess the child’s ASD symptoms, the mothers completed the Social Responsiveness Scale (SRS). It is a valid and reliable measure used to assess ASD symptomatology (Constantino and Gruber, 2005). There are 65 total items that participants respond to on a 4-point Likert-type scale (1 = not true to 4 = almost always true). Mothers were asked to reflect on their child’s behavior in the past 6 months. A total score for symptom severity was also calculated by summing all 65 items, with higher scores indicating more symptom severity. The internal consistency for the total score for the present sample was 0.83. After reverse coding 17 items, five scale scores were calculated by summing the items. The social awareness scale consists of eight items that measure an ability to detect social cues such as “seems to react to people as if they are objects.” The social cognition scale contains 12 items to measure skills related to interpreting social cues. For example, “doesn’t recognize when others are trying to take advantage of him or her.” The social communication scale consists of 22 items that include, “avoids eye contact or has unusual eye contact” to assess expressive skills related to social communication. Additionally, the social motivation scale measures whether the child is motivated to participate in social behavior and includes items such as “would rather be alone than with others.” Finally, the autistic mannerisms scale consists of 12 items to measure stereotyped behaviors or restricted interests. For example, “has an unusually narrow range of interests.” The internal consistencies for this sample were 0.68 for social awareness, 0.70 for social cognition, 0.85 for social communication, 0.77 for social motivation, and 0.79 for autistic mannerisms. For all the scales, higher scores reflect greater impairment.

**Family functioning.** In order to assess family characteristics, namely, family functioning, mothers completed the Family Adaptability and Cohesion Evaluation Scale IV (FACES IV; Olson, 2011). It is a valid and well-established measure that consists of six scales, some of which reflect balance in the family with regard to cohesion and flexibility and the others reflect unbalanced family functioning. The total measure consists of 42 items to which participants respond on a 5-point Likert-type scale (1 = does not describe our family at all to 5 = very well describes our family) to indicate how well the items describe their family. For the purposes of this study, we focused on the balanced cohesion scale and the rigidity scale. The balanced cohesion scale consists of seven items, such as “this family has a good balance of separateness and closeness.” The rigidity scale also consists of seven items, including items such as “this family has a rule for almost every possible situation.” Both scale scores were computed by summing the responses on each item of the scale, with higher scores reflecting greater cohesion or greater rigidity, respectively. The internal consistency for the present sample was 0.82 for balanced cohesion and 0.68 for rigidity.

**Daily general affect.** As part of the daily activities, the mothers completed the Positive and Negative Affect Schedule (PANAS). The PANAS is a valid and reliable measure of positive and negative affect (Watson et al., 1988) and consists of 20 items where participants are instructed to indicate how much they felt certain emotions each day on a 5-point Likert-type scale (1 = very slightly or not at all to 5 = extremely). Scale scores were then calculated by summing the items to create a positive affect scale that contains their response to 10 emotions such as “interested,” “excited,” and “active.” The remaining 10 items were the negative affect scale that contains emotions such as “dissatisfied,” “upset,” and “afraid.” Higher scores indicate higher positive and negative affects. For this sample, the internal consistencies on the first day of the daily activities were 0.87 for positive affect and 0.85 for negative affect.

**Daily parenting interactions.** In order to assess mood related to parenting interactions, mothers were given two items previously used in daily diary studies (Bass et al., 2009) and asked to respond with how much they agreed on a 5-point Likert-type scale (1 = strongly disagree to 5 = strongly agree). In order to obtain a measure of daily

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**Appendix**

**Adaptability and Cohesion Evaluation Scale IV.** The Family Adaptability and Cohesion Evaluation Scale IV (FACES IV) is a valid and well-established measure that consists of six scales, some of which reflect balance in the family with regard to cohesion and flexibility and the others reflect unbalanced family functioning. The total measure consists of 42 items to which participants respond on a 5-point Likert-type scale (1 = does not describe our family at all to 5 = very well describes our family) to indicate how well the items describe their family. For the purposes of this study, we focused on the balanced cohesion scale and the rigidity scale. The balanced cohesion scale consists of seven items, such as “this family has a good balance of separateness and closeness.” The rigidity scale also consists of seven items, including items such as “this family has a rule for almost every possible situation.” Both scale scores were computed by summing the responses on each item of the scale, with higher scores reflecting greater cohesion or greater rigidity, respectively. The internal consistency for the present sample was 0.82 for balanced cohesion and 0.68 for rigidity.

**Positive and Negative Affect Schedule.** The Positive and Negative Affect Schedule (PANAS) is a valid and reliable measure of positive and negative affect (Watson et al., 1988) and consists of 20 items where participants are instructed to indicate how much they felt certain emotions each day on a 5-point Likert-type scale (1 = very slightly or not at all to 5 = extremely). Scale scores were then calculated by summing the items to create a positive affect scale that contains their response to 10 emotions such as “interested,” “excited,” and “active.” The remaining 10 items were the negative affect scale that contains emotions such as “dissatisfied,” “upset,” and “afraid.” Higher scores indicate higher positive and negative affects. For this sample, the internal consistencies on the first day of the daily activities were 0.87 for positive affect and 0.85 for negative affect.
positive parenting interactions, mothers responded to “I had positive interactions with my child today.” To obtain a measure of daily frustrating parenting interactions, mothers responded to “my time with my child today was frustrating.” For both the measures, higher scores represented more positivity and negativity, respectively.

**Analysis plan**

Hierarchical linear modeling (HLM; Raudenbush and Bryk, 2002) was used to test the research questions of the study. HLM is used when studies have a hierarchical design, such as students nested within classrooms or repeated measures nested within an individual. HLM was appropriate for the planned analyses due to the fact that there are 14 daily measures nested within each of the 83 mothers. HLM simultaneously estimates two models: (1) within-person (i.e. daily diaries) and (2) between-person (i.e. initial assessment). Level 1 model examines associations between within-person variables whereas Level 2 model allows researchers to examine whether within-person (i.e. Level 1) responses vary as a function of between-person (i.e. Level 2) characteristics. In this study, we were primarily interested in examining whether mothers’ reported scores on family, child, and personal characteristics from the initial assessment (Level 2) predicted their reported daily general affect and parenting interactions (Level 1).

One important benefit is that HLM easily accounts for missing data, which is particularly relevant for daily diary studies where participants may miss days. In these models, if a mother is missing one or more days she is not removed from the analyses, as is common with other methods (i.e. repeated measures analysis of variance (ANOVA)) that employ listwise deletion. HLM uses all the available data for each participant by weighting the data according to the amount of completed days.

Finally, HLM provides the researcher with the flexibility to determine whether effects in the models are fixed or random. A random effect implies that the association between variables is different for participants whereas a fixed effect specifies that the association is the same across participants (Raudenbush and Bryk, 2002). In this study, all the effects were specified as random. Furthermore, in all the models, Level 2 predictors were centered on sample means in order to facilitate interpretation of significant effects (Raudenbush and Bryk, 2002).

**Results**

In accordance with our analytic plan, covariate analyses were first conducted to determine whether any demographic variables needed to be included in the subsequent analyses. Second, correlation analyses were conducted between all the variables of interest in order to discover the general relationship between study variables. Finally, HLM analyses were conducted in order to test the research questions of this study.

**Covariate analyses**

To determine whether any demographic variables needed to be included in subsequent analyses, covariate analyses were first conducted with maternal age, child age, maternal education, maternal marital status, household income, and ethnicity. Parent age was found to be significantly associated with daily positive parenting interactions, $r = 0.25, p < 0.05$. Older parents reported more daily positive parenting interactions. For all further analyses involving daily positive parenting interactions, maternal age was included as a covariate. No other demographic variables were significantly related to any of the outcome variables.

**Correlation analyses**

In order to conduct preliminary analyses of the relationship between study variables, an average across the 14 days was computed for each of the daily variables and scores on the global measures were also calculated (see Table 1 for descriptives). As shown in Table 2, correlations were computed between the daily and global variables of interest. With respect to the daily general affect variables, daily positive affect was associated with greater child symptom severity, $r = 0.22, p < 0.05$. Daily negative affect was associated with greater maternal depressive symptoms, $r = 0.43, p < 0.001$. For the daily parenting interaction variables, daily positive parenting interactions were associated with more family cohesion, $r = 0.35, p < 0.01$. Furthermore, daily frustrating parenting interactions were associated with greater family rigidity, $r = 0.29, p < 0.01$.

In order to test for differences between daily general affect (positive vs negative) and daily parenting interactions (positive vs frustrating), two separate repeated measures ANOVAs were conducted. Overall, mothers reported

<table>
<thead>
<tr>
<th>Table 1. Descriptive statistics.</th>
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<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>1. Daily positive affect</td>
</tr>
<tr>
<td>2. Daily negative affect</td>
</tr>
<tr>
<td>3. Daily positive parenting interactions</td>
</tr>
<tr>
<td>4. Daily frustrating parenting interactions</td>
</tr>
<tr>
<td>5. Maternal depressive symptoms</td>
</tr>
<tr>
<td>6. Child symptom severity</td>
</tr>
<tr>
<td>7. Family cohesion</td>
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<tr>
<td>8. Family rigidity</td>
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</tbody>
</table>

SD: standard deviation.
more positive affect than negative affect, $F(1, 82) = 256.61$, $p \leq 0.001$, $\eta_p^2 = 0.76$. Furthermore, after controlling for maternal age, there was no significant difference between mothers' reported daily positive parenting interactions and daily frustrating parenting interactions, $F(1, 81) = 4.42$, $p = 0.64$, $\eta_p^2 = 0.01$.

### HLM analyses

A series of HLM analyses were conducted in order to examine how global maternal, child, and family characteristics impacted daily general affect and daily parenting interactions (Table 3). In all cases, we first tested models wherein all hypothesized predictor variables were entered including maternal depressive symptoms, child ASD symptom severity (if the total score was significant, then follow-up analyses with subscales were conducted), and family cohesion and rigidity. All non-significant terms were removed and the model was reanalyzed. Therefore, the results presented below represent the final models containing only significant predictors. The following equation represents our final model for daily positive affect

$$PA = \beta_0 + \beta_1 (\text{Maternal Depressive Symptoms}) + \beta_2 (\text{Child Symptom Severity}) + r$$

where $PA$ is the score for daily positive affect, $\beta_0$ is a random coefficient for average daily positive affect, $\beta_1$ is a random coefficient for maternal depressive symptoms, $\beta_2$ is a random coefficient for child symptom severity, and $r$ represents error.

Maternal characteristics and child characteristics significantly predicted daily positive affect. The coefficients were interpreted as regression coefficients. For maternal characteristics, every 1 unit increase in maternal depressive symptoms was associated with a 0.14-unit decrease in daily positive affect, $\beta_1 = -0.14$, standard error ($SE$) = 0.06, $t(80) = -2.26$, $p < 0.05$. For child characteristics, every 1 unit increase in child symptom severity was associated

### Table 2. Correlations between study variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Positive affect</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Negative affect</td>
<td>-0.09</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Positive parenting</td>
<td>0.32***</td>
<td>-0.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Frustrating parenting</td>
<td>-0.18</td>
<td>0.36**</td>
<td>-0.53***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Depressive symptoms</td>
<td>-0.16</td>
<td>0.42***</td>
<td>-0.02</td>
<td>0.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Child symptom severity</td>
<td>0.22*</td>
<td>0.12</td>
<td>0.13</td>
<td>0.10</td>
<td>0.30***</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Family cohesion</td>
<td>0.16</td>
<td>-0.09</td>
<td>0.35***</td>
<td>-0.04</td>
<td>-0.18</td>
<td>0.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Family rigidity</td>
<td>0.20</td>
<td>0.11</td>
<td>-0.15</td>
<td>0.29***</td>
<td>0.01</td>
<td>0.19</td>
<td>0.02</td>
<td>-</td>
</tr>
</tbody>
</table>

*p < 0.05; **p < 0.01; ***p < 0.001.

### Table 3. HLM results.

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<tr>
<th></th>
<th>$\beta$</th>
<th>SE</th>
<th>$t$</th>
<th>df</th>
<th>% Variance reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Daily positive affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_0$ (Intercept)</td>
<td>29.18</td>
<td>0.63</td>
<td>46.42***</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>$\beta_1$ (Maternal depressive symptoms)</td>
<td>-0.14</td>
<td>0.06</td>
<td>-2.26*</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>$\beta_2$ (Child symptom severity)</td>
<td>0.10</td>
<td>0.04</td>
<td>2.61*</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>2. Daily negative affect</td>
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<td></td>
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<td></td>
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<td>0.42</td>
<td>37.91***</td>
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<td></td>
</tr>
<tr>
<td>$\beta_1$ (Maternal depressive symptoms)</td>
<td>0.17</td>
<td>0.04</td>
<td>4.35***</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>3. Daily positive parenting interactions</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_0$ (Intercept)</td>
<td>4.57</td>
<td>0.04</td>
<td>121.39***</td>
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<td></td>
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<tr>
<td>$\beta_1$ (Mother age)</td>
<td>0.02</td>
<td>0.01</td>
<td>3.12**</td>
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<td></td>
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<tr>
<td>$\beta_2$ (Family cohesion)</td>
<td>0.03</td>
<td>0.01</td>
<td>3.74***</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>4. Daily frustrating parenting interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_0$ (Intercept)</td>
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<td>0.09</td>
<td>26.37***</td>
<td>80</td>
<td></td>
</tr>
<tr>
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<td>0.02</td>
<td>0.01</td>
<td>2.05*</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>$\beta_2$ (Family rigidity)</td>
<td>0.06</td>
<td>0.02</td>
<td>2.76**</td>
<td>80</td>
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</tr>
</tbody>
</table>

HLM: hierarchical linear modeling; SE: standard error; df: degree of freedom.

*p < 0.05; **p < 0.01; ***p < 0.001.
with a 0.10-unit increase in daily positive affect, $\beta_2 = 0.10$, $SE = 0.04$, $t(80) = 2.61$, $p < 0.05$. This model accounted for an 8.6% reduction in between-person variability. One follow-up model was tested wherein the child symptom severity subscales (social awareness, social cognition, social communication, social motivation, and autistic mannerisms) replaced the total score as a predictor of daily positive affect. In this model, every 1 unit increase in maternal depressive symptoms was associated with an 0.17-unit decrease in daily positive affect, $\beta_1 = -0.17$, $SE = 0.04$, $t(81) = 4.35$, $p < 0.001$. This model accounted for a 21.0% reduction in between-person variability.

In addition, we examined the relationship between maternal, child, and family characteristics and daily negative affect. Our final model for daily negative affect was

$$NA = \beta_0 + \beta_1 (\text{Maternal Depressive Symptoms}) + r$$

where $NA$ is the score for daily negative affect, $\beta_0$ is a random coefficient for average daily negative affect, $\beta_1$ is a random coefficient for maternal depressive symptoms, and $r$ represents error. Only maternal characteristics were associated with daily negative affect. Specifically, every 1 unit increase in maternal depressive symptoms was associated with a 0.17-unit increase in daily negative affect, $\beta_1 = 0.17$, $SE = 0.04$, $t(81) = 4.35$, $p < 0.001$. This model accounted for a 21.0% reduction in between-person variability.

Next, we examined whether maternal, child, and family characteristics predicted daily parenting interactions. The final model for daily positive parenting interactions was

$$PI = \beta_0 + \beta_1 (\text{Maternal Age}) + \beta_2 (\text{Family Cohesion}) + r$$

where $PI$ is the score for daily positive parenting interactions, $\beta_0$ is a random coefficient for average daily positive parenting interactions, $\beta_1$ is a random coefficient for parent age, and $\beta_2$ is a random coefficient for family cohesion, and $r$ represents error.

Controlling for maternal age, only family characteristics were significantly associated with daily positive parenting interactions. For every 1 unit increase in family cohesion, daily positive parenting interactions increased by 0.03 units, $\beta_2 = 0.03$, $SE = 0.01$, $t(80) = 3.74$, $p < 0.001$. This model accounted for a 23.0% reduction in between-person variability.

Our final model examined the effects of maternal, child, and family characteristics on daily frustrating parenting interactions. The following equation was used to estimate daily frustrating parenting interactions

$$FI = \beta_0 + \beta_1 (\text{Maternal Depressive Symptoms}) + \beta_2 (\text{Family Rigidity}) + r$$

where $FI$ is the score for daily frustrating parenting interactions, $\beta_0$ is a random coefficient for average daily frustrating parenting interactions, $\beta_1$ is a random coefficient for maternal depressive symptoms, $\beta_2$ is a random coefficient for family rigidity, and $r$ represents error.

Maternal and family characteristics were significantly associated with daily frustrating parenting interactions. For every 1 unit increase in maternal depressive symptoms, daily frustrating parenting interactions also increased by 0.02 units, $\beta_1 = 0.02$, $SE = 0.01$, $t(80) = 2.05$, $p < 0.05$. In addition, for every 1 unit increase in family rigidity, daily frustrating parenting interactions increased by 0.06 units, $\beta_2 = 0.06$, $SE = 0.02$, $t(80) = 2.76$, $p < 0.01$. This model accounted for a 13.2% reduction in between-person variability.

### Discussion

The purpose of this study was to examine the global predictors of daily functioning for mothers of children with ASD. We found that global maternal, child, and family characteristics predicted not only mothers’ daily general affect but also parenting interactions. Specifically, elevated depressive symptoms were associated with less daily positive affect and greater child social motivation impairments were associated with higher daily positive affect. Furthermore, maternal depressive symptoms were associated with increased daily negative affect. For daily parenting interactions, mothers reported higher daily positive parenting interactions when their family was more cohesive. Finally, mothers reported greater daily frustrating parenting interactions when they reported higher levels of depressive symptoms as well as higher levels of family rigidity. Taken together, these results suggest that interventions are needed that target parent, child, and family characteristics in order to better enhance parents’ day-to-day functioning.

### Predictors of daily positive and negative affect

For daily general affect, we found that both positive and negative affect were impacted by global characteristics, namely, maternal depressive symptoms and child social motivation symptoms. First, increased depressive symptoms predicted increased daily negative affect and lower daily positive affect. These results support and expand on a growing body of research in the general population that highlights the impact of depressive symptoms on daily affect (e.g. O’Neill et al., 2010). Expanding on daily studies using depression history as a predictor of daily negative affect (e.g. O’Grady et al., 2010), our study suggests that depressive symptoms could also be used to examine the difference between the depression scar and depression...
vulnerability hypotheses. Our results provide support for the depression scar hypothesis, which states that depressive symptoms are associated with later difficulties in daily functioning. Within the population of mothers of children with ASD, there have been no studies examining how depressive symptoms impact daily functioning. Given that mothers of children with ASD are at an increased risk for depression (Bitsika et al., 2013), the results of this study provide a glimpse into the possible impact of these mental health problems on day-to-day functioning. However, because daily negative affect is only one aspect of daily well-being, it would be important for future studies to include other measures of daily functioning, such as daily stress and fatigue (Pottie and Ingram, 2008; Smith et al., 2010). Further studies are needed to investigate whether global mental health status moderates the associations between domains of daily functioning. For example, elevated levels of depressive symptoms may lead to a greater spill-over between daily negative affect and daily marital interactions (Lickenbrock et al., 2011). For positive affect, our results are consistent with Bylsma et al. (2011) who also found that in the general population, those with a history of depression experience less positive affect. Taken together, our results suggest that maternal depressive symptoms are a risk factor for lower daily well-being.

Similar to previous research, in this study, the measure for depressive symptoms was given closely in time to the daily measures of affect. Our measure of depressive symptoms asked mothers to reflect on the previous 7-day period and it is possible that we are simply capturing daily negative affect. However, previous studies have used the same measures and methodology and reported associations between depressive symptoms and daily negative affect that were greater than those found in this study (e.g. Parrish et al., 2011). Nonetheless, it would be beneficial for future studies not limited by the constraints of an online study to use measures of lifetime depression history (O’Hara et al., 2014).

With respect to child symptom severity, we found that children’s overall symptom severity was related to maternal daily positive affect only. Follow-up analyses showed that social motivation symptoms appear to be responsible for the effect. However, the effect was not in the direction that we hypothesized. We expected that greater child symptoms would be associated with decreased maternal positive affect due to the fact that research has consistently found child factors to be predictive of maternal well-being (e.g. Ingersoll and Hambrick, 2011). However, child social motivation symptoms were positively related to increased maternal daily positive affect. As measured by the SRS, social motivation symptoms involve a lack of motivation or drive to engage in social behaviors or interactions (Constantino and Gruber, 2005). A child that has many social motivation impairments, for example, would rather be alone than engage with others. A child who is more withdrawn and less socially motivated may not present with as many overt behaviors that would negatively impact the mother. On the other hand, it is possible that because the child is not motivated to engage in social behaviors, the mother is being especially warm and positive in an attempt to engage the child and increase social motivation. The mothers may be engaging in these types of parenting due to the fact that research has shown that supportive parenting is associated with better social skills for children with developmental disabilities (Green et al., 2014). These behaviors on the mothers’ part may be a compensatory mechanism that, in turn, is associated with them feeling more positive. Indeed, positive parenting styles, such as compassionate parenting, have been associated with positive outcomes for mothers (Conti, 2015). This finding may also be an artifact of the study’s use of daily diaries. Although mothers were instructed to reflect on their entire day, it is possible that they were recalling the most positive aspects of their day, and therefore, their positive affect levels were not an accurate reflection of the entire day. The positive relationship between child social motivation impairments and positive affect is in contrast to Pottie et al. (2009) who found a negative relationship between child characteristics and daily affect. However, in that study they found that it was child behavior problems, not core ASD symptomatology, that predicted maternal daily functioning. Indeed, there is a considerable amount of research showing that behavior problems predict decreased maternal well-being, above and beyond the effects of core ASD symptoms (e.g. Ekas and Whitman, 2010). Unfortunately, this study did not include a measure of behavior problems and it is possible that our results would be changed with the inclusion of such a measure. Therefore, future studies would benefit from examining the contributions of both core symptoms and behavior problems.

Predictors of daily parenting interactions

In addition to examining parents’ general daily affect, we also examined predictors of parenting interactions. Belsky (1984) theorized that parent characteristics, child characteristics, and environmental resources (e.g. family support) impact parenting. In this study, only family cohesion was associated with greater daily positive parenting interactions. Family cohesion encompasses feelings of being supported by family members and having a proper emotional bond. Therefore, in this study, mothers who perceive their family as being cohesive may also feel adequately and appropriately supported by her family despite the difficulties of having a child with ASD. This general feeling of support may allow mothers to interpret their interactions with their child in a more positive light. In addition, this finding supports and extends findings of the concurrent, positive relationship between family adaptability and the mother–child relationship (Baker et al., 2011) and extends
that relationship to mothers’ daily experiences. However, more studies need to investigate family functioning in the context of ASD. Our results do suggest that family functioning could be a potential area for intervention. If adaptive family functioning is associated with positive outcomes, interventions could target enhancing family functioning and, therefore, increase positive parenting interactions.

On the other hand, we found that maternal and family characteristics were predictors of daily frustrating parenting interactions. Extending previous research conducted with global measures (e.g. Secco et al., 2006), we found that maternal depressive symptoms were positively related to frustrating parenting interactions, which helps to elucidate the experience of parenting stress in the ASD population. However, this study extends previous studies (e.g. Benson and Karlof, 2009) that examined general negative feelings (i.e. anger), by including feelings related to the child and parenting interactions. It is possible that depressive symptoms may lead mothers to have more negative and frustrating interactions with their child or the symptoms simply result in mothers reporting the interactions to be more negative than they may actually be. Although some studies have found that depression allows parents to be more realistic in their reports, it is possible that depression could lead to distortion as well (Parent et al., 2014). This study relied on maternal report and future studies would benefit from including additional reporters or an observation of parent–child interactions in order to examine the associations between parent report and behavior.

Another predictor of daily frustrating parenting interactions was family rigidity. In this study, mothers who reported higher levels of family rigidity also reported increased daily frustrating parenting interactions. Rigid families typically have difficulty adapting and changing their family rules (Olson, 2000). These family-level difficulties may spill-over to impact parent–child relationship when raising a child who may engage in behaviors that are difficult to manage. Conversely, in families that are less rigid, mothers may find it easier to manage their child’s behavior and are able to have more positive interactions with their child. In fact, in this study, child behaviors were not associated with parenting interactions. Although child characteristics (e.g. social motivation) predicted maternal daily positive affect, it appears that only maternal and family characteristics spill-over into parenting interactions. Given the previous research showing that parents find behavior problems to be more stressful than core ASD symptoms (Ekas and Whitman, 2010), future research is needed to examine whether behavior problems would be a better predictor of daily parenting experiences. It is also possible that the direct relationships that we hypothesized may be more complex and require modeling the interactions between maternal depressive symptoms, child ASD symptom severity, and family functioning. For example, child ASD symptom severity may only impact daily functioning when the family is less supportive or when the mother reports elevated depressive symptoms. Future studies with larger sample sizes would benefit from creating more complex models utilizing interaction effects between maternal, child, and family characteristics to explore these possibilities.

Limitations and future directions

Although this study used a family systems approach to investigate the impact of having a child with ASD on mothers’ daily lives, there were some limitations. Although daily diaries allow for a more intensive investigation of family processes, this may also lead to different perceptions of relationships due to the fact that the mothers are now paying greater attention to their relationships (Laurenceau and Bolger, 2005). Similar to suggestions from Laurenceau and Bolger (2005), it is important to examine global measures related to these daily constructs before and after the daily diaries to examine these possible changes across time. For example, because we are asking mothers about their interactions with their child each day, they may be more attune to certain events that occur with the child or be more critical of those events. Furthermore, there is the risk of attrition with this more intensive data collection method. Namely, in our study, Hispanic mothers were less likely to complete the daily diary portion of our larger study, with 11 of the original 16 Hispanic mothers dropping out before the daily diaries portion. However, there were a relatively low number of Hispanic mothers in the sample to begin with, so future studies should aim to collect data from a more diverse sample. Additionally, not all mothers completed all 14 days of the study and it is possible that these missing data may not be randomly missing. Indeed, mothers may not complete the diaries on days that are particularly stressful or busy. Next, although this study utilized a single-item measure of daily parenting interactions, it is a common practice in daily diary studies to use single-item measures to evaluate whether or not a certain event occurred during the day (e.g. Bass et al., 2009). In addition, studies examining the psychological well-being of mothers of children with ASD have relied on single-item indicators of parent well-being (e.g. Weiss and Lunsky, 2011). In order to avoid burdening participants, it was not possible to include a more detailed measure of parenting. Finally, because mothers had the option to complete the daily diaries at any point in the day, it is possible that they were reporting on their parenting interactions in response to events that may have just occurred or were the most salient during the day as opposed to the sum of events across days. Overall, future studies would benefit from implementing ecological momentary assessments (e.g. text messaging several times per day) to capture events and feelings in real-time (Rönkä et al., 2010). By
expanding on the use of a family systems approach with advanced technology, we can better understand how multiple risk factors associated with having a child with ASD are associated with the day-to-day experiences of mothers of a child with ASD.

Beyond the use of daily diaries, there are several other limitations that warrant discussion. Due to the nature of the study, causal direction cannot be specified. Therefore, future studies with larger sample sizes should use time-lag predictors (e.g. Ekas and Whitman, 2011) to assess temporal ordering among daily variables. For example, it is possible that parenting interactions on one day could spill-over and impact maternal well-being the following day. In addition, because this study only consisted of mothers, it would be important to examine the daily functioning of fathers as well, since studies have found that mothers and fathers perceive stressors associated with having a child with ASD differently (e.g. Freeman et al., 1991). Including both mothers and fathers would also allow for an examination of reciprocal relations between mother and father functioning (Gerstein et al., 2009). Finally, because mothers are the sole reporters in this study, the inclusion of additional and independent reporters for these measures would clarify the daily functioning of families of children with ASD.

Implications and conclusion

This study has several implications for clinicians working with families of children with ASD. Since depressive symptoms were associated with lower daily well-being, some mothers may benefit from participating in cognitive behavioral therapy to ameliorate depressive symptoms. This will allow mothers to experience more positive affect, less negative affect, and potentially be less reactive to the stressors they experience. It may also help to reduce frustrating parenting interactions, due to the fact that depressed individuals may perceive child behaviors to be more negative than they actually are (Gartstein et al., 2009). We also found that family cohesion was associated with better daily functioning. Therefore, another target for intervention would be to include the family in the treatment of ASD so as to help them implement strategies that will support the mother. This increase in family cohesion may allow mothers to interact with their children more effectively if they feel supported both personally and in their role as a parent. This is similar to suggestions made by other researchers (e.g. Dykens, 2015) that there is an increased need for family intervention research for families of children with neurodevelopmental disorders.

This study not only utilized family-focused research, which is important for understanding the impact of a child with ASD (Cridland et al., 2014), but also added a daily diary component to better capture the dynamic experiences of mothers of children with ASD. We expanded on previous daily diary studies (e.g. Lickenbrock et al., 2011; Smith et al., 2010) using global measures to predict not only daily affect but also daily parenting interactions. Our results highlight the complexities associated with parenting a child with ASD. Some aspects of mothers’ lives, such as their depressive symptoms and rigid family structure, were associated with negative daily experiences whereas others, such as low child social impairments and cohesive family structure, predicted positive experiences. The findings of this study suggest that interventions focused on enhancing positive aspects within a family, namely, teaching family members how to support one another and how to better adapt to change, may lead to better outcomes for parents.

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