Familial Depression and ADHD in Toddlers with Autism Spectrum Disorders

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Abstract

Familial Depression and ADHD in Toddlers with Autism Spectrum Disorders

Melissa Smith

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Abstract
This study explored the relationship between autism spectrum disorder (ASD) in toddlers and familial depression, specifically maternal depression. The data on toddlers in this study were collected from the Early Detection of Autism Study at the University of Connecticut. It was hypothesized that there would be a significant relationship between toddlers’ ASD diagnoses and familial depression compared to families with non-ASD toddlers. More specifically, it was hypothesized that there would be a significant relationship between ASD diagnoses and maternal depression, due to the challenges and stressors that result from taking care of toddlers with ASD. This study’s findings did not support the original hypotheses, suggesting that the incidence of depression, maternal or familial, may not be higher in the families of toddlers with ASD compared to families of non-ASD toddlers. However, further research is necessary to support this conclusion.

*Keywords: Autism Spectrum Disorder (ASD), Typically Developing, Depression*
Mental illness in the families of children with developmental disorders are not rare occurrences. Developmental disorders may add stress to these families, leaving parents and other family members feeling stressed, worried, incompetent, and/or helpless. Sometimes these additional stressors accumulate and result in mental illness in the family members of toddlers with Autism Spectrum Disorders (ASD) (Bailey et al., 2007; Carter & Kuhn, 2006; Carter & Davis, 2006; Estes et al., 2009; Floyd & Singer, 2006; Herring et al., 2006). Researchers have also found that there may be a genetic link between attention-deficit hyperactivity disorder (ADHD) and ASD (Smalley et al., 2002). Consistent with such a link, Rommelse and colleagues (2010) suggested that ADHD and ASD may co-occur within families. It is yet unknown, however, whether the rate of ADHD diagnoses is higher in families of toddlers with ASD, when compared to families of typically developing toddlers.

ASD is a developmental disorder marked by lasting deficits in social communication as well as by repetitive and restrictive patterns of activities, behaviors, and interests (APA, 2013). Several studies have sought to find possible relationships between ASD and different mental disorders, especially including depression and ADHD (Carter & Kuhn, 2006; Estes et al., 2009; Mazefsky et al., 2010; Rommelse et al., 2010; Smalley et al., 2002). Learning more about the possible link between diagnoses of ASD in toddlers and histories of familial depression, and between ASD and familial ADHD, will add more to the general knowledge of ASD.

Depression is a mood disorder characterized by a loss of pleasure in usual activities or depressed mood for at least two weeks (APA, 2013). This mood disorder is characterized by impaired functioning and several symptoms which may include: irritable mood, significant weight change or change in appetite, change in sleeping patterns, psychomotor agitation or retardation, fatigue, guilt, inability to concentrate, and/or suicidality (APA, 2013).
Previous studies have researched the link between familial depression and ASD diagnoses. Bailey, Golden, Roberts, and Ford (2007) reviewed several studies on maternal depression and found that mothers of toddlers with disabilities are at greater risk for depression and tend to display a high rate of depressive symptoms. Significantly high ratings of maternal depression were found when mothers had poor coping styles, bad health, poor family support, and when they experienced high levels of stress (Bailey et al., 2007).

Other researchers have found that parents of toddlers with ASD may be more prone to experiencing depression. Carter and Kuhn (2006) have found that, compared to parents of toddlers who are typically developing, parents of toddlers with disabilities experience higher rates of depression and encounter higher levels of parental stress. Due to the unique stresses that parents of toddlers with autism experience on a daily basis, they are likely to have a difficult time maintaining self-efficacy and well-being (Carter & Kuhn, 2006). Self-efficacy is defined as feelings of competency, specifically competency in the parental role in this case (Carter & Kuhn, 2006). Carter and Kuhn (2006) found that depression, parental stress, and guilt among mothers of toddlers with disabilities negatively correlate with maternal self-efficacy. Because these parents are prone to having difficulties with maintaining self-efficacy, they may be more likely to experience depression.

Carter and Davis (2008) examined associations between stress of parents of toddlers (mean age = 26.9 months) diagnosed with ASD, and child behavior. Toddlers’ delays in their social relatedness were found to be associated with parent-child relationship issues, parenting stress, and distress in both mothers and fathers (Carter & Davis, 2008). Carter and Davis (2008) also pointed out that depression in parents of toddlers with ASD is strongly correlated with parental stress. According to Carter and Davis (2008), there are unique stresses and issues inherent
in raising toddlers diagnosed with ASD, and many challenges arise especially surrounding the
time of diagnosis and the start of intervention services.

Estes et al. (2009) explored the ways in which toddlers’ characteristics affect their moth-
ers’ psychological distress and parenting stress. Estes et al. (2009) compared mothers of pre-
school-aged toddlers with ASD to mothers of preschool-aged toddlers with developmental delay
without autism, and found that there are higher levels of psychological distress and parenting
stress among mothers of toddlers with ASD. The toddlers with ASD in this study showed more
problem behaviors and lower levels of daily living skills, when compared to the group of tod-
ddlers with only developmental delay. Estes et al. (2009) showed that greater levels of toddlers’
problem behaviors were significantly correlated with increased maternal psychological distress
and maternal stress.

Floyd and Singer (2006) utilized meta-analysis to integrate comparative study findings on
the depression of mothers with toddlers diagnosed and not diagnosed with developmental disor-
ders. An effect size of 0.39 suggested a heightened level of depression in mothers of toddlers di-
agnosed with developmental disorders. Mothers of toddlers with developmentnal disorders were
more at risk for developing depression than other mothers (Floyd & Singer, 2006). Floyd and
Singer (2006) also found that 29% of the mothers in this study who have toddlers with develop-
mental disabilities experience depression, likely due to the additional stress inherent in raising
toddlers with such disabilities. Because there is a high risk of developing depression for these
mothers, Floyd and Singer (2006) suggested that interventions aimed at preventing and treating
depression need to be more widely accessible to mothers of toddlers with developmental disor-
ders.
Mazefsky et al. (2010) suggested that mothers of adolescents with high-functioning ASD have a higher risk of experiencing depression and/or hostility when compared to mothers of typically developing toddlers. Also, Mazefsky et al. (2010) supported previous studies’ findings (Bolton et al., 1998; Delong, 2004; Ghaziuddin, 2005; Mazefsky, Williams, & Minshew, 2008b) that suggest a significant relationship between ASD comorbidity in toddlers and psychiatric symptoms in relatives.

Herring et al. (2006) suggested that emotional and behavioral problems in toddlers have a significantly negative effect on parental outcome. Such parental outcomes may include mental health problems, including depression or anxiety. Herring et al. (2006) suggested that it is important to address these emotional and behavioral problems in very young toddlers with ASD by means of early intervention. It is possible for the lessening of toddlers’ behavioral problems to improve family distress, mental health issues, and parenting stress (Herring et al., 2006).

In addition to studying the relationship between familial depression and ASD in toddlers, researchers have also been interested in examining the possible link between familial ADHD diagnoses and ASD diagnoses in toddlers. ADHD is marked by certain behaviors, which may result in issues related to social, educational, or work functioning (APA, 2013). Those diagnosed with this disorder experience problematic inattentive behaviors, as well as hyperactive-impulsive behaviors. People diagnosed with ADHD may display these symptoms, to name a few: fidgetiness, failure to pay close attention to details, difficulty paying attention to tasks or activities, failure to listen when spoken to directly, failure to finish school work or duties at work, distractibility, difficulty staying still for extended periods of time, and/or interrupt others (APA, 2013).

Previous studies have examined the possible relationship between ADHD and ASD, and they suggest that there may be higher rates of ADHD diagnoses in the families of toddlers diag-
nosed with ASD (Rommelse et al., 2010; Smalley et al., 2002). Rommelse et al. (2010) suggest that ADHD and ASD are “highly heritable neurodevelopmental disorders.” Additionally, Rommelse et al. (2010) have found that ASD and ADHD tend to co-occur within families. These two disorders co-occur so often that 20-50% of children diagnosed with ADHD meet ASD criteria, and 30-80% of children with ASD also meet criteria for ADHD. Rommelse et al. (2010) provided an overview of family based, candidate gene, twin, genome wide association, and linkage studies. These studies provided more information regarding the “shared genetic underpinnings” of these two developmental disorders.

Additionally, Smalley et al. (2002) suggested that ADHD is a disorder largely caused by genetic factors. Smalley et al. (2002) built upon a previous genome wide scan of ADHD. Several genome wide scans for autism have highlighted a region on chromosome 16p13, but only two of the scans for autism have met criteria for suggestive linkage (Smalley et al., 2002). This study concluded that it is unclear whether the area highlighted on the 16p13 chromosome contains a certain risk gene for ASD, ADHD, or both; further research is needed on this topic. Smalley et al. (2002) suggests that there may be a specific genetic link between ADHD and ASD.

One purpose of the present study is to examine the potential relationship between familial depression and ASD. This study will explore the link between rates of depression diagnoses in family members and ASD diagnoses in toddlers. This study predicts that there will be higher rates of depression diagnoses in the family histories of toddlers who have been diagnosed with ASD, when compared with the family histories of non-ASD toddlers. The current study makes this prediction due to the unique stresses and difficulties inherent in raising a child diagnosed with ASD. More specifically, this study predicts that the rates of depression in mothers of toddlers with ASD will be higher when compared to depression in mothers with non-ASD toddlers.
According to Estes et al. (2009), when mothers of preschool-aged toddlers with ASD were compared to mothers of preschool-aged toddlers with developmental delay without autism, the results suggested that there were higher levels of psychological distress among mothers of toddlers with ASD. Also, according to Carter and Kuhn (2006), parents of toddlers who have been diagnosed with ASD may find it difficult to preserve a positive sense of self-efficacy and wellness. Carter and Davis (2008) also suggest that toddlers’ delays in social relatedness and toddlers’ regulatory problems are linked to maternal distress. Parents of toddlers diagnosed with ASD in particular are at risk for high distress levels (Abbott, Dawson, Estes, Koehler, Munson, & Zhou, 2009). Therefore, the purpose of this study is to investigate whether there is a statistically significant relationship between the incidence of familial depression and ASD in toddlers, and in particular between maternal depression and diagnoses of ASD. This study also aims to investigate the link between familial ADHD diagnoses and ASD in toddlers.

**Methods**

**Participants and Procedure**

The participants in the current study were part of a multi-site study at the University of Connecticut examining the efficacy of the Modified Checklist for Autism in Toddlers (M-CHAT; Robins, Fein, Barton, & Green, 2001) and the Modified Checklist for Autism in Toddlers, Revised (M-CHAT-R; Robins, Fein, & Barton, 2009). The purpose of the M-CHAT is to screen toddlers between the ages of 16-30 months for risk of ASD. The present study includes data on 565 toddlers (422 males; 143 females) between the ages of 13.94 and 41.52 months ($M = 25.42$, $SD = 5.04$). A majority of the toddlers in the present study were reported as White ($n = 365$; 64.6%) by their parents, with 15.2% Hispanic ($n = 86$), 8.5% African American or Black ($n = 48$), 3.7% Asian or Pacific Islander ($n = 21$), 3.7% Biracial ($n = 21$), 3.2% unspecified ($n = 21$).
18), 0.9% other (n = 5), and 0.5% American Indian (n = 3). Through this multi-site study at the University of Connecticut, the M-CHAT was used to screen toddlers for ASD at both time 1 (18-24 months) and Time 2 (36-48 months). The multi-site study screened toddlers for ASD (at time 1) and those who scored positive were contacted and invited to participate in the M-CHAT-R follow-up interview. The toddlers who continued to display risk and continued to show symptoms for ASD were then invited for a diagnostic evaluation. Data on toddlers who received either an ASD or non-ASD diagnosis at the time 1 evaluation (17-36 months), and who had family histories of depression and/or ADHD, were included in this study. The ASD diagnoses were based on scores from the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 2002) and clinical judgment. Data from 81 participants were excluded from this study due to negative family history for depression and/or ADHD.

The ASD group of participants (n = 345) is composed of toddlers who received a diagnosis of ASD-low MA (n = 31), Autistic Disorder (n = 184), or PDD NOS (n = 130) as defined by diagnostic criteria from DSM-IV and DSM-IV-TR (except for ASD-low MA, which is not from the DSM; this category was created by the Early Detection Lab at the University of Connecticut and applies to toddlers who meet criteria for ASD but also have MA equivalents in all domains under 12 months). The non-ASD group of participants (n = 220) included toddlers who received a diagnosis of Developmental Delay (n = 125), Developmental Language Disorder (n = 56), other diagnosis (n = 11), or typically developing (n = 28).

**Measures**

**History Form:** Data on known mental disorders (including depression and ADHD) experienced by family members of toddlers screened for ASD were obtained from an Evaluation History Form, which was created for the purposes of the multi-site study. This form was completed
by the caregivers of screened toddlers who went on to have an evaluation because of screening positive on the M-CHAT or M-CHAT-R. The Evaluation History Form allows caregivers to provide known information regarding familial diagnoses of depression, mental retardation, learning disability, ASD, ADHD, social difficulties, anxiety, and/or other disorders. This form includes 11 different sections, including the general information on the child and family, information about the mother’s pregnancies (past and/or present), details on the child’s development and behavior in infancy, the child’s health history, childhood behaviors, family history information, educational/intervention history, and demographic information.

**Autism Diagnostic Observation Schedule:** Data from the ADOS measure (ADOS; Lord, Rutter, DiLavore, & Risi, 2002) were also used to provide information on the ASD and non-ASD diagnoses of participants in this study. The ADOS measures the child’s levels of language and communication (including measures of speech abnormalities associated with autism, immediate echolalia, and stereotyped/idiosyncratic use of words or phrases), reciprocal social interaction, imagination, and stereotyped behaviors and restricted interests (including measures of unusual sensory interest in play materials/persons, self-injurious behavior, excessive interest in or reference to unusual or highly specific topics or objects or repetitive behaviors, and compulsions or rituals).

**Mullen Scales of Early Learning:** The Mullen scale (Mullen, 1995), a measure of cognitive ability and motor development (used for toddlers aged 0-68 months) was also used in the present study. The Mullen includes five different subscales, including the gross motor, visual reception, fine motor, receptive language, and expressive language scales. The present study uses information on the expressive language, fine motor, receptive language, and visual reception subscales.
Data Analysis

A chi square test for independence was run in order to evaluate the relationship between ASD and maternal depression. This chi square test was run in order to determine whether there exists a significant relationship between these categorical variables (between ASD and maternal depression). Logistic regressions were also run with families whose histories were enriched with either depression or ADHD, but not for families with no family history. A binary logistic regression was run in order to test the current study’s prediction that higher rates of maternal depression diagnoses would be reported in the family histories of toddlers with ASD than toddlers with other developmental diagnoses. In this logistic regression, the predictor variables were the four Mullen subscale scores and the child’s evaluation diagnosis (ASD or non-ASD). The outcome variable was maternal depression. Mullen scores were entered first in this logistic regression, to rule out the possibility that the maternal depression diagnoses were associated with delays in expressive language, fine motor skills, visual reception, or receptive language, rather than ASD symptoms in particular. Two additional binary logistic regressions were run to test the study’s predictions that there are higher rates of familial depression diagnoses in the family histories of toddlers with ASD, and that there are higher rates of familial ADHD diagnoses in the family histories of toddlers with ASD. In the former logistic regression, the predictor variables were the Mullen scores and the child’s diagnosis, and the outcome variable was familial depression. In the latter logistic regression, the predictor variables were the Mullen scores and the child’s diagnosis, and the outcome variable was familial ADHD.

Results

The main goal of the present study was to determine how the rates of familial depression
diagnoses (and more specifically, the rates of maternal depression diagnoses) are related to the
diagnoses of ASD in toddlers in the current sample. According to the information filled out in
the Evaluation History Forms, 7.76% (n=44) of the mothers reported a history of depression,
1.06% (n=6) were reported having ADHD, 0.53% (n=3) reported a history of depression and
ADHD, 1.59% (n=9) of the fathers reported a history of depression, and 1.41% (n=8) fathers re-
ported a history of ADHD. Also according to the evaluation history forms, 7% (n=25) of ASD
families and 10% (n=22) of non-ASD families reported a history of depression. A chi square test
for independence was run. This test evaluated the relationship between ASD in toddlers and ma-
ternal depression diagnoses (ASD and non-ASD vs. mothers with depression and mothers with-
out depression). The Yates chi-square results, corrected for continuity, show no statistically sig-
nificant relationship between ASD diagnoses and maternal depression diagnoses ($\chi^2 (1, n = 565)$
= 1, $p = 0.32$). The Pearson chi-square, uncorrected for continuity, also shows no significant rela-
tionship ($\chi^2 (1, n = 565) = 1.34, p = 0.25$). These chi-square results are not near significance, and
indicate no difference in the proportion of families with depressed mothers. A binary logistic re-
gression was also run (See Table 1), to examine the relationship between maternal depression
diagnoses and ASD diagnoses in toddlers, controlling for Mullen scores. According to the lo-
gistic regression, the odds ratio is 1.06, which suggests no significant relationship between ma-
ternal depression and ASD ($p=0.86$). The odds of mothers in this study being diagnosed with de-
pression are not significantly higher for toddlers diagnosed with ASD than for toddlers without
ASD. For toddlers with ASD, the odds of their mothers having depression were lower by a factor
of 1.06, compared to the non-ASD group. In this particular study, the probability of a mother be-
ing diagnosed with depression seems to be lower for toddlers with ASD, compared to non-ASD
toddlers, however the small odds ratio suggests this is a very small effect. There appears to be a
significant relationship between maternal depression and the scores on the Mullen fine motor (0.04) and receptive language (0.01) subscales. The odds ratios for both subscales are greater than 1 (1.04 and 1.05, respectively), however they are close to 1 which suggests no significance.

A binary logistic regression was also run (See Table 2) to examine the relationship between familial depression diagnoses and ASD diagnoses in toddlers, controlling for Mullen scores. The predictor variable was the child’s evaluation diagnosis of ASD and the outcome variable was the diagnosis of depression in family members. According to the logistic regression, the odds ratio is 0.97, and the significance level of the relationship is 0.89, suggesting no relationships. The odds of family members in this study being diagnosed with depression are not significantly higher for toddlers diagnosed with ASD. However, there appears to be a trend between familial depression and scores on the Mullen receptive language subscale, with a significance level of 0.07. The odds ratio for this subscale is also greater than 1 (1.03), however it is close to 1 which suggests no significance.

An additional binary logistic regression was run (See Table 3) to examine the relationship between familial ADHD diagnoses and ASD diagnoses in toddlers, controlling for Mullen scores. The predictor variable was the child’s evaluation diagnosis of ASD and the outcome variable was the diagnosis of ADHD in family members. According to the logistic regression, the odds ratio was 0.88 but the significance level was 0.66, which suggests no significant relationship between familial ADHD and ASD. The odds of family members in this study being diagnosed with ADHD were not significantly higher for toddlers diagnosed with ASD. Interestingly, there appears to be a significant relationship between familial ADHD and the score on the Mullen receptive language subscale, with a significance level of 0.06. The odds ratio for this subscale is also greater than 1 (1.03), but it is close to 1 which suggests no significance.
Discussion

Because ASD is a developmental disorder characterized by restrictive, repetitive patterns of behaviors and marked deficits in social communication (APA, 2013), parents with ASD-diagnosed toddlers face unique stressors on a daily basis and may be more likely to experience depression compared to parents of non-ASD toddlers (Kuhn & Carter, 2006). Bailey et al. (2007) also found that mothers of toddlers with ASD are at higher risk for developing depression, compared to mothers of toddlers who do not have ASD. Because of such findings, this study predicted that there would be higher rates of depression in the families of toddlers with ASD, compared to families of toddlers without ASD. This study also made the prediction that there would be higher rates of depression diagnoses in the mothers of toddlers with ASD, compared to mothers of non-ASD toddlers. The purpose of this study was to investigate the relationship between familial depression diagnoses and the presence of ASD in toddlers, and in particular the relationship between maternal depression and ASD.

No statistically significant relationships were found between depression or ADHD diagnoses and ASD in toddlers, which suggests that there will not be significantly higher rates of these diagnoses found in the families of toddlers with ASD, compared to the families of non-ASD toddlers. However, this area of study requires further research.

The current study’s results differed from previous findings in the literature. For example, Bailey et al. (2007) found that mothers of toddlers with developmental disorders tend to express greater levels of depressive symptoms compared to mothers of toddlers without such disabilities. Additionally, Kuhn and Carter (2006) found that parents of toddlers with disabilities experience higher rates of depression and higher levels of stress. Estes et al. (2009) also found that mothers
of toddlers with ASD experience higher levels of psychological distress compared to mothers of typically developing toddlers. In contrast, the present study found no significant relationships between the rates of familial depression diagnoses or maternal depression diagnoses and ASD in toddlers. The present study’s findings do not support the findings of previous studies that suggest a significant relationship between the presence of depression in the families (specifically in the mothers) of toddlers diagnosed with ASD. Previous studies that have found a significant relationship between familial depression diagnoses and ASD diagnoses in children were specifically focused on studying potential relationships between psychiatric symptoms in family members and comorbidity in people diagnosed with ASD. For example, Mazefsky et al. (2010) asked mothers to fill out a Symptom Checklist-90-Revised form, which is a self-report inventory of present psychiatric symptoms. This method of asking caregivers specific questions related to their presenting symptoms may be a more reliable measure, compared to the self-report method of the present study’s Evaluation History Form.

The Evaluation History Form used in the present study utilized the self-report method; this form was completed by the caregiver(s) of toddlers in the multi-site study at the University of Connecticut. In this form, the caregiver(s) provided information regarding familial diagnoses and/or disorders. Some caregivers may have forgotten to record certain family members’ diagnoses or they may have been unaware of certain diagnoses. This possible source of error is one limitation of the present study.

Future research could take the avenue of further studying the various possible links between familial depression and ASD diagnoses in toddlers, on a larger scale where the family histories of toddlers with and without ASD are compared. In such a study, it would be important to include validated and reliable measures to assess for familial depression. Another possibility for
future research would be to compare the rates of familial depression diagnoses at time 1 (at time of ASD diagnosis) and time 2 (after ASD diagnosis). Future studies should examine whether the rates of familial depression increase after a child has been diagnosed with ASD. Perhaps the official diagnosis of ASD increases the parental stress levels and places parents at higher risk for developing depression and/or other mental health disorders. An additional possibility for future research would be to examine the rates of familial depression diagnoses of teenagers diagnosed with ASD. Perhaps adolescence presents parents with particularly stressful transitions and events for their ASD-diagnosed toddlers. As a result of this possible turbulence in their lives, parents of teenagers with ASD may be especially at risk for developing or worsening symptoms of depression. It would also be interesting to examine the particular relationship between maternal depression and ASD in toddlers, on a more widespread scale. Perhaps mothers in particular are more at risk than fathers to develop certain mental health disorders. Another possibility for future research would be to examine the possible genetic link between depression and ASD, as well as between ADHD and ASD. This study was unable to examine genetic links, but that type of research would be beneficial to the mental health field and to families with such diagnoses.

To conclude, the present study found no significant relationships between familial depression diagnoses and ASD diagnoses, or between maternal depression diagnoses and ASD diagnoses in toddlers. This study also found no significant relationship between familial ADHD diagnoses and ASD diagnoses in toddlers. However, these non-significant findings have small effect sizes, and the discovery of non-significant relationships between depression and ASD may be the result of this study’s limitations. Future research may take several different paths in examining the various links and relationships between depression and ASD, as well as between ADHD and ASD. These findings will likely be helpful for families experiencing any of these di-
agnoses and/or disorders, and these findings will also help grow the knowledge of the mental health field in general.

Table 1

*Binary Logistic Regression Results: ASD vs. Maternal Depression*

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*Binary Logistic Regression Results: ASD vs. Familial Depression*

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Table 3

Binary Logistic Regression Results: ASD vs. Familial ADHD

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Familial ADHD

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FAMILIAL DEPRESSION and ADHD in TODDLERS WITH ASD


