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Divorce, Separation, and Relationship Satisfaction Among Families of Children with
Autism Spectrum Disorders

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Abstract

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Many potential sources of stress exist in families in which at least one child has an autism spectrum disorder (ASD), and the experience of parenting a child with an ASD may impact the quality of the relationship between the parents; yet, little research has been done on marital outcomes and relationship satisfaction in parents of children with an ASD. The objective of this study was to investigate the association between a child's diagnosis of ASD and parental divorce or separation and the association between a child's diagnosis of ASD and relationship satisfaction of the parents. The data used for this study were taken from the 2011 – 2012 National Survey of Children's Health (NSCH), conducted by CDC's National Center for Health Statistics (NCHS), State and Local Area Integrated Telephone Survey program. The total sample size for this analysis was 70,323 completed child-level interviews. Of the included interviews, 1,787 children (2.54%) were identified as having ever been diagnosed with ASD. After controlling for covariates related to child, parent, and household characteristics, a child having been diagnosed with an ASD was significantly associated with parental divorce or separation occurring after the child's birth (OR: 1.94 (1.72, 2.19); $p < .0001$). Parents of children with an ASD were also more likely than parents without children with an ASD to report being not too happy or fairly happy with their relationship rather than very happy or completely happy ($p < .0001$). Within the group of families with a child with an ASD, severity was associated with divorce or separation and decreased relationship satisfaction. These findings suggest that raising a child with an ASD contributes to the likelihood of divorce, separation, and relationship dissatisfaction among parents, and these findings suggest that parents of children with an ASD may benefit from interventions that address marital and relationship conflict.

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Background

Autism in the General Population

Autism spectrum disorders (ASD) are characterized by impairment in communication, language, and social skills and by narrow and repetitive behaviors and interests.

Diagnosis is based on observation of the child's communication, behavior, and developmental levels, and combinations and severity of symptoms vary. ASD has been increasing in prevalence throughout the United States. In California, for example, the prevalence increased from 5.8 to 14.9 per 10,000 from 1987 to 1994 (Croen et al 2002).

The most recent estimates of the CDC's Autism and Developmental Disabilities Monitoring (ADDM) Network, using surveillance data from 2008, indicate that 1 in 88 children has been identified with an ASD, corresponding to a prevalence of 11.3 per 1,000 children in the United States (Baio 2012).

Burden of Care

The burden of care of individuals with an ASD typically falls on one or both of the child's parents and often extends into adulthood. There is no cure for ASD, and treatments have variable success and require substantial involvement from the caretaker.

Parents of children with an ASD experience a great financial burden involved in care of their child. For example, the average healthcare expenditure was \$5979 per patient in 2004 (Douglas and Martin 2007). Research has estimated a lifetime cost of \$3.2 million for a child with ASD, including expenses related to care as well as productivity losses (Ganz 2007). A recent study on parental labor force participation of parents of children with ASD found that children with ASD were 9% less likely to have both parents working, and family earnings of children with ASD were 21% (\$10,416) less than those of children with another health limitation and 28% (\$17,763) less than those of children with no health limitation (Cidav 2012).

Individuals with ASD are also at higher risk of comorbid conditions that present additional burdens on caretakers. Many individuals with ASD also experience physical disabilities. For example, research has indicated that 21% of individuals with ASD experience seizures (Volkmar & Nelson 1990). Several studies have also shown that individuals with ASD are at high risk of comorbid psychiatric conditions (Simonoff 2008; Bauman 2010; Ming 2007).

Stress in Parents of Children with Autism

Studies have reported increased levels of stress in parents of children with autism versus parents of children with other developmental disabilities and normally developing children (McKinney & Peterson 1987; Holroyd, J., & McArthur 1976; Bouma and

Schweitzer 1990). Many potential sources of stress exist in families in which at least one child has an ASD. In addition to coping with the financial burden placed on parents of children with an ASD, parents of children with ASD must adjust to a unique parenting situation that is unlikely to resemble the experience for which they had hoped and that they had envisioned. For example, a mother of an autistic child may not experience the same reassuring, positive feedback, such as smiles and hugs, experienced routinely by mothers of children with other developmental delay (DD) DD or mothers of typically developing (TD) children. Correspondingly, studies have shown that mothers of children with ASD report themselves as having less parenting knowledge than do mothers of children with Down syndrome and mothers of TD children. They also report experiencing less value associated with their role as a parent than do mothers of TD children, as well as both a greater number of aggravating agents and a greater degree of aggravation than did parents of TD children (Konstantareas & Soula 1989). They also report less marital satisfaction than do mothers of children with Down syndrome and mothers of TD children (Rodrigue 1990).

While it is unsurprising that parents of children with ASD report higher levels of stress than parents of TD children, research also suggests higher levels of stress among parents of children with ASD versus parents of children with other disabilities. In a study comparing parents of children with ASD, parents of children with Down syndrome, and TD children, mothers of children with ASD reported the highest levels of stress, greater than fathers of children with an ASD as well as mothers and fathers of TD children. Corresponding to the differential levels of stress, twenty-four mothers of children with

ASD expressed the need for additional support from their spouse compared to only three fathers of children with ASD reporting the need for additional support from their spouse (Konstantareas & Soula 1989). Studies comparing parents of children with ASD to parents of children with other developmental delay (DD) without ASD have indicated for higher levels of parenting stress and psychological distress in mothers of children with ASD compared to mothers of children with DD (Estes 2009).

The Role of Stress in Divorce

For western societies, the 20th century brought social changes that altered opinions about, and the feasibility of, divorce, leading to increases in divorce rates. In the United States, the divorce rate rose from 9.2 divorces per 1,000 married women in 1960 to 22.6 divorces per 1,000 married women in 1980 (Wilcox 2009). This trend was accompanied by academic interest in factors impacting satisfaction within marriage and causes of dissolution of marriage.

Recent research supports adoption of contextual models of marriage when considering divorce. The vulnerability-stress-adaptation model described by Karney and Bradbury emphasizes the interaction between enduring vulnerabilities (such as negative personality traits), stressful events, and poor adaptive processes that leads to marital dissatisfaction and divorce. (Karney & Bradbury 1995). A model proposed by Bodenmann further elaborates on the role of stress in regard to marital distress and hypothesizes the specific mechanisms by which stress harms marital satisfaction. According to the model, minor

stresses degrade marital quality in four ways. First, by decreasing the time partners spend together, stress minimizes joint experiences, leading to weakened feelings of togetherness, decreased self-disclosure, and poorer dyadic coping. Second, outside stressors promote negative interaction and withdrawal amongst couples, resulting in decreased quality of overall communication. Third, outside stresses can increase the likelihood of other psychological or physical disturbances. Fourth, outside stresses may exacerbate problematic personality traits that promote conflict between partners, resulting in mutual alienation (Bodenman 1995, 2000). Thus, these models allow for variability in marital outcomes amongst couples, owing to differences in personality traits, coping and communication skills, and situational circumstances.

Studies have provided empirical evidence in support of stress-related models of marital distress, demonstrating an association between accumulation of everyday stress and marital quality (Bodenmann 2007). A cross-national study of divorced individuals from Germany, Italy, and Switzerland found that trivial daily events were consistently reported as important reasons for divorce, and the accumulation of everyday stress was reported most frequently as a trigger of divorce, along with infidelity (Bodenmann et al 2009). The authors point out as noteworthy the fact that participants reported accumulated stress as an even stronger trigger of divorce than falling in love with another person, partner violence, or a specific major life event. They suggest that “the gradual, continual erosion of marital quality by chronic stress may produce a sudden breakdown that may not require an external event to prompt a divorce” (Bodenmann et al 2009).

Divorce and Parents of a Child with ASD

A product of anecdotal evidence and inaccurate media reporting, the perceived threat of seemingly inevitable divorce can add to the psychological burden of parents of a child with autism. Media outlets have reported alarmingly high divorce rates of 80% or higher in parents of a child with ASD, despite absence of empirical evidence supporting this claim (Solomon & Thierry 2006). Considering the role of chronic stress in divorce and the increased levels of stress experienced by parents of children with an ASD, it is reasonable to expect increased occurrence of marital distress and subsequent divorce. Yet, despite much speculation, the issue of divorce in relation to ASD has not received an appreciable amount of attention, and information addressing marital satisfaction and/or divorce in the context of autism is scarce.

However, an appreciable amount of research has examined marital conflict among families of children with attention-deficit/hyperactivity disorder (ADHD). Like autism, ADHD is characterized by disruptive behaviors, such as hyperactivity and impulsiveness. Furthermore, although the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), prohibits diagnosis of both ADHD and an ASD in an individual, studies have shown that symptoms consistent with ADHD occur in 41–78% of children with an ASD. (Reiersen & Todd 2008). Thus, research on the impact of ADHD may be useful when considering similar outcomes related to ASD. Several studies have indicated that parents of children with ADHD experience greater marital distress than parents of children without ADHD, and severity

of behavioral symptoms in children with ADHD has been shown to positively correlate with greater discord and less marital satisfaction among parents of children with ADHD (Barkley et al 1991; Jensen 1988; Johnson & Behrenze 1993). A recent study indicated that parents of children with ADHD were more likely to have experienced divorce (22.7%) than were parents of children without ADHD (12.6%), and parents of children with ADHD also experienced a shorter latency to divorce than did parents of children without ADHD (Wymbs and Pelham 2008).

The research that has been conducted on divorce in samples of families of children with ASD has reported mixed results. In 2010, Hartley et al. reported the results of the first empirical research study to address the risk and timing of divorce in families of one or more children with ASD in a sample of 391 families of adolescents and adults with ASD in Massachusetts and Wisconsin. They found that parents of children with ASD had a higher rate of divorce than the comparison group of parents of typically developing (TD) children (Hartley 2010). The risk of divorce in parents of a child with an ASD was nearly twice the risk of divorce in the comparison group (25.53% versus 13.81%, RR = 1.70). They also found that the risk of divorce began to decrease in late childhood for parents of TD children, continued to decrease with age of the child, and was extremely low by the time the child reached young adulthood. The risk of divorce for parents of children with an ASD, however, remained elevated until the child reached age 30 years (Hartley 2010). This research suggests significant differences in marital distress and the risk of divorce in parents of children with ASD compared to parents of TD children.

By contrast, a population-based, cross-sectional study conducted by Freedman et al. reported no evidence of an increased risk of a child with ASD living in a household without both biological or adoptive parents compared to other children (Freedman 2011). Although their unadjusted model indicated a 5% decrease in the probability of living with two biological or adoptive parents among children with ASD versus children without ASD, subsequent models adjusting for basic demographics, maternal characteristics, socioeconomic indicators, and co-occurring psychiatric diagnoses did not indicate an increased risk of living in a household without two biological or adoptive parents for children with ASD. This study also examined the relationship between severity of ASD symptomatology and family structure and did not find a significant association between severity and family structure (Freedman 2011).

Considering the conflicting results from the few available studies, further research is needed to determine whether or not there is an increased risk of marital discord and dissolution associated with raising a child with ASD

II. Methods

Subjects:

The subjects in this study were families with at least one child aged 0-17 years old living in the household at the time of the interview. The respondents were parents or guardians

of the selected child who knew about the health and health care of the child and were able and consented to answer related questions.

Sample:

The data used for this study were taken from the 2011 – 2012 National Survey of Children’s Health (NSCH), conducted by CDC’s National Center for Health Statistics (NCHS), State and Local Area Integrated Telephone Survey program. The study used a random-digit-dial (RDD) sampling design and collected data from households with landline or cellular telephones, using a list-assisted RDD sample of landline telephone numbers and an independent RDD sample of cell-phone numbers. The data were collected February 2011 through June 2012. Eligibility was determined by calling phone numbers and screening for residential status and the presence in the household of at least one child aged 0-17 years at the time of the interview. In households in which more than one child resided, one child was randomly selected to be the subject of the detailed interview. In households with only one child in residence at the time of the interview, that child was selected to be the subject of the detailed interview.

The sample of 95,677 completed child-level interviews aimed to represent the general population of families with one or more resident children aged 0-17 years in the United States, including each of the 50 states and the District of Columbia. Interviews were completed by a parent or guardian of the sampled child in the household, and, of the completed interviews, 68.6% of those interviewed were mothers (biological, step, foster,

or adoptive), 24.2% were fathers (biological, step, foster, or adoptive), and 7.2% were other relatives or guardians. Of the detailed completed interviews, 63,705 were completed with the landline sample, and 31,972 were completed with the cell-phone sample. The interview completion rate was 54.1% for the landline sample and 41.2% for the cell-phone sample.

The present study did not utilize all of the completed child-level interviews and excluded observations based on ineligibility or missing information (Figure 1). Interviews were excluded if information on whether or not a divorce or separation had occurred after the birth of the selected child was missing. Interviews were also excluded if information on ASD diagnosis in the child was missing. Interviews were excluded if the respondent reported being “single, never married,” as the opportunity for occurrence of a divorce was absent. Interviews were also excluded if the selected child had ever lived with a parent or guardian who died, as the death of a parent also prevented the opportunity for a divorce if it had not yet occurred.. However, interviews remained included if the respondent reported both that child had ever lived with a parent of guardian who got divorced or separated after the child’s birth and that the child had ever lived with a parent or guardian who died, since the divorce would presumably occur before the death. Observations were also excluded if the respondent reported that the child had ever been diagnosed as having speech or language problems but not an ASD, because speech and language problems are distinguishing features of ASD; thus, in the absence of objective measures of ASD, speech and language problems were excluded in order to reduce the risk of misclassification bias due to misdiagnosis.

To best ensure the accuracy of the ASD diagnosis, the present analysis would have also excluded children less than 18 months of age, but information on ASD was missing for the 8,058 children less than 18 months of age; thus, the observations were already excluded. The distribution of children with an ASD ranged from 2 years of age to 17 years of age; thus, children without an ASD who were less than 2 years of age were also excluded in an effort to make the comparison group of families without a child with an ASD as comparable as possible to the group of families with a child with an ASD.

As a result of our study-specific exclusion criteria, the total sample size for this analysis was 70,323 completed child-level interviews. Of the included interviews, 1,787 children (2.54%) were identified as having ever been diagnosed with ASD.

Procedure and Measures:

Divorce: The primary outcome variable was derived from the question “Did [study child] ever live with a parent or guardian who got divorced or separated after [study child] was born?” A “yes” response was labeled as “ever divorce” to indicate that the child had ever experienced a divorce or separation occurring in the household after he/she was born.

“Ever divorce” was chosen as the outcome variable in favor of a derived variable combining family structure and marital/cohabitation status of the child's parent(s) in the household. This decision was based on the possibility of information involving a

previous divorce being obscured by a current two-parent or two-guardian household. For example, a “two-parent step currently married” response could indicate divorce and remarriage of a caregiver of the study child, or it could indicate the marriage of a formerly single parent of the study child. Further, this study aims to examine the likelihood of divorce or separation occurring in a household in which one or more children have ASD, regardless of the current structure of the household, which could involve changes in caregiver, remarriage, etc.

Marital dissatisfaction was also examined as an outcome variable. Marital dissatisfaction derived from the question “The next question is about your relationship with your spouse or partner. Would you say that your relationship is completely happy, very happy, fairly happy, or not too happy?” Completely happy was used as the referent category.

Autism/Autism Spectrum Disorder: The primary predictor variable was derived from the question “Has a doctor or other health care provider ever told you that [study child] had autism, Asperger's disorder, pervasive developmental disorder, or other autism spectrum disorder?” A “yes” response was labeled as presence of ASD in the study child. The study instrument also included a question inquiring about the child’s “current” diagnosis, versus “ever” being diagnosed. The decision to use the “ever” diagnosis response was made based on two objectives: first, “ever” diagnosed was used in order to err on the side of inclusion of all potential cases rather than exclusion of potential cases. Of the 1,800 children “ever” diagnosed with ASD in our sample, 300 children were reported as lacking a “current” diagnosis; however, only 37 of those children were

reported to have their diagnoses changed by a doctor of healthcare provider. By contrast, 108 of those 300 children were reported to no longer have ASD based on the respondent's disagreement with the doctor or health care provider's opinion. Thus, "ever" diagnosed was selected in the effort to avoid introducing personal biases of the parent or guardian into categorization of the ASD status of the child. Secondly, regardless of the future course of the family's experience with ASD, the diagnosis itself has the potential to impact the stress levels and functioning of the family in a meaningful way.

For families in which the selected child has been diagnosed with ASD, ASD-specific variables were also examined, including age of diagnosis and severity of ASD. Severity of ASD was derived from the question "Would you describe [his/her] autism or autism spectrum disorder as mild, moderate, or severe?" Severity was considered at the aforementioned levels as well as dichotomized into "severe" and "not severe" groups in order to examine severe ASD as a risk factor on its own.

Characteristics of families: Along with the ASD diagnosis of the study child, additional characteristics of the families and specific family members were examined as predictors of divorce. General family characteristics included region of residence, poverty level, perceived difficult living on family's income, number of children in the household, and generational status of the household. Family characteristics specific to the study child's mother included age and education level. Family characteristics specific to the study child's father or a non-parent respondent included education level. Additional

characteristics specific to the study child included age, sex, race, special health care needs, birth order relative to other children in the household, and insurance coverage. All family characteristics were based on answers given by the respondents.

Data Analysis:

This study was designed to investigate the hypothesis that parents of a child with ASD experience a greater risk of marital dissatisfaction leading to separation or divorce than that of parents of a child without ASD. The data were analyzed using SAS 9.2 (Cary, NC). Exploratory univariate analyses were conducted on the predictor variables and potential covariates (Table 1). Demographic and family characteristics were examined across groups using likelihood ratio chi-square tests for categorical variables and two-tailed t-tests for continuous variables. Collinearity was tested among possible predictor variables using a correlation matrix and examining the variance inflation factor, using a value of > 10 as indication of collinearity.

To investigate whether occurrence of an ASD diagnosis in the study child would predict the occurrence of divorce, logistic regression analysis was utilized. A binary logistic regression model was constructed using divorce as the outcome and ASD as the primary predictor variable and including all potential covariates and potential interaction terms. Interaction was assessed using a chunk test of interaction terms.

Testing at the $\alpha=0.05$ significance level under the null hypothesis, each variable's contribution to the model when controlling for the other variables was tested by

bidirectional stepwise elimination. Potential covariates were chosen based on significant associations with ASD found during exploratory analysis or based on the literature.

Beginning with a model containing all possible covariates, covariates were eliminated, one at a time, if they had a p-value greater than 0.05. The model was tested after each elimination until no non-significant variables remained in the model. All covariates were then removed from the model, and significant covariates were added back to the model in groups, testing their significance after each addition to the model. The first group of covariates added included personal demographic characteristics of the study child. The second group of covariates added included household characteristics. The third group of covariates added included mental health characteristics of the child. The final model was chosen after assessing significance of the included covariates as well as number of observations retained in the analysis. Covariates were dropped from the model in order to preserve the maximum number of observations if their exclusion from the model did not change the odds ratio estimate of the primary predictor variable by $\geq 10\%$, and they were not otherwise considered important to include with respect to the existing literature. For covariates with multiple strata, homogeneity of odds ratios was tested using the Breslow-Day test statistic, with a p-value <0.05 considered significant.

The final model was also used to assess the association between an ASD diagnosis of the child and parental divorce or separation in households containing only one child. This was done in an effort to control for unknown health information about other children in the household, such as an ASD diagnosis, since the selection of the study child was randomized and, thus, the study child may live in a household with a child with an ASD.

The logistic regression procedure was repeated using only the group of respondents with a child with an ASD. Divorce was used as the outcome, and severity of ASD was used as the primary predictor variable.

To investigate whether or not an ASD diagnosis in the study child is associated with relationship satisfaction, multinomial logistic regression procedure was utilized. Three levels were included as possible outcomes: “Very happy vs. Completely happy,” “Fairly happy vs. Completely happy,” and “Not too happy vs. Completely happy.” Interaction was assessed using a chunk test of interaction terms.

Testing at the $\alpha=0.05$ significance level under the null hypothesis, each variable’s contribution to the model when controlling for the other variables was tested by bidirectional stepwise elimination, as previously described. The multinomial logistic regression procedure was repeated within the group of respondents with a child with an ASD, using severity as the primary predictor variable and assessing ASD-specific covariates.

III. Results

Descriptive statistics of children with and without a diagnosis of an ASD are presented in Table 1. The percentage of children who had lived with a parent who separated or divorced after the child’s birth was significantly higher among children with an ASD than children without an ASD (28.76% vs. 19.73%; $p < .0001$).

Most demographic differences between children with and without ASD were also statistically significant, including child's age, mother's age, Hispanic ethnicity, generational status of the household, poverty level, parents' education levels and employment of a member of the household for 50 out of the previous 52 weeks.

Compared to children without ASD, children with an ASD were slightly older and had slightly older mothers. They were less likely than children without an ASD to be of Hispanic ethnicity or to come from 1st or 2nd generation households. They were also less likely to live in a household in which anyone was employed 50 of the previous 52 weeks and more likely to live below the poverty line, but were more likely to have some kind of health care coverage. There was not a significant difference between the education level of the children's mothers; however, when available information on either or both parents was combined to determine the highest level of education of either parent, it was more likely for the highest level of education of either parent to be less than high school in households without a child with an ASD (4.99% vs. 3.33%; $p=0.02$).

Descriptive statistics pertaining to the medical histories and health characteristics of children with and without an ASD are presented in Table 2. For every mental or physical diagnosis considered, children with an ASD were statistically significantly more likely than children without an ASD to have received the diagnosis at some point in their lives.

The association between a child having been diagnosed with an ASD and having lived with a parent who separated or divorced after the child's birth was further examined using multiple logistic regression analysis. In the unadjusted model, ASD diagnosis was

significantly associated with divorce or separation after the child's birth (1.64 [1.48, 1.82] $p < .0001$). A logistic regression model was fit to examine the association between ASD and parental divorce or separation and to identify statistically significant predictors to assess in subsequent models (Table 3.). With all potential predictors included in the model, ASD diagnosis was significantly associated with a 56% ($p = .0003$) increase in the odds of parental divorce or separation after the child's birth.

A forward stepwise logistic regression strategy was used to continue assessing the association between a child's ASD diagnosis and parental divorce or separation, while controlling for the addition of groups of covariates (Table 4). A child having been diagnosed with an ASD maintained statistical significance after each addition ($p < .0001$) and odds ratios ranged from 1.64 to 1.82.

The final logistic regression model was constructed based on inclusion of covariates that were both statistically significant and logically meaningful, while attempting to preserve as many observations in the analysis as possible. Missing information related to the covariates resulted in between 5,295 and 10,076 observations being dropped from the analysis. In the final model, poverty level was dropped from the analysis due to its relatively high proportion of missing values, and because its exclusion resulted in a percent change to the OR estimate that was less than 10% (Table 5). In the final model chosen, a child having been diagnosed with an ASD was significantly associated with parental divorce or separation occurring after the child's birth (OR: 1.94 (1.72, 2.19); $p < .0001$). Covariates associated with increased odds of parental divorce or separation

occurring after the child's birth included female sex of the child, non-white race, Hispanic ethnicity, child's age, lower levels of education, behavioral or conduct disorder, ADHD, and identifying the child as having special mental health care needs. Covariates associated with decreased odds of parental divorce or separation after the child's birth included mother's age, lower generation status of the household, employment of anyone in the household for 50 of the previous 52 weeks, and increasing number of children in the household. Of the covariates assessed for homogeneity of odds ratios across strata, only employment of anyone in the household for 50 of the previous 52 weeks was significantly different across strata ($p = 0.006$). Although a child's diagnosis of an ASD was associated with increased odds of parental divorce or separation in each stratum, the effect magnitude was greater for households in which nobody was employed for 50 of the previous 52 weeks (OR: 2.11 (1.67, 2.67); $p < .0001$) versus households in which anyone was employed 50 of the previous 52 weeks (OR: 1.46 (1.30, 1.64); $p < .0001$).

The analysis was then restricted to families with only one child in the household (Table 6). A child having received an ASD diagnosis remained significantly associated with parental divorce or separation (OR: 1.81 (1.72, 2.19); $p < .0001$). All covariates previously associated with parental divorce or separation remained significant, with the exception of total number of children in the household, which was dropped from the model.

Analysis was further restricted to the group of households with children with an ASD diagnosis in order to examine ASD-specific predictors of divorce, using reported severity

of ASD as the primary predictor of interest. Bidirectional elimination was used to assess the association between ASD severity and parental divorce or separation while controlling for different sets of covariates (Table 7). In the unadjusted model, severe ASD (vs. mild) was significantly associated with parental divorce or separation (OR: 1.63 (1.13, 2.34); $p=0.0092$). Moderate ASD was not significantly associated with parental divorce or separation, compared to mild ASD ($p=0.264$), and subsequent models compared severe ASD to a combination of mild and moderate ASD. Of the covariates found to be associated with parental divorce or separation in combined ASD and non-ASD population, only child's age, household employment, and mother's age were found to be significantly associated with parental divorce or separation in the ASD subgroup. Child's age at diagnosis was significantly associated with parental divorce or separation ($p<.0001$). A variable created to count the number of comorbid diagnoses was significantly associated with parental divorce or separation ($p=.0023$), but with its inclusion in the model, the association between ASD severity and parental divorce or separation was no longer statistically significant.

To examine whether or not predictors were significantly associated with parental divorce or separation across different levels of severity, the analysis was stratified by severity (Table 8). Only mother's age was significant at all levels of severity. Age at diagnosis and household employment were significantly associated with parental divorce or separation at mild and moderate levels of severity. Child's age was significantly associated with parental divorce or separation at mild and severe levels of severity.

Relationship satisfaction was then assessed for both parents of children with an ASD and parents of children without an ASD (Table 9). Parents of children with an ASD were more likely than parents without children with an ASD to report being not too happy or fairly happy with their relationship rather than very happy or completely happy ($p < .0001$).

Two multinomial logistic regression models were fit to examine the association between having a child with an ASD and relationship satisfaction. The first model was unadjusted, and the second model adjusted for all covariates that were found to be statistically significant during stepwise regression. Results of these analyses are presented in Table 10. In both models, having a child with an ASD was associated with higher odds of reported unhappiness with the relationship. The strongest effect estimate of any variable included in the model was the association between perceived ability to cope with the day-to-day demands of parenthood and relationship satisfaction ($p < .0001$).

The same procedure was used to assess the association between ASD severity and relationship satisfaction within the group of parents with a child with an ASD. Several covariates that were significant in the previous analysis were no longer significant when considering only the ASD group. These covariates were dropped from the model and included race, Hispanic ethnicity, generational status of the household, and poverty level. The results from this analysis are presented in Table 11.

IV. Discussion

This study is the first population-based epidemiological investigation of the relationship between raising a child with an ASD and parental separation or divorce using parent or guardian reports of a divorce occurring after the child's birth as the outcome variable. The primary results of this analysis correspond to previous research by Hartley et al., finding ASD to be associated with increased odds of parental divorce or separation. Like Hartley et al., this study also found birth order and mother's age to be significantly associated with divorce within the group of parents of children with an ASD. However, unlike previous research, the present study found severity and age of diagnosis of ASD to be significantly associated with increased odds of parental divorce or separation within the ASD group.

This study further analyzed predictors of parent/guardian responses related to severity to better understand factors that may influence the response, since the question is phrased subjectively, asking, "Would you describe [his/her] autism or autism spectrum disorder as mild, moderate, or severe?" Age of diagnosis, child's age, comorbidity, and birth position were significantly associated with severity. As expected, younger age at diagnosis was associated with increased severity, as more severe cases of ASD would become apparent earlier. However, there is no known biological reason why reported severity should increase with child's age. One possibility is that, as a child with an ASD ages, the contrast between the behavior of typically developing children and a child with an ASD becomes sharper, leading to exaggerated perceptions of severity by the parent/guardian respondents. A similar explanation could account for the association

between reported severity and birth order; the child's ASD symptoms may seem more severe when compared to increasing numbers of typically developing children.

Alternatively, ASD may be perceived as more severe when combined with the stress of raising older children, though total number of children in the household was not significantly associated with severity.

Since younger age at diagnosis is associated with increased severity of ASD, our initial analysis showing older age at diagnosis to be positively associated with an increased likelihood of parental divorce or separation within the ASD group, when severity was included in the model, was unexpected and seemingly paradoxical, necessitating further analysis. Age of diagnosis was further examined using logistic regression stratified by severity of ASD. The stratified analysis demonstrated a positive association between older age of diagnosis and parental divorce or separation for mild or moderate ASD but not for severe ASD. A possible explanation for this difference amongst severity level is that, while the severe cases receive earlier diagnoses and parents are offered an explanation and treatment options for their child's abnormal behavior, mild or moderate cases are not always diagnosed early in childhood. This was observed in our sample, in which average age of diagnosis was 5.77 and 5.14 for mild and moderate cases, respectively, with a maximum age of 17, versus average age at diagnosis of 3.82 for severe cases, with a maximum age of 14. Thus, parents of children with mild or moderate cases are left without an explanation for their child's abnormal behavior, which, in and of itself, may lead to increased stress in the household. When considering marital conflict, the child's unexplained behavior may lead to increased resentment, blame, and

negative communication between the parents, in the absence of a diagnosed medical condition. The lack of an explanation may also increase feelings of inability to cope with the demands of parenthood, which we found to be strongly associated with relationship satisfaction. Furthermore, without a diagnosis, children with an ASD would not be able to benefit from the treatments and services, which may mitigate the stress caused by raising a child with an ASD, available to children diagnosed with an ASD. Thus, although the diagnosis itself may lead to increased stress depending on the parents' perception of ASD, the absence of the diagnosis withholds advantages from parents that may lessen the burden of caring for a child with an ASD.

In addition to investigating the potential impact of raising a child with an ASD on divorce or separation, this study also examined the association between raising a child with an ASD and relationship satisfaction. Having a child with an ASD was significantly associated with relationship dissatisfaction, and severity of ASD was associated with relationship dissatisfaction within the ASD group. Interestingly, while frequency of feeling angry with the study child was associated with increased odds of relationship dissatisfaction in both groups, the effect was stronger in the group of parents of children with an ASD (ORs: 1.81 vs 1.27). Because this study is cross-sectional, causal relationships cannot be established. Nevertheless, the observed association between anger at their children and feeling unhappy with their relationships suggests that parents of children with an ASD may benefit from interventions to help them cope with negative emotions, either to help prevent child-related anger from harming their relationships, or

to help them deal with increased anger at their children related to being in an unhappy relationship.

Negative feelings regarding ability to cope with the day-to-day demands of parenthood was also a significant predictor of relationship dissatisfaction, while having someone to turn to for day-to-day emotional help with parenthood was associated with decreased odds of relationship dissatisfaction in both groups. While these potential influences on relationship satisfaction are notable for both groups, parents of children with an ASD were much more likely to report feeling unable to cope with the demands of parenthood and much less likely to report having someone to turn to for emotional support. These findings suggest that future research and interventions involving support systems may be especially beneficial for parents of children with an ASD.

Strengths:

This study addressed several limitations of other studies. The use of occurrence of divorce or separation of a parent after the study child's birth allowed establishment of a temporal relationship, albeit loose, between the child's existence and parental divorce or separation, because the question specifically asks about divorce or separation occurring only after the child was born. This is an improvement over the study instrument used in the 2007 National Survey of Children's Health and analyses using the resulting data, because the data only provided information on the current family structure and lacked information regarding when a divorce or separation occurred in relation to the study

child. Of significance, 37.42% of those who responded that the study child had lived with a parent or guardian who divorced or separated after the child was born reported that the child currently lives in a two-parent household. Thus, considering family structure alone could bias the association toward the null hypothesis of no association between ASD and parental divorce or separation. Correspondingly, such a bias may explain the dissimilarity in results found by the present study and the study conducted by Freedman et al., who found no significant association between ASD and parental relationship status.

Unlike other studies, this study treated comorbidity with ASD as a distinct characteristic of ASD rather than as co-occurring behavior problems symptomatic of other conditions, independent of ASD. Creating a variable to count the number of comorbid diagnoses (physical and mental) experienced by children with an ASD, we were able to examine the relationship between comorbid conditions and ASD, finding a strong relationship between the two variables. We found that, of the 2041 children who had ever been diagnosed with an ASD, all children with an ASD had been diagnosed with a comorbid condition, whereas only 33.69% of children without an ASD had ever been diagnosed with a comorbid condition. Furthermore, over half (59.97%) of children with an ASD had experienced at least 4 comorbid diagnoses and as many as 16 comorbid diagnoses. Number of comorbid diagnoses was also the strongest predictor of parental response of severity of ASD and was significantly associated with divorce or separation within the ASD. These findings suggest that comorbidity may play a key role as a distinct feature of ASD and the experience of raising a child with an ASD. With consideration to this finding, the present study did not attempt to isolate the impact of ASD on parental

divorce or separation independent of comorbid diagnoses in children with an ASD that are also diagnosed in children without an ASD, such as anxiety and depression; therefore, comorbidity variables are included in all models.

Limitations:

Despite the contribution of this study to the understanding of the impact of ASD on parental relationships, several study limitations restrict the ability of the analyses to provide conclusive results. The cross-sectional nature of this study is a weakness, since, for most variables, temporality could not be established. For example, although information regarding mother's mental health and father's mental health was available, it could not be included as a control measure, since differences in mental health between groups may be a result of raising a child with ASD or could be causally related to the child's disability. Similarly, impaired mental health could just as easily be the result of marital dissatisfaction, separation, or divorce as it could be a contributing factor to those outcomes.

Another important limitation of this study was its total reliance on parent/guardian reporting and lack of objective measures of ASD. While research has shown ASD prevalence rates based on parent surveys to be similar to those from the Autism and Developmental Disabilities Monitoring Network (Kogan et al. 2009), research has also provided evidence that ASD diagnoses are regularly missed or misdiagnosed. Mandell et al. found that, of a sample of 406 Medicaid-eligible children with a current Autism

diagnosis, 56.2% of the children received a different diagnosis prior to their autism diagnoses, with type of diagnosis differing by race/ethnicity and sex (Mandell et al. 2006). Similarly, Chaidez et al. found that 16.5% of Hispanic and 2.8% of non-Hispanic participants recruited as general population controls actually met criteria for mixed and delayed development, and 19% of both Hispanic and non-Hispanic participants recruited with delayed development met criteria for an ASD (Chaidez et al. 2012). Thus, without reliable screening tools, misclassification bias could impact the analysis.

Another limitation of this study involves the information collected and lack of information related to variables of interest. Questions about paternal age, race/ethnicities of parents, age at marriage, are absent from the study instrument but have been established as predictors of divorce in the literature. Information collected was also subject to the knowledge of the respondent and varied based on whether the respondent was the child's mother, father, or a non-parent guardian. Although these factors limit the conclusions able to be drawn from our analysis, they, along with our results, suggest important factors to be addressed by future research. Many of these limitations could be addressed by a more comprehensive survey design intended to collect information about both the parents and children. Understandably, the parent-specific information available in the data collected by the National Survey of Children's Health was limited, as the intended subjects of the original study were children. Future studies focused on the parents of children with an ASD could fill in several of the information gaps from the present study.

A major limitation of the study involves the randomization of the study child, in addition to the lack of information on other children in the household. Since the study child is randomized in households containing more than one child, it is possible that the child selected to be the study child is a typically developing child, but another child (or children) in the household has an ASD; thus, any stress attributable to raising a child with an ASD would be present in the household but unable to be considered in the analysis. Alternatively, the study child may have an ASD, but there may be multiple children in the household with an ASD, which may create variation in household stress levels and parental divorce or separation. While we attempted to control for these possibilities by including an analysis of households with only one child and found the odds ratios to be similar, our results from the analysis of all households may be less generalizable than if information on other children in the household had been available.

Even with its limitations, this study provides insight into what factors may influence marital outcomes and relationship satisfaction, both generally and in the specific context of parents of a child with an ASD. This study suggests that parents of a child with an ASD are a group at increased risk of divorce, separation, and relationship dissatisfaction. Further research is needed to determine why this is the case, but public health interventions and services targeting these couples, such as couples therapy as part of a treatment plan for parents of a child with an ASD, may help prevent divorce and increase quality of life of both the parents and the children.

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Appendix A: Tables and Figures

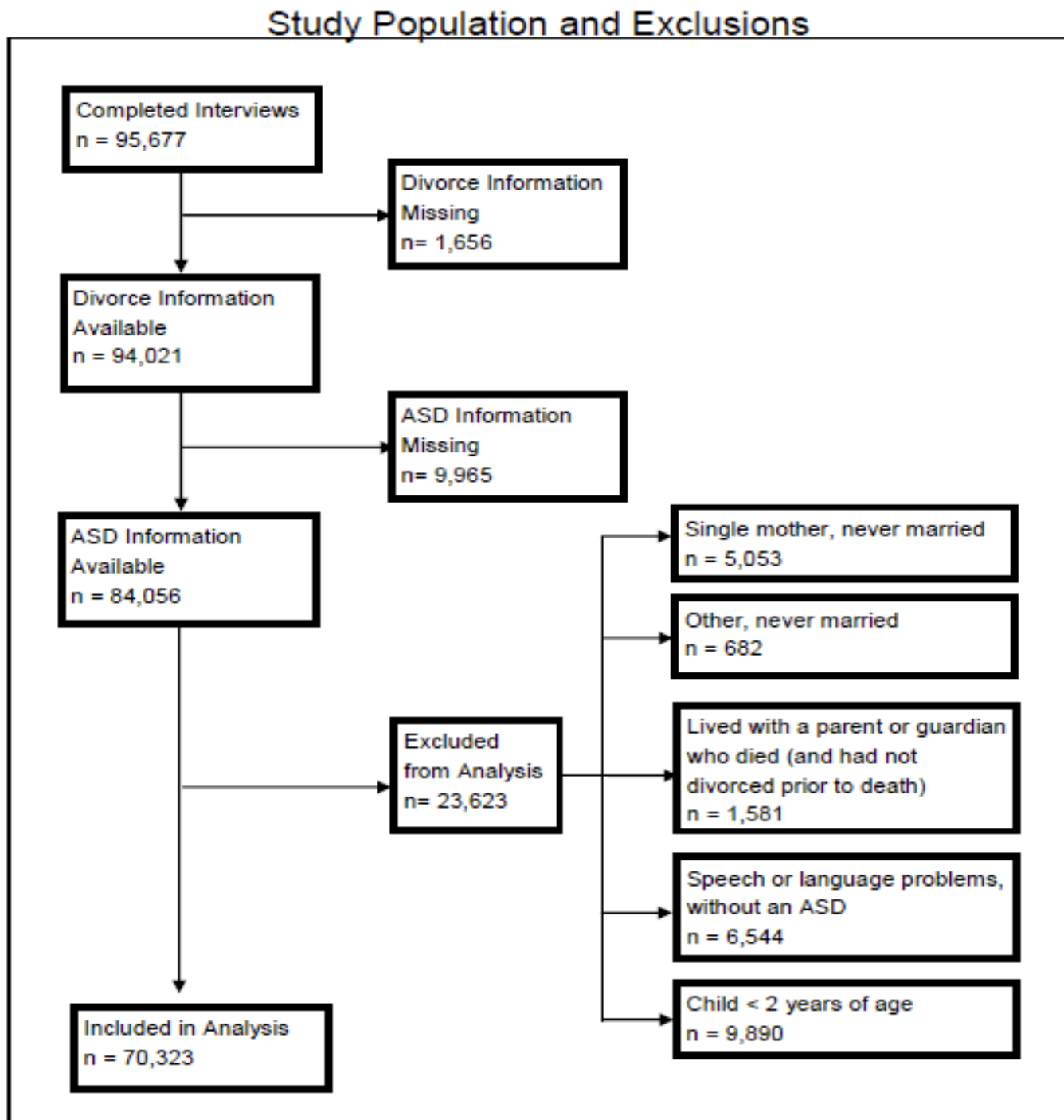


Figure 1. Flow chart describing the present study population sampled from the original National Survey of Children's Health 2011-2012 dataset.

Table 1.
Descriptive statistics of child and family characteristics of households with and without a child with ASD

Characteristic	Children with ASD (n=1,787)		Children without ASD (n= 68,536)		t test or chi square value	p-value
	Child Ever Lived with Parent/Guardian who divorced after child's birth, <i>n</i> (%)	515	(28.76)	13525	(19.73)	88.86
Mean (SD) Child's Age (years)	10.5	(4.03)	9.947	(4.65)	-5.35	<.0001
Sex, <i>n</i> (%)						
Male	1417	(79.34)	34185	(49.93)	602.12	<.0001
Race, <i>n</i> (%)						
White	1409	(79.11)	61757	(76.82)	5.17	0.076
Black	124	(6.96)	6269	(7.80)		
Other	248	(13.92)	12366	(15.38)		
Hispanic, <i>n</i> (%)	163	(9.12)	9002	(13.13)	24.75	<.0001
Health Care Coverage, <i>n</i> (%)						
Yes	1742	(97.59)	65405	(95.57)	16.98	<.0001
Child with Special Health Care Needs, <i>n</i> (%)	1603	(89.70)	12289	(17.93)	5659.48	<.0001
Number of Children in Household, <i>n</i> (%)						
1	746	(41.44)	32166	(39.41)	4.41	0.22
2	692	(38.44)	31604	(38.72)		
3	247	(13.72)	12271	(15.04)		
4+	115	(6.39)	5575	(6.83)		
Mean (SD) Mother's Age (years)	41.8	(7.89)	40.474	(7.85)	-6.73	<.0001
Mother's Highest Level of Education, <i>n</i> (%)						
Less than High School	85	(5.15)	4430	(6.93)	3.64	0.06
High School Graduate	296	(17.93)	11083	(17.34)		
More than High School	1270	(76.92)	48387	(75.72)		
Highest Level of Education of Either Parent, <i>n</i> (%)						
Less than High School	56	(3.33)	3289	(4.99)	5.29	0.02
High School Graduate	237	(14.07)	9050	(13.74)		
More than High School	1391	(82.60)	53533	(81.27)		
Generational Status of the Household, <i>n</i> (%)						
1st Generation	18	(1.07)	1513	(2.30)	24.70	<.0001
2nd Generation	219	(12.99)	10598	(16.10)		
3rd or Higher Generation	1449	(85.94)	53715	(81.60)		
Poverty Level, <i>n</i> (%)						
Below 100% above poverty line	258	(15.40)	7556	(11.93)	54.84	<.0001
100-200% above poverty line	344	(20.54)	10651	(16.81)		
200-300% above poverty line	311	(18.57)	10601	(16.73)		
300-400% above poverty line	219	(13.07)	9714	(15.33)		
400% above poverty line	543	(32.42)	24834	(39.20)		
Employment of Anyone in Household**						
Yes	1494	(83.79)	61293	(89.73)	65.69	<.0001
Region*						
South	580	(32.46)	22317	(32.56)	6.72	0.08
Midwest	407	(22.78)	16356	(23.86)		
Northeast	359	(20.09)	12074	(17.62)		
West	441	(24.68)	17789	(25.96)		

*Based on US Census divisions

** employed at least 50 weeks out of the past 52 weeks

Table 2.

Descriptive statistics of child health characteristics of households with and without a child with ASD

Characteristic	Children with ASD (n=1,787)		Children without ASD (n= 68,536)		<i>t</i> test or chi square value	<i>p</i> -value
	n	(%)	n	(%)		
Child With Special Healthcare Needs	1603	(89.70)	12289	(17.93)	5659.481	<.0001
Child's Medical History						
Any mental health diagnosis*	-----	-----	10157	(14.82)	-----	-----
ADHD	871	(48.96)	5353	(7.82)	3634.435	<.0001
Anxiety	764	(42.87)	3072	(4.49)	4959.071	<.0001
Depression	360	(20.15)	2094	(3.06)	1509.713	<.0001
Behavioral or Conduct Disorder	567	(31.80)	1640	(2.39)	4940.768	<.0001
Learning Disability	1235	(69.77)	4000	(5.84)	10222.44	<.0001
Intellectual Disability/Mental Retardation	374	(21.00)	174	(0.25)	9659.905	<.0001
Cerebral Palsy	50	(2.80)	79	(0.12)	684.9378	<.0001
Developmental Delay	1229	(68.89)	1206	(1.76)	23432.08	<.0001
Tourette Syndrome	60	(3.36)	107	(0.16)	754.1376	<.0001
Asthma	384	(21.52)	9736	(14.21)	75.386	<.0001
Diabetes	24	(1.34)	322	(0.47)	27.1127	<.0001
Seizure Disorder/Epilepsy	166	(9.32)	515	(0.75)	1328.843	<.0001
Hearing Problems	212	(11.86)	1565	(2.28)	648.5224	<.0001
Vision Problems	139	(7.80)	1010	(1.47)	432.0238	<.0001
Bone/Joint/Muscle problems	237	(13.31)	1930	(2.82)	639.1976	<.0001
Brain Injury/Concussion	125	(7.01)	2072	(3.02)	91.1123	<.0001

* In the absence of ASD (ASD = 0)

Table 3.

Statistics for logistic regression assessing potential predictors of divorce/separation for inclusion in model

Predictors	<i>B</i>	<i>SE</i>	Wald	OR	95% CI	<i>p</i> -value
Constant	-1.62	0.14	130.31			<.0001
Autism/Autism Spectrum Disorder	0.45	0.12	13.26	1.56	(1.23 , 1.99)	0.0003
Child With Special Healthcare Needs- Mental	0.11	0.06	3.45	1.12	(0.99 , 1.26)	0.0633
Child With Special Healthcare Needs- Physical	-0.09	0.05	2.92	0.92	(0.83 , 1.01)	0.0874
Child's Medical History						
Any mental health diagnosis	0.26	0.06	20.35	1.30	(1.16 , 1.46)	<.0001
ADHD	0.29	0.06	25.59	1.34	(1.19 , 1.49)	<.0001
Anxiety	0.14	0.06	5.64	1.15	(1.03 , 1.29)	0.0175
Depression	0.35	0.06	28.68	1.42	(1.25 , 1.61)	<.0001
Behavioral or Conduct Disorder	0.41	0.07	35.42	1.51	(1.32 , 1.73)	<.0001
Learning Disability	-0.18	0.05	11.55	0.83	(0.75 , 0.93)	0.0007
Intellectual Disability/Mental Retardation	-0.23	0.21	1.23	0.80	(0.53 , 1.19)	0.2678
Cerebral Palsy	0.28	0.30	0.89	1.33	(0.74 , 2.40)	0.3467
Developmental Delay	0.21	0.09	5.67	1.23	(1.04 , 1.46)	0.0173
Tourette Syndrome	-0.29	0.25	1.37	0.75	(0.46 , 1.22)	0.2413
Asthma	0.18	0.04	22.90	1.20	(1.12 , 1.30)	<.0001
Diabetes	0.34	0.15	4.91	1.40	(1.04 , 1.89)	0.0267
Seizure Disorder/Epilepsy	0.03	0.12	0.04	1.03	(0.81 , 1.31)	0.8326
Hearing Problems	0.12	0.07	2.61	1.13	(0.98 , 1.30)	0.1061
Vision Problems	0.08	0.09	0.75	1.08	(0.91 , 1.29)	0.385
Bone/Joint/Muscle problems	-0.04	0.07	0.38	0.96	(0.84 , 1.10)	0.5391
Brain Injury/Concussion	0.12	0.06	3.63	1.12	(1.00 , 1.27)	0.0567
Demographics						
Male	-0.10	0.02	16.41	0.91	(0.87 , 0.95)	<.0001
White				1.00		referrent
Black	0.29	0.04	46.53	1.34	(1.23 , 1.46)	<.0001
Other	0.16	0.04	20.36	1.17	(1.09 , 1.26)	<.0001
Hispanic	0.16	0.04	16.47	1.18	(1.09 , 1.27)	<.0001
Child's age	0.15	0.00	1909.99	1.17	(1.16 , 1.17)	<.0001
Mother						
Mother's age	-0.06	0.00	999.74	0.94	(0.93 , 0.94)	<.0001
Mother's education	0.42	0.04	106.52	1.52	(1.41 , 1.65)	<.0001
Household Characteristics						
Highest education level of either parent	-0.22	0.05	22.89	0.80	(0.74 , 0.88)	<.0001
Generational status of household	0.70	0.03	400.49	2.01	(1.88 , 2.15)	<.0001
Employment of at least one member of househo	-0.29	0.04	56.78	0.75	(0.70 , 0.81)	<.0001
Total number of children	-0.17	0.01	149.53	0.85	(0.82 , 0.87)	<.0001
Poverty Level	-0.34	0.01	1180.84	0.71	(0.70 , 0.73)	<.0001
Insurance Coverage	0.08	0.06	2.00	1.08	(0.97 , 1.21)	0.1568
Region	0.00	0.01	0.07	1.00	(0.98 , 1.02)	0.7879

Note: 11644 observations were deleted due to missing values for the response or explanatory variables.

Table 4.
Associations Between ASD Diagnosis and Divorce or Separation from Stepwise Multiple Logistic Regression Analysis

Predictors	Model 1 Observations used = 70,323			Model 2 Observation Used = 65,028			Model 3 Observations Used = 60,308			Model 4 Observations Used= 60,247		
	OR	(95% CI)	p-value	OR	(95% CI)	p-value	OR	(95% CI)	p-value	OR	(95% CI)	p-value
Autism/Autism Spectrum Disorder	1.64	(1.48, 1.82)	<.0001	1.82	(1.62, 2.05)	<.0001	1.58	(1.39, 1.79)	<.0001	1.78	(1.57, 2.02)	<.0001
Male				0.95	(0.91, 0.99)	0.01	0.96	(0.92, 1.00)	0.07	0.91	(0.87, 0.95)	<.0001
Race												
White (Ref.)				1.00					Ref.			Ref.
Black				1.49	(1.39, 1.61)	<.0001	1.30	(1.20, 1.41)	<.0001	1.33	(1.22, 1.44)	<.0001
Other				1.07	(1.01, 1.14)	0.03	1.15	(1.08, 1.23)	<.0001	1.15	(1.08, 1.23)	<.0001
Hispanic				0.98	(0.91, 1.04)	0.43	1.17	(1.08, 1.26)	<.0001	1.19	(1.10, 1.28)	<.0001
Child's Age				1.18	(1.18, 1.19)	<.0001	1.17	(1.17, 1.18)	<.0001	1.17	(1.16, 1.17)	<.0001
Mother's Age				0.93	(0.92, 0.93)	<.0001	0.94	(0.94, 0.94)	<.0001	0.94	(0.94, 0.94)	<.0001
Highest Education Level of Either Parent												
< High School							0.68	(0.60, 0.76)	<.0001	0.67	(0.60, 0.75)	<.0001
High School Graduate							0.85	(0.80, 0.91)	<.0001	0.85	(0.79, 0.90)	<.0001
> High School							1.00		Ref.			Ref.
Generational Status of Household												
1st							0.25	(0.20, 0.30)	<.0001	0.27	(0.23, 0.33)	<.0001
2nd							0.45	(0.42, 0.49)	<.0001	0.47	(0.44, 0.51)	<.0001
3rd or Higher (Ref.)							1.00		Ref.			Ref.
Employment of Anyone in Household							0.71	(0.66, 0.76)	<.0001	0.73	(0.68, 0.79)	<.0001
Number of Children in Household												
4+							0.67	(0.62, 0.74)	<.0001	0.66	(0.60, 0.73)	<.0001
3.00							0.66	(0.62, 0.71)	<.0001	0.66	(0.61, 0.71)	<.0001
2.00							0.66	(0.63, 0.70)	<.0001	0.65	(0.62, 0.69)	<.0001
1 (Ref)							1.00		Ref.			Ref.
Poverty Level							0.72	(0.70, 0.73)	<.0001	0.73	(0.71, 0.74)	<.0001
Behavioral or Conduct Disorder*										1.74	(1.51, 1.99)	<.0001
ADHD*										1.41	(1.28, 1.55)	<.0001
Child with Special Mental Health Care Needs*										1.46	(1.33, 1.61)	<.0001

** In the absence of ASD (ASD = 0)

Table 5.

Statistics for Multiple Logistic Regression: Final Model* Assessing Prediction of Divorce or Separation by ASD, Adjusting for Selected Child and Family Characteristics

Predictors	<i>B</i>	<i>SE</i>	Wald	OR	95% CI	<i>p</i> -value
Constant	0.57	0.08	55.76			<.0001
Autism/Autism Spectrum Disorder	0.66	0.06	116.14	1.94	(1.72 , 2.19)	<.0001
Male	-0.10	0.02	18.66	0.91	(0.87 , 0.95)	<.0001
Race						
White (Ref.)	----	----	----	1.00		Ref.
Black	0.41	0.04	109.79	1.51	(1.40 , 1.63)	<.0001
Other	0.22	0.03	43.33	1.24	(1.17 , 1.33)	<.0001
Hispanic	0.25	0.04	44.37	1.28	(1.19 , 1.38)	<.0001
Child's Age	0.16	0.00	2323.44	1.17	(1.16 , 1.18)	<.0001
Mother's Age	-0.08	0.00	1624.08	0.93	(0.92 , 0.93)	<.0001
Highest Level of Education of Either Parent						
< High School	0.01	0.05	0.05	1.01	(0.91 , 1.13)	0.8154
High School Graduate	0.17	0.03	30.67	1.18	(1.12 , 1.26)	<.0001
> High School (Ref.)				1.00		Ref.
Generational Status of the Household						
1st Generation	-1.22	0.09	175.09	0.30	(0.25 , 0.35)	<.0001
2nd Generation	-0.75	0.04	357.32	0.47	(0.44 , 0.51)	<.0001
3rd or Higher Generation (Ref.)	----	----	----	1.00		Ref.
Employment of Anyone in Household	-0.66	0.03	378.07	0.52	(0.48 , 0.55)	<.0001
Number of Children in Household						
4+	-0.13	0.04	8.75	0.88	(0.81 , 0.96)	<.0001
3	-0.26	0.03	57.77	0.77	(0.73 , 0.83)	0.0003
2	-0.38	0.03	211.13	0.69	(0.65 , 0.72)	<.0001
1 (Ref)	----	----	----	1.00		Ref.
Behavioral or Conduct Disorder**	0.66	0.07	96.09	1.93	(1.69 , 2.20)	<.0001
ADHD**	0.33	0.05	48.15	1.39	(1.27 , 1.53)	<.0001
Child with Special Mental Health Care Needs**	0.42	0.05	81.39	1.53	(1.39 , 1.67)	<.0001

* Number of Observations Used = 64684

** In the absence of ASD (ASD = 0)

Table 6.

Statistics for Multiple Logistic Regression: Model* Assessing Prediction of Divorce or Separation by ASD, Adjusting for Selected Child and Family Characteristics, in single-child households

Predictors	<i>B</i>	<i>SE</i>	Wald	OR	95% CI	<i>p</i> -value
Constant	0.41	0.11	14.66			<.0001
Autism/Autism Spectrum Disorder	0.60	0.10	38.87	1.81	(1.50 , 2.19)	<.0001
Male	-0.08	0.03	5.31	0.92	(0.86 , 0.99)	0.0212
Race						
White (Ref.)	----	----	----	1.00		Ref.
Black	0.41	0.06	50.71	1.51	(1.35 , 1.69)	<.0001
Other	0.13	0.05	6.35	1.14	(1.03 , 1.26)	0.0117
Hispanic	0.18	0.06	9.54	1.20	(1.07 , 1.34)	0.002
Child's Age	0.13	0.01	630.14	1.13	(1.12 , 1.15)	<.0001
Mother's Age	-0.06	0.00	546.34	0.94	(0.93 , 0.94)	<.0001
Highest Level of Education of Either Parent						
< High School	0.14	0.09	2.67	1.15	(0.97 , 1.36)	0.1022
High School Graduate	0.12	0.05	6.45	1.12	(1.03 , 1.23)	0.0111
> High School (Ref.)	----	----	----	1.00		Ref.
Generational Status of the Household						
1st Generation	-1.10	0.15	57.07	0.33	(0.25 , 0.44)	<.0001
2nd Generation	-0.58	0.06	95.74	0.56	(0.50 , 0.63)	<.0001
3rd or Higher Generation (Ref.)	----	----	----	1.00		Ref.
Employment of Anyone in Household	-0.65	0.05	154.09	0.53	(0.47 , 0.58)	<.0001
Behavioral or Conduct Disorder**	0.53	0.10	27.65	1.69	(1.39 , 2.06)	<.0001
ADHD**	0.31	0.07	19.44	1.36	(1.19 , 1.56)	<.0001
Child with Special Mental Health Care Needs**	0.39	0.07	31.44	1.48	(1.29 , 1.69)	<.0001

* Number of Observations Used = 23,988

** In the absence of ASD (ASD = 0)

Table 7.

Multiple logistic regression models fit to predict divorce within a group of parents of children with an ASD

	Observations Used	OR	95% CI		<i>p</i> -value
Model 1	1423				
Severity					
Mild (Ref.)		1.00	----	----	Ref.
Moderate		1.16	0.90	1.50	0.264
Severe		1.63	1.13	2.34	0.0092
Model 2	1422				
Severity					
Severe		1.56	1.09	2.22	0.0139
Mild to Moderate		1.00	----	----	Ref.
Race					
White (Ref.)		1.00	----	----	Ref.
Black		1.21	0.76	1.93	0.422
Other		0.92	0.65	1.31	0.6572
Hispanic		0.98	0.64	1.49	0.9251
Male		1.16	0.86	1.57	0.331
Model 3	1299				
Severity					
Severe		1.55	1.01	2.38	0.043
Mild to Moderate		1.00	----	----	Ref.
Child's Age		1.13	1.08	1.18	<.0001
Age at Diagnosis		1.09	1.04	1.13	0.0003
Mother's Age		0.93	0.92	0.95	<.0001
Household Employment		0.31	0.22	0.44	<.0001
Generational Status		1.35	0.91	1.99	0.1352
Birth Order		0.95	0.82	1.11	0.5036
Model 4	1299				
Severity					
Severe		1.37	0.89	2.11	0.1584
Mild to Moderate		1.00	----	----	Ref.
Child's Age		1.12	1.07	1.17	<.0001
Age at Diagnosis		1.09	1.05	1.14	<.0001
Mother's Age		0.94	0.92	0.95	<.0001
Household Employment		0.34	0.24	0.48	<.0001
Comorbid Diagnoses		1.11	1.04	1.19	0.0023

Table 8.

Multiple logistic regression models fit to predict divorce within a group of parents of children with an ASD, stratified by respondent-perceived severity

	Observations		OR	95% CI	<i>p</i> -value
	Used				
Model 1	797				
Age at Diagnosis			1.08	1.02 1.15	0.0062
Comorbid Diagnoses			1.10	1.00 1.20	0.0506
Mother's Age			0.94	0.91 0.96	<.0001
Child's Age			1.11	1.04 1.18	0.0017
Household Employment			0.39	0.24 0.61	<.0001
Model 2	479				
Age at Diagnosis			1.15	1.06 1.23	0.0003
Comorbid Diagnoses			1.09	0.97 1.23	0.1573
Mother's Age			0.97	0.94 1.00	0.0279
Child's Age			1.04	0.96 1.12	0.3202
Household Employment			0.36	0.22 0.61	0.0001
Model 3	165				
Age at Diagnosis			1.03	0.90 1.17	0.6749
Comorbid Diagnoses			1.01	0.85 1.21	0.8858
Mother's Age			0.93	0.89 0.98	0.0074
Child's Age			1.20	1.06 1.36	0.0035
Household Employment			0.71	0.29 1.71	0.4399

Table 9.

Distribution and significance testing of responses to the question, "Would you say that your relationship is completely happy, very happy, fairly happy, or not too happy?" amongst parents of a child with an ASD and parents without a child with an ASD

Response	Parents of Children with an ASD		Parents without a Child with ASD		chi square value	<i>p</i> -value
	n	%	n	%		
Completely Happy	463	31.28	27115	36.76	70.5199	<.0001
Very Happy	655	44.26	35261	47.8		
Fairly Happy	310	20.95	10075	13.66		
Not Too Happy	52	3.79	1320	1.79		

Table 10.

Multinomial logistic regression assessing the association between having a child with an ASD and relationship satisfaction, controlling for statistically significant covariates

	Not too happy vs. Completely happy		Fairly happy vs. Completely happy		Very happy vs. Completely happy	
	OR (95% CI)	<i>p</i> -value	OR (95% CI)	<i>p</i> -value	OR (95% CI)	<i>p</i> -value
Unadjusted Model						
Autism/Autism Spectrum Disorder	2.31 (1.72, 3.09)	<.0001	1.80 (1.56, 2.98)	<.0001	1.09 (0.965, 1.23)	0.17
Model controlling for statistically significant covariates						
Autism/Autism Spectrum Disorder	1.52 (1.10, 2.11)	0.0118	1.16 (0.98, 1.37)	0.0833	0.90 (0.79, 1.02)	0.1087
Race						
White (Ref.)	1.00	Ref.	1.00	Ref.	1.00	Ref.
Black	2.43 (1.98, 2.98)	<.0001	1.91 (1.73, 2.11)	<.0001	1.21 (1.12, 1.31)	<.0001
Other	0.99 (0.84, 1.18)	0.9324	1.09 (1.01, 1.17)	0.0323	1.08 (1.02, 1.13)	0.006
Hispanic	1.46 (1.21, 1.76)	<.0001	1.17 (1.07, 1.28)	0.0005	1.15 (1.09, 1.23)	<.0001
Mother's Age	1.04 (1.04, 1.05)	<.0001	1.03 (1.03, 1.04)	<.0001	1.01 (1.01, 1.01)	<.0001
Highest Level of Education of Either Parent						
< High School	1.44 (1.12, 1.85)	0.0047	1.07 (0.93, 1.24)	0.3581	1.04 (0.93, 1.15)	0.5269
High School Graduate	0.89 (0.74, 1.08)	0.2411	1.07 (0.99, 1.16)	0.1079	0.97 (0.92, 1.03)	0.3676
> High School (Ref.)	1.00	Ref.		Ref.		Ref.
Generational Status of the Household						
1st Generation	0.60 (0.41, 0.88)	0.0095	0.50 (0.40, 0.61)	<.0001	0.83 (0.72, 0.95)	0.0052
2nd Generation	1.18 (0.99, 1.40)	0.0665	0.99 (0.92, 1.07)	0.7874	1.07 (1.01, 1.13)	0.0152
3rd or Higher Generation	1.00	Ref.		Ref.		Ref.
Poverty Level						
Below 100% above poverty line	1.00	Ref.	1.00	Ref.	1.00	Ref.
100-200% above poverty line	0.67 (0.55, 0.82)	0.0001	0.80 (0.72, 0.88)	<.0001	0.86 (0.80, 0.93)	0.0001
200-300% above poverty line	0.50 (0.40, 0.63)	<.0001	0.66 (0.59, 0.74)	<.0001	0.88 (0.81, 0.95)	0.0015
300-400% above poverty line	0.40 (0.31, 0.51)	<.0001	0.58 (0.52, 0.65)	<.0001	0.83 (0.77, 0.91)	<.0001
400% above poverty line	0.35 (0.28, 0.44)	<.0001	0.55 (0.49, 0.61)	<.0001	0.85 (0.78, 0.91)	<.0001
Employment of Anyone in Household	1.21 (1.00, 1.47)	0.0458	1.20 (1.09, 1.32)	0.0002	1.08 (1.01, 1.16)	0.028
Child with Special Mental Health Care Needs*	1.75 (1.47, 2.07)	<.0001	1.10 (1.01, 1.20)	0.0331	0.96 (0.90, 1.03)	0.2469
Perceived ability to cope with the demands of parenthood						
Very well	1.00	Ref.	1.00	Ref.	1.00	Ref.
Somewhat well	3.33 (2.92, 3.80)	<.0001	3.65 (3.46, 3.85)	<.0001	1.86 (1.79, 1.93)	<.0001
Not very well	11.01 (8.18, 14.82)	<.0001	6.74 (3.55, 12.80)	<.0001	1.62 (1.31, 2.00)	<.0001
Not well at all	11.71 (5.21, 26.32)	<.0001	6.80 (3.59, 12.90)	<.0001	2.04 (1.09, 3.83)	0.0263
Frequency of anger with study child						
Never	1.00	Ref.	1.00	Ref.	1.00	Ref.

Table 11.

Multinomial logistic regression assessing the association between ASD severity and relationship satisfaction within a group of parents with children diagnosed with an ASD, controlling for statistically significant covariates

	Not too happy vs. Completely happy		Fairly happy vs. Completely happy		Very happy vs. Completely happy	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Unadjusted Model						
Severity						
Mild	1.00	Ref.	1.00	Ref.	1.00	Ref.
Moderate	1.70 (0.83, 3.47)	0.607	1.29 (0.92, 1.83)	0.1512	0.90 (0.67, 1.21)	0.4651
Severe	3.31 (1.41, 7.78)	0.006	1.15 (0.67, 1.98)	0.5291	0.86 (0.54, 1.37)	2.1337
Model controlling for statistically significant covariates						
Severity						
Mild	1.00	Ref.	1.00	Ref.	1.00	Ref.
Moderate	1.73 (0.79, 3.79)	0.173	1.12 (0.77, 1.63)	0.553	0.83 (0.61, 1.15)	0.2646
Severe	3.21 (1.20, 8.63)	0.021	0.91 (0.50, 1.650)	0.7446	0.71 (0.42, 1.18)	0.185
Comorbidity	1.20 (1.01, 1.19)	0.964	1.09 (1.00, 1.20)	0.0642	1.01 (0.83, 1.22)	0.0281
Mother's Age	1.06 (1.01, 1.11)	0.012	1.02 (1.00, 1.05)	0.0399	1.01 (1.00, 1.03)	0.1562
Perceived ability to cope with the demands of parenthood						
Somewhat to very well	1.00	Ref.	1.00	Ref.	1.00	Ref.
Not well at all to not very well	9.15 (2.93, 28.57)	1E-04	3.56 (1.41, 9.03)	0.0074	2.25 (0.90, 5.59)	0.0816
Frequency of anger with study child						
Never	1.00	Ref.	1.00	Ref.	1.00	Ref.
Rarely	1.44 (0.40, 5.20)	0.575	1.96 (1.17, 3.28)	0.0102	1.40 (0.95, 2.06)	0.0887
Sometimes	5.00 (1.58, 15.76)	0.006	2.42 (1.45, 4.07)	0.0008	1.58 (1.06, 2.36)	0.0243
Usually	7.75 (1.34, 44.89)	0.022	5.17 (1.87, 14.30)	0.0016	3.82 (1.56, 9.35)	0.0033
Always	14.36 (1.70, 121.4)	0.014	1.07 (0.15, 7.62)	0.9447	0.75 (0.14, 4.06)	0.7347
Has someone for emotional help with parenthood						
	0.36 (0.15, 0.87)	0.024	0.35 (0.20, 0.60)	0.0002	1.15 (0.64, 2.05)	0.6358

