ORIGINAL PAPER

Relationship Status Among Parents of Children with Autism Spectrum Disorders: A Population-Based Study

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Abstract Despite speculation about an 80% divorce rate among parents of children with an Autism Spectrum Disorder (ASD), very little empirical and no epidemiological research has addressed the issue of separation and divorce among this population. Data for this study was taken from the 2007 National Survey of Children's Health, a population-based, cross-sectional survey. A total of 77,911 parent interviews were completed on children aged 3–17 years, of which 913 reported an ASD diagnosis. After controlling for relevant covariates, results from multivariate analyses revealed no evidence to suggest that children with ASD are at an increased risk for living in a household not comprised of their two biological or adoptive parents compared to children without ASD in the United States.

Keywords Autism · Pervasive developmental disorders · Family · Divorce · Marriage · National Survey

Given the recent rise in the prevalence of Autism Spectrum Disorders (ASD) to almost 1% of the US population (Center for Disease Control 2009), media outlets have placed autism under the public microscope. The distinct

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behavioral challenges, as well as other difficulties associated with the social and communication deficits inherent to ASD, are often associated with increased emotional and financial burden on the entire family system (Järbrink et al. 2003). Such burdens could become overwhelming for families with a child with ASD, potentially leading many family relationships to become significantly stressed and perhaps dissolve.

Accompanying the rise in prevalence of ASD has been a focus on the prevalence of divorce in families with children with ASD. The most common cited statistic, which is empirically unfounded, is an 80% + divorce rate (Lofholm 2008; Mitchell 2006; Winfrey 2007). While the literature does suggest greater overall difficulty among parents of children with ASD (Abbeduto et al. 2004; Bristol et al. 1988; Bromley et al. 2004; Fisman et al. 1989; Rao and Beidel 2009; Rodrigue et al. 1992; Yamada et al. 2007), there has been little research dedicated to understanding if biological parents of children with ASD are at an increased risk for divorce or separation.

Although no epidemiological studies exploring separation and divorce rates have been conducted with an ASD population, there has been one scientific study (Hartley et al. 2010). Hartley et al. examined marriage and divorce information derived from 391 families of adolescents and adults with ASD in Massachusetts and Wisconsin. These families were participants in a longitudinal study and were asked direct questions regarding their family structure over the course of four different data collection processes from 1998–2004. This sample was then matched to a normative comparison sample of previously surveyed families with same-age typically developing children. Hartley et al. found that parents of children with ASD had an overall divorce rate of 23.5%. Although this rate was significantly higher than the divorce rate of parents of typically

developing children (13.81%), it is still substantially lower than the often-described 80% divorce rate. The 23.5% divorce rate was also lower than the rate reported by married couples in general during that time period, which was approximately 50% (Raley and Bumpass 2003). Hartley et al. also found that during the period of time in which the child with ASD was between 8 and 30 years old, parents of children with ASD were at an increased risk for divorce as compared to the matched sample. Since the sample of children with ASD only represented two states, additional exploration of this area using a nationally representative sample is warranted.

There have also been two published qualitative descriptions of marriage and divorce rates among families of children with ASD. DeMyer and Golderberg (1983) conducted a qualitative study of 23 families in Indiana with an adolescent with ASD. They reported a divorce rate of 26% in their sample, considerably less than the divorce rate for the rest of the state of Indiana (40.3%). Akerly (1984) provided a description of families with a child with ASD seen as a part of a clinical practice. These families were described as having a lower overall divorce rate compared to the general population. The shifts in diagnostic criteria of ASDs over the past 25 years suggest that these samples may only reflect those children with ASD who are severely impacted, since diagnoses such as Asperger Syndrome only began being formally diagnosed in the United States in 1994 (Klin et al. 1995). An updated examination of family structure is also necessary due to the decrease in overall divorce rates over time, which reached its lowest rate in 2005 since 1970 (Stevenson and Wolfers 2007).

While there has been a dearth of research on autism and separation/divorce, relationship status has been examined in parents of children diagnosed with other disorders. Using data from a national registry, Swaminathan et al. (2006) reported married mothers of children with a very low birth weight were twice more likely to become separated/divorced than those with a low to average birth weight child within two years after the birth of their child. Other studies have found similar results suggesting that parents of children with Cerebral Palsy (Joesch and Smith 1997), Attention Deficit Hyperactivity Disorder (Brown and Pacinin 1989; Wymbs et al. 2008), as well as Oppositional Defiant Disorder and Conduct Disorder (Wymbs et al. 2008) have greater marital dissolution as compared to parents of typically developing children. The high risk for divorce associated with many families with a child with an illness/disorder contradicts previous descriptions of low divorce rates among parents of children with ASD. It may be that there are factors specific to ASD that result in families with a child with ASD being less at-risk for separation and/or divorce. These factors may lead a family raising a child with ASD

to feel significant stress, but result in the parents ultimately deciding to remain together.

The previously described decrease in divorce rate in the general population over the past quarter century has been attributed to increases in age and education level at first marriage, as these groups have a lower risk of getting divorced (Heaton 2002; Stevenson and Wolfers 2007). Interestingly, families of children with ASD are also commonly found to have higher education levels and are older at the time of their child's birth, suggesting perhaps being older at the time of marriage (Croen et al. 2002; Croen et al. 2007). Therefore, these individuals may be at lower risk of divorce due to factors related to their demographic characteristics.

Despite little research dedicated to ASD and divorce/separation, the marital relationship has been found to be negatively impacted by raising a child with ASD. Previous studies of parents of children with ASD have shown decreased marital satisfaction when compared to parents of typically developing children and parents of children with other disabilities (Bristol 1987; Bristol et al. 1988; Fisman et al. 1989). The experience of raising a child with ASD can be quite stressful on individual parents, as both mothers and fathers of children with ASD have been shown to experience significant stress when compared to parents of typically developing children, as well as parents of children with other disabilities (Fisman et al. 1989; Rao and Beidel 2009). Mothers of children with ASD also exhibit increased symptoms of depression (Abbeduto et al. 2004), and greater emotional and psychological distress than parents of typically developing children (Bromley et al. 2004; Yamada et al. 2007). In addition to reporting increased stress, fathers often reportedly cope with the demands of parenting a child with ASD by becoming less involved and distancing themselves from their family (Bristol et al. 1988; Rodrigue et al. 1992). These negative individual parent experiences could subsequently have a damaging impact on their spouses, as well as marital satisfaction (Fisman et al. 1989).

Given that high stress and low marital satisfaction are often associated with marital termination (Gottman 1994), it would not be surprising if parents of children with ASD frequently separate and/or divorce. However, family systems theory suggests that these families might in fact be more inclined to stay together. Minuchin (1985) described a common phenomenon where families maintain their relationships in the face of adversity. In essence, these families may stay together because it is safer to live in discord than to face the unknown change that marital separation inevitably brings. Other families might remain together, despite significant relationship difficulties, in order to ensure that they can provide financially for their child's multitude of needs. Based on this line of thought,

minimal differences in divorce rates could be expected among parents of children with ASD when compared with the general population.

The current study aims to fill an important gap by examining a nationally representative sample of families with a child diagnosed with an ASD. Gaining a better understanding of parental relationship dissolution and termination is important because these factors and endpoints have been associated with a host of poor child outcomes for all families. Meta-analyses of research on divorce have concluded that children of divorce, compared to those with continuously married parents, suffer from lower achievement, adjustment, and overall well-being (Amato 2000; Amato and Keith 1991). However, in order to understand and devote resources to the impact of divorce on a child with ASD, a greater understanding of the prevalence of separation and divorce is required. The goal of this study was to observe the rate at which children with ASD are living with both of their biological or adoptive parents, as compared to children without ASD in the general US population. Additional attempts were made to identify those variables that contributed to children with ASD being more likely to live with both of their biological or adoptive parents compared to living in another family type. These findings will allow for a greater understanding of family relationships, thereby allowing for more targeted research, supports, and interventions for families of children with ASD.

Methods

Data used for this study were taken from the 2007 National Survey of Children's Health (NSCH), a population-based, cross-sectional telephone survey based on a probability-sampling design (Blumberg et al. 2009). The NSCH employed the State and Local Area Integrated Telephone Survey program (SLAITS) to identify households with children younger than 18 years of age in all 50 states, including the District of Columbia, using a random-digit dial sampling design. Once a child in each household was randomly selected for the survey, a parent or guardian responded to questions about child and family health and well-being. Survey estimation procedures were used to estimate quantities that reflect the national population and calculate standard errors that account for the complex survey design. The weights used reflect both the survey sampling probabilities, as well as adjustments for non-response and for households without telephones (Blumberg et al. 2009). Therefore, estimates using the sampling weights generalize to the non-institutionalized population of children ages 3–17 in each state and nationwide.

For the 2007 NSCH, 91,642 parent interviews were completed on children ages 0-17 years during 2007–2008.

Interviews were completed in 66.0% (a weighted 51.2% response rate) of identified households with children, primarily by mothers (78%) of study children (Kogan et al. 2009). The present analysis was restricted to children between the ages of 3–17, in order to increase the reliability of the child's ASD diagnosis, although only 8 children in the original dataset were diagnosed with an ASD under three years of age. The total sample size for our analyses was 77,911, of which 1,412 children were identified as having been diagnosed with an ASD sometime in their lifetime and 913 were identified as having a "current" ASD diagnosis. For specifics about "current" and "lifetime" ASD diagnosis, see Autism Spectrum Disorder diagnosis in the "Measures" section below.

Measures

Dependent Variable

Family structure: Provided by the NSCH, this derived variable combines several questions about the family household (e.g., who lives in the household, what is the relationship between adults in the household, what is the marital status of the respondent). The possible responses included a two-parent household (biological or adoptive), a two-parent household (step-parents), a single mother household, and other family types (other relatives, single fathers). From this response, an outcome was generated that exclusively identifies two-parent households consisting of biological or adoptive parents compared to the other family structures. The construction of the survey and availability of the data limited the extent to which divorce-specific data could be analyzed. Therefore, the outcome variable refers to the rate or odds that both biological or adoptive parents are married or together, as opposed to single, separated, or divorced. Information was only made available regarding the relationship of biological parents when the child lived in the same household as both parents. Otherwise, information regarding the relationship status of biological parents was unclear. For example, a mother who indicated that she was "divorced" may not have been divorced from the child's biological father, since they may never have been together.

Child-Related Predictor Variables

Autism Spectrum Disorder diagnosis: This primary independent 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 a "lifetime" diagnosis. Parents who endorsed this question were subsequently

asked "does [study child] currently have Autism or ASD?" as well as follow-up on the severity of the disorder, asking "would you describe his/her Autism or ASD as mild, moderate, or severe?" These subsequent questions were labeled as "current" diagnosis and "symptom severity". Similar to Kogan et al. (2009), "current" diagnosis was used as the predictor in the primary analyses.

Co-occurring Psychiatric Disorders: Three comorbid psychiatric conditions, Externalizing problems (Behavior/ Conduct), Internalizing problems (Anxiety and/or Depression), and Attention Deficit or Attention Deficit Hyperactivity Disorders) were included as separate covariates in the analysis. These predictors were derived from questions that asked if the respondent has ever been told by a doctor or other health care provider that the [study child] had one of the three aforementioned psychiatric problems, structured in the same way as the ASD question described above. An endorsement of a current problem was used in the analysis.

Parent-Related Predictor Variables

Self-reported Physical and Mental Health Status of Mother: These predictors, both physical and mental health, were derived from the NSCH question, "Would you say that, in general ([study child]'s [MOTHER]/your) health is excellent, very good, good, fair, or poor?". The item concerning mother's mental health was identical, except for interchanging "health" with "mental health". These predictors were dichotomized as: (1) mothers with poor, fair, or good self-reported (mental) health; and (2) mothers with very good or excellent self-reported (mental) health, leading to equal distributions of subjects across the two levels. All other predictors were derived from explicit questions from the NSCH.

Values for children whose parents either did not know or refused to answer a question were coded as missing and dropped from the analysis. Except mother's physical and mental (7%), there was less than .5% missing data on all variables of interest. The number of children omitted from a particular model ranged from 471 (0.6%) for the unadjusted analyses to 15,903 (20.4%) for Model 4. As expected, children in families that did not have two biological or adoptive parents in the household were more likely to have missing values for father's characteristics than were children with two biological or adoptive parents. Therefore, father's characteristics were not included in the analysis.

Statistical Analysis

A four-stage sequence of survey weighted logistic regression models were developed to estimate Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for the association between a current ASD diagnosis and living in a family

with two adoptive or biological parents, while controlling for sets of covariates. Model 1 controlled for basic demographics (age, gender, race, poverty level, and number of children); Model 2 added additional maternal characteristics (mother's age and physical and mental health); Model 3 included socioeconomic indicators (mother's college, employment, immigration, and health insurance status); and Model 4 included co-occurring current psychiatric diagnoses in the child (externalizing, internalizing, and ADHD). As a secondary analysis, within each model, the association between ASD-related symptom severity and family structure was examined.

Analyses were performed using STATA 10.1 (College Station, TX). Analysis of this data was performed under the auspices of The Johns Hopkins Medicine Institutional Review Board (NA_#00032766).

Results

Table 1 presents weighted and unweighted descriptive statistics of children with and without a current ASD diagnosis. The unweighted analyses reflect the sample of children in the NSCH while the weighted analyses represent the population of children across the United States. In the weighted sample, 1.1% of children had a current ASD diagnosis and 65.2% of children lived in a family with two married biological or adoptive parents.

Demographic differences between children with and without a current diagnosis of ASD include children with an ASD diagnosis being more likely to be male (81% vs. 51%; $p < .001$) and White (82% vs. 72%; $p = .02$ for the joint test of racial differences). Children with an ASD diagnosis were also much more likely than children without an ASD diagnosis to have an Externalizing Disorder (33% vs. 3%; $p < .001$) or ADHD (42% vs. 6%; $p < .001$). In terms of family characteristics, children with an ASD diagnosis on average had an older mother ($p = .01$), but there were no differences in the poverty levels or mother's education levels.

Analyses indicated no association between a child having an ASD diagnosis and whether or not the child lives in a family consisting of two biological or adoptive parents (compared to a family consisting of single parents, step parents or other types of households). In an unadjusted model, current ASD diagnosis was associated with a non-significant 5% decrease in the probability of living with two biological or adoptive parents ($p > .05$). A four-stage sequence of logistic regression models were then fit to examine the association between a child having a current ASD diagnosis and living in a two biological or adoptive parent household, while controlling for increasing numbers of covariates (Table 2). As more predictors were included,

Table 1 Descriptive statistics of children with and without ASDs

Demographics	Unweighted children with ASDs ($n = 913$)	Unweighted children without ASDs ($n = 76,998$)	Weighted children with ASDs ($n = 676,448$)	Weighted children without ASD ($n = 60,818,804$)	Weighted t test or x^2 value	p value
Age (SD)	10.2 (4.2)	10.6 (4.4)	9.9 (0.3)	10.1 (0.1)	−0.60	0.55
Male (%)	81.7%	51.6%	80.8%	50.9%	301.4	<0.0001
Race (%)						
White	81.9%	78.5%	81.6%	72.2%	43.9	0.02
African American	6.7%	11.2%	9.4%	16.9%		
Mixed	5.7%	5.3%	5.6%	5.1%		
Other	4.7%	5.0%	3.4%	5.8%		
Hispanic (%)	10.3%	12.2%	18.7%	19.8%	0.65	0.78
Current externalized disorder (%)	27.1%	2.7%	33.3%	3.1%	11070.0	<0.0001
Current ADHD (%)	36.2%	6.7%	42.2%	6.3%	1683.6	<0.0001
Poverty level (%)						
Below 100% above poverty line	12.5%	10.7%	16.3%	16.9%	11.68	0.52
100–200% above poverty line	16.6%	16.7%	17.5%	20.9%		
200–400% above poverty line	38.3%	34.4%	37.2%	31.9%		
400% above poverty line	32.6%	38.2%	29.0%	30.3%		
Number of children in household (%)						
1	45.9%	38.4%	27.8%	21.5%	27.40	0.07
2	37.1%	39.1%	32.4%	39.8%		
3 or more	17.0%	22.5%	39.8%	38.7%		
Mother's age (SD)	31.0 (6.4)	29.9 (6.2)	31.1 (0.7)	28. 9 (0.1)	3.39	0.01
Mother attended college or higher (%)	73.9%	71.7%	68.9%	62.2%	15.1	0.10
Region (%)						
Northeast (Regions 1, 2, 3)	31.2%	27.3%	25.5%	22.3%	21.3	0.24
West (Regions 8, 9, 10)	25.4%	26.9%	17.6%	24.0%		
South (Regions 4, 6)	21.0%	25.9%	32.6%	32.2%		
Midwest (5, 7)	22.4%	19.9%	24.3%	21.5%		
Family structure*						
Two adoptive or biological parents	64.1%	68.2%	64.0%	65.2%	0.49	0.76
Other family structures	35.9%	31.8%	36.0%	34.8%		

* Other family structures include single parent households, step family households and other relatives or guardians raising the child of interest

the odds ratio of the association between ASD and household status increased and reached marginal significance when concurrent diagnoses were included in the model.

The coefficients of predictors not related to ASD diagnosis were examined as possible protective and risk factors. The characteristics of the mother, including age, immigrant status, and employment status, were positively associated with a child being in a two biological or adoptive parent household, while having a mother with poor mental health was negatively associated with that outcome. Children from high-income families and those having siblings were more likely to be in two biological or adoptive parent households,

whereas older and African American and Mixed race children (compared to White children) were less likely.

Whether a child having more severe ASD-related symptoms was associated with family structure was examined in additional models that included separate terms for ASD symptom severity: moderate to severe, mild, or none (for those not diagnosed with an ASD). The results were somewhat unstable because of relatively small sample sizes; however there was no statistically significant association between ASD and belonging to a two biological or adoptive parent household for any of the symptom severity groups across any of the models (Table 3).

Table 2 Associations between ASD diagnosis and living in a household with two adoptive or biological parents

Predictors	Model 0		Model 1		Model 2		Model 3		Model 4	
	Weighted OR (95% CI)	p-value	Weighted OR (95% CI)	p-value	Weighted OR (95% CI)	p-value	Weighted OR (95% CI)	p-value	Weighted OR (95% CI)	p-value
Current autism spectrum disorder diagnosis (Dx)	0.95 (0.69, 1.31)	0.76	0.98 (0.68, 1.40)	0.90	0.90 (0.60, 1.33)	0.60	1.06 (0.69, 1.63)	0.78	1.66 (1.03, 2.67)	0.04
Age of child			0.92 (0.91, 0.93)	<0.001	0.92 (0.91, 0.94)	<0.001	0.92 (0.91, 0.93)	<0.001	0.93 (0.92, 0.94)	<0.001
Male			1.07 (0.97, 1.17)	0.18	1.08 (0.98, 1.19)	0.14	1.06 (0.96, 1.17)	0.24	1.10 (0.99, 1.21)	0.07
Race										
African American			0.29 (0.26, 0.33)	<0.001 <0.00	0.30 (0.27, 0.34)	<0.001 <0.00	0.30 (0.26, 0.34)	<0.001 <0.00	0.29 (0.26, 0.33)	<0.001
Mixed			0.49 (0.40, 0.60)	1 0.24	0.51 (0.41, 0.63)	1 0.46	0.51 (0.41, 0.62)	1 0.08	0.52 (0.42, 0.64)	<0.001
Other			1.15 (0.91, 1.44)		1.10 (0.85, 1.43)		0.78 (0.59, 1.03)		0.78 (0.59, 1.03)	0.08
White (Ref)			1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Poverty level										
Above 400% poverty line			9.55 (8.11, 11.25)	<0.001	7.35 (6.16, 8.78)	<0.001	6.97 (5.71, 8.51)	<0.001	6.81 (5.57, 8.33)	<0.001
200–400% poverty line			4.74 (4.10, 5.48)	<0.001	4.23 (3.61, 4.95)	<0.001	3.99 (3.37, 4.72)	<0.001	3.91 (3.29, 4.63)	<0.001
100–200% poverty line			2.34 (2.02, 2.73)	<0.001	2.17 (1.85, 2.56)	<0.001	2.08 (1.76, 2.45)	<0.001	2.04 (1.73, 2.41)	<0.001
Below poverty line (Ref)			1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Number of children										
3 or more			2.17 (1.92, 2.46)	<0.001	2.38 (2.09, 2.71)	<0.001	2.39 (2.10, 2.72)	<0.001	2.40 (2.10, 2.74)	<0.001
2			1.72 (1.55, 1.92)	<0.001	1.77 (1.57, 1.99)	<0.001	1.77 (1.58, 1.99)	<0.001	1.80 (1.60, 2.02)	<0.001
1 (Ref)			1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Age of mother					1.07 (1.06, 1.08)	<0.001	1.07 (1.06, 1.08)	<0.001	1.07 (1.06, 1.08)	<0.001
Poor mother health					1.03 (0.91, 1.16)	0.68	1.01 (0.90, 1.15)	0.83	1.02 (0.90, 1.15)	0.74
Poor mother mental health					0.64 (0.57, 0.73)	<0.001	0.65 (0.57, 0.74)	<0.001	0.69 (0.61, 0.79)	<0.001
Mother college							0.94 (0.83, 1.06)	0.29	0.92 (0.82, 1.04)	0.18
No insurance							1.25 (1.03, 1.52)	0.03	1.22 (1.00, 1.49)	0.05
Mother has regular employment							2.50 (2.04, 3.06)	<0.001	2.47 (2.01, 3.03)	<0.001
Mother immigrant							2.29 (1.87, 2.80)	<0.001	2.16 (1.77, 2.64)	<0.001
Current externalized disorder Dx									0.58 (0.42, 0.80)	0.001
Current internalized disorder Dx									0.71 (0.56, 0.90)	0.01
Current ADHD Dx									0.67 (0.54, 0.83)	<0.001

Table 3 Association between ASD severity levels and living in a household with two adoptive or biological parents (additional predictors included in each model; see Table 2 for details)

Symptom Severity*	Weighted OR (95% CI)	p-value	Model 1		Model 2		Model 3		Model 4	
			Weighted OR (95% CI)	p-value	Weighted OR (95% CI)	p-value	Weighted OR (95% CI)	p-value	Weighted OR (95% CI)	p-value
Moderate to severe	0.87 (0.53, 1.42)	0.58	1.10 (0.63, 1.92)	0.74	1.00 (0.57, 1.79)	0.99	1.24 (0.64, 2.40)	0.52	1.94 (0.97, 3.85)	0.06
Mild	1.04 (0.70, 1.56)	0.83	0.88 (0.56, 1.39)	0.59	0.81 (0.48, 1.38)	0.44	0.93 (0.64, 2.40)	0.81	1.46 (0.78, 2.71)	0.23
No symptoms	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent

* Of the 913 children who were diagnosed with an ASD, 419 were described as having moderate to severe symptoms by their caregiver. The remaining 494 children were described by the caregiver as having mild symptoms. There were 76,998 children who were not currently diagnosed with an Autism Spectrum Disorder

As a sensitivity analysis, we also examined associations between the "lifetime" ASD diagnosis variable and family structure and found virtually identical results to those presented here for "current" ASD diagnosis.

Discussion

This study represents a first step towards empirically understanding the impact of raising a child with ASD on parental separation and divorce. Despite mainstream media reports of divorce and separation rates of 80% or greater among parents of a child with ASD (Lofholm 2008; Mitchell 2006; Winfrey 2007), no prior epidemiological investigation has rigorously examined the relationship between rearing a child with ASD and parental separation or divorce. Data from the 2007 NSCH, a nationally representative sample, revealed no evidence to suggest that children with ASD are at an increased risk for living in a household not comprised of their two biological or adoptive parents.

A four-stage modeling approach was employed to investigate the relationship between ASD and marital status, while controlling for increasing numbers of covariates. The first model controlled for basic demographics, the second added additional maternal characteristics, and the third included additional socioeconomic indicators. Results from all of these models found no differences between a child having an ASD diagnosis and that child living in a two biological or adoptive parent household compared to other household types. Interestingly, the final model, which also controlled for co-morbid psychiatric disorders, indicated that a child with a current ASD diagnosis was slightly more likely than those without ASD to live in a two biological or adoptive parent household. This somewhat counter-intuitive result is likely due to particularly low probabilities of living in two biological or adoptive parent households for children with those other disorders (Externalizing, Internalizing, and ADHD), regardless of whether or not they have ASD. In fact, the data suggest that having one of these disorders is far more strongly related to the probability of not living in a two biological or adoptive parent household than is ASD. One possible explanation for this result could be that families with a child with ASD are more likely to receive support services for their disability (e.g., through school-based programs) than children without ASD who have psychiatric disorders. These support services may serve as a mediating variable preventing divorce or separation among families.

As a secondary analysis within each model, we examined the relationship between ASD symptomatology and family structure. Surprisingly, results from all four models suggest that symptom severity neither increases nor decreases the likelihood of a child living in a two biological or adoptive parent household. These results are consistent with previous findings on the impact of symptom severity on divorce (Hartley et al. 2010) and overall family functioning (Bristol 1987; Freeman et al. 1991), in which other factors, including parental depression and support, were more significant predictors.

Greater exploration of the marital relationship of parents of children with ASD is warranted. Although the main conclusion from this study is that children with ASD are just as likely to live in two biological or adoptive parent household as other children, these results are contrary to the results of the only other known published study on this topic (Hartley et al. 2010). These differences may exist as a result of the sampling differences for parents of children with ASD. This study is the first to use a nationally representative sample in examining such variables. In addition, the Hartley et al. sample examined the relationship status of parents of children with ASD into adulthood. While this represents a strength of that study, it also may have impacted differences in the rates of divorce, since

parents of older children would have had less access to resources and supports that have become more commonly available to families of children with ASD over the past 10–15 years. Furthermore, the older cohort in the Hartley et al. sample reflect many parents who would have been married in the 1970s and 1980s, a period in which there was a greater divorce rate than couples who were married more recently (Stevenson and Wolfers 2007). Finally, by controlling for several variables which may also impact divorce, the present study attempted to isolate the unique impact of ASD.

There remains a strong documentation of increased parenting-related stress (Abbeduto et al. 2004; Bromley et al. 2004; Yamada et al. 2007) and decreased marital satisfaction (Bristol et al. 1988; Fisman et al. 1989; Rodrigue et al. 1992) among parents of children with ASD. Thus, it would appear that many families remain married despite the presence of factors that might otherwise be predictive of divorce (Rodrigues et al. 2005). For some families, their spousal relationship may be their primary support mechanism, since many families find themselves feeling isolated from outside social support (Rao and Beidel 2009). Therefore, the possible absence of their spouse's support, due to separation or divorce, could be daunting and compel many parents to remain married. For other families, the financial and emotional challenges inherent to a divorce process may preclude them from separating, since parenting a child with ASD can require significant financial and emotional energy. These factors would be consistent with the Social Exchange Theory of marital stability, in which stability is hypothesized to be, in part, predicted by barriers to leaving the relationship (Rodrigues et al. 2005). This theory considers that marital stability and marital satisfaction are two distinct concepts of the marital relationship, which could explain the disparity between stability and satisfaction among parents of children with ASD. Other factors which may contribute to a lower-than-expected divorce rate among parents of ASD may be the increased probabilities that parents of children with ASD will be older and have higher education levels, which also happen to be predictive of lower rates of divorce (Croen et al. 2002; Croen et al. 2007; Heaton 2002; Stevenson and Wolfers 2007).

Future investigations that explicitly examine factors that differentiate parents of children with ASD who are married from parents of children with ASD who are separated or divorced should aim at identifying moderating and mediating variables that are amenable to intervention. In addition, the results of this study suggest that many couples remain married, despite lower marital satisfaction among parents of children with ASD (Bristol 1987; Bristol et al. 1988; Fisman et al. 1989). In order to understand how to best support those parents of children with ASD who

remain married, differences between parents with high and low marital satisfaction should also be examined to determine those factors that result in greater marital satisfaction. For example, research suggests coping strategies influence marital satisfaction (Bouchard et al. 1998). In fact, those strategies that were identified as predicting less marital satisfaction among males, including distancing and avoidance, have been previously found to be common among fathers of children with ASD (Rodrigue et al. 1992). Once identified, these coping strategies could be taught as part of a parent-based intervention designed to strengthen the family system.

Although this paper primarily examined the relationship between a child having a current ASD diagnosis and whether they live in a two biological or adoptive parent household, these analyses implicate comorbid psychopathology as a particularly important risk factor for living in a non-two biological or adoptive parent household. This is consistent with previous research identifying the association between having a child with an ADHD and/or behavioral problems and parental divorce (Brown and Pacinin 1989; Wymbs et al. 2008). Additional research might examine these disorders more in depth to determine if particular symptoms (e.g., aggressive behaviors) are more predictive of family functioning. This information is particularly relevant for families with a child with ASD, given the common occurrence of challenging behaviors among children with ASD (DSM-IV TR, American Psychiatric Association [APA], 2000), and the specific incidence of comorbid psychiatric diagnoses (Matson and Nebel-Schwalm 2007). The results of this study are also suggestive of the importance of screening for co-morbid psychopathology among children with ASD, since the presence of such pathology may impact the family system, warranting greater parental support.

A longitudinal study is the most appropriate design to assess marital relationship outcomes among parents of children with ASD. Following families with a child with autism over time would allow for a more detailed examination of how the marital relationship evolves and would further examine what, if any, impact there appears to be in having a child diagnosed with ASD. More specifically, longitudinal methods could provide insight into different points in the developmental trajectory of families with a child with autism, where risk may be heightened for separation or divorce, as it has been used in similar models (Swaminathan et al. 2006). Specifically, parents of school-aged children might be more closely examined, since previous research suggests that this commences a critical period where families with a child with ASD may be more at-risk for divorce (Hartley et al. 2010). The challenge for utilizing a longitudinal model among families with a child with ASD is that most children are not diagnosed until they reach toddler or preschool years. Therefore, it may be

difficult to determine the effects of early, unidentified signs of ASD on the marital relationship prior to initial measurement. However, the lowered age in which predictive factors of ASD can now be identified would suggest that many families could be assessed beginning in their child's infancy. Such information could promote preventive interventions aimed at supporting both the parental relationship and the family system.

Several factors limit the conclusions that can be drawn from these analyses. The primary limitation of the NSCH data, when examining the association between child ASD diagnosis and family structure, is the cross-sectional nature of the data, as discussed above. In particular, it was not possible to know the temporal ordering of relationship status and a child's ASD diagnosis, as no information was available regarding the family structure at the time of birth, nor could a link be established between the current family structure and the onset of ASD symptoms and/or diagnosis. Furthermore, the cross-sectional nature of the study makes it difficult to determine whether there are age-cohort effects. With a changing diagnostic landscape over the past ten years, it is possible that the likelihood of diagnosis was not equal across the range of 3–17 year olds. The finding that approximately 35% of children who had a lifetime diagnosis no longer possess a current diagnosis could also speak to levels of diagnostic accuracy fluctuating across age cohorts. However, it should be noted that a sensitivity analysis produced similar results between both current and lifetime ASD diagnoses as the main predictor.

A second limitation is the absence of robust measures of family satisfaction, stress, and coping skills. As mentioned above, information on these factors may help understand the mediating processes between a child's diagnosis with ASD and subsequent relationship problems between the child's parents. Some measures of these variables are available in the NSCH. However, given that the NSCH survey is cross-sectional, it was not possible to control for these types of measures, as they may be a function of family structure, or a predictor of it. An additional complication with the use of family functioning measures is that such variables are likely going to have different meanings depending on family structure. A final limitation is that all characteristics of the children and their families are based on parent report, with no external validation of diagnoses, which may lead to some misclassification. Recall bias could also play a role, with respondents with younger children being more likely to be able to accurately declare the presence of an ASD diagnosis. However, concerns about diagnostic misclassification are mitigated by previous research showing that ASD prevalence rates based on parent surveys are similar to those from the Autism and Developmental Disabilities Monitoring Network (Kogan et al. 2009). While there may also be some biases

associated with non-response to the telephone survey of the NSCH, the use of non-response and non-coverage adjustments in the survey weights mitigates this concern too.

There are also a number of strengths of this study, offsetting many of these limitations. The primary strength is the national representativeness of the sample, reflecting the characteristics of children across the United States. Most previous work in this area involved samples of convenience or small clinical samples, limiting the generalizability of the results. A second important strength is the large quantity of variables available in the data. In particular, the data includes important information regarding demographics, symptom severity, and co-occurring disorders, thereby allowing for an adjustment on a number of child and family characteristics that may be related to both family structure and ASD diagnosis, subsequently leading to a more accurate estimate of the relationship between family structure and ASD.

References

Abbeduto, L., Seltzer, M., Shattuck, P., Krauss, M., Orsmond, G., & Murphy, M. (2004). Psychological well-being and coping in mothers of youths with autism, Down Syndrome, or Fragile X Syndrome. *American Journal on Mental Retardation, 109*, 237–254.

Akerly, M. S. (1984). Developmental changes in families with autistic children. In E. Schopler & G. B. Mesibov (Eds.), *The effects of autism on the family* (pp. 145–162). New York: Plenum Press.

Amato, P. (2000). The consequences of divorce for adults and children. *Journal of Marriage and Family, 62*, 1269–1287.

Amato, P., & Keith, B. (1991). Parental divorce and the well-being of children: A meta-analysis. *Psychological Bulletin, 110*, 26–46.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (4th ed., text revision)*. Washington, DC: Author.

Blumberg, S. J., Foster, E. B., Frasier, A. M., Satorius, J., Skalland, B. J., Nysse-Carris, K. L., et al. (2009). Design and operation of the National Survey of Children's Health, 2007. *Vital and Health Statistics, 1*, 1–109. Retrieved from http://ftp.cdc.gov/pub/health_statistics/nchs/slaits/nsch07/2_Methodology_Report/NSCH_Design_and_Operations_052109.pdf.

Bouchard, G., Sabourin, S., Lussier, Y., Wright, J., & Richer, C. (1998). Predictive validity of coping strategies on marital satisfaction. *Journal of Family Psychology, 12*, 112–131.

Bristol, M. (1987). Mothers of children with autism or communication disorders: Successful adaptation and the double ABCX model. *Journal of Autism and Developmental Disorders, 17*, 469–486.

Bristol, M., Gallager, J., & Schopler, E. (1988). Mothers and fathers of young developmentally disabled and nondisabled boys: Adaptation and spousal support. *Developmental Psychology, 24*, 441–451.

Bromley, J., Hare, D., Davison, K., & Emerson, E. (2004). Mothers supporting children with autistic spectrum disorders: Social support, mental health status, and satisfaction with services. *Autism, 8*, 409–423.

Brown, R., & Pacinin, J. (1989). Perceived family functioning, marital status, and depression in parents of boys with attention deficit disorder. *Journal of Learning Disabilities, 22*, 581–587.

Center for Disease Control. (2009). Prevalence of autism spectrum disorders–autism and developmental disabilities monitoring network, 2006. *Morbidity and Mortality Weekly Report, 58*, 1–20.

Croen, L. A., Grether, J. K., & Selvin, S. (2002). Descriptive epidemiology of autism in a California population: Who is at risk? *Journal of Autism and Developmental Disorders, 32*, 217–224.

Croen, L. A., Najjar, D. V., Fireman, B., & Grether, J. K. (2007). Maternal and paternal age and risk of autism spectrum disorders. *Archives of Pediatric & Adolescent Medicine, 161*, 334–340.

DeMyer, M. K., & Goldberg, P. (1983). Family needs of the autistic adolescent. In E. Schopler & G. B. Mesibov (Eds.), *Autism in adolescents and adults* (pp. 225–250). New York: Plenum Press.

Fisman, S., Wolf, L., & Noh, S. (1989). Marital intimacy in parents of exceptional children. *Canadian Journal of Psychiatry, 34*, 519–525.

Freeman, N. L., Perry, A., & Factor, D. C. (1991). Child behaviours as stressors: Replicating and extending the use of the CARS as a measure of stress: A research note. *Journal of Child Psychology and Psychiatry, 32*, 1025–1030.

Gottman, J. (1994). *What predicts divorce? The relationship between marital processes and marital outcomes*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Hartley, S., Barker, E., Seltzer, M., Floyd, F., Greenberg, J., Orsmond, G., et al. (2010). The relative risk and timing of divorce in families of children with an autism spectrum disorder. *Journal of Family Psychology, 24*, 449–457.

Heaton, T. B. (2002). Factors contributing to increasing marital stability in the United States. *Journal of Family Issues, 23*, 392–409.

Järbrink, K., Fombonne, E., & Knapp, M. (2003). Measuring the parental, service, and cost impacts of children with autistic spectrum disorder: a pilot study. *Journal of Autism and Developmental Disorders, 33*, 395–402.

Joesch, J. M., & Smith, K. R. (1997). Children's health and their mothers' risk of divorce or separation. *Social Biology, 44*(3–4), 159–169.

Klin, A., Sparrow, S. S., Volkmar, F. R., Cicchetti, D. V., & Rourke, B. P. (1995). Asperger syndrome. In B. P. Rourke (Ed.), *Syndrome of nonverbal learning disabilities: neurodevelopmental manifestations* (pp. 93–118). New York: Guilford Press.

Kogan, M., Blumberg, S., Schieve, L., Boyle, C., Perrin, J., Ghandour, R., et al. (2009). Prevalence of parent-reported diagnosis of autism spectrum disorder among children in the US, 2007. *Pediatrics, 124*(5), 1–9.

Lofholm, N. (2008). Autism's terrible toll: parents risk "hitting a breaking point". *The denver post*. Retrieved from http://www.denverpost.com/news/ci_11116100?source=rss.

Matson, J., & Nebel-Schwalm, M. (2007). Comorbid psychopathology with autism spectrum disorder in children: An overview. *Research in Developmental Disabilities, 28*, 341–352.

Minuchin, P. (1985). Families and individual development: Provocations from the field of family therapy. *Child Development, 56*, 289–302.

Mitchell, A. (2006). NBC Chairman Bob Wright and his wife Suzanne talk about the urgency of discovering a cure for Autism with NBC Correspondent Andrea Mitchell. *Washington Life Magazine*. Retrieved from http://www.washingtonlife.com/issues/october-2006/bob-wright/.

Raley, R. K. & Bumpass, L. (2003). The topography of the divorce plateau: Levels and trends in union stability in the United States after 1980. *Demographic Research, 8*, 245–260. Retrieved from www.demographic-research.org/Volumes/Vol8/8/.

Rao, P., & Beidel, D. (2009). The impact of children with high-functioning autism on parental stress, sibling adjustment, and family functioning. *Behavior Modification, 33*, 437–451.

Rodrigue, J., Morgan, S., & Geffken, G. (1992). Psychosocial adaptation of fathers of children with autism, down syndrome, and normal development. *Journal of Autism and Developmental Disorder, 22*, 249–263.

Rodrigues, A. E., Hall, J. H., & Finchman, F. D. (2005). What predicts divorce and relationship dissolution. In M. A. Fine & J. H. Harvey (Eds.), *Handbook of divorce and relationship dissolution* (pp. 85–112). Hillsdale, NJ: Erlbaum Lawrence Erlbaum Associates.

Stevenson, B., & Wolfers, J. (2007). Marriage and divorce: Changes and their driving forces. *Journal of Economic Perspectives, 21*, 27–52.

Swaminathan, S., Alexander, G., & Boulet, S. (2006). Delivering a very low birth weight infant and the subsequent risk of divorce or separation. *Maternal and Child Health Journal, 10*, 473–479.

Winfrey, O. (2007). Jenny McCarthy Interviewed by O. Winfrey [Video Recording]. Mothers battle Autism. *The Oprah Winfrey Show*. Retrieved from http://www.oprah.com/oprahshow/Mothers-Battle-Autism/slide_number/7#slide.

Wymbs, B., Pelham, W., Molina, B., Gnagy, E., Wilson, T., & Greenhouse, J. (2008). Rate and predictors of divorce among parents of youths with ADHD. *Journal of Consulting and Clinical Psychology, 76*, 435–744.

Yamada, A., Suzuki, M., Kato, M., Suzuki, M., Tanaka, S., Shindo, T., et al. (2007). Emotional distress and it's correlates among parents of children with pervasive developmental disorders. *Psychiatry and Clinical Neurosciences, 61*, 651–657.