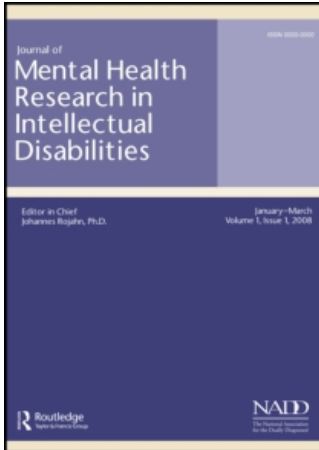


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Adolescents and Adults with Autism with and without Co-morbid Psychiatric Disorders: Differences in Maternal Well-Being

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This study investigated the associations between the characteristics of adolescents and adults with autism spectrum disorders (ASD) and maternal well-being. Two groups were compared: mothers of adolescents and adults with ASD and co-morbid psychiatric disorders (n = 142) and mothers whose sons or daughters had a single diagnosis of ASD (n = 130). Individuals with co-morbid psychiatric disorders had higher levels of repetitive behaviors, asocial behavior, and unpredictability of behavior than their counterparts with ASD only. They also had poorer rated health as well as more frequent gastrointestinal problems and sleep problems. Mothers of sons and daughters with ASD and co-morbid psychiatric disorders reported higher levels of burden and a poorer quality parent-child relationship than mothers of sons and daughters with ASD only. Higher levels of asocial behavior, unpredictability of behavior, and poorer health in sons and daughters with ASD were predictive of greater burden in mothers and a poorer quality parent-child relationship.

KEYWORDS *autism, co-morbidity, psychiatric disorders, adolescents and adults, burden*

There is accumulating evidence that mothers of children with autism spectrum disorders (ASD) experience higher levels of stress and mental

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health symptoms than mothers of typically developing children and children with other types of disabilities (Abbeduto et al., 2004; Blacher & McIntyre, 2006; Eisenhower, Baker, & Blacher, 2005; Greenberg, Seltzer, Krauss, Chou, & Hong, 2004; Weiss, 2002). Mothers of adults with mental illness experience a similar pattern of compromised well-being (Greenberg, Seltzer, & Greenley, 1993; Greenberg, Seltzer, Krauss, & Kim, 1997; Pruchno, Patrick, & Burant, 1996; Seltzer, Greenberg, Floyd, Pettee, & Hong, 2001). Although a number of studies report high rates of co-morbid psychiatric disorders (e.g., depression, anxiety, etc.) in individuals with ASD (Bradley, Summers, Wood, & Bryson, 2004; de Bruin, Ferdinand, Meester, de Nijs, & Verheij, 2007; Ghaziuddin, Weidmer-Mikhail, & Ghaziuddin, 1998; Leyfer et al., 2006; Tsakanikos et al., 2006), little is known about the effects of such co-morbidity on maternal well-being. Kim, Szatmari, Bryson, Streiner, and Wilson (2000) found that mothers who had children with ASD and anxiety or depression reported greater isolation and worried more about their child's future compared to mothers who had children with ASD only. Apart from the Kim et al. report, no other study has examined the well-being of mothers whose sons or daughters had both ASD and co-morbid psychiatric disorders. Therefore, this study compared mothers of adolescents and adults who have ASD and co-morbid psychiatric disorders with mothers of individuals who have ASD without other psychiatric disorders. We examined differences in the characteristics of the adolescents and adults with respect to autism symptoms, behavior problems, and physical health and evaluated the relative impact of these differences on maternal well-being.

PREVALENCE OF PSYCHIATRIC CO-MORBIDITY IN ASD

Studies of children with ASD find consistently high rates of co-morbid psychiatric disorders. For instance, de Bruin et al. (2007) found that over 80% of children with pervasive developmental disorders (PDD) and Leyfer et al. (2006) found that over 70% of the children with autism in their samples met symptom criteria for at least one other co-morbid psychiatric disorder. Similar rates have been found in children with Asperger's syndrome (Ghaziuddin et al., 1998). Other studies report that children with ASD have higher rates of a variety of psychiatric disorders than typically developing children, including mood disorders, anxiety disorders, and oppositional defiant disorder (Gadow, DeVincent, Pomeroy, & Azizian, 2004, 2005; Kim et al., 2000).

Rates of co-morbid psychiatric disorders remain high as individuals with autism enter adolescence and adulthood. Ghaziuddin et al. (1998) found that about 50% of adolescents and adults with Asperger's syndrome met diagnostic criteria for a co-morbid psychiatric disorder. Bradley et al. (2004) found that 67% of adolescents and adults diagnosed with both autism and severe intellectual disability met at least one clinical cutoff for a psychiatric

disorder. Tsakanikos and colleagues (2006) reported somewhat lower rates in their large community-based study of adults who had both autism and intellectual disability, with 36% of the sample having a psychiatric disorder.

BEHAVIORAL AND HEALTH CORRELATES OF PSYCHIATRIC CO-MORBIDITY

Little is known about how individuals with ASD and co-morbid psychiatric disorders differ from their counterparts without psychiatric disorders with respect to the manifestation and severity of autism symptoms, behavior problems, and the co-occurrence of physical health problems. One study found evidence that co-morbid psychiatric problems (i.e., anxiety and depression) in children with ASD were associated with elevated behavior problems (Kim et al., 2000), yet this remains largely unexplored territory. Similarly, little is known about health differences between those with co-morbid psychiatric disorders as well as ASD versus those with ASD only. Individuals with ASD and co-morbid psychiatric problems may be more likely than those with ASD only to be prescribed psychotropic medications that carry the risk of side effects (Aman, Lam, & Von Bourgondien, 2005; Tsai, 1999), which may adversely affect their health (Law, 2007).

IMPACTS OF CHILD CHARACTERISTICS ON MOTHERS

Attempts to explain compromised well-being in mothers of individuals with ASD often have focused on caregiving burden coupled with the need to deal with extremely challenging behavior problems over time (Seltzer, Krauss, Orsmond, & Vestal, 2001). Studies consistently find a strong association between behavior problems and maternal well-being (Abbeduto et al., 2004; Allik, Larsson, & Smedje, 2006; Herring et al., 2006; Lecavalier, Leone, & Wiltz, 2006). Behavior problems appear to be more stressful than autism symptoms per se. For example, Hastings et al. (2005) reported that challenging behaviors of preschool children with autism were associated with parent stress, whereas the severity of their autism symptoms was not.

In addition to the toll taken by behavior problems, the health of sons and daughters with ASD may play a role in the well-being of mothers. Beyond worry about a son's or daughter's health, health problems can necessitate additional caregiving responsibilities, such as increased frequency of doctor visits and medication management. We have found that poorer health in adolescents and young adults with ASD is related to a poorer quality mother-child relationship and higher levels of maternal anxiety (Lounds, Seltzer, Greenberg, & Shattuck, 2007; Orsmond, Seltzer, Greenberg, & Krauss, 2006). Other studies note that problematic sleep in children with ASD is associated

with higher levels of parental stress (Doo & Wing, 2006; Patzold, Richdale, & Tonge, 1998). The impact of other health symptoms on maternal well-being has not yet been investigated, but it is well established that individuals with ASD are vulnerable to elevated rates of seizures (Billstedt, Gillberg, & Gillberg, 2005; Fombonne, 2003) and gastrointestinal (GI) problems (Azfal et al., 2003; Horvath, Papadimitriou, Rabszty, Drachenberg, & Tildon, 1999; Molloy & Manning-Courtney, 2003; Valicenti-McDermott et al., 2006).

In summary, research on the well-being of mothers who have children with ASD suggests that behavior problems and poor health may be more important correlates of maternal distress than autism symptoms per se. Individuals with autism and co-occurring psychiatric problems may be at increased risk for experiencing elevated behavioral problems and health problems, each of which may have an adverse impact on maternal well-being.

OTHER FACTORS RELATED TO MATERNAL WELL-BEING

A number of sociodemographic variables, such as familial socioeconomic status, child age, and child gender, as well as the presence of intellectual disability, have been associated with maternal well-being in mothers of individuals with ASD (Bouma & Schweitzer, 1990; Gray & Holden, 1992). More recently, research has turned to the "broad autism phenotype," suggesting that parents and family members of individuals with ASD display personality characteristics that are milder, but qualitatively similar to, traits associated with autism, and further experience some psychiatric and neurological disorders at greater rates than individuals in the general population (i.e., Piven & Palmer, 1999; Yirmiya & Shaked, 2005), suggesting potential preexisting genetic vulnerability in these families (Piven, 1999; Yirmiya & Shaked, 2005).

RESEARCH AIMS AND HYPOTHESES

This study was designed to address gaps in previous research by investigating differences between adolescents and adults with ASD and a co-morbid psychiatric disorder and adolescents and adults with an ASD diagnosis but no co-morbid psychiatric disorder, and the impact of these differences on maternal well-being. This issue is optimally addressed during adolescence and adulthood because some co-morbid psychiatric disorders (e.g., schizophrenia) do not appear during childhood. Specifically, we investigated three research questions:

1. Is having a co-morbid psychiatric disorder associated with elevations in autism symptoms, behavior problems, and health problems in adolescents and adults with ASD?

2. Does having a son or daughter with ASD and a co-morbid psychiatric disorder increase maternal risk for psychosocial distress and poor health?
3. Which characteristics associated with having a co-morbid psychiatric diagnosis (i.e., levels of autism symptoms, behavior problems, or health problems) are most important in understanding the differential toll on mothers of an adolescent or adult with ASD and a psychiatric diagnosis versus mothers of an individual with ASD only?

With respect to our first research question, we hypothesized that individuals with ASD and co-morbid psychiatric disorders would exhibit more severe autism symptoms and behavior problems and more health problems compared to individuals with ASD who do not have psychiatric disorders. For our second research question, we predicted that mothers of individuals with ASD and co-morbid psychiatric disorders would display more compromised psychological well-being and poorer health than their counterparts. With respect to our third research question, we predicted that the son's or daughter's behavior and health problems would be more important than the severity of autism symptoms in explaining differences in maternal well-being between these two groups of mothers. For this last question, we examined the influence of these child-related factors in the context of other factors that may influence maternal well-being, such as sociodemographic variables and indicators of the broad autism phenotype in the mothers.

METHODS

Sample and Procedures

This analysis is based on data drawn from our larger longitudinal study of families of adolescents and adults with autism ($N = 406$; Seltzer et al., 2003). The criteria for inclusion in the larger study were that the son or daughter with ASD was age 10 or older (age range = 10–52) at the beginning of the study, had received an ASD diagnosis (Autistic Disorder, Asperger's Disorder, or PDD-NOS) from an educational or health professional and had a research-administered Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994) profile consistent with the diagnosis. Nearly all (94.6%) of the sample members met the ADI-R lifetime criteria for a diagnosis of Autistic Disorder. Case-by-case review of the other sample members (5.4%) determined that their ADI-R profile was consistent with their autism spectrum diagnosis of either Asperger's Disorder or PDD-NOS. Half of the participants lived in Wisconsin ($n = 202$), and half in Massachusetts ($n = 204$), and we used identical recruitment and data collection methods at both sites. Families were recruited through service agencies, schools, and clinics. Four waves of data have thus far been collected (every 18 months, spanning a 4.5-year period) via in-home interviews with mothers that typically lasted 2 to 3 hours, self-administered questionnaires, and behavioral assessments conducted with the individual with ASD.

This study is based on data gathered from families participating during the fourth wave of the study ($N = 306$), when in-depth data were collected on the psychiatric diagnoses of the son or daughter with autism. For this analysis, we focused on mothers who reported that their son or daughter with ASD had a co-morbid psychiatric disorder that was currently considered valid by a health or mental health professional. We included 142 mothers who reported their sons and daughters with ASD had Axis I disorders associated with psychotic, mood, or anxiety disorders (e.g., schizophrenia, bipolar disorder, major depression, and anxiety disorders including obsessive compulsive disorder (OCD)). We also constructed a comparison group of 130 mothers who had a son or daughter with autism but not an additional psychiatric diagnosis, for a total sample of 272. We classified mothers whose son or daughter with ASD was also diagnosed with attention deficit disorder (ADD) or attention deficit/hyperactivity disorder (ADHD) as having no other diagnosed psychiatric disorder because, according to diagnostic guidelines set by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000), diagnoses of ADD or ADHD should not be given to individuals with pervasive developmental disorders. In addition, 26 families were excluded from this analysis because the son or daughter had autism due to genetic disorders such as fragile X syndrome, neurofibromatosis, Rett syndrome, and Down syndrome (i.e., nonidiopathic autism; Muhle, Trentacoste, & Rapin, 2004) and 8 others were excluded because the data were obtained from a primary respondent other than the mother.

Table 1 contrasts those with ASD and co-morbid psychiatric disorders to the comparison group with respect to background characteristics. We found a predominant pattern of similarity between the two groups with respect to sociodemographic variables. The two groups did not significantly differ in mother's age, marital status, education, employment, ethnicity, having another child with a disability in the family, or their scores on the measure of the broad autism phenotype. Sons and daughters in the two groups also were similar in age, gender, the percentage with an intellectual disability, and the percentage who were nonverbal. The only variable on which the groups differed significantly was the residential status of the son or daughter with ASD, with fewer sons and daughters in the co-morbid psychiatric disorders group (48.0%) living at home with their mothers than those in the comparison group (64.0%). The sample was representative of the larger population of individuals with Autistic Disorder with respect to gender distribution and likelihood of having an intellectual disability (Bryson & Smith, 1998; Fombonne, 2003).

Measures

The primary independent variable was whether the individual with autism had a co-morbid psychiatric disorder (1) or not (0). In addition, measures

TABLE 1 Background Characteristics of Comparison Groups

	ASD & co-morbid psychiatric disorder (<i>N</i> = 142)	ASD only (<i>N</i> = 130)	Test statistics
Maternal characteristics			
Age (years)	55.6 (<i>SD</i> = 10.7)	54.7 (<i>SD</i> = 9.4)	<i>t</i> = 0.44
Maternal marital status (married)	67.7%	78.0%	χ^2 = 3.41
Maternal education			χ^2 = 2.91
High school or less	20.4%	22.3%	
Some college	29.6%	26.2%	
Bachelor's degree	29.6%	30.0%	
Graduate degree	20.4%	21.5%	
Maternal employment status	60.3%	68.3%	χ^2 = 1.76
Ethnicity (White)	95.1%	91.5%	χ^2 = 1.37
Other child with disability in family	31.2%	24.4%	χ^2 = 1.40
Broad autism phenotype	32.66 (<i>SD</i> = 13.34)	31.40 (<i>SD</i> = 11.58)	<i>t</i> = 0.58
Child characteristics			
Age	26.8 (<i>SD</i> = 9.8)	25.2 (<i>SD</i> = 8.6)	<i>t</i> = -1.42
Gender (female)	26.1%	23.8%	χ^2 = 0.18
Intellectual disability	64.8%	69.2%	χ^2 = 0.61
Nonverbal	18.3%	27.7%	χ^2 = 3.40
Co-residing with mother	48.0%	64.0%	χ^2 = 7.00**

***p* < .01.

of maternal and child characteristics were included to examine group differences in background variables. Maternal age was coded in years. Mother's race/ethnicity was a dichotomous variable, coded "0" for white and "1" if she indicated belonging to another racial or ethnic group. Maternal education was used as a proxy for socioeconomic status and coded as "1" for high school graduate or less, "2" for some college, "3" for bachelor's degree, and "4" for graduate degree. Mothers who were currently working full- or part-time were coded "1" and "0" otherwise. Mothers who had other children with disabilities were coded "1" and "0" otherwise. The Social Interaction section of the Development, Social Interaction, and Mood Questionnaire (DSIM; Magnusson et al., 2005) was used to assess the social component of the "broad autism phenotype" (BAP). This subsection of the DSIM contains 38 items measuring social communication, rigid and repetitive behaviors, and cognitive attention. The test authors report alphas ranging from .82-.87, which was similar to that found in the present sample (Cronbach's alpha = .85).

With respect to child characteristics, the child's age was measured in years and gender was coded "0" for male and "1" for female. Residential status was coded "0" if the son or daughter lived at home with the mother and "1" if he or she lived elsewhere. Intellectual disability status was coded "0" if the son or daughter did not have an intellectual disability and "1" if he or she had an intellectual disability. Intellectual disability was determined using a

variety of sources. IQ scores were obtained by administering the *Wide Range Intelligence Test* (WRIT; Glutting, Adams, & Sheslow, 2000) and adaptive behavior was assessed by the Vineland Screener (Sparrow, Carter, & Cicchetti, 1993). Individuals with standard scores of 70 or below on both measures were classified as having intellectual disabilities and those scoring above 75 on either measure were classified as not having intellectual disabilities, consistent with diagnostic guidelines (Luckasson et al., 2002). If the individual with ASD scored ambiguously on the two measures (i.e., 71–75), or for whom either of the measures was missing, a review of records by three psychologists, combined with a clinical consensus procedure, was used to determine intellectual disability status. We also included a variable indicating whether the child was nonverbal (coded “1”) or was verbal (coded “0”).

Autism symptoms, behavior problems, and health. The *Autism Diagnostic Interview-Revised* (ADI-R; Lord et al., 1994) was used to measure autism symptoms. Past research has demonstrated the test-retest reliability, diagnostic validity, convergent validity, and specificity and sensitivity of the items used in the ADI-R diagnostic algorithm (Hill et al., 2001; Lord et al., 1997). We utilized the standard scoring algorithm recommended by the authors to calculate scores on impairments in social interaction, repetitive behaviors, and verbal and nonverbal communication (Lord et al., 1994). Higher scores indicated more severe impairment in each domain.

Behavior problems were assessed via the *Scales of Independent Behaviors-Revised* (SIB-R; Bruininks, Woodcock, Weatherman, & Hill, 1996). This measure consists of eight behavior problems across three domains: (a) internalizing behaviors—behaviors that are hurtful to the self, withdrawn, or repetitive; (b) externalizing behaviors—behaviors that are hurtful to others, disruptive, or destructive of property; and (c) asocial behaviors—behaviors that are socially offensive or uncooperative. The mother rated the frequency and severity of each behavior problem during the past 6 months. Standard algorithms translate these scores into a maladaptive index from +10 = good to -74 = extremely serious. Reliability and validity have been established by the authors, and reliability is high in this sample (Cronbach’s $\alpha = .83$).

Unpredictability of behavior was constructed from three items. The first asked the mother to rate how frequently her son’s or daughter’s behavior problems seem to “come out of nowhere, and the other two items asked how frequently the mother feels as though she is “walking on eggshells” around her son or daughter in private or in public. These questions were each measured on a 5-point scale ranging from “never” to “always” and summed to create a score indicating the degree to which the child’s behavior was unpredictable (Cronbach’s $\alpha = .88$).

Physical health was measured by a maternal rating of her son’s or daughter’s current health status (1 = poor to 4 = excellent). Such ratings of health have been shown to be valid assessments of morbidity and predictive of mortality across a variety of populations (Idler & Benjamini, 1997). In

addition, seizures, disordered sleep, and GI problems were assessed by single items. The presence of seizures was coded as a dichotomous variable (1 = presence of seizures, 0 = absence of seizures). The mother reported how often (1 = never to 6 = daily) her child experienced GI and sleep problems during the past 12 months.

Mothers' psychosocial well-being and health. Mothers completed the 29-item Burden Interview (Zarit, Reever, & Bach-Peterson, 1980), a questionnaire that assesses subjective burden related to caregiving demands. The items ask mothers to rate their level of agreement with statements such as, "Because of my involvement with my son/daughter, I don't have enough time for myself" (0 = not at all, 1 = somewhat, 2 = extremely). Scores can range from 0 to 58, with higher scores reflecting greater burden (Cronbach's $\alpha = .88$).

Maternal depressive symptoms were measured with the *Center for Epidemiological Studies-Depression Scale* (CES-D; Radloff, 1977). For each of 20 depressive symptoms, the respondent is asked to indicate how many days in the past week the symptom was experienced (0 = never to 3 = 5 to 7 days). Scores can range from 0 to 60, with scores of 16 or above indicative of high depressive symptoms (Cronbach's $\alpha = .92$). In this sample, 33.3% of mothers of individuals with ASD and co-morbid psychiatric disorders had scores at or above 16 on this measure, not significantly different from the 30.8% of mothers whose son or daughter had ASD only who had scores at or above 16.

Maternal pessimism about the future of the son or daughter with ASD was measured with 10 items from the Pessimism subscale of the *Questionnaire on Resources and Stress* (QRS-F; Friedrich, Greenberg, & Crnic, 1983). An example of an item includes, "It bothers me that my son/daughter will always be this way." Mothers rated each item as false (0) or true (1), with resulting scores ranging from 0 to 10. Higher scores indicate more pessimism about the future of the son or daughter (Cronbach's $\alpha = .71$).

Parent-child relationship quality was measured by the 10-item Positive Affect Index (Bengtson & Schrader, 1982), which measures the degree of understanding, trust, fairness, respect, and affection in the relationship. Five questions addressed the mother's feelings of positive affect *toward* her son or daughter, and five questions represented the mother's perception of positive affect *from* her son or daughter, each rated on a scale from 1 (*not at all*) to 6 (*extremely*). The responses to the 10 items were summed, with a higher score indicative of more positive relationship quality (Cronbach's $\alpha = .88$).

RESULTS

Table 2 describes the co-morbid psychiatric diagnoses of sample members. Anxiety disorders were the most prevalent, with over 40% of the individuals

TABLE 2 Co-morbid Psychiatric Disorders by Diagnosis

Psychiatric disorder	Frequency	%
Anxiety disorder	121	44.5
Obsessive-compulsive disorder	75	27.6
Depression	65	23.9
Bipolar disorder	16	5.9
Schizophrenia or other psychotic disorder	7	2.6

Note. Numbers reported here exceed the 52.2% in the sample who reported a co-morbid psychiatric disorder because several individuals had multiple disorders.

with autism in our study having received this diagnosis, of which a large subgroup had obsessive-compulsive disorder. Depression also was quite prevalent in this sample (23.9%). Consistent with prior studies, psychotic disorders were uncommon but still more than twice the rate found in the general population (Saha, Chant, Welham, & McGrath, 2005). More than 15% of the sample had two or more co-morbid psychiatric disorders (see Table 3).

Group Differences in Son/Daughter Autism Symptoms, Behavior Problems, and Health

Analysis of covariance (ANCOVA) was used to examine our first research question examining group differences in autism symptoms, behavior problems, and health problems between adolescents and adults with ASD and a co-morbid mental health diagnosis versus adolescents and adults with ASD only. For the ANCOVA analysis, we controlled for whether the adolescent or adult lived at home because of significant group differences in rates of co-residence (see Table 1).

Hypotheses regarding group differences in autism symptoms and behavior problems were partially supported (see Table 4). Sons and daughters in the two groups differed significantly with respect to repetitive behaviors but not with respect to other indicators of autism symptoms. There were no significant group differences with respect to internalizing and externalizing behavior problems. However, individuals with ASD and co-morbid psychiatric disorders had significantly higher levels of asocial behaviors and

TABLE 3 Number of Co-morbid Psychiatric Disorders

Number reported	Frequency	%
0	130	47.8
1	95	34.9
2	40	14.7
3	7	2.6

TABLE 4 Group Comparisons of Son/Daughter Autism Symptoms, Behavior Problems, and Health

	ASD & co-morbid psychiatric disorder (<i>N</i> = 142)	ASD only (<i>N</i> = 130)	<i>F</i> -value
	Adj. <i>M</i> (<i>SD</i>) ^a	Adj. <i>M</i> (<i>SD</i>) ^a	
Autism symptoms			
Repetitive behaviors	4.66 (2.43)	4.00 (2.41)	3.93*
Social reciprocity	14.31 (6.04)	15.08 (6.77)	.38
Nonverbal communication ^b	5.37 (1.98)	5.62 (2.25)	.71
Verbal symptoms ^c	9.53 (3.77)	9.48 (4.13)	.72
SIB-R general maladaptive	-12.52 (10.51)	-10.39 (9.97)	2.62
Internalizing	-11.80 (10.03)	-11.18 (10.98)	.21
Externalizing	-5.53 (10.49)	-3.87 (10.24)	1.57
Asocial	-10.10 (12.60)	-6.76 (10.05)	5.26*
Unpredictability of behavior	4.60 (2.59)	3.47 (2.44)	11.54**
Health rating	2.04 (.70)	2.22 (.67)	4.15*
Seizures	0.18 (.39)	0.28 (.45)	3.46
Frequency of GI problems	2.32 (2.13)	1.67 (1.91)	4.99*
Frequency of sleep problems	3.25 (2.13)	2.38 (2.16)	9.16**

Note. Co-residence of child with ASD is a covariate.

^aStandard deviations are based on unadjusted means. ^bAnalysis based on sample of nonverbal individuals (*N* = 26 and *N* = 36 for ASD & co-morbid psychiatric disorder group and ASD only group, respectively). ^cAnalysis based on sample of verbal individuals (*N* = 116 and *N* = 94 for ASD & co-morbid psychiatric disorder group and ASD only group, respectively).

p* < .05. *p* < .01.

their behavior was significantly more likely to be unpredictable than those with ASD only. With respect to health problems, individuals with co-morbid psychiatric disorders had significantly poorer rated health, more frequent GI problems, and difficulty with sleep than those in the comparison group, but there were not significant group differences with respect to seizure disorders. Thus, with respect to our first research question, individuals with a co-morbid psychiatric disorder had elevated rates of repetitive and asocial behaviors, and their behavior was more unpredictable. Also, they had poorer health and more frequent GI and sleep problems.

Group Differences in Maternal Psychosocial Well-Being and Health

ANCOVA was also used to examine our second research question examining group differences in maternal well-being. Again, we controlled for whether the adolescent or adult lived at home because of significant group differences in rates of co-residence. Mothers who have sons and daughters with co-morbid psychiatric disorders reported significantly higher levels of subjective

TABLE 5 Group Comparisons of Mothers' Psychosocial Well-Being and Health

	ASD & Co-morbid psychiatric disorder (<i>N</i> = 142)		ASD only (<i>N</i> = 130)		<i>F</i> -value
	Adj. <i>M</i> (<i>SD</i>) ^a		Adj. <i>M</i> (<i>SD</i>) ^a		
Burden	35.79	(9.14)	32.15	(9.47)	9.74**
Depressive symptoms	13.42	(10.15)	11.95	(10.63)	1.23
Pessimism	6.89	(2.04)	6.62	(2.30)	.93
Parent-child relationship quality	45.61	(7.82)	47.93	(7.22)	5.72*
Mother health rating	1.83	(.67)	1.96	(.75)	2.27

Note. Co-residence of child with ASD is a covariate.

^aStandard deviations are based on unadjusted means.

p* < .05. *p* < .01.

burden and rated their relationships with their children as significantly poorer in quality than mothers in the comparison group (see Table 5). Mothers in the two groups did not differ in depressive symptoms, pessimism, or on ratings of their own physical health. Thus, with respect to our second research question, there was a substantial degree of similarity in maternal well-being, but mothers of individuals with a co-morbid psychiatric disorder had higher levels of burden and a poorer quality of relationship with their son or daughter.

Predicting Maternal Burden and Parent-Child Relationship Quality

Correlations for the variables of interest are presented in Table 6. Child age and gender were included in preliminary regression models, but because they were never significant predictors, they were dropped from the final models.

Hierarchical multiple regression analysis (see Table 7) was used to address the third research question investigating which child characteristics associated with having a co-morbid psychiatric condition (i.e., levels of autism symptoms, behavior problems, or health problems) were most important in predicting maternal well-being. We focused on the two aspects of maternal well-being in which the two groups of mothers significantly differed—caregiver burden and quality of the parent-child relationship—and conducted parallel regression analyses predicting each of these indicators of maternal well-being. On the first step of the regression analyses, we entered the variable indicating whether the adolescent or adult with autism had a co-morbid mental health disorder as well as control variables (i.e., child co-residence, presence of intellectual disability (ID), mother's education, and maternal BAP) that are known from prior research to influence levels

TABLE 6 Correlations of Key Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Co-morbid psychiatric disorder	1												
2. Presence of intellectual disability	-0.05	1											
3. Maternal education	0.01	-0.07	1										
4. Broad autism phenotype	0.04	-0.05	-0.11	1									
5. Son/daughter residential status	0.16	0.28	0.05	-0.07	1								
6. Repetitive behaviors	0.12	0.29	0.01	0.02	-0.04	1							
7. Asocial behavior	-0.13	-0.14	-0.16	-0.12	0.05	-0.21	1						
8. Unpredictability of behavior	0.22	0.20	0.18	0.05	0.02	0.27	-0.57	1					
9. Son/daughter health rating	-0.13	-0.05	0.16	-0.06	-0.04	-0.16	0.19	-0.31	1				
10. Frequency of GI problems	0.15	0.04	-0.03	-0.04	-0.02	-0.02	-0.26	0.28	-0.35	1			
11. Frequency of sleep problems	0.19	-0.04	0.01	-0.04	-0.05	0.04	-0.25	0.32	-0.19	0.29	1		
12. Maternal burden	0.16	0.05	0.15	0.26	-0.16	0.23	-0.49	0.56	-0.31	0.31	0.25	1	
13. Parent-child relationship quality	-0.15	0.02	-0.15	-0.17	-0.02	-0.09	0.34	-0.46	0.25	-0.22	-0.12	-0.56	1

Note. Correlations at 0.13 significant at $p < .05$ level and those above 0.16 significant at $p < .01$ level.

TABLE 7 Regression Models Predicting Maternal Burden and Parent-Child Relationship Quality

	Dependent variable: Maternal burden		Dependent variable: Relationship quality	
	Step 1	Step 2	Step 1	Step 2
Key independent variable				
Presence of co-morbid psychiatric disorder	.187**	.034	-.138*	-.032
Control variables				
Son/daughter residential status	-.220***	-.145**	.001	-.042
Presence of intellectual disability	.145*	-.007	-.004	.107
Maternal education	.187**	.110*	-.161**	-.096
Maternal broad autism phenotype	.256***	.215***	-.181**	-.144**
Child characteristics				
Repetitive behaviors		.071		.015
Asocial behavior		-.181**		.109
Unpredictability of behavior		.330***		-.339***
Health rating		-.130*		.119*
Frequency of GI problems		.108*		-.077
Frequency of sleep problems		.047		.061
<i>R</i>	.402	.683	.272	.518
<i>R</i> ²	.162***	.466***	.074**	.268***
<i>R</i> ² change		.304***		.194***

Note. All regression coefficients are standardized for comparative purposes.

* $p < .05$. ** $p < .01$. *** $p < .001$.

of maternal burden and the quality of the parent-child relationship. On the second step, we entered the measures of autism symptoms, behavior problems, and health problems that were found to be significantly different between the two groups in prior analyses, namely, repetitive behaviors, asocial behavior, unpredictability of behavior, health rating, frequency of GI problems, and frequency of sleep problems.

Regression analysis allows us to examine whether child characteristics (i.e., autism symptoms, behavior problems, and health problems) mediated the association between having a co-morbid mental health diagnosis and maternal well-being. Using procedures outlined by Baron and Kenny (1986), we tested for mediation. The criteria for mediation are (a) that the independent variable (having a co-morbid mental health diagnosis) is significantly related to the dependent variable (measures of maternal well-being), (b) that the independent variable is related to the mediators (measures of autism symptoms, behavior problems, and health problems), and (c) the association between the independent and dependent variables is reduced or eliminated after the mediators are entered into the analysis. Mediation would suggest that these differences in child characteristics account for why having a child with ASD and a co-morbid mental health diagnosis is more stressful for mothers than having a child with ASD only. Standardized coefficients are reported for comparative purposes.

Regarding the predictors of maternal burden (see Table 7), having a son or daughter with a co-morbid psychiatric disorder was a significant predictor of this dependent variable, net of control variables, satisfying Baron and Kenny's (1986) first criterion for mediation. In addition, when the son or daughter had an intellectual disability or lived at home, or when mothers had higher levels of education or higher scores on the BAP measure, levels of burden were higher.

As shown in Table 6, the child characteristics are all significantly related to maternal burden, satisfying the second criterion for mediation. As shown in Table 7, when child characteristics were entered in the second step, the effect of having a child with a co-morbid psychiatric disorder was no longer significant, satisfying the third criterion for mediation. Having a son or daughter with higher levels of asocial behavior, more unpredictable behavior, with a poorer health rating, or with greater frequency of GI problems were associated with higher levels of maternal burden. However, repetitive behaviors and frequency of sleep problems were not predictive of maternal burden. In total, 30.4% of the variance in maternal burden was accounted for by these child characteristics.

The predictors of parent-child relationship quality are also shown in Table 7. In the first step, having a son or daughter with a co-morbid psychiatric disorder was a significant predictor of poorer parent-child relationship quality, net of the control variables, again meeting the first criterion for mediation. A higher level of maternal education and higher scores on the BAP measure were each associated with poorer relationship quality.

As shown in the correlation matrix (Table 6), except for repetitive behaviors and the frequency of sleep problems, child characteristics are significantly related to parent-child relationship quality, satisfying the second criterion for mediation. In Table 7, when child characteristics were entered in the second step, the coefficient for having a son or daughter with a co-morbid psychiatric disorder became nonsignificant, consistent with the third criterion for mediation. Greater unpredictability of behavior and poorer health in the child were both associated with a poorer quality parent-child relationship. In all, 19.4% of the variance of parent-child relationship quality was accounted for by child characteristics.

DISCUSSION

This analysis revealed patterns of similarities and differences between individuals with ASD with and without co-morbid psychiatric disorders. Specifically, although we found that individuals with ASD and co-morbid psychiatric disorders had levels similar to those who did not have psychiatric disorders with respect to impairments in social reciprocity, verbal symptoms, nonverbal communication, and internalizing and externalizing

behavior problems, individuals with ASD and co-morbid psychiatric disorders had significantly higher levels of repetitive behaviors, higher levels of asocial behavior, and more unpredictable behaviors than their counterparts with ASD only. This pattern provides some support for previous research (e.g., Kim et al., 2000), showing that elevated behavior problems are characteristic of children who have ASD and co-morbid psychiatric disorders.

Further, we found that individuals with ASD and co-morbid psychiatric disorders had poorer health than their counterparts. In addition, although there is evidence from previous research that sleep and GI problems may be elevated in those with ASD as compared with the general population (e.g., Azfal et al., 2003; Molloy & Manning-Courtney, 2003; Valicenti-McDermott et al., 2006), individuals with ASD and co-morbid psychiatric disorders have even higher rates of these problems than their counterparts with ASD only. One possible explanation for the elevated sleep problems in these individuals is that sleep difficulty is a symptom associated with both anxiety and depression (American Psychiatric Association, 2000). Anxiety disorders and depression were the two most common psychiatric conditions reported in this sample. GI problems are common in autism and also are common side effects of many psychotropic medications (Handen & Lubetsky, 2005), so the substantially higher psychotropic medication use characteristic of a sample with co-morbid psychiatric disorders may also have contributed to this difference.

Past research has consistently shown that mothers of individuals with ASD and mothers of individuals with psychiatric disorders display more compromised well-being than most other groups of maternal caregivers (e.g., Abbeduto et al., 2004; Blacher & McIntyre, 2006; Greenberg et al., 1993; Pruchno et al., 1996). This study provides an explanation for this pattern, namely, that a substantial subgroup of individuals with ASD have co-morbid psychiatric disorders and it is these mothers in particular who have more compromised well-being. Specifically, we found that mothers of adolescents and adults with ASD and co-morbid psychiatric disorders reported more burden and poorer relationship quality with their son or daughter than the comparison group, adding to previous research suggesting that mothers of children with ASD and co-morbid psychiatric disorders report more worry and isolation than mothers of children with ASD only (Kim et al., 2000). These differences in well-being were not observed across all domains, as the two groups of mothers reported levels of depression, pessimism, and health similar to mothers of adolescents and adults with autism only, and the two groups did not differ in their scores on the BAP measure. Further, the magnitude of these differences, though statistically significant, may not be clinically substantial. Nevertheless, the fact that these mothers reported more burden and poorer parent-child relationship quality may suggest the need for targeted services for mothers of individuals with ASD and co-morbid psychiatric disorders such as respite programs that may help directly, to reduce

caregiver burden, and indirectly, to improve the quality of the relationship with their child by giving mothers a break from caregiving.

This study also examined which characteristics of sons and daughters (i.e., autism symptoms, behavior problems, and health problems) accounted for differences in maternal well-being for these two groups of mothers in maternal burden and parent-child relationship quality. Having a child who exhibited more unpredictable behavior was the strongest predictor of these two dimensions of maternal well-being. Also, having a child with poorer health also was a significant predictor of maternal burden and the quality of the parent-child relationship. Indeed, these factors fully mediated the effect of having a son or daughter with ASD and co-morbid psychiatric disorders on maternal well-being. These findings support previous research suggesting that behavior problems, rather than autism symptoms, predict maternal well-being (Hastings et al., 2005) and that poorer health in the son or daughter may be associated with more burden in these mothers (Lounds et al., 2007; Orsmond et al., 2006).

There are some limitations to this study that future research should address. First, we based our samples on maternal reports of her son's or daughter's current valid diagnoses, which may be subject to error. A second limitation is that we clustered individuals with diverse co-morbid psychiatric disorders into one group, even though the symptoms and natural course of these disorders may be very different. Because many individuals had multiple co-occurring disorders it was difficult to make diagnostic-specific comparisons, but future studies with larger samples could examine such groups. Finally, the direction of effects must be cautiously interpreted. Although our conceptual model was that the behavioral and health problems associated with a co-morbid psychiatric disorder led to more compromised well-being in mothers, the reverse pattern may also be true. That is, it is possible that pre-existing psychiatric conditions or the broad autism phenotype in these mothers could have affected their well-being. To address this limitation, we compared the two groups of mothers with respect to maternal BAP and showed that the two groups were similar, and we controlled for mothers' scores on a measure of the BAP in the regression models. The fact that the BAP measure was a significant predictor of maternal well-being, net of the child's diagnosis of co-morbid psychiatric disorders, attests to the importance of this issue. Future longitudinal studies with more robust BAP measures are needed to fully sort out these issues.

In conclusion, adolescents and adults with ASD and co-morbid psychiatric disorders exhibit significantly higher levels of behavior problems than their counterparts with ASD only. This finding suggests that these families may require additional supports and targeted interventions. Poorer health in the son or daughter was also associated with maternal distress, emerging as a significant predictor of both burden and parent-child relationship quality. The relatively high level of health problems experienced by adolescents and

adults with ASD and co-morbid psychiatric disorders suggests not only a need for further research in this area but also for health services aimed at improving both the health of individuals with these diagnoses and the well-being of their mothers.

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