

Bidirectional Effects of Expressed Emotion and Behavior Problems and Symptoms in Adolescents and Adults With Autism

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Abstract

Expressed emotion measures the emotional climate of the family and is predictive of symptom levels in a range of medical and psychiatric conditions. This study extends the investigation of the effects of expressed emotion to families of individuals with autism. A sample of 149 mothers co-residing with their adolescent or adult child with autism over an 18-month period was drawn from a large multiwave longitudinal study. High expressed emotion was related to increased levels of maladaptive behavior and more severe symptoms of autism over time. Also, characteristics of the son or daughter influenced levels of maternal expressed emotion over time. Although autism is a complex genetic disorder, the effect of the family environment in shaping the behavioral phenotype should not be underestimated.

In contrast to the recent proliferation of research on the genetic causes, brain structure and function, and behavioral repertoire of young children with autism (Rutter, 2005), there has been no comparable examination of how the family environment may mediate the manifestation of the core deficits of autism. In the 1950s and 1960s, mothers of individuals with autism were blamed for their child's disorder, as the prevailing theory was that poor parenting was the precipitating factor (for an historical review, see Folstein & Rosen-Sheidley, 2001). This history of maternal blame was also characteristic of theories of the etiology of schizophrenia during the middle 20th century (Fromm-Reichmann, 1948). It is now believed that autism and schizophrenia are complex genetic disorders, with environmental influences as well, and it is widely accepted that these disorders are not caused by parenting styles. Perhaps in reaction to the history of blaming families of children with autism, there has been very limited re-

search on the impact of autism on the family or the influence of the family environment on the development of the child. Given the centrality of the family in influencing the lifelong development and maintaining the quality of life of persons with autism, there is a need for research on the family environment not only during the early childhood years but also when the person with autism reaches adolescence and adulthood. The present study is based on a larger longitudinal study with these goals (Greenberg, Seltzer, Krauss, Chou, & Hong, 2004; Orsmond, Krauss, & Seltzer, 2004; Seltzer et al., 2003).

In a search to identify characteristics of the family environment that may influence the course of a child's disability, researchers have paid considerable attention to the phenomenon of expressed emotion (e.g., Butzlaff & Hooley, 1998). *Expressed emotion* is conceptualized as a measure of the emotional valence of the household and has come to be defined as high levels of criticism

and/or marked emotional overinvolvement as expressed by a family member about another family member with an illness or a disability. Expressed emotion was originally conceptualized in terms of five dimensions of family life: criticism, hostility, emotional overinvolvement, warmth, and positive comments. However, in an early study of the effects of expressed emotion on relapse rates in adults with schizophrenia, Brown, Birley, and Wing (1972) found empirically that neither warmth nor positive comments were independently related to relapse. Although hostility was highly correlated with level of criticism, it was the criticism dimension that was the crucial variable in predicting symptomatic relapse, with emotional overinvolvement independently predicting relapse in a small number of cases.

Subsequent studies confirmed that the effects of criticism and emotional overinvolvement are the most important dimensions for predicting relapse in schizophrenia (Leff & Vaughn, 1985). The criticism dimension is designed to tap feelings of negativity expressed about the individual with the disability. The emotional overinvolvement dimension provides an index of extreme overprotectiveness or self-sacrifice by the family member. In a meta-analysis of studies of expressed emotion and psychiatric relapse, Butzlaff and Hooley (1998) reported that the mean effect size for expressed emotion in predicting relapse in schizophrenia was .30. The effect sizes were even larger in studies in which investigators examined the effect of expressed emotion on relapse for mood disorders, $r = .39$, and eating disorders, $r = .51$. Furthermore, evidence implicates expressed emotion in predicting symptom levels and relapse rates across a broad range of other medical conditions, including Alzheimer's disease, asthma, diabetes, and Parkinson's disease (Wearden, Tarrrier, Barrowclough, Zastowny, & Rahill, 2000).

More recently, expressed emotion has been explored in studies of families of individuals with developmental disabilities (e.g., Beck, Daley, & Hastings, 2004; Dossetor, Nicol, & Stretch, 1994; Greedharry, 1987; Lam, Giles, & Lavander, 2003). In a cross-sectional study of mothers who had a child with a developmental disability and at least one child without a disability, Beck et al. (2004) found that mothers evidenced higher levels of expressed emotion regarding their child with disabilities than their other children and that the child with disabilities had more behavior problems. Similarly, Lam et al. (2003) found that chil-

dren with intellectual disabilities had more severe behavior problems when their mothers had high versus low expressed emotion, although again this was a cross-sectional study. Dossetor et al. (1994) examined levels of expressed emotion in 92 mothers of adolescents with developmental disabilities in another cross-sectional study. They found that a high level of maternal expressed emotion was associated with higher levels of behavior problems. Adolescents of mothers with high emotional overinvolvement had more behavior problems in public, whereas a high level of maternal criticism was related to agitation in the adolescent sample members. In the only longitudinal study to date of families with a child with a developmental disability, Hastings, Daley, Burns, and Beck (2006) found that maternal criticism but not overinvolvement was related to more severe externalizing behavior problems in the children. However, the relationship between criticism and externalizing behaviors only held up cross-sectionally and not over time.

Our purpose in the present longitudinal study was to investigate the bidirectional effects between expressed emotion and maladaptive behaviors and symptoms in families of individuals with autism spectrum disorders. The study extends our previous cross-sectional study of mothers of adolescents and adults with autism, in which we examined the predictors of criticism and emotional overinvolvement and the consequences of expressed emotion for caregiving gains and strains (Ormond, Seltzer, Greenberg, & Krauss, 2006). An environment characterized by high levels of expressed emotion is likely to be experienced as stressful to any individual, but in particular to individuals with autism, who often have difficulty regulating their stress responses (Prizant, Wetherby, & Rydell, 2000). In addition to investigating the prevalence of high levels of expressed emotion in this population, we also examined the cross-lagged relationships between maternal expressed emotion and the behavior problems and autism symptoms in their adolescent and adult sons and daughters with autism. This line of research is important in determining how the family environment affects the manifestation of the symptoms of autism over the life course as well as to elucidate how these symptoms may reciprocally affect family (in this case, maternal) well-being.

The theoretical mechanism explaining how expressed emotion leads to an escalation in symptoms is not well-understood. Hooley and Gotlib

(2000) proposed a diathesis-stress model for explaining the relationship between high expressed emotion and clinical outcomes. They suggest that persons with a high risk for certain mental disorders, such as schizophrenia, may have a heightened genetic vulnerability or sensitivity to stress; a high level of expressed emotion is widely considered a form of psychosocial stress. The results of studies conducted by Goldstein, Rosenfarb, Woo, and Nuechterlein (1994) suggest that persons with schizophrenia in high expressed emotion families show both more verbal (e.g., delusions, suspiciousness, socially inappropriate behavior) and nonverbal (e.g., hostility) subclinical symptoms of psychopathology during interactions with family members than do individuals with schizophrenia in low expressed emotion families (Goldstein et al., 1994; Rosenfarb, Goldstein, Mintz, & Nuechterlein, 1995; Woo, Goldstein, & Nuechterlein, 2004). Furthermore, when persons with schizophrenia behave in odd or unusual ways, family members from high expressed emotion households tend to be more likely to respond to the behavior with criticism than in low expressed emotion households. In turn, individuals with schizophrenia become more symptomatic in response to these critical comments (Woo et al., 2004). Thus, it appears that in high expressed emotion families, negative verbal and nonverbal behavior tends to be reciprocated, which, if persistent over time, leads to an escalation in behavior problems and symptoms.

There is a debate in the literature regarding the direction of effects between expressed emotion and the behavior problems and symptoms of the individual with disabilities. A growing number of investigators conducting prospective treatment studies have reported that a reduction in expressed emotion is followed by a reduction in symptoms and a decrease in relapse rates among persons with major mental disorders, suggesting that the direction of the causal path is from expressed emotion to behavior problems (for a review, see Butzlaff & Hooley, 1998). However, other researchers have concluded that expressed emotion is also a reaction by a family member to high levels of symptoms and behavior problems in the individual with the disability (Bledin, Kuipers, MacCarthy, & Woods, 1990; King, 2000; Vitaliano, Young, Russo, Romano, & Magana-Amato, 1993), suggesting a bidirectional pattern of effects.

Disentangling the causal nature of the relationship between expressed emotion, symptoms,

and behavior problems is particularly complex in studies of parents of children with autism because of the unique caregiving challenges these parents face on a daily basis. Parents may feel responsible for anticipating their child's needs, in part because of the difficulties that individuals with autism have in communicating their needs, causing parents to closely monitor their child's behavior. For those parents whose child has highly stereotyped and ritualistic modes of interaction, obsessional interests, resistance to change, and/or seems emotionally detached or insensitive to the feelings of others, expression of frustration and criticism are understandable responses. Some parents learn that close supervision of their child with autism may be necessary to protect the child's safety. Thus, the symptoms and behaviors associated with autism demand, to varying degrees, highly involved parental behavior, and may elicit critical comments. As with most parent-child interactions, therefore, the relationship between expressed emotion and symptoms is most likely bidirectional. Recognizing these bidirectional effects and patterns of mutual influence, in this study we examined not only the effects of expressed emotion on the subsequent behavior of the individual with autism but also whether the behaviors and symptoms of autism affect subsequent levels of maternal expressed emotion.

Recently, investigators have begun to explore which component of expressed emotion (criticism or emotional overinvolvement) has the stronger effect on the behavior of the individual with the disability. The available research suggests that poorer outcomes for both adults and children with disabilities have more frequently been associated with high levels of criticism than with high levels of emotional overinvolvement. Among studies of adults, Tarrier, Sommerfield, and Pilgrim (1999) reported that adults with posttraumatic stress disorder who experienced a high level of criticism had poorer treatment outcomes than those who experienced low levels of criticism, whereas emotional overinvolvement was unrelated to treatment outcomes. Similarly, in a 2-year longitudinal study, Kim and Miklowitz (2004) found that a high level of criticism was related to increased mania and depression in adults with bipolar disorder, but the level of emotional overinvolvement was not predictive of these outcomes.

Studies of children show similar patterns. In an investigation following young children from

preschool through third grade, Peris and Baker (2000) found that criticism was highly predictive of whether the child had a diagnosis of ADHD in third grade, but emotional overinvolvement was not. Even after controlling for preschool behavior problems and maternal stress, criticism remained a significant predictor of ADHD symptoms in third grade. Similarly, in a study of girls ages 6 to 12 years old, Peris and Hinshaw (2003) found that criticism had a stronger association with symptoms of ADHD and aggression than did emotional overinvolvement. Stubbe, Zahner, Goldstein, and Leckman (1993), in one of the few studies based on a community rather than a clinical sample of preadolescent children, reported that a high level of criticism, but not emotional overinvolvement, was related to a child having disruptive behavior disorders. Hirshfeld, Biederman, Brody, Faraone, and Rosenbaum (1997) also found that a borderline or high level of criticism but not emotional overinvolvement was associated with elevations in mood and behavioral disorders in a sample of at-risk children.

However, a few researchers have found a relationship between levels of emotional overinvolvement and child psychopathology. Asarnow, Thompson, Woo, and Cantwell (2001) found elevated rates of emotional overinvolvement in families of children with comorbid ADHD and anxiety disorders. Stubbe et al. (1993) also found that a high level of emotional overinvolvement was related to a diagnosis of anxiety disorder. Thus, although most researchers in this area have concluded that criticism is the more powerful predictor of mood and externalizing disorders, a few have implicated high levels of overinvolvement in the development of anxiety disorders.

The present study was based on findings of this past research. We examined both overall expressed emotion levels as well as the separate effects of criticism and emotional overinvolvement on the manifestation of behavior problems and autism symptoms. We used a longitudinal design to begin to sort out the direction of effects between maternal expressed emotion and behavior problems and symptoms in adolescents and adults with autism. We recruited a community-based sample to increase the generalizability of the findings.

Specifically, we investigated three related research questions: (a) Does the level of expressed emotion, criticism, and emotional overinvolvement in families of adolescents and adults with

autism change over an 18-month period of time? (b) Are levels of overall expressed emotion, criticism, and emotional overinvolvement predictive of subsequent behavior problems and autism symptoms for adolescents and adults with autism? (c) Reciprocally, is the severity of the child's behavior problems and autism symptoms predictive of subsequent levels of overall maternal expressed emotion, criticism, and emotional overinvolvement?

In examining the bidirectional relationship between maternal expressed emotion and the son or daughter's behavior problems and symptoms of autism, we controlled for the child's age, gender, and a comorbid diagnosis of mental retardation. We controlled for the age of the individual with autism because research suggests higher levels of family stress in adolescence than adulthood (Seltzer & Krauss, 2001; Seltzer et al., 2003) and that there is an abatement in behavior problems and autism symptoms as individuals with autism age (Shattuck et al., 2006). Similarly, gender of the individual with autism was controlled because it has been shown that mother-child interactions across the life course vary with the gender of the child (Rossi & Rossi, 1990). Finally, we controlled for a comorbid diagnosis of mental retardation because individuals with mental retardation have a high frequency of behavior problems and functional limitations in communication and social skills, which might confound the relationship between expressed emotion and the dependent variables in the present analysis.

Based on the existing research, we hypothesized that children with autism living in family environments characterized by high maternal expressed emotion would display increasingly severe behavior problems (internalizing, externalizing, and asocial) and symptoms of autism (repetitive behaviors and circumscribed interests, impairments in reciprocal social interactions, and impairments in communication) over time than children living in low expressed emotion families, controlling for prior levels of behavior problems and symptoms (as well as age, gender, and mental retardation status). In regard to the components of expressed emotion, we hypothesized that high levels of maternal criticism would be related to increasingly severe maladaptive behaviors and symptoms of autism over time. However, based on past research that showed emotional overinvolvement to have limited effects, we did not expect levels of maternal emotional overinvolvement

ment to be related to changes in the severity of the child's behavior problems or symptoms of autism. Recognizing the bidirectional nature of influences of parents and children, we also expected that the severity of the child's behavior problems and symptoms of autism would have a significant effect on subsequent levels of maternal expressed emotion, both with respect to criticism and emotional overinvolvement. Mothers of children with autism who display more severe behavior problems and autism symptoms will need to be more involved in monitoring all aspects of their child's behavior. This may lead to more self-sacrificing and overly protective behavior as well as place a greater burden on parents, which may in turn result in higher levels of criticism of the child.

Method

Participants

The data for this analysis came from a larger study of 406 families of adolescents and adults with an autism spectrum disorder who have been followed in an ongoing (4-wave) longitudinal study (Seltzer et al., 2003). The families resided in Wisconsin ($n = 202$) or Massachusetts ($n = 204$) when the study began. Identical recruitment procedures were used in the two states (i.e., informational packets sent out by agencies, schools, and diagnostic clinics as well as via announcements made through the media). Data for the present analysis are taken from the second and third waves of the study (Time 2, conducted in 2000–2001, and Time 3, conducted in 2002–2003), which were the first two points of data collection when all the variables of interest in the present analysis were included.

The families met three criteria when initially recruited: (a) had a son or daughter age 10 or older; (b) child had received a diagnosis on the autism spectrum from a medical, psychological, or educational professional, as reported by the parents; and (c) administration of the Autism Diagnostic Interview–Revised (Lord, Rutter, & Le Couteur, 1994) that confirmed the parental report of an autism spectrum disorder. Of the 406 individuals in the sample, 384 (94.6%) met all criteria for autism on the Autism Diagnostic Interview–Revised (qualitative impairments in communication and language; qualitative impairments in reciprocal social interaction; repetitive, restrictive, and stereotyped behaviors; and onset of symptoms prior to 36 months). The remaining 22 individuals

(5.4% of the sample) demonstrated a pattern of impairments on the Autism Diagnostic Interview–Revised that was consistent with their diagnosis of Asperger's disorder or pervasive developmental disorder—not otherwise specified.

The present analysis was limited to the 149 mothers who lived with their son or daughter with autism continuously over the second and third waves of the study. We restricted the sample in this way because the effects of expressed emotion require high levels of face-to-face contact between parent and child (Leff & Vaughn, 1985). We restricted the expressed emotion data collection to mothers because of evidence that expressed emotion from mothers and fathers correlate differently with various outcomes (King & Dixon, 1995) and because mothers tend to be the primary caregivers of individuals with developmental disabilities (Essex & Hong, 2005). Participants not included in the present analysis were mothers whose son or daughter lived away from home at Time 2 and Time 3 ($n = 125$), mothers whose child moved from the parental home between Time 2 and Time 3 ($n = 14$), mothers who participated at Time 1 but whose son or daughter died by Time 3 ($n = 4$), mothers who died before Time 3 ($n = 5$), cases for which the child's father was the primary respondent for the interview ($n = 12$), mothers who declined participation or could not be located at Time 2 or Time 3 ($n = 59$), and cases for which there were missing data on the expressed emotion measure at either Time 2 or Time 3 ($n = 20$).

By restricting the sample to adolescents and adults with autism who had continuously lived at home, it is possible that we introduced a selection bias into this analysis. Specifically, this would be the case if high levels of expressed emotion, behavior problems, or autism symptoms were factors precipitating the move from the parental home. Therefore, we explored whether families in which the child moved from the parental home between Time 2 and Time 3 ($n = 14$) differed from families in which the child remained living at home ($n = 149$). The two groups did not differ significantly on any of the measures of behavior problems or autism symptoms. Also, they did not differ on overall expressed emotion level at Time 2 or any of the expressed emotion measures at Time 3. However, mothers whose child moved from the parental home between Times 2 and 3 had higher levels of criticism at Time 2 than did mothers whose child remained at home (1.14 vs. .66, re-

spectively), $t = 2.21$, $p = .028$, and higher levels of overinvolvement (.93 vs. .56), $t = 2.12$, $p = .048$, respectively. Given these differences, we reran the analysis including these 14 cases. The relationships between the measures of expressed emotion and its components and maladaptive behaviors or autism symptoms did not change. Thus, we concluded that dropping these 14 cases did not introduce a selection bias.

The adolescents and adults with autism spectrum disorder included in the subsample used in this analysis ranged in age from 11.3 to 48.9 years at Time 2, with a mean age of 19.9 years ($SD = 7.84$). The majority of the sample was male (75.5%), reflective of the higher prevalence of autism in males compared with females (American Psychiatric Association, 2000). Fifty-seven percent of the participants had been given a diagnosis of mental retardation.

The mothers ranged in age from 34.0 to 80.8 years at Time 2 ($M = 49.3$). Most were married (81.6%). Nearly all had completed high school (98.0%), and almost three quarters (70.1%) were employed either part- or full-time. The average annual household income in 2000–2001 was \$45,800. Most mothers were White; only 7.4% were persons of color.

Procedure and Measures

At both Times 2 and 3, mothers participated in a 2- to 3-hour in-home interview and completed self-administered questionnaires. The two points of data collection were separated by 18 months.

Expressed emotion. The Five-Minute Speech Sample was used to code the level of expressed emotion, following the standardized procedures described in the coding manual developed by Magana et al. (1986). This measure has been used widely in studies of expressed emotion in a variety of diagnostic groups (for a review see Van-Humbeeck, Van-Audenhove, De-Hert, Pieters, & Storms, 2002). The mother was asked to speak about her son or daughter for 5 minutes without interruptions. The speech sample was tape recorded, transcribed, and rated as *high* (coded 5), *borderline* (3), or *low* (0) along the dimensions of criticism and emotional overinvolvement. The mother was categorized as high in expressed emotion if she was rated as high on criticism and/or emotional overinvolvement. Although initially expressed emotion was seen as a unitary dimension reflecting high levels of criticism and/or high lev-

els of emotional overinvolvement, more recently the components of expressed emotion have been evaluated separately and shown to have different effects on different types of behaviors and symptoms (e.g., Peris & Baker, 2000; Stubbe et al., 1993). Therefore, we examined both the effects of overall expressed emotion and its components on behavior problems and autism symptoms.

The operational definitions of the expressed emotion components of criticism and overinvolvement in the Five-Minute Speech Sample were developed based on the more extensive Camberwell Family Interview (Magana et al., 1986). Respondents are rated as high on criticism if they (a) make a negative opening remark, (b) describe their relationship with their son or daughter in negative terms, or (c) make one or more criticisms about their son or daughter during the course of the 5-Minute Speech Sample. Respondents are rated as borderline on criticism if they do not satisfy the above requirements but, nevertheless, make one or more statements of dissatisfaction with the relationship with their son or daughter. A rating of low is given in the absence of any critical comments. The following transcript, which represents a composite case, provides an example of how a mother classified as high in criticism speaks about the relationship with her child.

What kind of a person he is? Well he's a very unique individual. How can I put this? One of the things about Jonnie is that I really like him when he's in a good mood but when he's in a bad mood, it's impossible for us. I still cannot trust him being alone in the house without destroying something. He's compulsive, and he's so controlling, especially with me. The tension in the household gets absolutely incredible. He is very very stubborn. He'll tend to scream to the point where my eardrums vibrate at that point. I suppose that's his only way to fight something he's scared of. He doesn't have any social skills. One of the biggest problems is what to do to fill his time, he gets bored real easily and has a lot of compulsive behaviors that are difficult to deal with. He hates change and doesn't want to move but he's becoming impossible to live with.

Emotional overinvolvement is rated as high if the family member either expresses excessive self-sacrificing or overprotective feelings toward the son or daughter or experiences an emotional display (e.g., crying) during the administration of the Five-Minute Speech Sample. Also, emotional overinvolvement is rated as high if two of the following behaviors are present: excessive detail about the son or daughter's past, a statement of attitude (e.g., "I will do anything for my child"), or excessive praise of the son or daughter, as in-

licated by five or more positive remarks. A rating of borderline emotional overinvolvement is assigned if there is some evidence of overinvolvement (e.g., excessive detail about the past or excessive praise), but the full criteria for high emotional overinvolvement are not met. Low emotional overinvolvement represents the absence of such indicators.

The concept of overinvolvement as operationalized in expressed emotion research is easily misunderstood because many parents of children with autism have been unfairly labeled by professionals as overinvolved when they advocate for services for their child. In the context of expressed emotion research, emotional overinvolvement is *not* indicated by advocacy behavior or by protective behaviors that are necessary and reasonable within the context of ensuring the safety and well-being of a child with a disability. Rather, the concept emotional overinvolvement is meant to capture an extreme overidentification with the child that does not allow the child to respond as an autonomous individual, and/or behavior that is overly protective given the child's developmental and functional capabilities. Another aspect of emotional overinvolvement is excessive praise of the child with autism. The following transcript provides an example of a family classified as high in emotional overinvolvement:

Susie is almost 17 years old. She is very intelligent, creative, and brave. She is a very moral person. At times because of her needs, she is the focus, the central focus, of our family. Our communication is, a lot of times, not verbal. Throughout her life, I have been her interpreter, interpreting her to the world and then interpreting the world to her. I've always been the one who could understand that what she was saying was not meaningless. I oftentimes wonder how much of my identity is wrapped up in her. Where is the line? Where does Susie end and I begin?

Mothers are classified as high in expressed emotion if they are rated as high on criticism and/or emotional overinvolvement. In the present study, all expressed emotion ratings were performed by a rater with 20 years of experience in coding the Five-Minute Speech Sample. In addition, a second experienced rater independently coded 30 taped speech samples. Their level of agreement was 83.3%, $\kappa = .67$. Several researchers have found that there is good correspondence between how families are rated on the Five-Minute Speech Sample and the full Camberwell Family Interview (Magana et al., 1986; Moore & Kuipers, 1999).

Behavior problems. The measure of behavior problems was based on the Problem Behavior subscale of the Scales of Independent Behavior-Revised (Bruininks, Woodcock, Weatherman, & Hill, 1996), which consists of eight behavior problems: hurtful to self, unusual or repetitive, withdrawn or inattentive, socially offensive, uncooperative, hurtful to others, destructive to property, and disruptive. The mother was asked whether her son or daughter manifested each of these eight behavior problems within the last 6 months and, if so, to rate the frequency (1, *less than once a month* to 5, *one or more times an hour*) and severity (1, *not serious* to 5, *extremely serious*) of the behavior. Standardized algorithms (Bruininks et al., 1996) were used to translate frequency and severity ratings into three subscales scores: Internalized Maladaptive Behavior (hurtful to self, unusual or repetitive habits, and withdrawn or inattentive behavior), Asocial Maladaptive Behavior (socially offensive and uncooperative behavior), and Externalized Maladaptive Behavior (hurtful to others, destructive to property, and disruptive behavior). Bruininks et al. have previously documented the reliability and the validity of the Scales of Independent Behavior-Revised. In our study, the correlations between the Time 2 and Time 3 measures were all above .60 (Externalizing, $r = .76$; Internalizing, $r = .64$, and Asocial, $r = .63$), indicating high levels of stability over time. Higher Scales of Independent Behavior-Revised scores indicate more severe behavior problems.

Autism symptoms. The Autism Diagnostic Interview-Revised (Lord et al., 1994) was used to measure autism symptoms. This measure is a standardized investigator-based interview conducted with a primary caregiver (in our case, with the mother of the individual with autism). These items are based on the *Diagnostic and Statistical Manual of Mental Disorder-fourth edition—DSM-IV-TR* (American Psychiatric Association, 2000) and International Classification of Diseases (World Health Organization, 1990) criteria for an autism diagnosis. We administered the items that comprise the diagnostic algorithm of the Autism Diagnostic Interview-Revised (C. Lord, personal communication, February 1999). A code of 0 indicates *no abnormality present*; 1, *possible abnormality*; and 2, *definite abnormality*. Some items were coded on a 0- to 3-point scale, with a score of 3 indicating *extreme abnormality with respect to the behavior*. As suggested by Lord et al. (1994), we combined scores of 3 and 2. Items were coded twice

at Time 1, once to reflect the severity of the symptom when the child was age 4 to 5 and again to reflect current level of symptom severity. At Times 2 and 3, only current ratings were obtained, and these were the data analyzed for the present analysis.

The Autism Diagnostic Interview-Revised yields ratings for the three primary symptom clusters used in the diagnosis of autism: repetitive behaviors and restricted interest, impairments in reciprocal social interaction, and impairments in communication. The Repetitive Behaviors and Restricted Interests domain includes seven autistic symptoms: circumscribed interests, unusual pre-occupations, compulsion/rituals, hand and finger mannerisms, other complex mannerisms/body movements, repetitive use of objects/interest in parts, and unusual sensory interests. An eighth item, verbal rituals, was dropped for this analysis because it is not administered to sample members who are nonverbal (16.1% of the present subsample, $n = 24$). A total score of the seven items was calculated for Times 2 and 3.

Impairments in Reciprocal Social Interaction were measured by the sum of the ratings of 14 items measuring qualitative impairments in reciprocal social interaction (direct gaze, social smiling, range of facial expression, interest in people, response to others' approaches, friendships, directing attention, offering to share, sharing enjoyment with others, use of other's body, offering comfort, quality of social overtures, inappropriate facial expressions, and appropriateness of social response).

The impairments in the Communication domain of the Autism Diagnostic Interview-Revised consists of 11 symptoms of autism. However, 7 of the symptoms are not administered if the individual is nonverbal and, thus, were not analyzed here. The 4 remaining items (i.e., pointing to express interest, gestures, nodding, and head-shaking) were administered to all sample members (verbal as well as nonverbal) and were summed to derive an overall score indicating the adolescent's or adult's current level of impairments in nonverbal communication.

The interviewers who administered the Autism Diagnostic Interview-Revised participated in an approved training program for conducting this structured interview. All interviews were tape recorded. Interrater reliability for individual Autism Diagnostic Interview-Revised items between the

interviewers and two supervising PhD clinical psychologists experienced in the diagnosis of autism and in the use of the Autism Diagnostic Interview-Revised averaged 89%, mean $\kappa = .81$. Past research has demonstrated the test-retest reliability, diagnostic validity, convergent validity, and specificity and sensitivity of the Autism Diagnostic Interview-Revised (Hill, Bölte, & Petrova, 2001; Lord, Pickles, & McLennan, 1997).

Characteristics of the son/daughter with autism spectrum disorder and of the mother. We examined three characteristics of the son or daughter with autism: age, gender, and a comorbid diagnosis of mental retardation. Age was coded in years. Gender was coded 0 (male) or 1 (female). Mental retardation status was determined using a variety of sources of information. Standardized intelligence and adaptive behavior measures were administered by interviewers trained and supervised by a PhD clinical psychologist. Intelligence was assessed through use of the Wide Range Intelligence Test (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 mental retardation, consistent with diagnostic guidelines (Luckasson et al., 2002). Those with scores above 75 on either of the measures were classified as not having mental retardation.

For those sample members with scores between 71 and 75 on one or both measures or for whom either of the measures was missing, a review of records combined with a clinical consensus procedure was used to determine mental retardation status. This determination was conducted by three psychologists (one master's level and two PhDs), who reviewed each case file independently. Information in the file included the standardized measures (Wide Range Intelligence Test or Vineland, when available), parent report of prior diagnoses, intellectual functioning, adaptive behavior, and clinical and school records (when available). Agreement among the three independent raters was reached on 77.8% of cases following the initial review. All cases in which there was disagreement among the raters were discussed until consensus was reached as to whether the individual had mental retardation. For this analysis, a comorbid diagnosis of mental retardation was coded 1 or 0 if the child did not have a diagnosis of mental retardation.

Results

Prevalence of High Levels of Expressed Emotion

For our first research question, we asked about changes in the level of expressed emotion over an 18-month period in families of adolescents and adults with autism. As shown in Table 1, high levels of expressed emotion were found in only about a quarter of the families at Time 2 and about a fifth of the families at Time 3. There was considerable stability in levels of expressed emotion over the 18-month study period. Approximately 61.7% had low expressed emotion at both waves of data collection, and 10.7% had high expressed emotion at both data points. About 17% of the sample showed a reduction in expressed emotion (high at Time 2 but low at Time 3) and 10.7% showed an elevation in expressed emotion (low at Time 2 and high at Time 3). Similarly, relatively few mothers had high ratings on either criticism or overinvolvement. However, as shown in Table 1, mothers were approximately twice as likely to be classified as high on criticism as on overinvolvement. Whereas relatively few families were high on criticism or overinvolvement, a larger number fell in the borderline category. Approximately 30% of the mothers had borderline scores on the criticism dimension at Time 2, which increased by Time 3 to about 40%. The

Table 1. Distribution of Expressed Emotion, Criticism, and Emotional Overinvolvement in the Sample ($N = 149$)

Expressed emotion & subscales	Time 2		Time 3	
	<i>n</i>	%	<i>n</i>	%
Expressed Emotion				
Low	108	72.5	117	78.5
High	41	27.5	32	21.5
Criticism				
Low	78	52.3	63	42.3
Borderline	44	29.5	61	40.9
High	27	18.1	25	16.8
Emotional Overinvolvement				
Low	81	54.4	87	58.4
Borderline	53	35.6	51	34.2
High	15	10.1	11	7.4

percentage of families in the borderline emotional overinvolvement group was stable over time, with about a third of the sample classified as borderline at each of the two waves of data collection. Thus, although we found relatively low rates of high overall expressed emotion, criticism, or overinvolvement, a more substantial number of families fell into the borderline categories.

Bidirectional Effects

Our second and third research questions concerned the cross-lagged effects between behavior problems, autism symptoms, and expressed emotion. A cross-lagged correlational approach has been used in other studies of the bidirectional effects of the family environment and the behavior of children with developmental disabilities (e.g., Mink & Nihira, 1987; Orsmond, Seltzer, Krauss, & Hong, 2003) and in studies of expressed emotion effects (e.g., King, 2000). To estimate bidirectional effects, we used path analysis for a two-wave cross-lagged effects model (Finkel, 1995) using LISREL 8.54 to obtain maximum likelihood estimates of the paths. Each variable at Time 3 is predicted by the Time 2 value of the variable as well as the Time 2 value of the cross-lagged variable and control variables (child's age, gender, and whether child had a diagnosis of mental retardation). The variables measured at the same point in time were allowed to be correlated. A separate path model was performed for each measure of behavior problems and autism symptoms. Because all possible paths are estimated, the model is saturated so that LISREL fit indices indicate a perfect fit of the data. As an alternative estimate of the fit of the models, we report the percentage of variance explained for each of the Time 3 outcomes.

The Pearson product-moment correlations among all study variables at Time 2 and Time 3 are shown in Table 2. However, the path analysis was based on a mixed matrix of Pearson correlations and polychoric/polyserial correlations (available from the first author). We computed polychoric/polyserial correlations for correlations involving expressed emotion, criticism, and emotional overinvolvement because these variables are measured as dichotomous or ordinal variables but conceptually represent underlying continuous constructs. All other variables analyzed were based on Pearson product-moment correlations.

Our preliminary analyses indicated that the age of the child with autism had no effect on any

Table 2. Pearson Correlations Among Study Variables by Time

Variable ^a	1	2	3	4	5	6	7	8	9
1. T2 EE	1.0								
2. T2 Criticism	.57	1.0							
3. T2 EOI	.36	-.18	1.0						
4. T2 SIB-R Externalizing	.13	.29	-.05	1.0					
5. T2 SIB-R Internalizing	.22	.22	.10	.46	1.0				
6. T2 SIB-R Asocial	.19	.18	.11	.62	.55	1.0			
7. T2 ADI-R Repetitive Behaviors	.09	.09	-.01	.32	.37	.29	1.0		
8. T2 ADI-R Social Reciprocity	.03	.13	-.13	.19	.39	.18	.28	1.0	
9. T2 ADI-R Nonverbal Communication Impairment	-.05	-.08	-.08	-.00	.14	.03	.03	.59	1.0
10. T3 EE	.26	.26	.08	.03	-.02	.03	.11	.05	-.05
11. T3 Criticism	.26	.36	-.03	.21	.06	.19	.12	.10	.01
12. T3 EOI	-.00	-.18	.32	-.10	-.04	.03	-.05	-.09	-.03
13. T3 SIB-R Externalizing	.28	.31	.04	.76	.47	.58	.27	.24	.06
14. T3 SIB-R Internalizing	.27	.36	.08	.41	.64	.37	.27	.39	.08
15. T3 SIB-R Asocial	.33	.31	.16	.54	.37	.63	.14	.13	.04
16. T3 ADI-R Repetitive Behaviors	.14	.26	-.03	.31	.44	.38	.59	.33	.08
17. T3 ADI-R Social Reciprocity	.16	.18	-.06	.20	.33	.15	.27	.87	.54
18. T3 ADI-R Nonverbal Communication Impairment	-.09	-.11	-.07	.02	.07	.04	.07	.57	.83
19. Gender ^b	.09	.04	-.08	.03	.01	-.03	.06	.02	.03
20. MR status ^c	.08	.11	-.01	.08	.18	.08	.15	.39	.38
21. Child's age	-.06	-.12	-.07	-.17	-.05	-.14	-.02	.21	.24
Mean	.28	.66	.56	104.98	113.37	110.50	4.66	14.79	4.69
SD	.45	.77	.67	9.79	9.55	11.39	2.09	6.12	2.59

Note. All correlations of .16 to .21 significant at $p < .05$; .22 to .25, $p < .01$; .26 and above, $p < .001$.

^aT2 = Time 2, EE = expressed emotion, EOI = emotional overinvolvement, SIB-R = Scales of Independent Behavior-Revised, ADI-R = Autism Diagnostic Interview-Revised, T3 = Time 3. ^b1 = female, 0 = male. ^c1 = child has mental retardation diagnosis, 0 = otherwise.

measures of Time 3 expressed emotion, autism symptoms, or behavioral outcomes, and dropping it from the model did not have any effect on the findings. Therefore, to achieve a more parsimonious model, we dropped age from the final model. Figure 1 provides a diagram of the conceptual model we analyzed.

Table 3 shows the relationships between externalizing, internalizing, and asocial maladaptive behaviors and the measures of expressed emotion. Model 1 is based on the overall expressed emo-

tion score, with Models 2 and 3 reporting the coefficients for the criticism and emotional overinvolvement domains separately. As shown in Table 3, there was considerable stability in the Scales of Independent Behavior-Revised measures of behavior problems over time. The stability coefficient for externalizing behavior was .71. For internalizing behaviors, the coefficient was .58, and for asocial behaviors, .55. The stability coefficients for Scales of Independent Behavior-Revised measures in the remaining models ranged from .57 to

Table 2. Extended

10	11	12	13	14	15	16	17	18	19	20	21
1.0											
.68	1.0										
.35	.02	1.0									
.20	.35	-.04	1.0								
.13	.21	-.09	.57	1.0							
.15	.31	-.04	.66	.50	1.0						
.12	.20	-.11	.34	.43	.33	1.0					
.12	.16	-.08	.29	.38	.19	.29	1.0				
-.06	-.04	.12	.05	.07	-.01	.10	.51	1.0			
.17	.07	.10	-.02	-.02	.04	.04	.09	.08	1.0		
-.01	.14	-.19	.18	.18	.23	.23	.42	.26	-.03	1.0	
-.12	-.09	-.15	-.16	-.12	-.15	-.04	.18	.25	-.11	.23	1.0
.22	.75	.50	106.09	113.20	111.11	4.62	14.01	4.56	.77	.57	19.94
.41	.73	.63	11.41	10.11	12.16	2.30	6.03	2.54	.43	.50	7.84

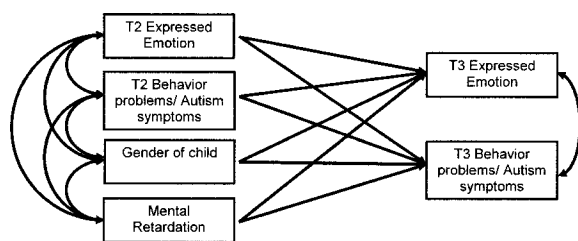


Figure 1. Conceptual model of relationship between expressed emotion and behavior problems and symptoms of autism.

.75 and were highly significant in each model. Expressed emotion and the two dimensions of criticism and emotional overinvolvement were less stable (ranging from .41 to .46), but all of the coefficients were highly significant, $ps < .001$.

Next, we examined the cross-lagged effects of the three Scales of Independent Behavior-Revised maladaptive behavior subscales and overall level of expressed emotion, as shown in Model 1 of Table 3. Consistent with our hypothesis, a high level of expressed emotion at Time 2 was significantly related to increasing levels of externalizing maladaptive behavior in the son or daughter with autism 18 months later at Time 3, $\beta = .21$. However, externalizing behavior problems at Time 2

Table 3. Standardized Path Coefficients for Two-Wave Cross-Lagged Models for Subscales of the Scales of Independent Behavior-Revised (SIB-R)

Model ^a	Behavior		
	Externalizing	Internalizing	Asocial
Model 1: Expressed Emotions			
Stability effects			
T2 EE to T3 EE	.43***	.46***	.43***
T2 SIB-R to T3 SIB-R	.71***	.58***	.55***
Cross-lagged effects			
T2 EE to T3 SIB-R	.21***	.18***	.27***
T2 SIB-R to T3 EE	-.04	-.15*	-.05
Control variables			
Gender of child to T3 SIB-R	-.06	-.04	.02
Gender of child to T3 EE	.21***	.21***	.21***
MR to T3 SIB-R	.10*	.06	.15**
MR to T3 EE	-.05	-.03	-.05
<i>R</i> ²			
T3 EE	.24	.26	.24
T3 SIB-R	.63	.45	.50
Model 2: Criticism			
Stability effects			
T2 Criticism to T3 Criticism	.41***	.45***	.41***
T2 SIB-R to T3 SIB-R	.72***	.57***	.57***
Cross-lagged effects			
T2 Criticism to T3 SIB-R	.10	.26***	.22***
T2 SIB-R to T3 Criticism	.09	-.07	.13
Control variables			
Gender of child to T3 SIB-R	-.04	-.03	.05
Gender of child to T3 Criticism	.06	.06	.06
MR to T3 SIB-R	.11*	.05	.15**
MR to T3 Criticism	.11	.12	.11
<i>R</i> ²			
T3 Criticism	.23	.22	.23
T3 SIB-R	.59	.48	.48
Model 3: Emotional Overinvolvement (EOI)			
Stability effects			
T2 EOI to T3 EOI	.42***	.43***	.43***
T2 SIB-R to T3 SIB-R	.75***	.63***	.60***
Cross-lagged effects			
T2 EOI to T3 SIB-R	.08	.02	.11
T2 SIB-R to T3 EOI	-.10	-.05	.01

(Table continued)

Table 3. Continued

Model ^a	Behavior		
	Externalizing	Internalizing	Asocial
Control variables			
Gender of child to T3 SIB-R	-.03	-.02	.07
Gender of child to T3 EOI	.17**	.17**	.17**
MR to T3 SIB-R	.12*	.07	.18***
MR to T3 EOI	-.19***	-.19**	-.20***
<i>R</i> ²			
T3 EOI	.25	.24	.24
T3 SIB-R	.59	.42	.44

^aExpressed emotion, SIB-R = Scales of Independent Behavior–Revised, T2 = Time 2, T3 = Time 3.

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

did not have a reciprocal cross-lagged effect on expressed emotion at Time 3, $\beta = -.04$. With respect to internalizing behaviors, high levels of expressed emotion at Time 2 were related to increasingly severe internalizing behavior problems at Time 3, $\beta = .18$. In addition, internalizing behavior problems had a significant reciprocal effect on levels of expressed emotion at Time 3, $\beta = -.15$, but the direction of the effect was the opposite of our expectation. A high level of internalizing behavior problems at Time 2 was related to decreasing expressed emotion at Time 3. Finally, a high level of expressed emotion at Time 2 was related to increasing asocial maladaptive behaviors at Time 3, $\beta = .27$, but asocial maladaptive behavior at Time 2 was unrelated to levels of expressed emotion at Time 3, $\beta = -.05$. The model explained approximately 25% of the variance in levels of expressed emotion at Time 3, and 63%, 45%, and 50% of the variance in Time 3 externalizing, internalizing, and asocial maladaptive behaviors, respectively.

Model 2 displays the cross-lagged effects of criticism and the three behavior problems subscales. Contrary to our hypothesis, there were no significant cross-lagged effects between levels of criticism and externalizing behavior. With respect to internalizing behaviors, a high level of criticism at Time 2 was related to an increase in the severity of internalizing maladaptive behaviors at Time 3, but internalizing maladaptive behaviors at Time 2 did not have a cross-lagged effect on criticism at Time 3. Similarly, a higher level of criticism at Time 2 was related to a significant increase in the severity of the child's asocial behaviors at Time 3,

but the severity of the child's asocial behavior problems at Time 2 did not have an effect on levels of criticism at Time 3.

Model 3 reports the cross-lagged effects of emotional overinvolvement and the three behavior problems subscales. As expected, emotional overinvolvement at Time 2 had no effect on the severity of externalizing, internalizing or asocial behaviors at Time 3. In addition, there was no cross-lagged effect between externalizing, internalizing, or asocial behavior problems at Time 2 and levels of emotional overinvolvement at Time 3.

Turning from behavior problems to autism symptoms, Table 4 reports the path coefficients between overall expressed emotion and its components and the three Autism Diagnostic Interview–Revised subscales: Repetitive Behaviors and Restricted Interests, Impairments in Social Reciprocity, and Impairments in Nonverbal Communication. Again, there was a high level of stability in the symptoms manifested by the adolescent or adult with autism. The stability coefficients ranged from .55 to .85, quite similar in magnitude as the stability coefficients for the Scales of Independent Behavior–Revised subscales.

As shown in Model 1, a high level of expressed emotion at Time 2 was associated with increasing impairments in reciprocal social interaction at Time 3. Contrary to our hypothesis, there were no cross-lagged effects in either direction between levels of expressed emotion and the severity of repetitive behaviors and restricted interests or impairments in nonverbal communication. The model explained approximately 25% of the variance in levels of expressed emotion at

Table 4. Standardized Path Coefficients for Two-Wave Cross-Lagged Models for Autism Diagnostic Inventory-Revised (ADI-R) Measures of Symptoms

Model ^a	Repetitive behaviors & restricted interests	Impairments in reciprocal social interactions	Impairments in nonverbal communication
Model 1: Expressed Emotions			
Stability effects			
T2 EE to T3 EE	.41***	.42***	.42***
T2 ADI-R to T3 ADI-R	.56***	.83***	.84***
Cross-lagged effects			
T2 EE to T3 ADI-R	.11	.18***	-.07
T2 ADI-R to T3 EE	.11	.08	-.03
Control variables			
Gender of child to T3 ADI-R	-.01	.05	.06
Gender of child to T3 EE	.20***	.21***	.21***
MR to T3 ADI-R	.14*	.08*	-.06
MR to T3 EE	-.07	-.08	-.04
<i>R</i> ²			
T3 EE	.25	.25	.24
T3 ADI-R	.38	.80	.69
Model 2: Criticism			
Stability effects			
T2 Criticism to T3 Criticism	.43***	.43***	.44***
T2 ADI-R to T3 ADI-R	.55***	.82***	.84***
Cross-lagged effects			
T2 Criticism to T3 ADI-R	.23***	.07	-.04
T2 ADI-R to T3 Criticism	.07	-.00	.01
Control variables			
Gender of child to T3 ADI-R	-.00	.07	.05
Gender of child to T3 Criticism	.06	.06	.06
MR to T3 ADI-R	.12	.10*	-.06
MR to T3 Criticism	.10	.11	.11
<i>R</i> ²			
T3 Criticism	.22	.22	.22
T3 ADI-R	.42	.78	.69
Model 3: Emotional Overinvolvement (EOI)			
Stability effects			
T2 EOI to T3 EOI	.43***	.44***	.44***
T2 ADI-R to T3 ADI-R	.57***	.84***	.85***
Cross-lagged effect			
T2 EOI to T3 ADI-R	-.02	.06	.00
T2 ADI-R to T3 EOI	-.04	.08	.12

(Table continues)

Table 4. Continued

Model ^a	Repetitive behaviors & restricted interests	Impairments in reciprocal social interactions	Impairments in nonverbal communication
Control variables			
Gender of child to T3 ADI-R	.01	.08*	.05
Gender of child to T3 EOI	.17**	.17**	.16*
MR to T3 ADI-R	.15*	.10*	-.07
MR to T3 EOI	-.19***	-.23***	-.24***
<i>R</i> ²			
T3 EOI	.24	.25	.25
T3 ADI-R	.37	.78	.69

^aExpressed emotion, ADI-R = Autism Diagnostic Interview-Revised, T2 = Time 2, T3 = Time 3.

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

Time 3, and 38%, 80%, and 69%, of the variance in Time 3 repetitive behaviors, impairments in reciprocal social interactions, and impairments in nonverbal communication, respectively.

Regarding the components of expressed emotion, level of criticism at Time 2 was significantly related to worsening Autism Diagnostic Interview-Revised repetitive behaviors at Time 3 (Model 2). However, the reciprocal cross-lagged effect was not significant. In addition, there were no effects in either direction between maternal criticism and either the Autism Diagnostic Interview-Revised reciprocal social interaction or nonverbal communication impairment domains.

Model 3 in Table 4 shows the relationship between emotional overinvolvement and the three Autism Diagnostic Interview-Revised subscales. Consistent with our expectation, higher levels of emotional overinvolvement at Time 2 were not related to an elevation in repetitive behaviors and restricted interests, impairments in reciprocal social interactions, or nonverbal communication impairments at Time 3. Also, there were no cross-lagged effects between the symptoms of autism at Time 2 and levels of overinvolvement at Time 3.

In each model reported above, the associations between the control variables (gender and mental retardation status) and the measures of behavior problems and autism symptoms are displayed. Although the coefficients (and levels of significance) varied somewhat from model to model, the general pattern was the same. As predicted, those who had a diagnosis of mental retardation had higher levels of externalizing and

asocial maladaptive behavior, more severe repetitive behaviors, and more severe impairments in social reciprocity. Female sample members were more impaired in reciprocal social interactions.

We also examined the extent to which the control variables predicted expressed emotion in all models. Mothers of female sample members had higher levels of overall expressed emotion as well as higher levels of emotional overinvolvement. Mothers of sample members with mental retardation had lower levels of overinvolvement. Thus, characteristics of the son or daughter with autism conditioned maternal expression of overinvolvement.

Discussion

We found strong support for the hypothesis that high levels of maternal expressed emotion would have detrimental effects on the well-being of individuals with autism. For four out of six dependent variables, high levels of overall expressed emotion led to increasing levels of maladaptive behaviors and/or more severe autism symptoms over time. Consistent with the general literature on expressed emotion, a high level of overall expressed emotion in mothers of adolescents and adults with autism was related to increasing severity and intensity of externalizing, internalizing, and asocial maladaptive behaviors over time, controlling for prior levels of behavior problems. High levels of overall expressed emotion had similar, though weaker, effects on the symptoms of autism, leading to intensifying impairments in reciprocal social interactions.

Consistent with prior research, the level of criticism appears to be driving the relationship between overall expressed emotion and elevation in symptoms. A high level of criticism was significantly related to increasing levels of internalizing and asocial maladaptive behaviors and to increasing severity of repetitive behaviors over time. It was only with respect to impairments in nonverbal communication (i.e., gestures, pointing, nodding, and head-shaking) that neither overall expressed emotion nor criticism had a significant effect. Our findings are consistent with the more general literature on the effects of parental criticism on maladaptive behavior in children (e.g., Ge, Best, Conger, & Simons, 1996; G. Patterson, 1982).

Mink and Nihira (1987) were among the first to examine the bidirectional parent/child influences in families of children with mental retardation. They found that the direction of influence between parent and child depended on the type of family, with the influence flowing from parent to child in highly cohesive families and from child to parent in control-oriented and child-oriented families. Our findings here parallel their findings for cohesive families. Although it would have been informative to replicate their family typology in our sample, we did not have the data to do so. We were, however, able to examine the levels of family cohesion based on data collected at the first wave of our study, when the Family Cohesion subscale from the FACES II (Olson et al., 1983) was administered. The average level of family cohesion was 60.4 (scale ranges from 16 to 80), indicating a moderate level of family closeness. In addition, most mothers in our study reported close relationships with their child who had autism (Orsmond et al., 2006). Thus, our findings appear to lend some support to Mink and Nihira's (1987) earlier findings about the direction of effects in cohesive families. An important goal for future researchers is to examine whether the relationship between expressed emotion and behavior problems and symptoms of children with autism is moderated by family type.

Although our focus in this paper was on the detrimental effects of high levels of expressed emotion on the behavior problems and symptoms of adolescents and adults with autism, we note that the majority of families in our sample did not evidence elevated levels of expressed emotion. On average, the levels of expressed emotion in these families were lower than those reported in families

dealing with psychiatric disorders (e.g., Barrowclough & Parle, 1997; P. Patterson, Birchwood, & Cochrane, 2000; Scazufca & Kuipers, 1996). Such patterns may indicate a pattern of family strength and effective coping with the stresses of autism and suggest a positive influence of the effect of the family environment on the development of individuals with autism spectrum disorders.

Another explanation for the low rates of expressed emotion in our sample is suggested by research on the relationship between expressed emotion and parental attributions about the degree to which the child has control over his or her symptoms. There is growing evidence that high expressed emotion occurs when the family members perceive that the individual with disability has control over his or her symptoms and behaviors (Greenley, 1986; Hooley, 1987). As part of the larger study, we asked mothers to tell us their beliefs regarding why their child developed autism. Many mothers attributed the cause of their child's condition to factors beyond their child's control, such as birth complications, genetics, or environmental toxins. Thus, the relatively low rate of high expressed emotion in our sample may be related to the fact that many of the mothers in our study attributed their child's behavioral symptoms to factors beyond his or her control. It also may explain why we did not replicate King's (2000) finding of a relationship between negative symptoms and higher levels of maternal criticism. If mothers perceive their son or daughter's behaviors and symptoms as beyond the child's control, we would not expect that they would be highly critical when their son or daughter displayed behavior problems and autism symptoms.

There was some evidence supporting the expectation that the characteristics of the individual with autism would have an influence on maternal expressed emotion, but the influence in this direction was weaker. Mothers had higher levels of overall expressed emotion and overinvolvement with daughters than with sons, reflecting gendered patterns of maternal vigilance. Overinvolvement was found to be lower when the individual with autism also had a comorbid diagnosis of mental retardation. We speculated that this finding may have been the result of a higher level of service utilization by those who had a comorbid diagnosis of mental retardation because higher levels of service utilization make it possible for mothers to share responsibility with the formal service system and not shoulder the caregiving burden

alone. In a follow-up analysis, we compared sample members who had a comorbid diagnosis of mental retardation with those who did not and found that the former group received significantly more services than did the latter group, as expected (means at Time 3 = 7.68 vs. 4.01), $t(1, 147) = 6.70, p < .001$. One possible implication of this finding is that providing a rich array of services to individuals with autism may have the indirect effect of reducing maternal emotional overinvolvement.

Finally, mothers tended to display declining levels of overall expressed emotion when the son or daughter had higher levels of internalizing maladaptive behavior, a category that includes being withdrawn, inattentive, and self-injurious. Perhaps this reflects a pattern of mutual or reciprocal emotional disengagement, a finding that warrants additional research given the high prevalence of depression among individuals with autism (Ghaziuddin, Ghaziuddin, & Greden, 2002; Howlin, 2002).

One of the unsettled issues in the field is whether expressed emotion represents an underlying personality trait or a transient state. In a study comparing relatives who were high versus low on expressed emotion, Hooley and Hiller (2000) found that those classified as high in expressed emotion were less flexible, less tolerant, and had lower levels of empathy and achievement, as measured by the California Psychological Inventory, than those classified as low in expressed emotion. Hooley (1998a) also found that relatives high in expressed emotion were more likely to have an internally based locus of control compared to relatives low in expressed emotion. Our finding of a moderate level of stability observed for expressed emotion over the 18-month period along with weak cross-lagged effects of behavior problems and autism symptoms on expressed emotion are consistent with conceptualizations of expressed emotion as a personality trait.

However, other researchers have found evidence that expressed emotion is reactive to characteristics of the adult with disabilities, in particular fluctuations in behavior problems and, thus, expressed emotion also may have state-like qualities (King, 2000). Still others reported evidence that expressed emotion has characteristics of both a state and trait (Schreiber, Breier, & Pickar, 1995). In our study, even though expressed emotion remained quite stable over time, approximately 30% of the sample shifted from low to high expressed emotion or vice versa between Times 2 and 3. We

agree with Hooley (1998b) and others (e.g., Rosenfarb et al., 1995) that attention should be focused on understanding the mechanisms underlying the relationship between expressed emotion and symptom exacerbations rather than continuing the trait versus state debate.

In research on families of individuals with schizophrenia, expressed emotion has been shown to be modifiable through psychoeducational interventions. For example, Leff and Vaughn (1985) reported that a 9-month psychoeducational group for relatives of adults with schizophrenia had a 54% success rate in reducing expressed emotion level from high to low. Tarriner et al. (1988) found that psychoeducational behavior-oriented treatment significantly reduced levels of criticism and overinvolvement. Based on the evidence of the present investigation, there is reason to develop and evaluate the effects of similar interventions for families of individuals with autism, particularly during the early childhood years when family interaction patterns may be more fluid, and targeted to families who score high on expressed emotion. Family psychoeducational interventions are likely also important for families of adolescents and adults with autism, as our data suggested that there are continued significant detrimental effects of high levels of expressed emotion, even in adulthood. Because our data are correlational and do not permit strong inferences regarding causality, intervention studies are a necessary first step to determine whether family treatments designed to lower caregiver expressed emotion in families of persons with psychiatric disabilities have a similar beneficial effect on adolescents and adults with autism.

Several limitations of the study must be acknowledged. First, our sample of mothers of adolescents and adults with autism consisted of volunteers who were predominantly White. Consequently, the representativeness of the sample and the generalizability of the findings are not known. Second, the 18-month time span analyzed in our data represents a very small slice in the life of the interaction between mothers and their adolescent or adult child with autism. The correlations between parental characteristics and child behaviors reflect bidirectional transactional processes that unfold over many years. For example, Bates, Pettit, and Dodge (1995) found that an infant's early characteristics elicited harsh parenting at age 4, which in turn predicted externalizing problems when children were young adolescents. Thus, a

longer time period may be needed to detect the influence of the son or daughter's behavior problems or symptoms on the mother. Third, the measures of maladaptive behavior problems, and autism symptoms were based on data collection from the mothers. This likely increased the associations among these variables over time, making it more difficult to detect the effect of behavior problems and autism symptoms on expressed emotion. Fourth, as noted above, overall levels of expressed emotion were low relative to other studies, with very few mothers in our sample classified as high on emotional overinvolvement. The restriction in range on the emotional overinvolvement measure at both Time 2 and Time 3 may partially explain why we were not able to replicate longitudinally our earlier cross-sectional finding of a relationship between impairments in reciprocal social interactions and emotional overinvolvement, based on a larger sample drawn from the same study (Orsmond et al., 2006). In addition, although Leeb et al. (1991) found considerable stability in ratings based on the Five-Minute Speech Sample on two occasions 5 weeks apart, the evidence for the long-term stability of Five-Minute Speech Sample ratings is mixed. King (2000) reported considerable stability in these speech sample ratings over an 18-month period, with stability coefficients for criticism higher than those for emotional overinvolvement (ranging from .69 to .71 vs. .53 to .60, respectively). Peris and Baker (2000) found good stability over a 2-year period on the overall rating of expressed emotion but lower levels of stability for criticism and emotional overinvolvement. Clearly, more research needs to be conducted on the stability of Five-Minute Speech Sample ratings in longitudinal research.

Past research on families of individuals with autism has confirmed that such families experience greater levels of stress than do families whose children have other types of developmental disabilities (Seltzer et al., 2000). Early intervention for young children with autism has been shown to be an effective strategy for improving skills and reducing the level of impairments (Lord & McGee, 2001). Results of the present study point to another potentially effective avenue for improving life-course outcomes for this population, because the sons and daughters of mothers who do not express high levels of criticism, and to a lesser extent, who are not overly vigilant, tend to become less impaired over time. Although there is increas-

ing evidence that autism is a complex genetic disorder, the effect of the family environment in shaping the behavioral phenotype should not be underestimated.

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