Externalizing and Internalizing Behaviors in ASD

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The current study investigated the relationships between internalizing and externalizing (I-E) behaviors and family variables, including both parenting stress and quality of attachment relations, in children aged 8–12 with high-functioning autism spectrum disorder (ASD) or with typical development. Compared to the group with typical development, children with ASD exhibited significantly greater levels of psychopathology as assessed by the Child Behavior Checklist [Achenbach, 1991], and parents of children with ASD exhibited higher parenting stress as assessed by the Parenting Stress Index [Abidin, 1995]. In a hierarchical multiple regression analysis, parenting stress emerged as the most important predictor of children's I-E problems. Results are discussed in light of the two groups' similar relationships between parenting stress and child psychopathology.

Keywords: psychopathology; adaptive behavior; high-functioning ASD; parental stress

Two major behavior types are known as important predictors of typically developing children's social competence: disregulated overt or ''externalizing'' behaviors like aggressiveness, impulsivity, and control problems, and disregulated ''internalizing'' behaviors like withdrawal, anxiety, and depression [Burt, Obradovic', Long, & Masten, 2008; Hay, Payne, & Chadwick, 2004]. Higher levels of each behavior types predict lower peer acceptance and greater social difficulties [e.g., Burt et al., 2008; Deater-Deckard, 2001; Mesman, Bongers, & Koot, 2001].

Internalizing and externalizing (I-E) behaviors are frequently observed in school aged and older youngsters with autism spectrum disorder (ASD). Depression is one of the most common coexisting syndromes observed in individuals with ASD, particularly in higher-functioning individuals who can describe their difficulties [Lainhart & Folstein, 1994; Meyer, Mundy, Van Hecke, & Durocher, 2006]. Anxiety is also frequently reported [Ghaziuddin, Weidmer-Mikhail, & Ghaziuddin, 1998; Green, Gilchrist, Burton, & Cox, 2000; Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Meyer et al., 2006]. In addition, empirical research and clinical observation suggest that a relatively large number of high-functioning individuals with ASD exhibits externalizing problems at some point during development [Brereton, Tonge, & Einfeld, 2006; Gadow, DeVincent, Pomeroy, & Azizan, 2005]. High rates of co-morbid ADHD and ODD symptoms are noted in these children, as well as more severe conduct disorder (CD) symptoms in school-aged vs. preschool children with ASD [Gadow et al., 2005].

Several studies of I-E behaviors in ASD utilized the Child Behavior Checklist [CBCL; Achenbach, 1991]. The CBCL is a parent report of children's problems in eight sub-domains (i.e., Withdrawn, Somatic Complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, and Aggressive Behavior). ASD research [e.g., Bölte, Dickhurt, & Poustka, 1999] found that three of these sub-domains constitute the higher-order *internalizing* scale (i.e., anxiety/depression, somatic complaints, and withdrawal), and two other sub-domains comprise the *externalizing* scale (i.e., delinquency problems and aggressiveness). Bölte et al. [1999] found that children with ASD age 4–18 years ($M = 11.3$ years, SD = 4.5) scored higher on the CBCL social, thought, and attention problem subscales and on the mean total CBCL score compared to same-age children in typical or clinical groups. Although no gender effect emerged, a positive effect did emerge for children's IQ. However, the IQ range was large (20–128), and cognitive abilities could not be examined in half of the participants, thus limiting this study's implications for the relationship between IQ and psychopathology in ASD.

Duarte, Bordin, de Oliveira, and Bird [2003] also demonstrated that a group of children with ASD age 4–11 years ($M = 7$ yrs; 4 mos) differed from both a clinical group (e.g., ADHD, CD, ODD, depressive and anxiety disorders) and a typically developing group on the CBCL sub-domain of thought problems. However, children's general level of functioning was not reported. In a recent study by Sikora, Hall, Hartley, Gerrard-Morris, and Cagle [2008], the CBCL withdrawal sub-domain was

particularly efficient in differentiating young children with autism age 36–71 months ($M = 53.54$) from others. Hartley, Sikora, and McCoy [2008] found that one-third of young children with ASD showed a CBCL total problem score in the clinically significant range, with higher scores observed on the withdrawal, attention problems, and aggression subscales.

Other studies have reported elevated risk for internalizing psychopathology (mainly depression and anxiety) or externalizing psychopathology (aggressiveness, disruptive behaviors) in ASD compared with typical controls [e.g., see review in Stewart, Barnard, Pearson, Hasan, & O'Brien, 2006; and also Kim et al., 2000; Sukhodolsky et al., 2008]. Thus, accumulating data using the CBCL suggest a high risk of I-E problems in ASD; however, the literature so far is limited by studies' large age ranges and inadequate control of participants' cognitive or language characteristics.

Familial Origins of I-E Behaviors in ASD

Two extremely important factors that affect the development of children's I-E behaviors include the quality of parent–child attachment and relations and the intensity of parenting stress.

Attachment Relations in ASD

Despite the potential complexity involved in measuring and interpreting findings for attachment relations among children with specific developmental or genetic disorders like ASD [Rutter, Kreppner, & Sonuga-Barke, 2009], a relatively large number of autism studies has utilized well-accepted tools to assess parent–child attachment security. Researchers have demonstrated that approximately half of children with ASD experience secure attachment, compared to the well-documented two-thirds in typical development [e.g., Capps, Sigman, & Mundy, 1994; Rogers, Ozonoff, & Masline-Cole, 1991, 1993; Rutgers, Bakermans-Kranenburg, van IJzendoorn, & van Berckelaer-Onnes, 2004; Shapiro, Sherman, Calamari, & Koch, 1987].

Theorists have suggested that during infancy and childhood, parents and other attachment figures function as ''external organizers'' for their children by providing a scaffold for emotion regulation [Bowlby, 1973; Grossmann & Grossmann, 1993; Grossmann, Grossmann, & Zimmermann, 1999]. As they develop, children reveal increasing autonomy in adapting and applying emotion regulation patterns learned during early experiences. Children who are ''securely'' attached can more flexibly integrate both positive and negative emotions compared to children with ''insecure'' attachments [Bretherton & Munholland, 1999; Spangler & Grossman, 1993; Spangler & Schieche, 1998]. By

adolescence, securely attached youngsters are less hostile toward peers, less anxious, less helpless [Kobak & Sceery, 1988], more socially competent, and use more active coping strategies [Zimmermann & Grossmann, 1997] than insecurely attached adolescents. Muris, Meesters, and van den Berg [2003] found that adolescents who classified themselves as avoidantly or ambivalently attached displayed higher levels of I-E symptoms than securely attached adolescents. Furthermore, perceived parental rearing behaviors were also associated with I-E symptoms. Aspects of parents' attachment behaviors, like low levels of emotional warmth and high levels of rejection and overprotection, were accompanied by children's high levels of psychopathological I-E symptoms [Muris et al., 2003].

Parenting Stress in ASD

Parents of children with ASD (especially mothers) are at greater risk of experiencing stress compared to either parents of children with typical development or to parents of children with other disabilities or chronic illnesses [e.g., Bouma & Schweitzer, 1990; Bristol, Gallagher, & Schopler, 1988; Duarte, Bordin, Yazigi, & Mooney, 2005; Dumas, Wolf, Fisman, & Culligan, 1991; Moes, Koegel, Schreibman, & Loos, 1992; Rodrigue, Morgan, & Geffken, 1990; Sanders & Morgan, 1997; Wolf, Noh, Fisman, & Speechley, 1989]. Parenting stress can also contribute to children's social competence and aggressiveness. Family instability can increase adolescent risk for psychological problems by directly contributing to insecure appraisals of the family [Forman & Davies, 2003]. Forman and Davies also showed a pathway whereby family instability predicted parenting difficulties, which in turn indirectly predicted adolescents' aggravated I-E symptoms through their association with lower levels of perceived family security. Kim, Conger, Elder, and Lorenz [2003] offered further support for such predictions during adolescence, suggesting that stressful life events lead to maladjusted I-E behaviors, which then lead to increased family stress. Thus, parenting stress and children's maladjusted behaviors may be reciprocally linked.

The Current Study

The current study examined whether the relations identified by previous research between I-E behaviors and family variables (quality of attachment relations and parenting stress) in typically developing children could also be identified in high-functioning children with ASD. Thus, we carefully matched a group of children with typical development to a group of children with ASD; examined group differences on the CBCL's sub-domains and two major domains; and investigated the contribution

of attachment security and parenting stress to the understanding of I-E behavior types in both groups. Specific study aims were to examine:

1. Group differences in children's I-E behaviors (per maternal reports) between matched groups of children with ASD and children with typical development.

2. Group differences in self-reported levels of maternal parenting stress between groups of mothers of children with ASD and mothers of children with typical development.

3. The contribution of children's verbal IQ (VIQ), children's self-reported security of attachment, children's perceived mother–child relationship, mother-reported parenting stress index (PSI), and these variables' inter-relations to the understanding of children's I-E behaviors (per mother reports).

Based on the binational nature of our sample, including participants from the USA and Israel, nationality differences were also examined as a secondary goal.

On the basis of the empirical links previously identified between attachment security, parenting stress, and I-E behaviors in nonautistic development, we predicted that children who had an insecure pattern of attachment and whose mothers had higher levels of parenting stress would demonstrate the highest I-E behavior problem scores, regardless of grouping (ASD/typical).

Method
Participants

A total of 77 children from the USA and Israel participated in the study. They included two groups with high-functioning ASD ($n = 23$, Israel; $n = 20$, USA, each group included one girl) and two typically developing groups ($n = 22$, Israel; $n = 12$, USA, each group included one girl).

ASD groups. Inclusion criteria in both nations comprised the following: (1) previous *DSM-IV* diagnosis [American Psychiatric Association, 1994] from a licensed, experienced clinician outside the study; (2) Autism Diagnostic Interview–Revised (ADI-R) score [Lord, Rutter, & LeCouteur, 1994] within the autism range as administered by the research staff; (3) a VIQ of 80 or above on the Peabody Picture Vocabulary Test [PPVT; Dunn & Dunn, 1997] to designate high functioning for the ASD sample because the PPVT verbal language scores correlate very highly with many other measures of general language ability and cognitive ability [Sattler, 1988]; and (4) normative reading comprehension level based on norms for the reading subtest of the Wide Range

Achievement Test 3 [WRAT 3; Wilkinson, 1993] in the USA sample and based on norms for the *Ma'akav* reading test [Shany, Lachman, Shalem, Bahat, & Zeiger, 2003] in the Israeli sample.

Thus, all participants in the ASD groups were designated high functioning and showed normative reading levels. In the Israeli sample, children with ASD had received a prior clinical diagnosis of either autistic disorder ($n = 8$; 37.5%, one girl) or Asperger syndrome ($n = 15$; 62.5%), and all 23 participants scored above the autism cutoff on the ADI-R. In the USA sample, children with ASD had received a prior diagnosis of either autistic disorder ($n = 7$; 35%) or Asperger syndrome ($n = 13$; 65%, one girl), and all 20 participants scored above the autism cutoff on the ADI-R. Children with diagnoses of autistic disorder and Asperger syndrome were included because diagnostic practices in both Israel and the USA do not consistently differentiate these two groups among children with unimpaired intellectual ability (all of whom qualified for autistic disorder based on the ADI-R) and because of the shared social characteristics for both populations during middle childhood [Frith, 2004; Macintosh & Dissanayake, 2004].

The multivariate analysis of variance (MANOVA) performed to examine differences on the ADI-R between children with ASD in the USA and Israel yielded nonsignificant main effects for the overall ADI-R, $F(3,38) = 2.56$, $P > 0.05$, $\eta^2 = 0.16$. However, in the examination of univariate effects, groups did differ only on the ADI-R communication sub-domain, $F(1,40) = 6.66$, $P < 0.05$, $\eta^2 = 0.14$ ($M = 13.35$, SD = 4.14 in Israel; and $M = 16.63$, SD = 4.05 in the USA). Group means were also slightly higher for the USA group than the Israeli group on the ADI-R socialization and behavior sub-domains, but the differences were nonsignificant (Socialization: $M = 17.17$, SD = 3.40 in Israel; and $M = 19.53$, SD = 4.75 in the USA; Behavior: $M = 5.22$, SD = 1.31 in Israel; and $M = 6.47$, SD = 2.83 in the USA).

Typical groups. In each country, the group of children with typical development was matched to the group of children with ASD on: maternal education, VIQ based on the PPVT [Dunn & Dunn, 1997], child age, and gender (Table I).

Measures

Security of attachment. The Kerns Security Scale [KSS; Kerns, Aspelmeier, Gentzler, & Grabill, 2001; Kerns, Klepac, & Cole, 1996] is the most widely used self-report for children in middle childhood that provides a continuum of security scores among individuals. This 15-item forced-choice self-report measure was designed to evaluate children's perceptions of security in mother–child and father–child relationships. The current study utilized only the mother–child scale. KSS items tap those aspects of attachment thought to reflect

Table I. Sample Characteristics for Children with Autism Spectrum Disorder (ASD) and Children with Typical Development in Israel and the USA

	ASD		Typical		
	Israel ($n = 23$)	USA ($n = 20$)	Israel ($n = 22$)	USA ($n = 12$)	Group difference (1, 73)
CA (in months)					
M	116.65	125.42	122.95	121.88	1.28
SD	14. 05	15.17	17.10	15.78	
Verbal IQ					
M	106.04	105.25	112.36	113.00	2.07
SD	10.01	16.18	6.96	15.33	
Mother's education					
M	4.72	5.00	4.55	5.28	1.05
SD	1.35	0.80	1.35	1.25	

Verbal IQ scores are based on the Peabody Picture Vocabulary Test. Mother's education was calculated on a 6-point scale as follows: 1, less than 8th grade; 2, some high school; 3, high school with diploma; 4, some college; 5, college degree such as BA; 6, graduate degree (e.g., masters or above).

security during middle childhood: (1) availability—e.g., whether a child worries that a parent will not be there when needed; and (2) reliance (ease and interest in communication with the parent)—e.g., whether a child goes to the parent when upset and whether a child likes to tell a parent what she or he is thinking and feeling. Items were rated on a 4-point scale using Harter's [1982] "Some kids….Other kids…" format. For example: "Some kids find it easy to trust their mom BUT other kids are not sure if they can trust their mom." Children were asked to indicate which statement was more characteristic of them and then to indicate whether this statement was really true for them or somewhat true. Scores across items were summed, so that children received a score on a continuous dimension of security, with higher scores indicating more secure attachment. Also, Kerns et al. [1996] suggested a cut-off score, where a score of 45 or below reflects an insecure attachment style, and a score above 45 reflects a secure attachment style. The KSS has shown good internal consistency with mothers (Cronbach α of 0.79 and in current study 0.70), and a high test–retest correlation over a short time interval, r (30) = 0.75, indicating stability in children's perceptions of security over a short period of time [Kerns et al., 1996, 2001].

Mother–child relationship qualities. To complement the KSS in measuring mother–child attachment relationships, the current study also included the Inventory of Parent and Peer Attachment [IPPA; Armsden & Greenberg, 1987]. The IPPA was developed to assess children's perception of the positive and negative affective/cognitive dimensions of relationships with their parents and close friends, specifically tapping how well these figures serve as a source of psychological security. The current study utilized only the mother–child scale. The 25-item IPPA was rated on a 5-point Likert scale from 1 (*never true*) to 5 (*always true*), yielding three broad relationship qualities: the degree of mutual trust (e.g., "My mother respects my feelings," $\alpha = 0.74$); quality of communication (e.g., "I tell my mother about

my problems and troubles," $\alpha = 0.76$), and the extent of anger and alienation (e.g., "I get upset easily around my mother," $\alpha = 0.65$); and an overall score ($\alpha = 0.87$).

Child Behavior Checklist. The parent-reported 113-item CBCL [Achenbach, 1991; Achenbach & Rescorla, 2000] covers a variety of behavioral and emotional problems in children and adolescents, rated along three response options. The CBCL yields eight sub-domain factors with adequate reliability and validity according to the CBCL manual: Withdrawn, $\alpha = 0.77$; Somatic Complaints, $\alpha = 0.83$; Anxious/Depressed, $\alpha = 0.87$; Social Problems, $\alpha = 0.86$; Thought Problems, $\alpha = 0.79$; Attention Problems, $\alpha = 0.88$; Delinquency problems, $\alpha = 0.64$; and Aggressive Behavior, $\alpha = 0.91$. These subscales further yield two broad behavior problem scales: the internalizing scale ($\alpha = 0.91$) and the externalizing scale ($\alpha = 0.92$).

Parenting Stress Index. The 120-item PSI [Abidin, 1995] identifies highly stressed parenting and predicts the potential for parental behavior problems and child adjustment difficulties within the family system. Based on the underlying assumption that the total stress a parent experiences is a function of certain salient child characteristics, parent characteristics, and situations that are directly related to the parenting role, the PSI consists of a total stress score, plus scale scores for both child and parent characteristics, which pinpoint sources of stress within the family. Child characteristics comprise six subscales: Distractibility/Hyperactivity, Adaptability, Reinforces Parent, Demandingness, Mood, and Acceptability. Parent personality and situational variables comprise seven subscales: Competence, Isolation, Attachment, Health, Role Restriction, Depression, and Spouse.

Procedure

This article reports part of a larger study that included several additional measures not reported here. Research

data were collected in each PI's laboratory, one at the MIND Institute at UC Davis (Rogers), and the other at the School of Education, Bar-Ilan University (Bauminger), under the authority of the institutional review board for each university. The research session included the target child and the target child's mother, who were each met by a researcher team member concurrently but separately. The child completed the KSS, IPPA, PPVT, and WRAT 3 (USA sample) or *Ma'akav* (Israel sample), while the mother completed the PSI and CBCL. Order of administration of study measures, including several questionnaires and tasks beyond the focus of the current report, was counterbalanced across participants.

Several procedures were followed to assure that data collection and management did not differ by site (USA vs. Israel). First, the research team developed a very detailed study protocol with written instructions for administration of all measures and the experimental scenario. This was carefully followed for all assessments. Second, the Israeli PI (N. B.) visited the USA PI (S. R.) and team annually to train and review all aspects of the study. Finally, all data coding procedures were executed in Israel by bilingual coders fluent in Hebrew and English. A more comprehensive description of study procedure can be found in Bauminger et al. [2008].

Results
Group Differences

CBCL: Children's I-E behaviors. In line with the first study aim, a 2×2 MANOVA (Disability status: ASD/ typical $\times$ Nationality: Israel/USA) was performed to examine disability and nationality differences on the externalizing dimension and on the internalizing dimension of the CBCL. The MANOVA results yielded significant main effects for disability, $F(2, 72) = 14.80$, $P < 0.001$, $\eta^2 = 0.29$, and for nationality, $F(2, 72) = 7.80$, $P < 0.001$, $\eta^2 = 0.18$. Follow-up univariate analysis of variances (ANOVAs) demonstrated a significant disability effect for externalizing problems, $F(1, 73) = 11.74$, $P < 0.001$, $\eta^2 = 0.14$, and for internalizing problems, $F(1, 73) = 29.14$, $P < 0.001$, $\eta^2 = 0.28$. As expected, children with ASD showed higher levels of externalizing ($M = 11.69$, SD $= 9.46$) and internalizing ($M = 13.09$, SD $= 8.86$) behaviors compared to children with typical development ($M = 4.76$, SD $= 6.88$; $M = 4.02$, SD $= 4.01$, respectively). Nationality differences were also significant for both externalizing behaviors, $F(1, 73) = 15.80$, $P < 0.001$, $\eta^2 = 0.18$, and internalizing behaviors, $F(1, 73) = 8.25$, $P < 0.01$, $\eta^2 = 0.10$, with USA children showing higher levels of externalizing ($M = 13.31$, SD $= 10.49$) and internalizing ($M = 12.43$, SD $= 8.72$) behaviors compared to Israeli children ($M = 5.31$, SD $= 6.07$; $M = 6.71$, SD $= 7.42$, respectively).

Given these findings on the overall CBCL scores, a second MANOVA was performed to examine disability and nationality differences on the eight CBCL sub-domains. Significant main effects emerged both for disability, $F(8, 65) = 13.59$, $P < 0.001$, $\eta^2 = 0.62$, and for nationality, $F(8, 65) = 2.79$, $P < 0.01$, $\eta^2 = 0.25$. Follow-up ANOVAs revealed significant disability differences for all eight CBCL sub-domains, where children with ASD reported more severe ratings of maladjusted behaviors (Table II), as expected, compared to typically developing children. Nationality differences were also found for all sub-domains except for social withdrawal, where the USA group reported more severe ratings of such behaviors compared with Israelis. As expected, all CBCL sub-domains correlated highly with the two broad clusters (with r ranging from 0.55 to 0.86); hence, we used only these two broad behavior types—I and E—in our regression analyses. Using these two combined broad scales, 21% of the ASD group met the clinical criteria for externalizing behaviors and 26% met the clinical criteria for internalizing behaviors, whereas only 3% of the typical group demonstrated externalizing behaviors above the cutoff and 0% met criteria for internalizing behaviors.

PSI: Maternal parenting stress. In line with the second study aim, a MANOVA was performed to examine disability and nationality differences on the PSI scales, including the child characteristics scale and the parent personality and situational variable scale. Significant main effects emerged for disability, $F(16, 58) = 2.22$, $P < 0.05$, $\eta^2 = 0.38$, and for nationality, $F(16, 58) = 2.24$, $P < 0.05$, $\eta^2 = 0.38$. Follow-up univariate ANOVAs revealed significant differences on all the PSI subscales except for isolation and attachment in the parent scale (Table III). In all PSI subscales, mothers of children with ASD reported higher stress levels compared to mothers of children with typical development. Despite an overall nationality effect, ANOVA results for nationality differences revealed only one significant difference, on relationship with spouse, $F(1, 73) = 11.91$, $P < 0.001$, $\eta^2 = 0.14$, for which Israeli mothers reported lower scores than USA mothers ($M = 33.17$, SD $= 25.21$; $M = 46.18$, SD $= 29.00$, respectively).

Hierarchical Regression Predicting I-E Behaviors from VIQ, Attachment, Mother–Child Relationship, and Parenting Stress

In line with the third study aim, hierarchical regression analyses were performed to investigate how VIQ, security of attachment, mother–child relationship quality, and parenting stress, as well as their interactions may contribute to the explanation of I-E behaviors. The first step of the analysis introduced disability, nationality, and VIQ to control for variance related to these independent variables. Next, we entered the security of attachment score and the overall mother–child relationship quality score in the second step of the regression, and the parenting stress score in the third step. The fourth and final step consisted of the interactions between the various predictors. In the first three steps, the variables'

Table II. Disability and Nationality Group Differences for the CBCL

	Disability		Nationality		F(1, 77) Disability η²	F(1, 77) Nationality η²
	ASD	TYP	ISR	USA		
Social withdrawn						
M	3.93	0.55	2.11	2.93	56.89[a]	0.93
SD	2.45	1.08	2.68	2.42	0.43	0.01
Somatic complaints						
M	2.21	0.67	0.87	2.58	8.11[b]	6.05[c]
SD	3.31	1.21	1.43	3.68	0.10	0.08
Anxious/depressed						
M	7.34	2.75	3.88	7.58	19.78[a]	9.19[b]
SD	5.60	3.14	4.78	5.11	0.21	0.11
Social problems						
M	6.60	1.64	3.22	6.22	50.04[a]	11.04[a]
SD	3.72	2.61	3.43	4.44	0.40	0.13
Thought problems						
M	4.72	0.33	2.00	3.96	93.56[a]	8.87[b]
SD	2.78	0.89	2.60	3.40	0.55	0.11
Attention problems						
M	9.32	2.47	4.64	8.70	64.23[a]	14.58[a]
SD	4.49	3.23	4.49	5.52	0.46	0.17
Delinquent behavior						
M	2.07	0.75	0.77	2.48	9.24[b]	13.06[a]
SD	2.15	1.64	1.29	2.57	0.11	0.15
Aggressive behavior						
M	9.62	4.17	4.53	11.09	14.06[a]	15.98[a]
SD	7.78	5.33	5.23	8.38	0.16	0.18

CBCL, Children's Behavior Checklist. Several SDs were higher than their Ms; therefore, we performed an additional two series of Mann–Whitney nonparametric tests for independent samples on group and on nation differences for these cases, and the same significant differences emerged.
[a]$P<0.001$; [b]$P<0.01$.

Table III. Disability Group Differences for the Parenting Stress Index

	ASD		Typical		F(1, 77) Disability	η²
	M	SD	M	SD		
Child characteristics subscales						
Distractibility/hyperactivity	60.58	27.75	37.55	32.05	9.03[b]	0.11
Adaptability	77.16	30.09	37.35	33.64	25.67[a]	0.26
Reinforces parent	71.39	25.77	60.44	26.43	3.73[†]	0.05
Demandingness	74.88	29.50	37.55	33.23	22.64[a]	0.24
Mood	68.00	32.05	43.64	34.62	7.67[b]	0.09
Acceptability	80.46	26.18	46.50	34.92	20.11[a]	0.21
Total child scale	77.81	28.75	38.92	34.41	24.35[a]	0.25
Parent personality and situational subscales						
Competence	46.88	27.71	26.58	23.98	10.61[b]	0.13
Isolation	48.07	29.39	35.23	28.53	3.25	0.04
Attachment	33.32	25.56	36.88	27.93	0.53	0.00
Health	52.67	28.76	32.38	27.85	8.85[b]	0.11
Role restriction	48.21	31.61	38.50	29.44	2.74	0.03
Depression	46.48	29.89	35.47	28.73	4.24[c]	0.05
Spouse	55.79	31.39	28.94	22.84	4.45[c]	0.05
Total parent scale	46.21	28.59	32.56	28.67	9.07[b]	0.11
Total parenting stress	63.42	30.31	49.79	33.20	18.05[a]	20

[a]$P<0.001$; [b]$P<0.01$; [c]$P<0.05$; [†]$P=0.057$.

entrance was forced, whereas in the fourth step, variables entered according to the significance of their contribution ($P<0.05$).

The regression analysis revealed that the predictors explained 50% of the variance of both externalizing behaviors and internalizing behaviors (Table IV). In the

Table IV. Hierarchical Regression Analysis of Children's Externalizing and Internalizing Behaviors by VIQ, Attachment, Parenting Stress, and their Interactions

Predictors	External β	Internal β
Step 1 (ΔR^2)	0.33[a]	0.36[a]
Nationality	0.41[a]	0.26[b]
Disability	−0.36[a]	−0.51[a]
VIQ	0.16	0.06
Step 2 (ΔR^2)	0.02	0.02
Nationality	0.41	0.26[b]
Disability	−0.38	−0.54[a]
VIQ	0.12	0.02
IPPA-G	0.18	0.22
SA	−0.19	−0.20
Step 3 (ΔR^2)	0.09[a]	0.09[a]
Nationality	0.34[a]	0.18[c]
Disability	−0.24[c]	−0.40[a]
VIQ	0.18[c]	0.08
IPPA-G	0.13	0.16
SA	−0.13	−0.14
PSI	0.35[a]	0.35[a]
Step 4 (ΔR^2)	0.06[b]	0.02[c]
Nationality	0.34[a]	0.21[c]
Disability	−0.22[c]	−0.38[a]
VIQ	0.10	0.13
IPPA-G	0.13	0.13
SA	−0.06	−0.12
PSI	0.32[a]	0.32[b]
VIQ × Dis.	−0.26[b]	
VIQ × IPPA		−0.16[c]
R^2	0.50[a]	0.50[a]

IPPA-G, global mother-child relationships; SA, secure attachment based on the KSS; PSI, Parenting Stress Index.
[a]$P<0.001$; [b]$P<0.01$; [c]$P<0.05$.

first step, disability and nationality but not VIQ significantly contributed to the understanding of I-E behaviors, demonstrating that within this higher IQ sample, an ASD placed children at a greater risk for elevated I-E behaviors regardless of IQ level. Surprisingly, in the second step, neither security of attachment nor quality of mother–child relationship accounted for a significant amount of the variability related to elevated I-E behaviors. In the third step, parenting stress significantly contributed to the understanding of both externalizing behaviors and internalizing behaviors. In the fourth step, the interaction of VIQ and disability status significantly contributed to the understanding of externalizing behaviors on the CBCL. Similarly, the interaction of VIQ and mother–child relationship quality significantly contributed to the prediction of internalizing behaviors.

To clarify the interaction of disability and VIQ in externalizing behaviors, we calculated the correlation between VIQ and external behavior in each study group. Findings revealed that correlations in both groups had similar magnitudes but differed in direction ($r = 0.33$, $P<0.05$ for ASD; $r = -0.28$, $P = 0.06$ for typical). Thus, VIQ may provide some explanation to the understanding of

externalizing behaviors in both groups but differently: For the ASD group, those with higher VIQs reported more externalizing behaviors, whereas for the typical group, those with lower VIQs reported more externalizing behaviors.

To clarify the interaction of mother–child interaction quality and VIQ in internalizing behaviors, we divided the group into two VIQ subgroups, according to the total group median score of 112 on the PPVT, and we examined correlations between mother–child relationship quality score and internalizing behaviors for each VIQ subgroup. A significant correlation emerged in the above-median VIQ subgroup ($r = -0.40$, $P<0.05$) but not in the below-median subgroup ($r = -0.05$, $P>0.05$). Thus, only for children with a VIQ above the median, a more positive mother–child relationship related to fewer internalizing behavior problems.

Discussion

This study examined familial variables associated with two kinds of common behavior problems in ASD—increased rates of externalizing behaviors and of internalizing behaviors. In the literature on typically developing western children, these behaviors have been linked to the quality of mother–child relationships as measured by attachment security, and also to levels of parenting stress. Data in the current study and in others demonstrated higher rates of I-E behaviors in ASD than in their typical counterparts, but possible environmental correlates have rarely been investigated [e.g., Bölte et al., 1999; Duarte et al., 2003; Hartley et al., 2008; Sikora et al., 2008]. The present study examined this question by analyzing data on I-E behaviors, child variables (VIQ) and social–environmental variables (attachment quality, parenting stress), comparing children from a typically developing group to those with ASD.

As expected based on previous research findings for the characteristic behavior patterns associated with ASD, we found higher rates of I-E in children with ASD compared to typically developing children. Likewise, as expected, mothers of children with ASD reported a higher level of parenting stress than mothers of typically developing children. Parenting stress has previously been associated with increased I-E behavior problems in non-ASD groups, and our findings thus extended these prior outcomes to families of children with ASD as well. In the regression analysis, with variability related to diagnosis and parent–child quality controlled, parenting stress was significantly related to the severity of both types of behavioral psychopathology, for both children with ASD and children with typical development.

How might parenting stress be linked with child I-E behaviors? A stressed parent may have less energy and emotional resources to support children's efforts to cope

adaptively with stress. Children may find that their parents' attention is easier to gain through acting out behaviors or withdrawn, rejecting behaviors than through less emotionally intense verbal mediation. If children's maladaptive behavior is then reinforced through parental attention, a coercive pattern emerges, with increased disruptive child behaviors, which then contribute additionally to increased parent stress. This cycle of negative emotions can eventually undermine parents' sense of self-efficacy and lead to increased risk of parental anxiety and depression in these families [Hastings & Brown, 2002; Sofronoff & Farbotko, 2002].

The most important finding emerging from this paper is the two groups' similarity in their relations between children's I-E behaviors and social–environmental variables. That is, higher levels of parenting stress were related to more severe I-E problems in both high-functioning children with ASD and typically developing children. This link between parental experiences and child behavior in ASD may hold important implications for intervention. If the behavior of children with ASD is influenced by variables similar to those influencing children with typical development, then intervention and management strategies that have already been found effective for other groups may be legitimately applied to ASD for the same targeted behaviors. The finding may also suggest that children with ASD are sensitive to the social relationships and social–emotional milieu around them. Behavior occurs in context, and understanding the behavior profiles of children with ASD requires an understanding of their social–environmental variables as well as their neuropsychological variables.

Having said that our study results showed that parenting stress contributed to the understanding of children's I-E problems beyond disability, we nevertheless cannot rule out the possibility of a reversed causal link, in which parenting stress is affected by the severity of child's clinical characteristics. Perhaps a bidirectional-transactional model would even better describe the full complexity of reciprocal influences between child and parent characteristics on the well-being of each. Due to the current limited sample size, we could not investigate a model of ''fitness'' in the current study; however, future research would do well to further scrutinize this issue with larger numbers of participants. Longitudinal studies may also be important because bidirectional influences may change as a function of time.

We also examined the role of quality of maternal–child relations in the understanding of I-E behavior for both groups. Attachment theory suggests that children with secure attachment relations should have fewer behavior problems than those with insecure attachment patterns. Positive affect promotes child development in typically developing children [Maccoby & Martin, 1983]. Optimism in mothers relates to better coping with problem

behaviors in children with developmental delay [Baker, Blacher, & Olsson, 2005]. Shared positive affect, or moments where both child and parent are engaged in happiness, laughter, smiling, or affectionate touch, has been related to increased child compliance, moral development, social skills, frustration tolerance, and kindergarten adjustment in typically developing children [Kochanska & Aksan, 1995; Kochanska & Murray, 2000; Laible & Thompson, 2000]. Such relations exist for children with ASD as well. In one study, higher levels of parent/child synchronization and attunement, a form of shared positive affect, led to superior joint attention and language development 1, 10, and 16 years later in children with autism [Siller & Sigman, 2002]. Furthermore, in a previous paper involving the present sample, we found that higher mother–child relationship qualities contributed to better peer friendship qualities, beyond disability status [Bauminger, Solomon, & Rogers, 2009]. However, in the present study, no such relationship was found between attachment security and I-E behavior levels for either group.

Another aim of this study was to control for participants' cognitive or language characteristics in light of the literature gap in this area. The current regression analysis demonstrated that once the variability related to diagnosis and nationality was controlled, children's verbal ability (VIQ) was no longer significantly related to their overall severity of I-E behaviors. However, an interaction effect between verbal ability and diagnostic status accounted for a small but significant amount of the variability in externalizing behaviors. In the ASD group, those with a receptive language level above the median revealed higher levels of externalizing psychopathology. In contrast, in the typical group, those with a receptive language level above the median revealed lower levels of externalizing psychopathology. It is not easy to make sense of these opposing relations. One suggested explanation may be that higher VIQ skills in the autism group coincide with more extroverted behavior but not necessarily with more accurate and well-adjusted behaviors, whereas in the typical group higher capabilities are linked in a more expected way to lower psychopathology.

Another noteworthy finding in the current study involves the nationality differences that emerged in I-E behaviors. Interestingly, children in the USA scored higher on almost all of the CBCL sub-domains and on the I-E domains, compared to children in Israel. This finding is difficult to explain due to the lack of cross-cultural research on the differences between USA and Israel with regards to I-E behaviors or any of the other variables examined in this study. This outcome cannot be attributed to nationality differences in ASD severity, because both ASD groups demonstrated the same overall effect of the ADI-R. However, the fact that parents in the USA evaluated their children as higher on the CBCL

sub-domains than parents in Israel, for both typically developing children and for children with ASD, demonstrates that children with ASD may still follow the normative cultural path despite their higher level of I-E difficulties. In addition, it is interesting to note that the contribution of the current study variables to the understanding of I-E behaviors was similar in both nations. These results raise an important question about possible cultural differences in the environmental factors influencing the manifestations of ASD. Nationality differences should be further examined in future studies to strengthen this speculation. An alternative explanation for the link between parenting stress and children's I-E behaviors may be shared genetic factors like a shared vulnerability in the realm of psychosocial functioning. In other words, anxious parents may also have anxious children. The role of shared genetic influences in explaining the types of relationships we observed represents another important area for future research.

We would like to conclude with a discussion of this study's limitations. Concerning our choices of instruments, we focused on self and other reports. First, the CBCL parent-report instrument is indeed frequently used to assess psychopathology in the general population and also in autism [e.g., Deprey & Ozonoff, 2009]. Several studies have shown that the CBCL can differentiate ASD from other psychiatric conditions [e.g., Duarte et al., 2003; Petersen, Bilenberg, Hoerder, & Gillberg, 2006] and can identify comorbid psychiatric conditions such as high rates of ADHD and ASD [e.g., Holtmann, Bölte, & Poustka, 2007]. We also turned to the CBCL because of its available standardization in both English and Hebrew, necessary for our measurement of I-E behaviors in bi-national samples. However, the CBCL was not specifically developed to assess comorbidity in ASD; therefore, future studies assessing I-E psychopathology would do well to include other more autism-specific instruments instead of or in addition to the CBCL such as the Autism Comorbidity Interview—Present and Lifetime version [ACI-PL; Leyfer et al., 2006], which is the autism modification of the more general Schedule for Affective Disorders and Schizophrenia for School Age Children—Present and Lifetime version [K-SADS-PL; Kaufman et al., 1997]. The K-SADS-PL is considered the gold standard in evaluating psychiatric disorders in childhood and adolescence [Deprey & Ozonoff, 2009]. The ACI-PL presents good psychometric properties and is sensitive to symptom manifestation differences within ASD as a result of cognitive functioning [Leyfer et al., 2006].

Second, the current groups of participants were matched according to verbal performance based on the PPVT [Dunn & Dunn, 1997]. Results from this test correlate strongly with overall measures of both intelligence and language comprehension [Sattler, 1988]; however, a more comprehensive examination of cognitive

and language functioning would have formed more solid matching criteria.

Third, it is imperative to remember that attachment relations may be difficult to interpret in individuals with developmental disabilities. To enhance the likelihood of validity for the KSS and IPPA instruments used here, we took several steps. Care was taken to ensure that participants understood items they were endorsing; thereby providing the best assurance possible that use of the selected measures produced interpretable results. We ensured that our participants understood the KSS and IPPA items by requiring (a) normative reading comprehension level and (b) VIQ above intellectual disability level (>80) as our selection criteria for participation in the study. We also selected self-report measures that provide continuous rather categorical ratings, and as such, are less subject to difficulties in interpretation. We used self-reports to assess children's perceptions of attachment security and the quality of mother–child relationships because at older ages like preadolescence these perceptions are a function of children's subjective evaluations rather than a function of close proximity like at younger ages. Furthermore, we assumed self-reports would be valid in these high-functioning children with ASD based on previous studies' utilization of self-reports with this population to assess social–emotional aspects such as complex emotions [e.g., Capps, Yirmiya, & Sigman, 1992], self-competence [Capps, Sigman, & Yirmiya, 1995], and quality of actual friendships [Bauminger et al., 2008]. In addition, the significant moderate correlation that emerged in a previous paper involving the present sample between children's reports on the IPPA and on the KSS for the ASD group [$r = 0.56$, $P < 0.001$; Bauminger et al., 2009] suggests that these children showed a coherent perception of their relationships with their mothers. Likewise, in a previous paper involving the present sample, we found a coherent perception of friendship quality between the perceptions of the child with ASD and the perceptions of that child's friend [Bauminger et al., 2008]. Nevertheless, despite all these precautions, future research would benefit from the inclusion of objective measures to assess mother–child quality of relationships at older ages such as structured dyadic interviews and observations. Finally, while it is true that attachment theory has been extremely valuable to the understanding of human relationships, attachment-related constructs must be used with caution so it is not assumed that they constitute the entire and categorical explanations for behavior [Rutter et al., 2009].

In conclusion, the current study adds to the literature on I-E behaviors in ASD by examining familial correlates involving attachment security and parenting stress in a more homogeneous group of children with ASD than has been studied previously and by examining this question cross-culturally. Taking into account study limitations,

the possible link found between parenting stress and children's I-E behaviors in ASD is an important one that should be seriously regarded in intervention programs and in the design of support groups for parents of children with ASD.

Acknowledgments

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