

# Self-regulated compliance in preschoolers with autism spectrum disorder: The role of temperament and parental disciplinary style

Autism

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## Abstract

Regulatory difficulties are common in children with autism spectrum disorder. This study focused on an important aspect of self-regulation—the ability to willingly comply with frustrating demands of socialization agents, termed “self-regulated compliance.” We studied compliance to parental demands in 40 preschoolers with autism spectrum disorder and 40 matched typically developing preschoolers, during separate interactions with mother and father, while engaging in two paradigms: toy pick-up and delayed gratification, which tap the “do” and “don’t” aspects of self-regulated socialization at this age. Parents’ disciplinary style was micro-coded from the two paradigms and child temperament was parent reported. Compared to their typically developing peers, children with autism spectrum disorder showed more noncompliance and less self-regulated compliance to parental demands and prohibitions and greater temperamental difficulties across several domains. No group differences were found in parental disciplinary style. Child self-regulated compliance was associated with parental supportive disciplinary style and with child attention focusing. Findings highlight the importance of parental supportive presence in structuring the development of socialization in children with autism spectrum disorder. Implications for parent–child emotion regulation interventions are discussed.

## Keywords

autism spectrum disorder, compliance, parenting, temperament

Successful compliance with the demands of socialization agents is an important developmental milestone in the attainment of self-regulation (Feldman and Klein, 2003; Stifter et al., 1999), which is associated with better social adaptation, moral internalization, and empathic abilities across childhood and up to adolescence (Barry and Kochanska, 2010; Feldman, 2007). Compliance is characterized by the ability to resist tempting impulses, control frustration, delay gratification, and complete a requested action (Kochanska, 1993). The development of the child’s ability to comply with parental demands and resist temptation is shaped by the nature of parent–child relationship across the first year of life (Feldman et al., 1999; Kopp, 1982) and the development of inhibitory capacities during the second year of life, pinpointing the child’s third year of life as a hallmark in the attainment of self-control. Two forms of child compliance have been described in the literature, which distinguish between two motivational systems underlying child compliance: The first, *self-regulated*

*compliance*, describes an internally motivated embrace of the parental rules that marks the emergence of self-regulation; the second, *externally monitored compliance*, refers to parent-monitored compliance with little indication of internalization. Unlike externally monitored compliance, self-regulated compliance is a form of early internalization, which is associated with children’s early conscience development (Feldman and Klein, 2003; Kochanska and Aksan, 2006). The two forms of compliance were shown to be stable over time, having distinctly different developmental trajectories (Kochanska and Aksan, 1995). Only

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the self-regulated compliance was associated with moral internalization and socialization (Kochanska, 2002).

Child self-regulated compliance has been repeatedly associated with a parental disciplinary style that is responsive to the child's cues (Fletcher et al., 2008), places warm and consistent limits, minimizes the use of power, and promotes dialogical strategies such as negotiation (Sandstrom, 2007), suggestions, and empathy (Crockenberg and Litman, 1990; Maccoby and Martin, 1983). Both parental sensitivity and limit setting are central to socialization and are associated with self-regulated compliance (Feldman and Klein, 2003).

Mothers and fathers play a unique role in supporting the development of their child's ability to comply. Differences in father-child and mother-child compliance and parental style include more frequent attempts to discipline the child in natural settings by mothers, compared to fathers (Lytton, 1979); semantically softer and less directive attempts made by mothers, compared to fathers (Power et al., 1994); and more active gentle guidance made by mothers than fathers in their interactions with their child (Blandon and Volling, 2008; Volling et al., 2006).

Developmentally, children were more compliant with mothers at 2 years of age, more compliant with fathers at 4 years of age, and similarly compliant with both parents at 6 years of age (Power et al., 1994). Furthermore, toddlers showed a higher rate of self-regulated compliance to fathers than to mothers during a pick-up paradigm at 24 months of age, but no such difference at 15 months (Feldman and Klein, 2003; Kochanska et al., 2005). The associations between parental warmth and disciplinary style and children's cooperation and later behavioral difficulties have been supported by meta-analytic studies. These associations were stronger for mothers than for fathers and for boys than for girls and were strongest in childhood, compared to adolescence (Rothbaum and Weisz, 1994).

In addition to the effects of parental interactive behavior during moments of socialization, the development of children's compliance is affected by the child's temperament, which describes individual differences in responsiveness and self-regulation in areas of affect, activity, and attention (Kochanska, 1995; Rothbart and Sheese, 2007). Perspectives on socialization have emphasized the role of temperament in the development of internalization and compliance—in particular, emotion regulation and self-control skills—and have pointed to the interaction between child temperament and parenting behavior in shaping socialization (Feldman et al., 1996; Stifter et al., 2009). This study examined compliance in preschoolers with autism spectrum disorder (ASD), a group that exhibits marked difficulties in emotion regulation (Mazefsky et al., 2013) and social functions (Chamberlain et al., 2007).

ASD is a neuro-developmental condition characterized by social-communication difficulties and restricted, repetitive, behavior patterns (American Psychiatric Association, 2013). Individuals with ASD often show emotional and

behavioral difficulties such as anxiety, restlessness, explosiveness, oppositional behavior, and compliance difficulties (Gadow et al., 2004). Lately, there has been a growing recognition in the need to explore mechanisms of emotion regulation in children with ASD as a potential explanation of these difficulties (Mazefsky et al., 2012). It is possible that the difficulties in children with ASD experience in reading social situations (Golan et al., 2008; Travis et al., 2001), as well as their inborn temperamental difficulties in regulation and attention (Stifter et al., 1999), impede their ability to comply and may explain some of their behavioral difficulties.

Few studies focused on compliance in children with ASD. Arbelle et al. (1994) examined responses to parental prohibition in 3- to 5-year-old children with ASD as compared to developmentally delayed and typically developing (TD) children. Children were prohibited from eating sweets offered by the experimenter, and the parent was instructed to tell the child "no" and use gestures but was not allowed to freely talk or play with the child to mediate compliance. Children with ASD exhibited significantly less compliant behavior than children in the two control groups (Arbelle et al., 1994). Bryce and Jahromi (2013) studied compliance in children with high-functioning ASD as compared to matched TD controls during a toy clean-up task with parents. No group differences in child compliance were found, but children with ASD had greater difficulties complying with parental indirect commands, suggesting that compliant behavior in children with ASD may require more direct parental guidance.

Several studies examined temperamental characteristics in children with ASD. Reports using various scales found temperamental differences between children with ASD and TD children, with greater difficulties reported by parents of children with ASD on multiple dimensions, including activity, rhythmicity, adaptability, distractibility, and persistence (Brock et al., 2012; Kerekes et al., 2013). Compared to their TD peers, children with ASD were rated lower on attention focusing, attention shifting, soothability and inhibitory control (Konstantareas and Stewart, 2006), higher on negative affect, and lower on effortful control and surgency (De Pauw et al., 2011). Findings highlight the need for further research on the relations between child compliance and temperamental difficulties in children with ASD. Since child compliance is shaped by the parental disciplinary style, it is important to include parental disciplinary behavior in such investigation. However, to our knowledge, the role of parental disciplinary style in shaping compliance in children with ASD has not been examined. Furthermore, the unique role of fathers and mothers in supporting the development of compliance in such children has not been tested and fathering in general has received surprisingly little attention in research on children with ASD.

In this study, we used two common child compliance paradigms, to study the compliance of preschoolers with ASD: the pick-up and the delayed gratification paradigms.

**Table 1.** Mean values (SDs) and ranges of participants' demographic measures.

	Total sample (N=79)	ASD group (N=39)	TD group (N=40)	t(77)
<i>Child measures</i>				
Age (months)	58.47 (13.93) 29–82	63.38 (12.35) 36–82	53.56 (13.83) 29–78	3.31*
S-B Verbal Reasoning	14.83 (5.13) 1–43	14.15 (4.08) 7–21	15.51 (5.98) 1–43	1.17
S-B Abstract/Visual Reasoning	13.36 (10.27) 1–80	12.67 (6.66) 3–27	14.05 (12.98) 1–54	0.59
S-B Quantitative Reasoning	11.35 (7.27) 1–54	11.15 (5.59) 1–20	11.54 (8.7) 1–80	0.23
S-B Short-Term Memory	12.49 (6.26) 1–42	13.18 (4.86) 4–22	11.79 (7.58) 1–42	0.96
ADOS-2		11.89 (3.23) 7–22	NA	
<i>Parents' measures</i>				
Mother's age (years)	36.88 (4.45) 27–47	37.6 (4.45) 30–47	36.14 (4.39) 27–44	1.37
Father's age (years)	39.49 (5.14) 28–53	40.34 (5.33) 31–53	38.6 (4.86) 28–52	1.12
Mother's education (years) <sup>a</sup>	16.26 (2.38) 12–25	15.94 (2.47) 12–22	16.59 (2.28) 12–25	1.42
Father's education (years) <sup>a</sup>	16.39 (3.34) 12–28	15.97 (3.71) 12–25	16.87 (2.85) 12–28	1.11

S-B: Stanford–Binet; SD: standard deviation; ASD: autism spectrum disorder; TD: typically developing; ADOS-2: Autism Diagnostic Observation Schedule, 2nd ed.

<sup>a</sup>The Israeli school system is 12 years long. Additional years of education are considered higher education.

\* $p < 0.05$ .

These two paradigms represent two kinds of compliant behavior. In the pick-up paradigm, the child is expected to act (i.e. pick up the toys she or he played with), whereas in the delayed gratification paradigm, the child is expected to refrain from action (i.e. wait until permitted to eat attractive sweets). Based on the research described above, we hypothesized that (1) children with ASD would exhibit less self-regulated compliance and more noncompliant behaviors than TD children; (2) children with ASD will exhibit more temperamental difficulties than their TD peers; (3) parental disciplinary style would differ between mothers and fathers, with mothers being more warmly and more actively involved than fathers, based on prior findings in TD children (Bandon and Volling, 2008; Volling et al., 2006). However, since no prior study examined fathers' disciplinary style in children with ASD, this hypothesis remained exploratory in the group of children with ASD; (4) specific child temperamental characteristics, including levels of attention focusing, attention shifting, soothability, and inhibitory control, found to be compromised in children with ASD (Konstantareas and Stewart, 2006) will be associated with self-regulated compliance. Finally, consistent with prior research on the association between parental warm-control discipline and child self-regulated compliance toward both mother and father (Feldman and Klein, 2003), we hypothesized that (5) the warm-control parental disciplinary style, which provides positive affect and encouragement combined with clear limit setting, will be associated with child's self-regulated compliance.

## Method

### Participants

A total of 80 families of mothers, fathers, and their preschool aged children participated in two groups. The *ASD*

group included 40 preschoolers (5 females), aged 36–82 months ( $M=63.4$ , standard deviation ( $SD$ )=12.4), diagnosed with ASD by trained clinicians according to the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; American Psychiatric Association, 2000) criteria, and their parents. Families were recruited from psychiatric clinics and special-needs kindergartens in central Israel. Diagnosis was confirmed using the second edition of the Autism Diagnostic Observation Schedule (ADOS-2; Gotham et al., 2007), by research-trained administrators. The minimum criterion for administration of module 2 of the ADOS, that is, speech with flexible three-word phrases, was set as an inclusion criterion for participation in the study. Meeting this criterion (based on the ADOS administrator's evaluation) was considered a minimum requirement for paradigm comprehension and for scoring of child's verbal behavior. A total of 56% of the participants were given module 2 of the ADOS and 44% module 3 (administered to verbally fluent children). One child failed to meet ASD criteria and was excluded from the study.

The *Typical Development group* included 40 preschoolers (6 females), aged 29–78 months ( $M=53.6$ ,  $SD=13.8$ ), with no known neuro-psychiatric diagnoses, and their parents. Families were recruited by ads posted in the community. TD participants were screened out for ASD using the Childhood Autism Spectrum Test (CAST; Scott et al., 2002). The two groups were matched on mental age, gender, and family demographics. To provide better matching between groups on mental age, children in the TD group were slightly younger than children in the ASD group, and groups were matched on raw scores of four subtests from the Stanford–Binet Intelligence Test (Thorndike et al., 1986). Table 1 details the groups' demographic measures. Families were paid for their participation.

## Procedure

**Diagnostic and cognitive assessment.** Participants with ASD were visited in kindergarten by trained psychologists for ADOS-2 assessment. All participants were tested with the Stanford–Binet Intelligence Test (see Table 1).

**Parent–child interaction assessment.** All families were paid two home visits, one for mother–child interaction and one for father–child interaction, in a counterbalanced order, based on even/odd participant serial number. Various paradigms were administered in the study, with the entire session lasting about 90 min for each home visit. Here, we report results from the two paradigms assessing compliance. Interactions were videotaped for later coding. Parents filled out questionnaires separately.

**Pick-up paradigm.** Parent and child were instructed to play freely for 10 min, with a predefined set of miniature toys provided by the experimenter (dolls, cars, toy animals, a dining play set, and a doctor’s play set), then the experimenter said to the parent and child, “you have to stop playing now, please pick up the toys into this bag.” The pick-up procedure was videotaped for a maximum of 5 min or until all toys have been picked up. All participants managed to pick up the toys within the 5-min time frame.

**Delayed Gratification Paradigm—Tea-party.** The child was seated at a table near the mother. The experimenter put a plate with sweets on the table and said, “these sweets are for you, but I forgot the juice in my car, please wait until I fetch it. Don’t eat or touch the sweets until I return.” The experimenter left the room, returned 5 min later with juice, and allowed the child to eat. The delayed gratification paradigm was administered with mothers only, since repeating the scenario of the experimenter forgetting the juice was deemed not credible and therefore ineffective.

## Measures

Paradigms were micro-coded offline for parent’s and child’s behavior on a computerized system (The Observer; Noldus Information Technology, Wageningen, The Netherlands), by two trained coders who were naïve to the research hypotheses. An interval, mutually exclusive coding scheme of behaviors was employed. Codes were defined in line with previous work (Feldman et al., 1996; Kochanska and Aksan, 1995). Inter-rater reliability was computed for 12% of the observations in the two paradigms. Kappa coefficients averaged 0.80 for child compliance (range: 0.79–0.82) and 0.79 for parent disciplining (range: 0.78–0.80).

**Pick-up paradigm coding.** Child compliance coding was conducted in line with prior work (Feldman, 2007; Feldman et al., 1999; Feldman and Klein, 2003) and included three

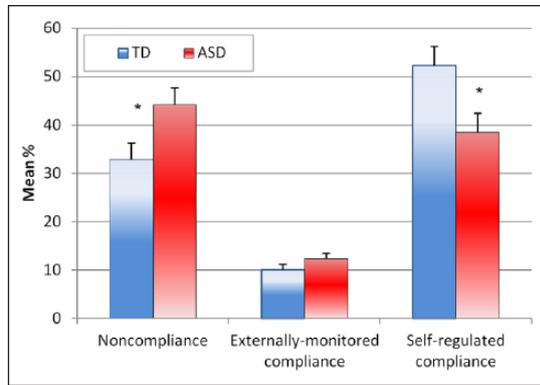
mutually exclusive behaviors: *self-regulated compliance* (enthusiastic compliance to task, child initiates and continues work without adult monitoring), *externally monitored compliance* (child complies, but stops often, needs continuous reminders, and leaves task when adult looks away), and *noncompliance* (child does not comply, shows negativity, defiance, takes time off from the task, argues, screams, or scatters the toys).

Parental discipline included three mutually exclusive behaviors: *harsh control* (parent uses physical force, insults, yelling, or manipulations), *warm control* (parent shows positive affect while providing consistent limits, uses tactics such as encouragement, redirection of attention, praise, negotiation with the child, explaining and suggesting, and showing empathy in order to keep the child on task), and *no control* (parent provides no structure, lets the child do as she or he pleases, with no attention to task, and may pick up the toys for child). In light of previous findings emphasizing the importance of direct instructions in parent–child interaction in children with ASD, we added two categories to the coding of parental disciplinary style: *warm control* was divided into *direct support* (using encouragement, guidance, and demonstration in order to direct the child to pick up the toys.) and *supportive presence* (positive presence of the parent beside the child who picks up the toys without direct instructions, including “small talk”). Parental *no control* was divided into parental *un-involvement* (ignoring the child’s noncompliance or having no interaction with the child who is picking up the toys) and parental *over-involvement* (the parent picks up the toys *instead* of the child rather than with the child or for modeling). Parent and child behaviors were independently coded throughout the paradigm (e.g. child’s noncompliance could be coded simultaneously with any possible parental disciplinary behavior).

Total sums of time intervals for each parental and child behavior were computed, and proportions of these sums out of the total paradigm administration time were computed by the Noldus computerized system prior to data analysis, in line with previous studies on the pick-up paradigm (Bryce and Jahromi, 2013).

**Delayed gratification paradigm coding.** In this paradigm, child compliance was coded as *noncompliant* (children who ate or touched the sweets before the experimenter’s return) or *compliant* (children who did not eat or touch the sweets before the experimenter’s return), in line with previous research on the tea-party paradigm (Arbelle et al., 1994).

Maternal discipline included the three mutually exclusive behaviors used in the pick-up task—*warm control*: encouragement, guidance, and demonstration in order to direct the child to avoid touching the sweets (including supportive presence without direct intervention), *harsh control* (verbal scolding, threats and use of harsh tone of voice, and physical grabbing of child’s arm), and *no control* (the



**Figure 1.** Child compliance mean values in the ASD and TD groups on the pick-up paradigm. \* $p < 0.05$ .

mother ignores the child's noncompliance or allows touching or eating the sweets). Maternal behavior scores were computed as described above for the pick-up paradigm.

**The Children's Behavior Questionnaire.** Mothers filled out this 195-item scale. Each item is rated from 1 (extremely untrue of your child) to 7 (extremely true of your child). Rothbart et al. (2001) used the Children's Behavior Questionnaire (CBQ) to assess the temperament of TD 3- to 7-year olds. They reported alpha levels across the CBQ dimensions to have ranged from 0.64 to 0.92, with a mean of 0.73, showing good internal consistency. In this study, CBQ questionnaires were completed by 32 mothers of TD children and by 35 mothers of children with ASD. Item ratings were averaged to create subscale and overall CBQ scores (Rothbart et al. 1994).

## Results

### Child compliance

In order to examine hypothesis 1, in the pick-up paradigm, a repeated measures multivariate analysis of variance (MANOVA) was computed, with child behavior (self-regulated compliance, externally monitored compliance, and noncompliance) and parent (mother and father) as the within-subject factors, and group (ASD and TD) as the between-group factor. The Stanford-Binet Verbal Reasoning score was added as a covariate, to control for potential group differences on verbal ability. The analysis yielded a group-by-child-behavior interaction (Wilks'  $F(2, 73)=3.13$ ,  $p < 0.05$ ,  $\eta^2=0.079$ ), indicating differences in child behavior between children with ASD and TD, over and above parent. Verbal ability had no significant effects. Since the main effect of parent and the group by parent interaction were not significant, child behavior with mother and father was averaged for each child for further analysis. Post hoc analysis revealed that, compared to the TD group, children with ASD showed more noncompliant behavior

(ASD:  $M=44.22$ ,  $SD=20.06$ ; TD:  $M=32.83$ ,  $SD=22.90$ ;  $t(77)=2.35$ ,  $p < 0.05$ ), similar externally monitored compliance (ASD:  $M=12.29$ ,  $SD=6.95$ ; TD:  $M=10.02$ ,  $SD=7.33$ ;  $t(77)=1.14$ , n.s.) and less self-regulated compliance (ASD:  $M=38.54$ ,  $SD=21.71$ ; TD:  $M=52.33$ ,  $SD=26.36$ ,  $t(77)=2.54$ ,  $p < 0.05$ ), as shown in Figure 1.

In order to examine hypothesis 1, in the tea-party paradigm, a goodness-of-fit test was conducted. The proportion of children who complied with the instruction and refrained from touching the sweets was marginally significantly lower in the ASD group (12.8%) than in the TD group (30.8%;  $\chi^2(1)=3.69$ ,  $p=0.055$ ).

### Child temperament

In order to examine hypothesis 2, average scores were calculated for 15 CBQ subscales. Next, a MANOVA with group (ASD and TD) as the between-subject factor and verbal ability as a covariate examined differences in CBQ subscale scores and found a significant overall difference between groups (Wilks'  $F(15, 49)=3.27$ ,  $p < 0.001$ ,  $\eta^2=0.501$ ). Univariate group differences on the CBQ's subscale scores are shown in Table 2.

Using Holm's sequential rejective Bonferroni procedure for multiple comparisons (Holm, 1979), significant group differences were found for the *inhibitory control*, *perceptual sensitivity*, and *attention focusing* subscales. Verbal ability had a significant effect only on *inhibitory control* ( $F(1, 63)=4.16$ ,  $p < 0.05$ ,  $\eta^2=0.06$ ). This effect did not reach significance when Holm's procedure for multiple comparisons was used.

### Parental disciplinary style

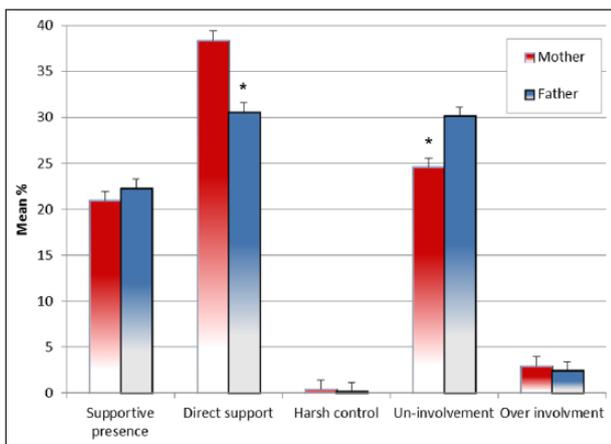
In order to examine hypothesis 3, in the pick-up paradigm, a repeated measures MANOVA was computed with parental discipline (warm control, supportive presence, harsh control, un-involvement, and over-involvement) and parent (mother and father) as the within-subject factors and group (TD and ASD) as a between-group factor. The analysis yielded a parent by parental behavior interaction (Wilks'  $F(3, 74)=4.20$ ,  $p < 0.01$ ,  $\eta^2=0.146$ ), indicating differences in parental behaviors between mother and father over and above group. Post hoc analysis comparing parental behavior between mothers and fathers beyond group revealed that, compared to fathers, mothers demonstrated more direct support (mothers:  $M=38.37$ ,  $SD=17.00$ , fathers:  $M=30.57$ ,  $SD=16.87$ ;  $t(77)=3.28$ ,  $p < 0.005$ ) and less un-involvement (mothers:  $M=24.57$ ,  $SD=16.12$ , fathers:  $M=30.11$ ,  $SD=19.44$ ;  $t(77)=2.00$ ,  $p < 0.05$ ). No significant differences were found in maternal and paternal harsh control (mothers:  $M=0.41$ ,  $SD=1.87$ , fathers:  $M=0.18$ ,  $SD=0.67$ ;  $t(77)=1.09$ , n.s.), supportive presence (mothers:  $M=20.96$ ,  $SD=17.89$ , fathers:  $M=22.27$ ,  $SD=18.56$ ;  $t(77)=0.44$ , n.s.), and

**Table 2.** Group averages (and standard deviations) on CBQ subscale scores.

CBQ subscale	ASD	TD	F(1, 63)	$\eta^2$
Activity level	4.85 (0.75)	4.41 (0.81)	5.61*	0.08
Anger frustration	4.47 (0.95)	4.56 (0.74)	0.24	0.00
Approach	4.63 (0.59)	4.82 (0.55)	1.87	0.03
Attention focusing	3.78 (0.74)	4.46 (1.17)	9.01**	0.13
Attention shifting	4.41 (0.92)	4.90 (0.76)	5.85*	0.09
Discomfort	4.10 (0.62)	4.19 (0.69)	0.15	0.00
Falling reactivity and soothability	4.41 (0.92)	4.90 (0.76)	5.85*	0.09
Fear	4.22 (1.03)	4.48 (0.79)	1.31	0.02
High-intensity pleasure	4.66 (0.87)	4.88 (0.67)	1.33	0.02
Impulsivity	4.31 (0.69)	4.21 (0.75)	0.41	0.01
Inhibitory control	3.91 (0.95)	4.78 (0.74)	20.46***	0.25
Perceptual sensitivity	4.56 (0.76)	5.47 (1.06)	15.58***	0.20
Sadness	3.87 (0.72)	3.92 (0.59)	0.02	0.00
Shyness	4.12 (1.14)	3.51 (1.10)	5.45*	0.08
Low-intensity pleasure	5.27 (0.55)	5.55 (0.52)	5.47*	0.08
Smiling and laughter	4.97 (0.86)	5.30 (0.55)	2.89	0.04

CBQ: Children's Behavior Questionnaire; ASD: autism spectrum disorder; TD: typically developing.

\* $p < 0.05$ , \*\* $p < 0.01$ , and \*\*\* $p < 0.001$ .



**Figure 2.** Disciplinary style differences between mothers and fathers on the pick-up paradigm over and above group.

\* $p < 0.05$ .

over-involvement (mothers:  $M=2.93$ ,  $SD=5.83$ , fathers:  $M=2.39$ ,  $SD=4.83$ ;  $t(77)=0.67$ , n.s.). These differences are illustrated in Figure 2. No significant group effects or interactions with group were found for parental disciplinary style, on either pick-up or tea-party paradigms.

### Temperamental effects on child compliance

In order to examine hypothesis 4, a hierarchical regression analysis was conducted, examining the associations of child self-regulated compliance (averaged across mother and father) with group and the three CBQ subscales on which group differences were reported above (attention

focusing, inhibitory control, and perceptual sensitivity), controlling for verbal ability. Group and verbal ability were entered into the regression in the first block, CBQ subscales were entered in the second block, and group by CBQ subscale interactions were included in the third block. Child self-regulated compliance was associated with group ( $\beta=0.27$ ,  $p < 0.05$ ), verbal ability ( $\beta=0.32$ ,  $p < 0.01$ ), and attention focusing ( $\beta=0.29$ ,  $p < 0.05$ ). No interaction effects were found significant. Overall, 31.2% of the criterion's variance were explained.

### Parental disciplinary style effects on child compliance

In order to examine hypothesis 5, two hierarchical regression analyses were computed, one for child–mother and the other for child–father interactions, examining the associations of child self-regulated compliance with group and parental disciplinary style, controlling for verbal ability. Group and verbal ability were entered into the regression in the first block, parental disciplinary styles were entered in the second block, and group by parental disciplinary styles interactions were included in the third block.

As shown in Table 3, child self-regulated compliance with mother was associated with group and in addition was positively associated with maternal supportive presence and negatively associated with maternal over-involvement. Child self-regulated compliance with father was positively associated with the child's verbal ability and with paternal supportive presence. No group-by-parental disciplinary style interactions were found. Overall, the models explained 51.4% of the variance in child self-regulated compliance

**Table 3.** Regression analyses for child self-regulated compliance during the pick-up paradigm.

Block	Factors	With mother		With father	
		$\beta$	Block $R^2$ change	$\beta$	Block $R^2$ change
1	Group	0.27*		0.14	
	Verbal ability	0.16	0.115*	0.26*	0.099*
2	Supportive presence	0.25*		0.57***	
	Direct support	-0.21		0.02	
	Over-involvement	-0.33**		-0.15	
	Un-involvement	-0.19		0.10	
	Harsh control	-0.16	0.352***	-0.07	0.334***

\* $p < 0.05$ , \*\* $p < 0.01$ , and \*\*\* $p < 0.001$ .

to mother and 49.8% of the variance in child self-regulated compliance to father.

## Discussion

This study examined compliance to parental requests and prohibitions in children with ASD as compared to matched TD children in relation to the parent's disciplinary behavior and the child's temperamental dimensions. As hypothesized, we found that children with ASD experience more difficulties complying with their parental requests in situations that required both action and inhibition, as compared to TD children. When presented with a request to pick up the toys following mutual play with both mother and father, children with ASD exhibited less self-regulated compliance and more noncompliant behaviors than TD children. Similarly, children with ASD experienced more difficulties resisting temptation when asked to refrain from eating attractive sweets and were less able to inhibit the desire to touch the sweets. Differences were also found on three temperamental dimensions, of which attention focusing was associated with greater self-regulated compliance to parental requests. The disciplinary style of mothers and fathers of children with ASD did not differ from parents of TD children. In both groups, supportive parental presence, defining a style where the parent escorts the child in picking up the toys by dialogue and behavioral support, was related to the child's self-regulated compliance to requests from both parents. For mothers only, maternal over-involvement (e.g. picking up the toys herself) was associated with poorer child compliance.

Compliance to parental requests to resist temptation and to perform unpleasant tasks is an important requirement for social adaptive functioning in general and for success in educational settings in particular (Adams et al., 2000). Children at this age are often required to perform frustrating chores (e.g. reading and writing) and delay gratification (e.g. play, food). Hence, difficulties in compliance may hamper academic achievement as well as adjustment to social norms in the school environment and in family life (Cialdini and Goldstein, 2004). Optimal

adjustment to school involves additional social demands, such as turn-taking and sharing, which also require compliance to social norms and rules. Conforming to these social norms are particularly challenging for children with ASD (Williams White et al., 2007). Noncompliant behavior in children with ASD has been described as a central cause of parental distress (McStay et al., 2013) and was associated with the development of psychiatric comorbidities, such as oppositional defiant disorder or conduct disorder (Simonoff et al., 2008). The group differences we report in self-regulated compliance and in noncompliance highlight the deficits in the internalization of social norms in preschoolers with ASD. However, the lack of group difference on externally monitored compliance emphasizes the importance of appropriate mediation by parents and other significant adult figures (Singh et al., 2006), which is essential if children with ASD are expected to conform to social demands. In this study, mediation was examined through the lens of parental disciplinary style.

Parental disciplinary style plays a critical role in children's socialization and the development of self-regulatory abilities (Kerr et al., 2004). Our results demonstrate that the parental disciplinary style in ASD does not differ from that of parents of TD children. These findings correspond with previous work showing similar parental qualities of parents of children with ASD and TD (Feldman et al., 2014; Gadow et al., 2004; Hirschler-Guttenberg et al., 2014). The elicitation of self-regulated compliance in both children with ASD and TD was associated with a more supportive approach from both mothers and fathers and less maternal over-involvement. These results are consistent with research demonstrating that parental supportiveness, warm limit setting, and sensitivity are strongly associated with children's compliance and cooperation with parents in the general population (Feldman and Klein, 2003), and that mothers' harsh parenting affected child emotion regulation more strongly than father's harsh parenting (Chang et al., 2003). Maljaars et al. (2014) reported similar findings with regard to children with ASD in an online parent survey. To our knowledge, this is the first behavioral study showing associations between parental

disciplinary style and compliance in children with ASD. It is important to note, however, that parental disciplinary style and child compliance were measured simultaneously in our study, hence this association could be bidirectional: parental warm control could contribute to child compliance and, similarly, parental disciplinary behavior could be affected by children's compliance.

Our findings also reveal differences between mothers' and fathers' disciplinary style, which were found in parents of children with ASD as well as in TD children. Mothers exhibited more directive support and less no-control than fathers in both groups. These findings of more active involvement of mothers, compared to fathers, are similar to those found in compliance studies with TD children, which showed more active guidance of mothers in disciplinary interactions (Power et al., 1994). Maternal active involvement in disciplinary interactions may be related to the fact that in both groups mothers usually spend more time with their young children and develop more active strategies to help them follow everyday chores (Eisenberg et al., 2010).

In addition to parental effects, our study also examined temperamental effects on children's ability to resist temptation and to comply with parental demand. We found group differences on three temperamental dimensions: An emotion regulation factor (inhibitory control), an attentional factor (attention focusing), and a factor specifically associated with ASD (perceptual sensitivity). Prior studies found similar temperamental deficits in children with ASD (Konstantareas and Stewart, 2006; Samson et al., 2014). These findings support the central role emotion regulation deficits play in the observed adjustment difficulties among children with ASD (Mazefsky and White, 2014). Our study adds to those findings by examining temperamental effects on self-regulated compliance. Interestingly, the only factor associated with child's self-regulated compliance was attention focusing. This factor is usually associated with attention deficit and hyperactivity disorder (ADHD), a diagnosis that is also characterized by compliance difficulties (Anderson et al., 1994). These factors may be connected to behavior problems in children with ASD over and above the core features of the diagnosis. Indeed, the comorbidity of ASD and ADHD is reported to appear in up to 44% of children (Lai et al., 2014), and recent studies have shown that children diagnosed with both disorders experience greater difficulties in adaptive functioning (Matson and Goldin, 2013; Rao and Landa, 2014). Our findings suggest that children with ASD who also have attention focusing difficulties (and potentially other ADHD symptoms) may be less prone to self-regulated compliance. However, since ADHD symptoms were not tested in this study, the effects of ADHD features on compliance in children with ASD should be further studied.

Our study has several implications for parent-mediated interventions among children with ASD, particularly for those presenting behavior problems (Hastings and Brown, 2002). The importance of parent-mediated interventions for young children with ASD has recently gained support, and studies emphasize the benefit of such programs in fostering attachment (Siller et al., 2014) and emotion regulation (Gulsrud et al., 2010; Hirschler-Guttenberg et al., 2014), as well as in reducing challenging behaviors (McStay et al., 2013; Sanders et al., 2004). Our findings stress the need for such interventions to address compliance difficulties, enhancing self-reliance and self-regulation of children with ASD. These should be complemented by educating parents of children with ASD to provide supportive presence and to diminish over-involvement.

Several limitations in this study should be taken into account. Lower functioning and minimally verbal children with ASD were not included, due to the paradigms' verbal understanding requirements. Indeed, child's verbal ability was positively associated with self-regulated compliance in our study. Since noncompliance may be greater in the lower functioning area of the autism spectrum, further research is needed on factors associated with compliance in minimally verbal children. Another limitation was that interrater reliability on micro-coding of child and parent behaviors was only tested for 12% of the observations, which is relatively modest, in comparison to the recommended practice for behavioral observation research. Future studies should strive for at least 20% of observations to be coded for reliability. In addition, temperament was measured through parental report rather than through direct observations, limiting the potential associations between temperamental features and compliance in children with ASD. Future studies employing a more direct approach to the assessment of child temperament may demonstrate additional links between temperamental features and compliance in children with ASD. As mentioned above, another limitation of this study relates to its correlational nature, limiting the interpretation of the association between parental supportive presence and child's self-regulated compliance that was apparent in both ASD and TD groups. It is possible that warm parental style contributes to the child's socialization and compliance. However, it is also possible that children who are more cooperative and temperamentally positive elicit warmer parental style. Finally, our study did not take into account socio-economic status (SES) effects on parenting practices or the associations between parenting practices, child compliance, and child outcomes. Whereas the association between SES, parental practices, and child outcomes have been examined before in children with ASD (e.g. Levy and Perry, 2011; Maljaars et al., 2014), testing the mediating role of child compliance (e.g. from a longitudinal perspective) is still called for.

To conclude, our findings demonstrate the difficulties in compliance and particularly in self-regulated compliance in children with ASD. These important components of emotion and self-regulation may further impair the adaptation of children with ASD. Parental supportive presence can potentially boost self-regulated compliance in children with ASD, as it does in their TD peers.

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