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Concurrent Validity of Social Subtype and IQ after Early Intensive Behavioral Intervention in Children with Autism: A Preliminary Investigation

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Three subtypes of autism based on social style have been proposed by Wing: active-but-odd, passive, or aloof. Previous research has shown evidence of an association between IQ and Wing subtype in untreated children and adults. Because IQ changes can accompany behavioral treatment, but often only for a subset of children, social subtype may be related to treatment responsiveness. We administered a social subtyping measure, the Wing Subgroups Questionnaire (WSQ), at various points in treatment to younger children than previously studied with autism in early, intensive behavioral intervention (EIBI). Thirty-seven children in EIBI (aged 39–71 months, amount of EIBI 0–44 months) were assessed to determine whether Wing's three proposed subtypes were found in this sample and whether subtypes were associated with current IQ and change in IQ after a period of EIBI. Results confirmed that all three subtypes were present and correlated with IQ after a period of intervention, as well as with change in IQ. Participants classified as aloof had significantly lower IQ scores and changes in IQ after EIBI than other children. Future studies should extend these findings by examining whether social subtype at pretreatment predicts EIBI outcome.

KEY WORDS: autism; treatment; IQ; social; subtype.

Although autism is biological in origin, with evidence of genetic risk and neuroanatomical pathology at its core (e.g., Kemper & Bauman, 1993; Lauritsen & Ewald 2001), psychological and educational interventions, rather than biomedical, are currently the primary treatments for children with this disorder (United States Surgeon General, 1999). Most research on such interventions has centered on behavioral treatment, which emphasizes the application of learning principles such as operant conditioning, to teach children new skills. Behavioral interventions have been shown to be effective and have been the most widely studied form of treatment (Smith, 1999). Matson and colleagues (1996) reviewed more than 550 published studies that demonstrated behavioral treatment enhances communication, social interaction, play and leisure activities, self-care, academic and vocational skills, and emotion regulation. The largest gains may occur with early, intensive behavioral intervention (EIBI), which begins prior to the age of 5 years and involves 20–40 h per week of treatment for two or more years (Green, 1996). Across studies, children with autism in EIBI have achieved average increases of approximately 20 points on standardized tests of intelligence;

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similar increases on standardized tests of language, adaptive behavior, and achievement; and less restrictive classrooms than are usually offered to children with autism (Smith, 1999).

A shortcoming of EIBI outcome research is that evaluated outcomes have been limited in scope. In many studies, IQ was the primary pretreatment and outcome measure. In other studies, investigators added standardized tests of language and adaptive behavior but still omitted measures of autistic behaviors (Smith, 1999). For this reason, it remains unclear how EIBI affects such behaviors, particularly those pertaining to social interaction (Schreibman, 2000).

The limited assessments may also have contributed to the failure to identify reliable predictors of EIBI outcome despite reports of large individual differences in treatment response. For example, in an early study by Lovaas (1987) investigating the effectiveness of behavioral treatment, two distinct groups of children emerged: 47% attained normal functioning after at least 2 years of intensive treatment, but 40% improved only mildly. This bi-modal response to treatment is perplexing and suggests underlying differences between the two groups of children. The main focus in the identification of predictors has been on IQ and studies have yielded inconsistent results, with some reporting that IQ predicts outcome (Harris & Handleman, 2000; Lovaas & Smith, 1988) but others finding no such association (Smith, Groen, & Wynn, 2000). Several explanations have been proposed for the inconsistency, including broad qualitative assessment of language, small sample sizes, restricted range of IQ scores and reliance on a single measure of intelligence (Smith, 1999). In any case, reliable prediction is vital because EIBI requires a major commitment of time, effort, and resources from children, families, service providers, and funding agencies.

Social subtypes of autism have emerged as important predictors of later functioning in longitudinal studies of children whose treatment histories were not documented (e.g., Fein *et al.*, 1999). However, subtype has not been explored for its influence, or even presence, in a sample of children receiving a standard treatment. Also of interest is whether very young children, like those likely to be enrolled in EIBI, will show the characteristics associated with each social subtype. Previous research has focused on older children with an average age of approximately 11 years (with the lower end of the range at just under 5 years). Children in EIBI often enter treatment at age 3 or 4.

Wing and Gould (1979) identified three social subtypes: aloof, passive, and active-but-odd. This system of classification has stimulated several studies over the past two decades and will be briefly reviewed below. Aloof individuals reject most social contact, have atypical attachment to caregivers, lack pretend play and joint attention, have little eye contact, engage in inappropriate behaviors (e.g., tantrums, screaming), and are usually nonverbal. Passive children also do not initiate social interaction spontaneously, but accept others' approaches and invitations to engage in activities. Their play typically consists of imitative rather than imaginative activities, and their communication tends to be repetitive, but is usually more developed than in the aloof group. Active-but-odd children seek interactions with others, but these interactions are one-sided and peculiar (e.g., often talking at others for the sake of serving their own narrow interests, rather than for social reasons). They use language communicatively, but they may have poor eye contact, speak in monotone, lack conventional gestures, and have difficulty comprehending abstract or idiomatic statements.

The validity of the three Wing social subtypes has been generally supported in the literature and the subtypes may correspond to distinct subgroups of children with autism. This body of work was reviewed in depth in our recent paper (Beglinger & Smith, 2001) and will only be briefly summarized here. With one exception (O'Brien, 1996), investigators have replicated the finding that the "most autistic" children are found in the aloof group and the least autistic in the active-but-odd group. Castelloe and Dawson (1993) suggested that the aloof and active-but-odd groups fall at two ends of a continuum (based on a correlation of −.70 between the two group's summary scores). Though the aloof and active-but-odd subtypes have been robust, some authors have found the aloof subtype to be the most distinct (Castelloe & Dawson) and others the active-but-odd (Volkmar, Cohen, Bregman, Hooks, & Stevenson, 1989). O'Brien (1996) found only moderate consistency for the passive subtype and Fitton (2000) found the passive subtype to be the least correlated with other established measures of autism severity (i.e., CARS and PL-ADOS). Evidence of Wing subtype correlations with biological variables has also been shown. Dawson and colleagues (1995) found electroencephalographic (EEG) differences among the subtypes and Modahl *et al.* (1998) found lower levels of oxytocin in aloof children relative to controls. Intellectual functioning has consistently emerged as a strong predictor of subtype, yet Volkmar *et al.* (1989) found it to account for only 53% of the variance suggesting other important contributions. Younger age has also been related to aloofness, but methodologically sound, longitudinal studies are needed to explore this finding. According to Wing (1981,1997), social subtypes are usually stable across the lifespan, although a few aloof children mature into a passive social style and some passive children progress to an active-but-odd style as they age.

Limitations of the Wing system include: (a) subtypes do not differentiate diagnostic categories (e.g., autism vs. Pervasive Developmental Disorder—Not Otherwise Specified), (b) the passive subtype has only garnered moderately reliable values (e.g., Borden & Ollendick, 1994) and (c) O'Brien (1996) found high interscale correlations for three cases in his study and suggested that, although most children will fit primarily within one subtype, a minority may fit into more than one subtype. Finally, as noted above, little is known about the presence of Wing subtypes in very young children or how treatment and subtype might be related.

The utility of social subtypes in treatment research has remained unexplored. Accordingly, the current study was an attempt to integrate and advance both the subtyping and treatment literature, with the goals of examining whether Wing subtypes (as measured by the Wing Subgroups Questionnaire (WSQ)) emerged among young children in EIBI and whether subtypes were related to IQ after a period of treatment. Further, this study was designed to address a persistent concern specific to our multi-site treatment project; namely, to identify alternate or additional means of assessing children's behavior and progress within the study, given the lack of reliable predictors and issues of validity of test results. Assessment of subtype is not part of our multi-site protocol. Therefore, we were interested in a preliminary exploration of whether social subtype would be a valuable source of information to include in our assessment battery across all treatment centers.

It was hypothesized that Wing's social subtypes would emerge in this sample of young children receiving EIBI and would correlate with their IQ scores, as has been found in older children not enrolled in EIBI. Further, the WSQ subtypes were expected to correlate with change in IQ (current IQ–intake IQ) after EIBI, with aloof children showing the smallest change and active-but-odd children the largest change, based on the continuum model. Of specific interest was whether any subtype would be more strongly associated with current IQ than pretreatment IQ, thus supporting its potential as an added source of treatment variance and providing justification for further research on a larger scale.

METHOD

Participants

Participants ($N = 37$) consisted of a sub-sample of children enrolled in the Multisite Young Autism Project (MYAP) who met the following criteria: (a) a diagnosis of autism by a licensed psychologist or psychiatrist, independent of our project, using the Autism Diagnostic Interview (Lord, 1995) and DSM-IV criteria; (b) chronological age of not more than 42 months at referral and not more than 8 years at the time of enrollment into this study; (c) acceptance into the MYAP and active participation in intensive treatment (approximately 30–40 h per week of one-to-one instruction; see Treatment section for description); (d) no major medical limitations that would impede treatment, such as cerebral palsy with motor deficits; and (e) ratio IQ of 30 or higher on the Bayley Scales of Infant Development: Mental Development Index (Bayley, 1993). The Bayley is a commonly used instrument for obtaining IQ scores in young children with autism (e.g., Magiati & Howlin, 2001). Ratio IQ is the index usually reported for this population (Lord & Schopler, 1989). A cutoff of 30 was used because autism becomes difficult to diagnose in lower ranges of functioning.

Families of 38 children consented to participate. One child was dropped from the study because he found a computer task administered during the same session as the WSQ highly aversive; because of the child's distress, we followed the human subjects-approved protocol and discontinued participation. Two other WSQ's were not returned; data for those children were used only for demographic information in Table I (as they did complete the other portion of the test session utilizing the computer). Two WSQ's were incomplete (e.g., individual questions not answered); data were used where appropriate (e.g., categorical subtype assignment or total scores for any complete subtype question sets). The ratio of boys to girls was 32:5, which represents a slightly higher proportion of boys than is found in the general population (4:1) of children with autism (Smith, 1997) and was interpreted simply as an artifact of the

Table I. Participant Characteristics ($N = 37$)[a]

	Mean	SD	Range
Chronological Age (Years)	5.42	1.08	3–6
Intake IQ ($n = 37$)	54.13	12.63	32–82
Participants with Intake IQ Only ($n = 7$)	59.29	18.45	39–82
Participants with Current IQ ($n = 30$)	72.74	20.41	30–109
Months in Treatment	26.16	13.69	< 1–44

[a] Includes 2 children who did not complete the WSQ. Without these children, *M* age = 5.56; *M* Intake IQ = 52.94; *M* Current IQ = 73.03; and *M* months in treatment = 27.92.

particular sub-sample of children recruited. Three participants were enrolled and receiving treatment at the Pullman, WA site, 9 at the Portland, OR site, and 25 at the Madison and Milwaukee, WI sites. Participants ranged in age from 3–6 years and had an average intake IQ of 54. IQ at current testing averaged 73. Some children showed a decline in IQ scores over time, which is not unusual for children who show little progression, given that age is factored into ratio IQ. In essence, a child who fails to show the progression expected to occur with age will score farther and farther from the initial score (and peers) over time. Because children in MYAP receive the standard battery of tests (not the WSQ) yearly, the 7 participants who had been in MYAP less than 1 year had intake IQ scores only (i.e., no "current" IQ scores). No WSQ subtype was available for one of these children. The intake IQ scores and increase in IQ in this sample are consistent with those in other EIBI studies (Smith, 1999). Complete demographic characteristics of the sample can be found in Table 1

Instruments and Procedure

Wing Subgroups Questionnaire

The WSQ (Castelloe & Dawson, 1993) is a parent or teacher completed questionnaire with items representing 13 behavioral domains (e.g., social approach, communication skills, cognitive skills (i.e., play and imitation), unusual motor behavior, resistance to change, physical coordination, and challenging behaviors). Parents rate their child in each of these domains (grouped into 4 subtypes: aloof, passive, active-but-odd, and typically developing) on a scale from 0 (never) to 6 (always). A summary score is calculated for each subtype by summing all corresponding items that pertain to that subtype. The highest summary score is considered to indicate the child's subtype. Evidence for the external validity of the WSQ has been previously achieved with reasonable concordance rates between clinician ratings and Wing subtype ($r = .73$) (Castelloe & Dawson, 1993). Internal consistency was highest for the active-but-odd group ($\alpha = .85$), followed by the aloof (.77) and passive (.63) groups in the original sample (see O'Brien, 1996 for additional psychometrics). For our analyses, Wing subtype was assigned by identifying the highest summary score out of the four on the WSQ and checking to insure that the rater (the child's parent(s)) had also indicated this subtype as most descriptive of their child (categorical assignment). In the few cases of dispute between the two, the summary score was used because it was based on greater detail. WSQ raw score totals (e.g., the sum of all ratings on items describing a particular subtype) for each subtype were used for correlation calculations.

The research protocol dictates that participants in the MYAP are administered core assessment tests at the time of intake and annually thereafter. As children show improvements in functioning (e.g., improvements in language), the WPPSI-R may be administered instead of the Bayley (Smith, Donahoe, & Davis, 2000). Because of the relatively small number of patients being enrolled into the MYAP at any given time, WSQ scores were not collected at intake and longitudinally thereafter. Instead, they were collected from a sub-sample of children, who were at differing points in treatment, to provide preliminary data (Table II). Thus, an important limitation in this study is the lack of WSQ scores at intake, which precludes prediction and longitudinal conclusions. The average length that children had been enrolled in treatment with the MYAP at the time of WSQ testing was 26 months (SD = 13.7). The length of time in treatment did not statistically differ between subtypes ($F = 0.30$, $p = 0.83$). The average length of time from most recent IQ testing to WSQ assessment was 4.9 months (SD = 4.2). Given the relatively short interval, IQ scores were expected

Table II. Length of EIBI Treatment (Months) at Time of WSQ Assessment by Subtype

Aloof ($n = 14$)	Passive ($n = 5$)	Active-But-Odd ($n = 7$)	Typically Dev. ($n = 9$)
25.26 (14.25)	25.11 (10.82)	30.88 (12.85)	27.3 (14.34)

Note: Mean (Standard Deviation). ANOVA was not significant: $F = 0.30$, $p = 0.83$.

to be valid for the time of WSQ assessment, even though they were not collected together. Children were selected to receive the WSQ (as well as a computer task, presented independently) if they met the following criteria: (a) currently actively enrolled in the MYAP and reside within 1 driving hour of the following treatment sites (chosen for either geographical convenience or the large number of clients treated at the site): Pullman, Vancouver, Milwaukee or Madison; (b) parental consent was obtained. The WSQ was given to both parents prior to their appointment time for this study, either through the mail or by the lead therapist on their child's treatment team. In accordance with the original procedure described by Castelloe and Dawson (1993), parents were asked to complete the WSQ independently from one another (in cases where two parents were available). Because most raters completed the WSQ at home, they were not monitored for compliance. However, LB met with each child's parent(s) for debriefing and feedback; based on these interactions, the parents seemed to have followed the instructions.

Treatment

Children in the MYAP receive intensive behavioral treatment based on the UCLA model (Smith, Donahoe, & Davis, 2000), which consists of 40 h per week of one-to-one intervention typically administered in the child's home. Therapy is provided by a team of personnel, including a project director, supervisor, lead therapist, student therapists, and parents, and utilizes operant conditioning principles and experimentally validated teaching techniques (e.g., shaping, discrimination training, the use of functional positive reinforcers). Early treatment provides extremely individualized discrete trial training to the child; it later becomes increasingly more complex, group-setting focused, and adapted to the child's natural environment. For example, early treatment goals include teaching verbal and nonverbal imitation, basic receptive language skills and toy play. In later stages of treatment, the focus shifts to skills such as expressive language, appropriate interactions with peers, and transitioning into a school setting. For a more detailed discussion of treatment and quality control, see Smith, Eikeseth, Klevstrand, & Lovaas (1997).

Data Analysis

For children with at least one post-intake assessment ($n = 29$), change in IQ was calculated. The IQ scores of children in treatment for less than 1 year ($n = 7$) were used only in "intake IQ" analyses and are identified in the tables. Bonferroni-corrected (to reduce the risk of familywise error) Pearson Product–Moment correlations (Larzelere & Mulaik method 2002) between each child's WSQ summary score for each subtype (aloof, passive, active but odd, and typically developing) and their IQ measures were calculated to explore this relationship. A hierarchical regression analysis was conducted to determine whether the WSQ or intake IQ was more strongly associated with current IQ. Intake IQ was entered into the regression model first, followed by the WSQ-aloof score. This was the only other predictor used for two reasons: (a) it was the subtype that contained the largest number of subjects and at least 15 data points per predictor is standard for a reliable equation (e.g., Stevens, 1986), and (b) the aloof and typically developing subtypes correlated highly, at $r = -.85$, indicating that only one of these variables was needed.

RESULTS

Social Subtypes

The WSQ yielded a score for each of the following categories: aloof, passive, active-but-odd, and typically developing. Table III contains WSQ summary scores for each subtype (all children included), intake and current IQ scores, and the number of participants being categorized into each subtype. The highest number of participants was classified as aloof, and those children also had the lowest current IQ scores. This is consistent with the

Table III. WSQ Subtypes: Scale Scores, IQ and Number of Participants Classified in Each Subtype

Scale	WSQ Summary Score By Scale[a]	Total Participants in Subtype (Intake IQ Only)	Intake IQ Scores		Current IQ Scores
			Intake only	1 + Assessment	
Aloof	29.1 (14.5)	14 (3)	50.6 (13.4)	46.8 (8.0)	54.5 (13.5)
Passive	33.5 (10.8)	5 (1)	62.4 (11.9)	57.5 (5.5)	76.8 (13.4)
Active-but-odd	28.2 (10.3)	7 (1)	52.4 (12.7)	53.7 (13.5)	80.8 (15.2)
Typically Developing	33.7 (15.5)	9 (1)	55.8 (12.1)	57.0 (12.3)	93.8 (10.1)

[a] WSQ summary score for each subtype with all children included.
Mean (Standard Deviation).

literature suggesting that the most classically ''autistic'' children are categorized as aloof and that aloofness correlates with lower levels of intellectual functioning. Although intake IQ scores did not significantly correlate with WSQ subgroup, examination of change scores from intake to current IQ revealed a logical trend (a one-way ANOVA was significant, $F = 9.48$, $p < .0001$); aloof children had the smallest mean IQ change (7.6 points) and typically developing had the greatest (36.75; passive = 19.25 and active-but-odd = 27.17). Post hoc testing (Scheffe′) indicated that change in IQ in the aloof group was significantly smaller than in the active-but-odd ($p < .05$) and typically developing groups ($p < .0001$).

In keeping with Castelloe and Dawson's (1993) method of evaluating the association of parent and clinician ratings, correlations between mother and father categorical ratings of subtype were obtained (Spearman rank coefficient) and were generally high, r (24, df) = .83, however, different subtypes were indicated in a few cases. In a dispute, the primary caregiver's rating was used to assign subtype; the primary caregiver was identified by the parent(s). Correlation coefficients were obtained for Wing subtypes, age and months in treatment to explore whether age (as suggested in some research) or treatment duration may be associated with subtype. None of the Wing subtypes correlated significantly with either age or months in treatment. These Pearson values ranged from 0.19 to −0.14.

Intercorrelations between the WSQ and IQ

Results (Table IV) revealed that aloofness had a strong negative correlation with the typically developing subtype, but did not have significant associations with the passive or active-but-odd subtypes. The passive subtype was not correlated with typically developing, $r = -.21$, *ns*, but showed a significant correlation with the active-but-odd subtype, $r = .51$, $p < .01$. The passive and active-but-odd subtype had a moderate, positive correlation with each other but no significant correlations with other WSQ subtypes. The aloof subtype was negatively correlated with all IQ measures (pretreatment, current, and change scores); the passive and active-but-odd subtypes had low correlations with IQ; and the typically developing subtype was positively correlated with IQ. The low to moderate correlations between WSQ subtypes sug-

Table IV. Pearson Product-Moment Correlations Between WSQ Summary Scores for Each Subtype, Pretreatment IQ, Current IQ, and Change in IQ ($N = 28$–37)

	PreTx IQ	Current IQ	IQ Change	Aloof	Passive	Act/Odd	Typical
PreTx IQ	–						
Current IQ	.51[b]	–					
IQ Change	−.13	.85[c]	–				
Aloof	−.39[a]	−0.70[b]	−.52[b]	–			
Passive	.18	−0.02	−.10	0.34	–		
Active/odd	.04	0.28	.18	−0.15	0.51[b]	–	
Typical	.42[a]	0.73[c]	.60[b]	−0.85[c]	−0.22	0.13	–

Note:. Uneven cells due to incomplete current IQ data ($n = 6$ with intake IQ scores only) and WSQ response.
[a]$p < .05$; [b]$p = .001$; [c]$p < .001$.

gests that they tap separate domains. The results are consistent with a continuum in which the aloof subtype contains the lowest functioning children, followed by the passive, active-but-odd, and typically developing at the highest end.

The WSQ as a Predictor

Although it is noted that the WSQ was not administered at the time of entry into the study making evaluation of the WSQ as a treatment predictor impossible, we were interested in whether it might be a useful variable to add to our multi-site protocol. Table V presents summary data for the hierarchical regression and shows that the addition of the aloof predictor produced a model that accounted for significantly more of the variance in current IQ than when intake IQ was used alone.

DISCUSSION

In this study, the WSQ was utilized in two distinct ways: it was given to a group of children receiving intensive behavioral treatment and was administered to a younger sample than in most previous research, where the lower limit has been approximately age 5. Our study included children as young as 3 years receiving treatment. The aim of this study was to collect data to address the persistent concern about treatment outcome studies; measures other than IQ may better characterize the functional level of the children enrolled in the study. Ultimately, our goal is the identification of new measures that may be added to the protocol to gauge treatment responsiveness. Here, we combined the subtyping and treatment literature by exploring the concurrent validity of a social subtyping measure with current IQ in a sample of young children with autism receiving early intensive behavioral treatment. Specifically, we were interested in whether Wing's three proposed subtypes (aloof, passive, and active-but-odd) were found in this sample, whether any of the WSQ subtypes demonstrated concurrent validity with IQ, and whether Wing subtype was associated with change in IQ after EIBI as a preliminary step toward future exploration of this measure in our multi-center treatment program.

Results suggest that social subtypes (as measured by the WSQ), specifically the aloof subtype, could be an important variable to measure in EIBI studies. Consistent with studies of children with autism not enrolled in structured treatment, participants in EIBI appeared to fall along a continuum. Children classified as aloof were the lowest functioning and showed the least change in IQ scores from intake to post-treatment testing; children classified as typically developing were the highest functioning with the greatest change scores; and passive and active-but-odd children fell between the two. Interestingly, treatment duration was not significantly correlated with any subtype. Aloofness was associated with participants' current IQ more strongly than their intake IQ, which may be due to the restricted range of scores at intake. Nevertheless, these results suggest that aloofness may be a particularly meaningful variable to assess at intake, as it is related to less improvement in IQ scores. Previous research has shown IQ at intake to be an inconsistent predictor of treatment responsiveness, and while aloofness does correlate with IQ, it explained more of the variance in current IQ than that accounted for by intake IQ. Therefore, aloofness may be an important quality to measure, above and beyond initial IQ, in EIBI children.

A clear limitation of this study is that subtype was not collected at entry to the study and, therefore, no information about the usefulness of it as a predictor was gained. Additionally, the WSQ was

Table V. Hierarchical Regression Analysis Using Intake IQ and WSQ-Aloof as Predictors of Current IQ ($N = 28$)

Variable	R	R^2	SE	ΔF	β	T (for β)
Model 1	.56	.32	.82	12.5[a]		
Intake IQ					.58	3.53[a]
Model 2	.75	.58	.67	15.02[a]		
Intake IQ					.34	2.30[b]
WSQ: Aloof					−.53	−3.88[a]

[a]$p = .001$; [b]$p < .05$.
R = multiple regression coefficient; R^2 = R squared; SE = standard error of the estimate; ΔF = F change; β = beta coefficient; T = t value for beta.

examined for its association with only one measure of treatment responsiveness (IQ) and there was no control group to address whether other forms of treatment (or no treatment) may have produced the same results. Nevertheless, our results support the concurrent validity of the WSQ and IQ after a period of EIBI and suggest that the measure may be a useful complement to developmental testing. Clinical considerations provide additional support to this conclusion. As a parent-completed questionnaire, the WSQ is easier to administer and is less subject to the inaccuracies of intellectual testing which can be biased by the motivational level of the child and skill of the examiner.

Parents' informal reports raised an interesting issue specific to the use of the WSQ in treatment studies: Many parents stated that their child had switched subtypes during the course of treatment or was in transition at the time of their rating. These reports suggest that specifying a time frame for ratings might improve the reliability of the WSQ and indicate the importance of prospective investigations in the predictive power and stability of subtype classification of young children with autism in EIBI. Future investigations should address several important questions: (a) at what age do children move from one subtype to another? (b) do more untreated than treated children make such moves and how does treatment affect this? (c) are children with certain subtypes particularly likely to change classification?; and (d) do the changes tend to occur in the direction from more to less severe (i.e., passing through each subtype)?

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