

Running Head: Using the Autism Treatment Evaluation Checklist to monitor progress in children with ASD

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**Is the Autism Treatment Evaluation Checklist (ATEC) a useful tool for monitoring progress
in children with Autism Spectrum Disorders?**

Running Head: Using the Autism Treatment Evaluation Checklist to monitor progress in children with ASD

Abstract

Background: There are few well validated brief measures that can be used to assess the general progress of young children with Autism Spectrum Disorders (ASD) over time. In the present study, the Autism Treatment Evaluation Checklist (ATEC; Rimland and Edelson, 1999) was used as part of a comprehensive assessment battery to monitor the progress of 22 school-aged children with ASD who had previously taken part in intensive home- or school-based intervention programmes in their pre-school years. *Methods:* Parents completed the ATEC when the children were on average 5.5 years and then again 5-6 years later (mean age 10.4 years). Standardised measures were also used to assess cognitive, language and adaptive behaviour skills and severity of autism symptoms over the same period. *Results:* The ATEC had high internal consistency at both time points. ATEC total and subscale scores remained relatively stable over time and were highly and significantly correlated with cognitive, language and adaptive behaviour skills and severity of autism symptoms at both assessment points. Initial ATEC total scores predicted 64% of the variance in scores at the subsequent follow-up. However, there was also considerable variation in the patterns of scores shown by individual children over time. *Conclusions:* This study provides some preliminary evidence of the ATEC's potential value for monitoring progress of children with ASD over time. Its advantages and limitations are discussed in the context of the need systematically to monitor the progress of children with ASD over time or in response to intervention.

Keywords: Autism Spectrum Disorder, Autism Treatment Evaluation Checklist (ATEC), assessment, progress, intervention, effectiveness.

(Abstract word count: 245)

1. INTRODUCTION

The impact of various biomedical, educational, developmental, behavioural or other interventions on children with autism spectrum disorders (ASD) has been the focus of intensive research over recent years (for reviews see; Eldevik et al., 2009; Howlin, Magiati & Charman, 2009; Reichow & Wolery, 2009; Rogers & Vismara, 2008; Seida, Ospina, Karkhaneh, Hartling, Smith et al., 2009; Spreckley & Boyd, 2009; Technology Evaluation Center, 2009; Virtu -Ortega, 2010). Several longitudinal studies have monitored the continuing development of children with ASD subsequent to their participation in intervention programmes (e.g. MacEachin et al., 1993; Sallows and Graupner, 2005; Harris and Handleman, 2000). Others have focussed on developmental trajectories more generally (e.g. Charman, Taylor, Drew, Cockerill, Brown & al., 2005; Eaves & Ho, 1996; 2008; McGovern & Sigman, 2005; Turner, Stone, Pzdol & Coonrod, 2006).

However, the choice of appropriate measures to assess change in this population remains controversial. Indeed, the lack of reliable and valid measures to evaluate progress and change has proved a major challenge to the field. IQ and language tests provide information about a relatively narrow range of skills, and basal and ceiling levels can also prove problematic. Thus, a test designed for children of 0-6 years may no longer be valid as the child grows older, resulting in difficulties in interpreting scores from different tests at different times. Although measures of autism severity, such as the **Autism Diagnostic Interview-Revised (ADI-R; Lord et al., 1994)**, the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, Dilavore & Risi, 1999) or the Childhood Autism Rating Scale (Schopler, Reichler & Renner, 1986) have been used to assess progress or response to treatment, these were primarily developed as diagnostic instruments and as such designed to show overall *stability* over time, not to be sensitive to change. Moreover, it is becoming increasingly evident that interventions that have a significant impact on skills that are

directly related to the focus of training have far less effect on more distal areas, and in particular on overall levels of autism severity (cf Dawson et al., 2010; Green et al., 2010). Given these limitations, most researchers in search of standardized instruments to monitor change have resorted to using measures developed for typically developing children. However, these are often not appropriate for children with ASD whose patterns of development are highly variable (i.e. Lord and Schopler, 1989; Magiati and Howlin, 2001). A further problem in measuring change over extended periods is the lack of instruments that span the age range from pre-school to junior school and beyond. Although some informant-based schedules such as the Vineland Adaptive Behavior Scales (VABS-II; Sparrow, Cicchetti, & Balla, 2005) do cover a broad age range, their focus is on developmental profiles, which in autism may be both very delayed and deviant, so that comparisons with normative data are compromised. Moreover, instruments such as the Vineland do not focus specifically on improvements in behaviour or autistic symptomatology.

Given the increasing number of children with ASD who now have access to early preschool interventions, there is a crucial need reliably to monitor the outcome of such programmes, both in the short and longer term, and to establish a firm evidence base for treatment effectiveness. In times of financial constraints, too, it is important to be able to monitor progress in a way that is reliable and systematic but is also practical, economically viable and time efficient for families, schools, and other service providers.

The *Autism Treatment Evaluation Checklist* (ATEC; Rimland & Edelson, 1999) was developed in an attempt to address the need for an easy to administer, sensitive to change and valid instrument specifically developed for children with ASD. The ATEC is a short, one-page non-copyrighted checklist designed to be completed by parents, teachers and/or primary caretakers of children with ASD. The ATEC is free and can be accessed and scored online

(http://legacy.autism.com/ari/atec/atec_report.htm). The scale covers 77 items in the areas of communication, sociability, sensory and cognitive awareness, and health and physical behaviour, and also provides a total score (for more details on the measure see methods section).

In a search of the PsychInfo database in July 2010 using “Autism Treatment Evaluation Checklist” as a keyword, seven peer reviewed studies were identified that had used the ATEC (five in English: Charman, Howlin, Berry & Prince, 2004; Coben and Padolsky, 2007; Jarusiewicz, 2002; Meiri, Bichovsky and Belmaker, 2009; Ratcliff-Schaub, Carey, Reeves and Rogers, 2005; one in Portuguese: Goncalves Leitao, 2004 (5 cases only); and one in Chinese: Deng, Zou, Tang & Li, 2007). Deng et al. (2007) used the ATEC to describe autism characteristics in their sample and not as a measure of change. Of the 5 studies in English, all but Charman et al. (2004) used the ATEC to assess change following biological or neurological treatments (secretin, omega 3 fatty acids and neurofeedback). Most of the studies reported decreases in ATEC scores (indicating improvements) at follow-up periods ranging from 4 weeks to 5 months. In the three studies employing a control group (placebo or wait list), two reported significant differences in ATEC scores at follow-up between treatment and control group in favour of the treatment group (Jaruziewicz, 2002; Coben and Padolsky, 2007). In contrast, Ratliff-Schaub and colleagues (2005) reported no ATEC score differences after 4 weeks of transdermally applied secretin or placebo in a double blind, randomized controlled trial in 15 children with autism/ PDD. Charman et al. (2004) used the ATEC (rated by parents) alongside two other parent questionnaires to monitor the progress of 57 4-5 year old children with ASD during their first year at primary school. Scores on the ATEC Speech/ Language/ communication subscale were lower at the end of the year than they had been initially (indicating milder symptoms/ better developmental skills), but there were no significant changes on the other

subscales. The ATEC also correlated significantly with moderate effect sizes with the Vineland ABC composite score ($r=.45$ at Time 1 and $-.50$ at Time 2; both $p<.001$; Charman, July 2010, personal communication). The authors discussed the potential usefulness of the ATEC as a routine outcome measure, but also noted the difficulties arising in scoring and interpreting the scale because of the inclusion of both developmental and symptom severity items.

This paper: background, aims and research questions

The aim of the present paper is to add to the currently limited literature on the value of the ATEC as a measure of children's behaviour and functioning over time. Data are based on a cohort of 22 children whose progress was monitored from pre-school, when the children were on average 3.4 years ($sd=7.2$ months, range 2.3-4.4 years) and enrolled in early intensive community-based interventions, through to junior school. Their parents completed the ATEC as part of a comprehensive assessment battery when the children were followed-up at a mean age of 5.6 years (Follow-up 1 –FU1, $sd=7.2$ months; range 4.3-6.8 years) and again 5-6 years later (Follow-up 2 –FU2; mean age 10.4 years, $sd=9.3$ months, range 9.2-12 years; for more details see Magiati et al., 2007; Magiati et al, submitted).

The following research questions are addressed in this paper:

1. What is the internal consistency of the ATEC?
2. How do ATEC total, subscale and individual item scores change over time?
3. Does the ATEC total score correlate with other concurrent standardized measures of child functioning and autism severity (convergent and concurrent validity)?

4. Does the ATEC have predictive validity, i.e. do children's ATEC scores in the first year of primary school (at age 5-6 years) predict functioning in the final years of primary school (age 10-11 years)?

2. METHODS

2.1. Participants

All participants had originally been involved in a study of early intensive (school or home based) interventions for autism (see Magiati et al., 2007; Magiati et al., submitted). Of the 44 participants in the original Magiati et al. (2007) study, 35 were assessed in the long-term follow-up study 5-6 years later (Magiati et al., submitted). Of those, 22 (63%) had complete ATEC data at both FU1 and FU2 timepoints and were included in the present study. There were no statistically significant differences in FU1 child and demographic characteristics between children with available ATEC data and those without. At FU1, two years after the start of their early interventions, the parents of 22 children completed the ATEC and a number of other standardized measures. These same children were assessed again 5-6 years later at FU2. All participants were boys with a clinical diagnosis of ASD or autism which was confirmed on the ADI-R (Lord et al, 1994) when they were initially recruited in the study. English was the primary language spoken at home. Key demographic characteristics of the 22 participants at the start of the study are presented in Table 1.

Table 1 about here

2.2. Measures

The ATEC was used at FU1 and FU2 to measure caregiver-reported changes in behaviour and functioning in the following areas: i. Speech/Language/Communication (14 items; ceiling score 28); ii. Sociability (20 items; ceiling score 40); iii. Sensory/Cognitive Awareness

(18 items; ceiling score 36); iv. Health/Physical behavior (25 items; ceiling score 75). Ratings on subscales i-iii range from 0 to 2, with a score of 2 indicating lower developmental ability/ higher severity of autistic and behavioural problems; items on the Health/ Physical behavior subscale are scored from 0 (“no problem”) to 3 (“serious problem”). The total maximum score is 179 (range 0-179) with a higher score indicating more difficulties and a reduction in score indicating improvement. The ATEC authors provide no information or recommendations regarding the use of the ATEC with different age or ability groups. So far, no data on the validity or reliability of the ATEC have been published in the peer-reviewed literature, although Rimland and Edelson (1999) cite some “norms” and reliability and validity data online. Internal consistency (split-half reliability tests on over 1,300 completed baseline ATECs) was reported to be high (.94 for the total score; .81-.92 for subscale scores).

Apart from the ATEC, children’s cognitive, language and adaptive behavior functioning and severity of autism difficulties were assessed at both FU1 and FU2. The assessment of cognitive ability was based on the most appropriate/best standardized test available for each child’s age, developmental and language level. The more able children were assessed on either the *Wechsler Pre-school and Primary Scale of Intelligence* (WPPSI; Wechsler 1990; 2003) or the *Wechsler Intelligence Scale for Children* (WISC-IV; Wechsler, 2004) as appropriate; for those unable to score above basal on the Wechsler tests, IQ was assessed on the *Bayley Scales of Infant Development* (Bayley, 1993) or an IQ estimate was based on the *Merrill-Palmer Scale of Mental Tests* (MP; Stutsman, 1948) which has been used in other follow up studies of children with autism, especially those who are non-verbal. For ease of comparisons over time, a “best test” IQ and Mental Age (MA) score was calculated for each child based on the most developmentally appropriate/ best standardized cognitive test available at each time point

according to the following hierarchy: WISC> WPPSI (higher level)> Bayley> MP> WPPSI (lower level)¹. Adaptive behaviour was assessed by the *Vineland Adaptive Behavior Scales* (VABS, Survey form; Sparrow et al., 1984); the VABS Maladaptive behavior domain was also administered. Language Comprehension was assessed by the *British Picture Vocabulary Scales – 2nd Edition* (BPVS; Dunn et al., 1997) and expressive language by the *Expressive One Word Picture Vocabulary Test* (EOWPVT; Gardner, 1990; Brownell, 2000). Due to basal effects at FU1, raw scores were used in all analyses for language data. The *Autism Diagnostic Interview-Revised* (ADI-R; Lord et al., 1994) was used to monitor *current* ASD symptom severity in Verbal and Non-Verbal Communication (VC; NVC), Reciprocal Social Interaction (RSI) and Restricted, Stereotyped and Repetitive Behaviors (RSRB) domains. A total ASD symptom severity raw score based on the conventional ADI- R algorithm (i.e. ADI-R total=RSI + NVC + RSRB) was calculated. The ***Developmental Behaviour Checklist-Parent/ Caregiver or Teacher Version*** (DBC-P and DBC-T; Einfeld & Tonge, 2002), a 96-item checklist of behavioural and emotional problems in children aged between 4-18 years old with developmental difficulties, was completed by the children’s parents and teachers at FU2 only, as it was not initially included in the FU1 assessment battery.

In this paper, raw scores are presented for ATEC, ADI-R, BPVS and EOWPVT, while Age Equivalent (AE) and Standard Scores (SS) are presented for cognitive and adaptive behaviour functioning. However, all statistical analyses were carried out using raw or age equivalent scores as these are considered more appropriate for analyses of developmental levels in young children with ASD (i.e. see Carter et al., 1998).

2.3 Procedure

¹ The Mullen Scales of Early Learning (Mullen, 1995) were not widely available or used in the UK when this study began in 1998.

The study was approved by the Ethical Committees of St George's Hospital Medical School University of London and the Institute of Psychiatry, King's College London. All assessments were conducted by the first and second authors who had extensive prior experience of assessing children with ASD and were trained in the administration of the ADI-R and the standardised tests used. Assessments were conducted at home or school, and at final follow up all but 4 assessments were carried out at school. Parental interviews (ADI-R and Vineland) were completed within 2 months of the child's standardised assessment. Parents (usually the mother) were asked to complete the ATEC forms based on their child's *current* behaviour and functioning. Reliability of the other standardized assessments administered was high and is reported in more detail elsewhere (Magiati et al., 2007).

2.4. Data Analysis

Cronbach's alphas were calculated to examine internal consistency. Paired *t*-tests or non-parametric *Wilcoxon* tests (for language raw scores which were negatively skewed due to basal effects, particularly at FU1) were conducted to compare ATEC scores across the two follow-up time points. Pearson *r* correlations (or Spearman's *rho* for language scores) were carried out to examine the strength and nature of association between ATEC total and subscale scores and between the ATEC and scores on standardized assessments of cognitive and language functioning, adaptive behaviour, autism severity and overall behaviour.

3. RESULTS

3.1. ATEC internal consistency

Cronbach's alpha correlation coefficients were very high for total scores (FU1=.91 and FU2=.96; N=22, 77 items). Internal consistency of the four ATEC subscales was also very high (.86-.94 at FU1 and .87-.94 at FU2).

3.2. Change in ATEC scores over time

Tables 2 and 3 about here

Tables 2 and 3 present children's scores on the ATEC and the other standardized measures over the 5-6 year follow-up period. Total ATEC scores remained relatively stable but scores on the Speech/ Communication/ Language subscale decreased significantly between FU1 and FU2, indicating improvements over time. However, the average difference was only 2 points. Socialization subscale scores increases were statistically significant (mean change =3.3 points), indicating a small deterioration in this area. Sensory/ Cognitive scores overall remained stable over time, while Health/ Behavior subscale scores increased slightly (mean change= 4 points). ATEC total and subscale scores at FU1 were between the 20th and 60th centiles according to the score distributions published online by the checklist's authors, indicating moderate autism behaviours and developmental delays in this sample. At subsequent follow-up 5-6 years later, all ATEC scores were within the 40th-49th percentile, indicating moderate difficulties.

Raw/ age equivalent scores on standardized measures of cognitive, language and adaptive behaviour functioning increased significantly over time except for Vineland Maladaptive Behavior and ADI-R raw total score which did not change (see Table 3). However, *standard scores* on cognitive and adaptive behaviour tests either remained stable or decreased over time.

3.3. Individual differences in ATEC change scores

Although, on average, ATEC scores remained relatively stable over time, there were large individual differences in patterns of change, with some children showing improvements and others showing increases in their scores (indicating worsening of behaviour/ developmental gains; see Table 2). Large individual differences in changes in cognitive, language and adaptive behaviour scores were also noted (see Table 3; for more details see Magiati et al., 2007; Magiati et al., submitted).

3.4 Relationship between ATEC total score and scores obtained in standardised assessments

Due to the relatively large number of correlations conducted, a significance value of $p < .01$ was set. ATEC total scores were significantly and highly correlated between first and subsequent assessments ($r = .80$, $p < .001$). At both FU1 and FU2, ATEC total scores were significantly and highly correlated with cognitive and adaptive behaviour age equivalent scores and expressive and receptive vocabulary and ADI-R raw scores (see Table 4). All correlations were negative, with the exception of the ADI-R (on the ATEC and ADI-R, a higher score = greater impairment; on all other scales a higher score = higher ability). These large and significant associations were maintained for adaptive behaviour age equivalent and ADI-R raw scores when children's IQ was controlled for, with the exception of adaptive behaviour at FU2 which showed a non-significant, but moderate, association with ATEC total score (see Table 4). FU2 ATEC total score also correlated highly and significantly with DBC-Parent ($r = .78$, $p < .001$, $N = 21$), but not DBC-Teacher ($r = .36$, $p = .1$, $N = 22$).

Table 4 about here

3.5. Association between ATEC subscale scores and other standardized measures

ATEC Communication subscale scores correlated highly and significantly, with large effect sizes, with the other standardized communication measures administered at both follow-up time points (Vineland Communication age equivalent scores, BPVS, EOWPVT and ADI-R non-verbal communication raw scores; r values ranged from $-.77$ to $-.92$, all $p < .001$). At both FU1 and FU2, ATEC Sociability subscale was significantly associated with Vineland Socialization and ADI-R Socialization with medium to large effect sizes ($r = -.57$ to $.8$, all $p < .01$). ATEC Sensory/ Cognitive Domain scores were significantly associated with MA (FU1 $r = -.63$; FU2 $r = -.71$, both $p < .001$). ATEC Health/ Physical/ Behavior scores correlated significantly with VABS

maladaptive behavior raw scores at FU1 and 2 (both $r=.74$, $p<.001$). Finally, FU2 ATEC Health/Physical/ Behaviour raw scores correlated highly with FU2 parent DBC ($r=.8$, $p<.001$), but not with teacher DBC ($r=.02$, $p=.9$).

3.6. Predictive validity of the ATEC

In order to identify whether the ATEC score from FU1 was a good predictor of outcome and progress in this sample at FU2, two summary variables were created in SPSS: a total outcome rank variable (FU2 scores) and a total progress rank variable (FU2-FU1 change scores). As different scores were used in the different measures employed in the study (i.e. age equivalent and standard scores for cognitive and adaptive behaviour functioning, raw scores for language assessments and ADI-R) and in order to avoid repeated separate regression analyses for each outcome measure given the small sample size, progress (FU2-FU1) and outcome (FU2) data were summarized using ranks. First, children's scores at FU2 and their FU2-FU1 change scores in each of the key variables (cognitive and language functioning, adaptive behaviour and autism behaviour severity) were ranked from highest to lowest; then, the ranks obtained by each child in these four domains were summed to create the two summary variables. Two linear regressions were carried out with initial ATEC total score as the independent variable and total progress ranks and total outcome ranks as the dependent variables respectively. FU1 ATEC total scores alone significantly predicted 46% of the variance in progress between FU1 and 2 ($R^2=.46$, $F(1, 19)=16.2$, $p=.001$) and 64% of the variance in FU2 outcome ranks ($R^2=.64$, $F(1, 19)=33.56$, $p<.001$). When IQ and ATEC were entered together, they predicted 63% of the variance in progress ranks ($F(2, 18)=15.2$, $p<.001$) but as expected, given the high correlation between ATEC total score and cognitive functioning, FU1 total ATEC scores did not additionally

contribute to the model ($\beta=-.15$, $t=.64$, $p=.532$ for progress and $\beta=-.22$, $t=-1.44$, $p=.17$ for FU2 outcome).

4. DISCUSSION

This study investigated the potential usefulness of the Autism Treatment Evaluation Checklist (ATEC) for measuring progress over time in young children with ASD. Over a period of 5-6 years, children's scores on the ATEC were compared with their scores on other standardized measures of cognitive and language functioning, adaptive behaviour and autism severity. ATEC total and subscale scores correlated significantly with age equivalent and raw scores obtained from standardized measures. However, there were large individual differences in ATEC change scores over time. ATEC total scores at age 4-6 significantly predicted the extent of progress made 5-6 years later, while ATEC subscale scores were also highly correlated with the corresponding subscales of the standardized instruments administered. Although sample size was small ($n=22$), the findings provide tentative evidence of the ATEC's content validity. The finding that initial ATEC scores predicted a significant amount of the variance in overall outcome at subsequent follow-up, as well as the progress made over time, are also indicative of the scale's predictive validity. In addition, the large effect sizes of these associations indicate that parents are reliable informants of their child's functioning and that the ATEC is a potentially useful instrument for collecting current information on a relatively wide range of behaviours and skills in children with ASD. The study's findings also highlight the fact that a general assessment of children's skills and behaviours can be carried out systematically, reliably and validly in a relatively inexpensive and time efficient manner through parent report alone, particularly in community settings with limited resources.

While the data presented here suggest that the ATEC is a potentially reliable and valid tool for monitoring change over time, the study has a number of limitations. Firstly, the sample is small and self-selected, with more families of higher socio-economic and educational background than in the general population. Although 27% of participants had initial IQ scores >75, 50% of children had IQ scores <50, thus this sample is more representative of children with ASD who present with additional moderate to severe intellectual impairments. Furthermore, the participants had all previously been involved in intensive pre-school programmes, which is not typical of services and interventions received by most children with ASD in the UK. Secondly, the cognitive measures against which the ATEC was compared differed across time and between children, although similarly large relationships were found between the ATEC and standardised measures of other areas of functioning (i.e. language, adaptive behaviour, autism severity) which were used with all children and on both occasions.

Despite its potential usefulness, the ATEC provides only raw and centile scores and to be of greater value standardized norms are needed for children with ASD of different chronological, mental and verbal ages. In this sample, the 7 participants who obtained FU1 ATEC scores in the “mild difficulties” range (<20th centile) had an IQ score in the normal range (>80); their receptive and expressive vocabulary scores were only slightly below chronological age (59 to 61 months at mean age of 69 months); their ADI-R scores also indicated mild autism difficulties (mean ADI-R total score=17). ATEC scores correlated highly and negatively with cognitive scores, indicating that children of higher cognitive functioning obtained lower (less severe) scores. This suggests that the ATEC may have more limited use when monitoring the progress of children with ASD in the higher functioning range. The breadth and range of items included in the different subscales of the ATEC is somewhat limited and children with age-appropriate

communication and cognitive skills are likely to obtain full scores in the corresponding ATEC subscales. In its current form, the ATEC is likely to be more beneficial for monitoring progress in children with moderate to severe cognitive disabilities and/or less well developed communication skills.

In our sample, there were no children who obtained an ATEC score of >89 (>80th centile; severe difficulties according to ATEC score distributions). This observation could be accounted for by two possible interpretations: firstly, our sample was small and thus may not have allowed for a range of ATEC scores; secondly, the ATEC higher scores may indicate such extreme difficulties that very few children will actually obtain such high scores. In fact, the 3 children in our sample with the highest FU2 ATEC scores (71-89) had a mean IQ of 37, were all non-verbal and had an ADI-R total raw score of 40 indicating severe difficulties in these measures. It would have been expected that these children would score in the severe range in the ATEC as well; however, this was not the case and they all scored in the moderate range. Clearly, the validity of the scale also needs to be examined further for children with severe autism and cognitive/communication impairments.

The validity of the 4-scale factor structure of the instrument also requires further exploration using samples of adequate size (as the suggested minimum of cases: items ratio is 5:1, no such analyses could be carried out with this sample; Floyd and Widaman, 1995). The current classification of certain items in the checklist suggests a number of apparent inconsistencies. For example, item 1 in the Speech/ Language/ Communication subscale “knows own name” and item 1 in the Sociability scale “responds to own name” appear to assess similar constructs but are included in different categories. “Temper tantrums” and “disagreeable/ non compliant” are included in the Sociability scale, although they might be considered to be more

appropriately placed in the Health/ Physical/Behavior section. “Appropriate facial expressions” and “tuned in/ spacey” are included in the Sensory/ Cognitive subscale, rather than in the Sociability scale although such items are typically included in the socialization domain in other well established scales (i.e. in the ADI-R). Similarly, “no eye contact” is included in the sociability scale, while “looking where others are looking” is included in the sensory/ cognitive awareness. In addition, as Charman et al. (2004) previously noted, the ATEC includes both developmental and symptom severity items. Thus, the Communication subscale includes only developmental items, the Health/ Physical/ Behaviour subscale only includes behavioural/ severity items whilst the Sociability and Sensory/ Cognitive awareness domains include both developmental and autism severity items. This is conceptually challenging as it is unclear whether the ATEC measures developmental abilities or severity of problem behaviours. Although the ATEC does appear to measure children’s skills and behaviours reliably (as shown by high correlations with standardised measures of both developmental functioning and behaviour severity), it needs to have a clearer conceptual focus. In addition, further research is needed on the factor structure and item selection of the checklist before the ATEC’s validity as a measure of developmental progress or autism severity can be established.

Our data also showed that the scores obtained from the ATEC correlated with parental, but not teacher reports of behaviour problems (as measured by the DBC) and the scale’s reliability/validity when used with different informants requires further exploration. Finally, given the broad scope of the items included in the ATEC, the instrument may be less useful when evaluating interventions targeting specific skills, for which more specific and sensitive measures may be necessary.

In summary, the ATEC appears to be a potentially promising instrument for providing a general summary of children's current behaviours and skills, and could be useful as a routine measure in service-wide and school based monitoring procedures alongside other more formal assessments. It is quick and easy to administer, freely available and requires minimal training and resources but has the potential to gather valid and reliable information on children's general functioning. It showed high internal consistency, significant correlations with scores on standardized assessments and good predictive validity in this study, but more research is needed to establish its potential and usefulness in monitoring treatment outcome research.

(text word count 4.510)

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