

## Emotional Intelligence in Asperger Syndrome: Implications of Dissonance between Intellect and Affect

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*Abstract: Although many individuals with AS keenly desire social relationships, they are often unsuccessful in developing and maintaining them. Emotional intelligence (EI) as both an ability and trait is a construct that offers potential to enhance understanding of emotional and social characteristics of individuals with AS. Twenty-five young adults (aged 16–21 years) diagnosed with AS participated in an exploratory study that investigated EI. Trends and differences between AS and normative groups were examined. Correlation and multiple regressions were employed to explore relationships amongst variables. Results indicated that trait EI was impaired for individuals with AS; however, ability EI was intact. Regression analyses revealed that trait and ability EI together predicted 57% of the variance for self-reported interpersonal skills and 31% of the variance for parent-reported social skills. Trait EI alone predicted 19% of the variance for self-reported social stress. Results are discussed in terms of terms of social skills interventions for individuals in this population and suggest future research directions.*

Although changes to diagnostic criteria are under consideration, Asperger Syndrome is currently classified as one of the Pervasive Developmental Disorders (PDDs), sometimes referred to as Autism Spectrum Disorders (ASDs). The presence of social and emotional difficulties has been widely accepted as a hallmark feature of PDDs. However, in contrast to lower functioning PDDs, a primary feature of Asperger Syndrome (AS) is the failure to develop age-appropriate social abilities despite typically-developing cognition and language skills (Barnhill, 2001; Gutstein & Whitney, 2002). Asperger referred to this unexpected underachievement in social interaction as a

lack of “harmony between affect and intellect” (pg. 79, Frith, 1991). This dissonance undoubtedly impacts social competence and may present as an absence of reciprocal social interaction, difficulties understanding hidden or implicit rules of socialization, naïve and/or inappropriate social behaviors, and a lack of empathy (Wing, 1981). Although various researchers have examined emotions in PDD, to this point, none have directly examined Asperger’s assertion that a primary feature is the dissonance between cognition and affect. An exploration of emotional intelligence may be one vehicle to investigate such claims and provide promise to understand the ‘unexpected’ social difficulties of those with AS.

Various researchers have outlined social difficulties commonly experienced by individuals with AS, such as appreciating social cues (Attwood, 2000; Klin, 2000; Koning & Magill-Evans, 2001), engaging in socially/emotionally appropriate behaviors (McLaughlin-Cheng, 1998), following social conventions (Tantam, 1991), and sensing the feelings of others (Szatmari, Bartolucci, & Bremner, 1989). In addition, some have documented detachment from the feelings of and avoid-

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ance of others or a preference for being alone (Szatmari et al., 1989). The atypical cognitive styles and idiosyncratic and unusual behaviors frequently exhibited by individuals with AS undoubtedly contribute to their social-emotional difficulties with peers (Baron-Cohen, 2003; Ehlers & Gillberg, 1993). Moreover, significant difficulty developing social competencies, despite an eagerness to connect with others, has been hypothesized to increase the risk of co-morbid mental health conditions such as depression, anxiety, and suicidal ideation (Ghaziuddin, Weidmer-Mikhail, & Ghaziuddin, 1998; Gillberg, 1992; Tantam, 1988; 1991; 2000; Wing, 1981). Indeed, failure to connect socially has far-reaching implications for quality of life and long-term outcomes (Gutstein & Whitney, 2002; Shaked & Yirmiya, 2003; Szatmari, 2000). As such, it is essential to examine and understand the social deficits of those with AS.

Various explanations have been put forth to account for the social deficits in AS (and other PDDs). Deficits in theory of mind (ToM; see Baron-Cohen, 1995) and executive functions (EF; see Ozonoff, 1997) are two dominant hypotheses for social difficulties in AS in the research literature. Those who adhere to the ToM explanation assert that it is the inability of individuals with AS to understand and decode that others have thoughts, perceptions, and beliefs that differ from their own that is core to the social problems encountered. Alternately, those who advance the executive dysfunction approach contend that it is deficient and/or inefficient cognitive processes that are responsible for difficulties in social contexts. While both of these are intuitively sensible, neither ToM nor executive dysfunction has been clearly linked to social outcomes (Klin, 2000; Tager-Flusberg, Joseph, & Folstein, 2001). Similarly, neither of these theories provides sufficient explanation for the difficulties in emotional understanding that individuals with AS commonly face, difficulties that have an impact upon social skill development. Consequently, it may be useful to examine alternate approaches linked more directly to competence with the processing of emotion to explain and understand the social deficits in AS.

### *Emotional Difficulties in AS*

Individuals with AS are often reported to display limited empathy (Baron-Cohen, 2003; Gillberg, 1992). Few studies, however, have examined empathetic abilities in specific PDD subcategories in this area or in other aspects of emotional understanding and processing. Researchers investigating affective capacities within the broad PDD category have reported atypical recognition and expression of emotion (Capps, Yirmiya, & Sigman, 1992; Macdonald et al., 1989), as well as deficits in the perception of facial emotion (Weeks & Hobson, 1987). Various researchers have also noted marked impairments in the ability to discriminate and/or integrate perceptions of facial, gestural, and vocal emotional expression (Hobson, 1986a, 1986b; Njikiktjien et al., 2001), difficulties labeling emotions (Davies, Bishop, Manstead, & Tantam, 1994; Yirmiya, Sigman, Kasari, & Mundy, 1992), and an absence of empathic reaction to the stress of others (Sigman, Kasari, Kwon, & Yirmiya, 1992) in individuals with PDD. For individuals with AS specifically, qualitative differences in the way that these individuals process facial expressions (Grossman, Klin, Carter, & Volkmar, 2000) and information on emotionally-based tasks (Baron-Cohen, O'Riordan, Stone, Jones, & Plaisted, 1999; Critchley et al., 2000; Wang, Dapretto, Hariri, Sigman, & Bookheimer, 2004) have been reported. Researchers measuring cerebral blood flow using Positron Emission Tomography (PET) have reported difficulties with the integration of emotional information and differences in the activation of brain regions typically related to emotional processing (Hall, Szechtman, & Nahmias, 2003). Although individuals with AS appear to cope adequately with emotional information in laboratory situations (Hobson, 1986b), natural environments pose difficulties because these same individuals struggle with the fluency around the emotional aspects of social interactions (Dissanayake & Macintosh, 2003). Mixed findings on direct measures of empathy (Baron-Cohen & Wheelwright, 2004; Dyck, Ferguson, & Shochet, 2001) may mean there are factors other than poor empathy contributing to the social and emotional deficits of those with AS. Although difficulties in the domain of socialization have long been recog-

nized, an explicit connection between socialization difficulties and impairments in emotional processing has been rarely reported (for discussion, see Dyck et al., 2001; Gillberg, 1992; Tonge, Brereton, Gray, & Einfeld, 1999). Various researchers have explored the role of the dominant theories (ToM and EF) in understanding social impairment in AS. However, none have explored the emerging field of EI for its implications for this group. Additionally, much of the current literature examines ToM and EF in the broader PDD population without differentiating between individuals on extreme ends of the 'spectrum' who likely have significantly different cognitive and/or language skills.

### *Emotional Intelligence*

Emotional intelligence is a construct that has been clearly linked to social outcomes (see Mayer, Salovey, & Caruso, 2004). EI appears to facilitate enhanced understanding of individual differences (beyond that accounted for by personality and intelligence) and may impact important theoretical outcomes, such as social skills and general quality of life (e.g., Austin, Saklofske, & Egan, 2005). There are two predominant and distinct approaches to emotional intelligence: trait and ability. Trait emotional intelligence is viewed as a set of competencies in areas related to emotion including optimism, self-awareness, self-esteem, and self-actualization (Bar-On, 1997; Goleman, 1995; 1998; Mayer, Salovey, Caruso, & Sitarenios, 2001). The ability approach "stresses the concept of an intelligence that processes and benefits from emotions" (Mayer, Salovey, & Caruso, 2000, pg. 105). Although there is some controversy surrounding the respective characterizations of each approach, recent research has demonstrated incremental validity (above and beyond approaches such as personality) for each model in a variety of areas relating to social skills and overall competence. The trait EI model has been shown to predict successful social interactions (Lopes et al., 2004; Lopes, Salovey, Cote, & Beers, 2005) and social network size (Austin & Saklofske, 2005). Moreover, it has been negatively correlated with psychological distress (Slaski & Cartwright, 2002) and depression (Dawda & Hart, 2000; Schutte et al., 1998). In contrast, the ability model of EI has been

shown to predict life satisfaction (Ganon & Ranzi, 2005; Law, Wong, & Song, 2004; Palmer & Stough, 2001), self-reported quality of relationships (Ciarrochi, Chan, & Caputi, 2000), self-reported empathy (Ciarrochi et al.; Rubin, 1999; Sullivan, 1999), judged social competence (Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006) and is negatively correlated with social deviance (Brackett & Mayer, 2003).

Given the important relationships between EI and constructs such as empathy and self-reported quality of relationships, exploring the ability of EI to predict social outcomes in children with AS seems logical. Findings are likely to support the importance of exploring EI in youth with AS and ultimately its clinical utility in informing socially or affectively-mediated interventions (Lopes, 2003). However, to our knowledge, only our research group is systematically examining this.

### *Emotional Intelligence and Asperger Syndrome*

The social deficits in AS cannot be adequately explained by existing hypotheses such as ToM and EF (Tager-Flusberg & Joseph, 2001). As the ability and trait approaches conceptualize EI differently, each model may provide interesting and important information about the characteristics of individuals with AS. For example, trait approaches may provide insight about how individuals with AS feel they perform in social interactions, while the cognitive approach may provide information about how individuals manage content and are able to reason in such situations. Moreover, EI includes important aspects of social functioning such as flexibility of thinking and reasoning with emotional information, aspects that are well-defined areas of impairment in individuals with AS (Baron-Cohen, 2003; Gillberg, 1992; Hughes, Russell, & Robbins, 1994; Manjiviona & Prior, 1999; Ozonoff, 1997; Ozonoff, Pennington, & Rogers, 1991; Ozonoff, Rogers, & Pennington, 1991; Rinehart, Bradshaw, Moss, Brereton, & Tonge, 2001; Verte, Guerts, Roeyers, Oosterlaan, & Sergeant, 2006). As such, there is an intuitive link between EI functioning and social outcomes.

This study explored the use of both models of EI for young adults with AS, a clinical condition that theoretically would appear nega-

TABLE 1

Participant Characteristics: Means (standard deviations)

|                  | <i>Males</i><br><i>N = 20</i> | <i>Females</i><br><i>N = 5</i> | <i>Total</i><br><i>N = 25</i> | <i>Range</i> |
|------------------|-------------------------------|--------------------------------|-------------------------------|--------------|
| Age              | 17.80 (1.2)                   | 19.6 (1.1)                     | 18.16 (1.4)                   | 16–21        |
| VIQ              | 115.5 (11.3)                  | 108 (8.7)                      | 114 (11.1)                    | 89–135       |
| KADI SS          | 92.10 (12.4)                  | 103.2 (10.7)                   | 94.3 (12.7)                   | 75–118       |
| Age at diagnosis | 10.33 (3.9)                   | 13.75 (2.9)                    | 10.9 (3.9)                    | 8.5–18.3     |

*Note.* The Wechsler Abbreviated Scale of Intelligence (WASI) is from Wechsler, 1999. VIQ refers to Verbal Intelligence Quotient. The Krug Asperger Disorder Index (KRUG) is from Krug and Arick, 2003. Mean and standard deviation performance for the KADI and VIQ is reported in standard score units.

tively associated with EI, as well as the relationship between EI and social outcomes.

## Method

### *Participants*

Thirty-nine individuals were recruited from school and mental health settings in Manitoba and Alberta as part of a broader project. Of the thirty-nine individuals recruited for the PDD study, twenty-five young adults (aged 16–21 years,  $M = 18.2$ ,  $SD = 1.38$ ; 20 male, 5 female) met inclusion criteria and were invited to participate. All participants were required to have an official diagnosis of AS conveyed by a medical doctor or psychologist. Further, to ensure individuals were not better characterized by another PDD, a verbal intelligence quotient (VIQ) of  $\geq 85$  was required. Individuals with co-existing conditions were not excluded from the study unless the condition interfered with their ability to complete tasks (e.g. selective mutism). To differentiate AS participants from individuals with high functioning autism (HFA), participants with parent-reported language delays (no single words by age 2, no phrases by 3) were excluded from this particular study. Individuals were also excluded if parents could not recall if their child met the aforementioned language milestones. Since diagnosis of AS is sometimes controversial and differing clinicians may interpret criteria in unique ways, it was necessary to use an external measure to confirm diagnostic status. Consequently, parents were asked to 1) document the onset of and quality of language development and

2) complete the Krug Asperger Disorder Index (KADI; Krug & Arick, 2003) to provide validation of the initial diagnosis. In addition to the aforementioned language development information, a KADI score  $\geq 70$  was considered sufficient validation of the participant's original diagnosis.

The mean VIQ score for the group was 114 ( $SD = 11.10$ ), while the mean KADI score was 94.3 ( $SD = 12.70$ ). According to parent reports, the mean age of diagnosis for participants was 10.9 ( $SD = 3.9$ ). These characteristics of the sample are summarized in Table 1. Participants' initial diagnoses were reported to be conferred by pediatricians ( $n = 1$ ), physicians ( $n = 1$ ), psychiatrists ( $n = 15$ ), and psychologists ( $n = 7$ ). Fifteen of the participants had been diagnosed with AS by more than one clinician. Information pertaining to co-existing conditions is summarized in Table 2.

### *Procedure*

Individuals who met the criteria for inclusion were invited to participate in the study. Participants then completed the Mayer-Salovey Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002), the Bar-On Emotional Intelligence Quotient Inventory, Short Version (Bar-On EQ-i:S; Bar-On, 2002), and the Behaviour Assessment Scale for Children – Second Edition (BASC-2; Reynolds & Kamphaus, 2004) in a randomized order.

### *Measures*

*Krug Asperger Disorder Index (KADI).* The KADI (Krug & Arick, 2003) is a reliable and

**TABLE 2**

**Co-morbid Psychological or Medical Diagnoses Reported by Participant's Parent**

| <i>Psychological condition</i>                   | <i>Number of participants</i> |
|--|-------------------------------|
| None   | 8                             |
| Attention deficit hyperactivity disorder (AD/HD) | 10                            |
| Anxiety  | 4                             |
| Depression                                       | 2                             |
| Obsessive compulsive disorder                    | 2                             |
| Tourette's syndrome                              | 1                             |
| Tic disorder                                     | 1                             |
| Giftedness                                       | 1                             |
| Learning disability                              | 1                             |
| Nonverbal learning disability                    | 1                             |
| Bipolar disorder                                 | 1                             |
| Dyspraxia  | 1                             |
| Asthma   | 1                             |
| Cerebral Palsy                                   | 1                             |
| Strabismus                                       | 1                             |
| Unidentified condition                           | 1                             |

valid screen for identifying individuals with AS (Campbell, 2005). It is a norm-referenced, clinician-administered 32 item report designed to collect information on individuals aged 6 to 21 years, 11 months. The KADI requires 5 to 10 minutes to administer. Ratings of behaviors are to be completed by close friends, parents, or relatives of the individual in question. The psychometrics properties for this measure meet acceptable standards.

*The Wechsler Abbreviated Scale of Intelligence (WASI).* The WASI (Wechsler, 1999) is an individually administered intelligence test appropriate for assessing the general intellectual ability of adults or children (aged 8–89). For this study, only the two verbal subtests were administered to generate a Verbal IQ score. The psychometric properties of this instrument are considered to be excellent.

*BarOn Emotional Quotient Inventory - Computer Administered Version, Short form (BarOn EQ-i:S).* The BarOn EQ-i:S (Bar-On, 2002) is a self-report measure of EI for individuals aged 16 and older. The EQ-i:S employs a five-point Likert self rating system. The measure consists of 51 items and takes approximately 10–15 minutes to complete. It generates a total EQ (Emotional Quotient) composite score and

seven EQ subscales (Intrapersonal, Interpersonal, Stress Management, Adaptability, General Mood, Positive Impression, Inconsistency Index). An inconsistency index is included to detect random responding, and the positive impression scale is included to detect individuals who tend to portray themselves more positively than is true. The reliability and validity evidence provided for this instrument exceeds standards for acceptability.

*The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)- Computer Administered Version.* The Mayer-Salovey-Caruso Emotional Intelligence Test (Mayer et al., 2002) is based on the four-branch model of EI. The MSCEIT is a 141 item self-report that takes 30–45 minutes to administer. Items are provided in multiple-choice format, and the test is intended for use with individuals aged 17 or older (though use for 16 year olds is allowed for in the manual). This measure yields a single overall performance score, two area scores for Emotional Experience and Emotional Reasoning, and scores reflecting the four-branch model: 1) perceiving emotions; 2) using emotions to facilitate thought; 3) understanding emotions; and 4) managing emotions to foster personal growth and healthy social relations. The psychometric properties of this measure indicate that it meets standards for acceptability.

*The Behavior Assessment System for Children, Second Edition (BASC-2).* The BASC-2 (Reynolds & Kamphaus, 2004) is a multi-dimensional inventory of behavior and self-perceptions for individuals aged 2 to 25 years. Three rating forms (self, parent, teacher) are available to provide multi-source information about the behavior and emotional functioning of children and youth in various contexts. The BASC-2 possesses excellent psychometric properties. Four scales (Social Stress and Interpersonal Skills from the BASC-2: SRP; Social Skills and the Adaptive Composite from the BASC-2: PRS) were used in this study as they reflect social abilities as rated separately by the individual and a close caregiver.

*Analysis*

Descriptive statistics were used to enable interpretation and examine score distributions. Single-sample t-tests were conducted to com-

TABLE 3

## Single Sample Comparisons of EI for AS Group and Normative Group

| <i>Measure</i>                | <i>Mean score</i> | <i>Mean difference</i> | <i>Sig. (two-tailed)</i> |
|-------------------------------|-------------------|------------------------|--------------------------|
| <b>MSCEIT Total EI</b>        | 103.43            | 3.43                   | .23                      |
| Perceiving                    | 109.18            | 9.18                   | .04*                     |
| Using                         | 107.70            | 7.70                   | .02*                     |
| Understanding                 | 120.60            | 20.60                  | .001*                    |
| Managing                      | 98.03             | -1.97                  | .45                      |
| <b>Positive-Negative Bias</b> | 96.37             | -3.63                  | .33                      |
| <b>BarOn EQ-i:S Total EQ</b>  | 87.12             | -12.88                 | .001*                    |
| <b>Positive Impression</b>    | 107.00            | 7.00                   | .02*                     |
| Intrapersonal                 | 89.60             | -10.40                 | .006*                    |
| Interpersonal                 | 89.16             | -10.84                 | .001*                    |
| Stress Management             | 91.40             | -8.60                  | .04*                     |
| Adaptability                  | 94.64             | -5.36                  | .13                      |
| General Mood                  | 86.28             | -13.72                 | .001*                    |
| <b>BASC-2 Subscales</b>       |                   |                        |                          |
| Social Stress (SRP)           | 52.60             | 2.60                   | .15                      |
| Interpersonal relations (SRP) | 47.72             | -2.28                  | .12                      |
| Adaptive Composite (PRS)      | 43.17             | -6.83                  | .002*                    |
| Social Skills (PRS)           | 42.46             | -7.54                  | .004*                    |

*Note.* Mean and standard deviation performance for the MSCEIT and BarOn EQ-i:S tasks are reported in standard score units. Mean and standard deviation performance for the BASC-2 tasks are reported in T-score units. An asterisk denotes a significant difference from the normative population at  $p < .05$ .

pare participants to normative data reported in the manuals of the Bar-On EQ-i:S, MSCEIT, and BASC-2. Single subject t-tests (two-tailed) were performed to determine if the AS group differed significantly from the typical populations on which these measures were normed. Two-tailed tests were chosen throughout this study as EI has not previously been investigated with this population. Pearson Product Moment correlations were conducted to identify significant relationships between age, IQ, EI composites, EI subscales and branches, and BASC-2 scales. Finally, theoretical and statistical information was used to establish a model to examine prediction of social outcomes. Given the relatively small sample size, analysis for this study is considered to be exploratory and preliminary.

## Results

### *Differences in AS from the Normative Population*

The mean scores, mean differences, and significance levels of results on the MSCEIT,

Bar-On EQ-i:S, and BASC-2 are shown in Table 3. Performance for the AS group on the MSCEIT total EI score was not significantly different from that of the norm group,  $t(24) = 1.24$ ,  $p = .23$ , two-tailed. However, an examination of results on the subscales revealed significantly better performance for the AS group on Perceiving Emotions ( $t(24) = 2.21$ ,  $p = .04$ , two-tailed), Using Emotions ( $t(24) = 2.53$ ,  $p = .02$ , two-tailed), and Understanding Emotions ( $t(24) = 3.63$ ,  $p = .001$ , two-tailed). Mean performance on Managing Emotions was not significantly different from the norm group. Results of the Positive-Negative Bias subscale indicated that the MSCEIT is valid for use with the AS population and that the interpretation of group performance on the scales is appropriate.

For the BarOn-EQ-i:S, individuals with AS performed significantly poorer than did the normative group (Total EQ,  $t(24) = -4.17$ ,  $p = .001$ , two-tailed). Although the validity index (Positive Impression) on this measure produced significantly different scores than for the normative group ( $t(24) = 2.57$ ,  $p =$

.02, two-tailed), the mean score for the AS group was within the acceptable range ( $M = 107$ ; within one standard deviation from the mean) and skewed positively, thus improving their overall scores. The AS group had significantly lower scores than the normative group on the Intrapersonal ( $t(24) = -3.03, p = .006$ , two-tailed), Interpersonal ( $t(24) = -3.79, p = -2.22, p = .04$ , two-tailed), and General Mood ( $t(24) = -3.81, p = .001$ , two-tailed) scales.

As shown in Table 3, the comparison of AS scores to those of the normative group revealed no significant difference for BASC-2 Social Stress (SRP) ( $t(24) = 1.47, p = .154$ , two-tailed) or Interpersonal Relations (SRP) ( $t(24) = -1.61, p = .120$ , two-tailed). For the parent scales however, both the Adaptive Composite (PRS) ( $t(24) = -3.60, p = .002$ , two-tailed) and the Social Skills (PRS) scales ( $t(24) = -3.22, p = .004$ , two-tailed) were significantly different from the normative group. It is important to note that, due to the age range of this group and limitations of the BASC-2, only clinical scores (comparing those with AS to other clinical groups) for social outcomes were generated. As such, the scores reported may underestimate the extent of skill deficits.

#### *Correlations among Variables*

Zero-order correlations among the variables are presented in Table 4. Exact  $p$  values are reported, but caution in interpreting results is urged because of multiple comparisons.

Age and VIQ were examined for their relationship with the variables on the scales and branches used in this study. Results for this analysis indicated that there was a strong association between age and Perceiving Emotions (MSCEIT). Additionally, there was a strong association between verbal IQ and the Understanding Emotions branch on the MSCEIT, a scale that requires individuals to identify emotions and demonstrate an understanding that "there are groups of related emotions" (Mayer et al., 2002, p. 19). No other significant associations with age or VIQ were found.

Significant correlations between the MSCEIT and BarOn EQ-i:S are shown in Table 5. Moderate correlations between the MSCEIT total EI score and the BarOn EQ-i:S

Interpersonal scale ( $r = .47, p < .05$ ) and the BarOn EQ-i:S Adaptability scale ( $r = .45, p < .05$ ) were found. Additionally, moderate but significant associations were revealed between the MSCEIT Managing Emotions branch and the BarOn EQ-i:S Interpersonal scale ( $r = .56, p < .01$ ).

Significant correlations between the BarOn EQ-i:S and BASC-2 scales are reported in Table 6. A moderately strong negative relationship was found between the self-report of Social Stress on the BASC-2 and the BarOn EQ-i:S total EQ composite ( $r = -.51, p < .01$ ) and the BarOn EQ-i:S Stress Management scale ( $r = -.58, p < .01$ ) while a moderately strong positive correlation was found between this scale and the BarOn EQ-i:S General Mood scale ( $r = .56, p < .01$ ). A moderately strong positive correlation was found between the self-report of Interpersonal Skills on the BASC-2 and the BarOn EQ-i:S total EQ composite ( $r = .63, p < .01$ ), the BarOn EQ-i:S Intrapersonal scale ( $r = .55, p < .01$ ), the BarOn EQ-i:S Stress Management scale ( $r = .52, p < .01$ ), and the BarOn EQ-i:S General Mood scale ( $r = .62, p < .01$ ). Further, a moderate and strong positive correlation was found between the parent-report of Social Skills on the BASC-2 and the BarOn EQ-i:S Adaptability scale ( $r = .41, p < .05$ ). No significant correlations were found between the BASC-2 scales and the MSCEIT total score or branch scores.

A series of multiple regressions using three different dependant variables (Interpersonal Relations; Social Stress; and Social Skills) was conducted to explore the potential of the EI measures to predict social outcomes. In the interest of using conservative procedures with a relatively small sample size, the enter method was employed for these analyses. In addition, the more conservative adjusted  $R^2$  was utilized because of the relatively high ratio of predictor to outcome variables (see Bellini, 2006). However, the small sample size requires that the analyses should be considered exploratory at this stage.

Independent variables (IVs) for this procedure were chosen based on the results of aforementioned correlational analysis. Only IVs that were moderately to strongly correlated with the dependant variables (DVs), but not strongly correlated with each other, were

**TABLE 4**  
**Zero Order Correlations Among Variables**

| Age | VIQ | Total EQ | Intra | Inter | Stress | Adapt | Mood  | Total EI | Perceive | Using | Underst | Manage | SRP SS | SRP Inter | PPS Adapt | PPS SS |
|-----|-----|----------|-------|-------|--------|-------|-------|----------|----------|-------|---------|--------|--------|-----------|-----------|--------|
| 1   | 2   | 3        | 4     | 5     | 6      | 7     | 8     | 9        | 10       | 11    | 12      | 13     | 14     | 15        | 16        | 17     |
| 1   | —   | -.03     | -.12  | -.16  | .05    | .01   | .00   | -.13     | -.48*    | -.19  | -.07    | -.04   | -.01   | .03       | .22       | .24    |
| 2   | —   | .06      | .02   | .08   | -.14   | .34   | .04   | .30      | .06      | .18   | .55**   | .17    | -.10   | .08       | .10       | -.03   |
| 3   | —   | —        | .75** | .49*  | .76**  | .46*  | .91** | .34      | -.04     | .18   | .35     | .13    | -.51** | .63**     | .18       | .01    |
| 4   | —   | —        | —     | .10   | .54**  | .02   | .67** | .03      | .07      | -.03  | .03     | -.11   | -.29   | .55**     | .06       | -.03   |
| 5   | —   | —        | —     | —     | .02    | .41*  | .35   | .47*     | -.10     | .29   | .33     | .56**  | -.04   | .25       | .10       | -.06   |
| 6   | —   | —        | —     | —     | —      | .16   | .72** | .07      | -.06     | .00   | .24     | -.24   | -.58** | .52**     | .02       | -.09   |
| 7   | —   | —        | —     | —     | —      | —     | .28   | .45*     | .06      | .24   | .32     | .31    | -.17   | .14       | .32       | .41*   |
| 8   | —   | —        | —     | —     | —      | —     | —     | .29      | -.09     | .20   | .35     | .11    | -.56** | .62**     | .17       | -.08   |
| 9   | —   | —        | —     | —     | —      | —     | —     | —        | .39      | .84** | .69**   | .53**  | -.15   | -.21      | .28       | .00    |
| 10  | —   | —        | —     | —     | —      | —     | —     | —        | —        | .51** | -.03    | -.19   | .13    | -.23      | .25       | .18    |
| 11  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | .52**   | .34    | -.10   | -.22      | .17       | -.06   |
| 12  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | —       | .29    | -.24   | -.04      | -.03      | -.29   |
| 13  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | —       | —      | .01    | -.16      | .13       | -.05   |
| 14  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | —       | —      | —      | -.67**    | .03       | .05    |
| 15  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | —       | —      | —      | —         | -.04      | -.01   |
| 16  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | —       | —      | —      | —         | —         | .72**  |
| 17  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | —       | —      | —      | —         | —         | —      |
| 18  | —   | —        | —     | —     | —      | —     | —     | —        | —        | —     | —       | —      | —      | —         | —         | —      |

Note. \*  $p < .05$ ; \*\*  $p < .01$ ; two-tailed

**TABLE 5**

**Significant correlations between EI measures in AS and Normative Group**

|                            | <i>MSCEIT total EI</i> |             | <i>MSCEIT Managing</i> |             |
|----------------------------|------------------------|-------------|------------------------|-------------|
|                            | <i>AS</i>              | <i>Norm</i> | <i>AS</i>              | <i>Norm</i> |
| BarOn EQ-i:S Interpersonal | .47                    | .23         | .56                    | .26         |
| BarOn EQ-i:S Adaptability  | .45                    | .23         | –                      | –           |

*Note.* These correlations were significant at  $p < .05$

chosen (see Tabachnick & Fidell, 2007). Consequently, only the BASC-2 Social Stress (SRP), Interpersonal Skills (SRP), and Social Skills (PRS) scales were considered for regression procedures in this study. Table 7 lists the IVs and DVs used in the regression series. Collinearity diagnostics for all procedures were within acceptable guidelines. Table 8 provides the regression coefficient information for the predictor variables entered into the three models.

The first regression examined the prediction of self-reported interpersonal skills (BASC-2 Interpersonal Composite) by the composite scores for both EI measures. Using the enter method, a significant model emerged:  $F(2,22) = 16.65, p < .005$ . The model explains 57 % of the variance (Adjusted  $R^2 = .566$ ). Both variables were significant predictors in this model.

A second regression explored the ability of EI scores to predict self reported Social Stress (BASC-2). Using the enter method, a significant model emerged:  $F(2,22) = 3.82, p < .038$ . The model explains 19 % of the variance (Adjusted  $R^2 = .19$ ). Only the BarOn Total EQ was a significant predictor in this model.

A third regression was conducted to explore

the prediction of parent reported social skills (BASC-2) by subscales from each EI measure. Again, the enter method was used and a significant model emerged:  $F(2,22) = 6.23, p < .007$ . The model explains 31% of the variance (Adjusted  $R^2 = .31$ ). Both predictors were significant in this model.

**Discussion**

One goal for this study was to compare the ability and trait EI of individuals with AS to normative groups. The results provide interesting insight into the characteristics of individuals with AS. In general, individuals with AS performed similarly to the normative group on the MSCEIT Total EI composite. However, analyses of the EI components revealed that individuals with AS performed significantly better than the normative group on the Understanding Emotions branch of the MSCEIT. Although this appears to be an unusual result, it is consistent with reports for this group on tasks from a similar construct, theory of mind (ToM). In studies examining ToM (the ability to perceive that other’s have thoughts, feelings, perceptions different from our own), individuals with AS were able to

**TABLE 6**

**Significant Correlation Coefficients for the BarOn EQ-i:S and BASC-2**

|                          | <i>Total EQ</i> | <i>Interpersonal</i> | <i>Adaptability</i> | <i>Stress Management</i> | <i>General Mood</i> |
|--------------------------|-----------------|----------------------|---------------------|--------------------------|---------------------|
| SRP Social Stress        | –0.51**         |                      |                     | –0.58**                  | 0.56**              |
| SRP Interpersonal Skills | 0.63**          | 0.55**               |                     | 0.52**                   | 0.62**              |
| PRS Social Skills        |                 |                      | 0.41*               |                          |                     |

*Note.* A single asterisk denotes a  $p$  value below 0.05. A double asterisk denotes a  $p$  value below 0.01.

**TABLE 7**

**Variables for Multiple Regression Analysis**

| <i>Model and Predictor Variables (IVs)</i>                            | <i>Dependent Variable</i>  |
|---|----------------------------|
| Model 1<br>BarOn EQ-i:S Total EQ<br>MSCEIT Total EIQ                  | Interpersonal Skills (SRP) |
| Model 2<br>BarOn EQ-i:S Total EQ<br>MSCEIT Total EIQ                  | Social Stress (SRP)        |
| Model 3<br>BarOn EQ-i:S Adaptability<br>MSCEIT Understanding Emotions | Social Skills (PRS)        |

perform quite adequately on laboratory tasks when ample time was provided (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997), yet are impaired in real life scenarios (Dissanayake & Macintosh, 2003). Many researchers assert that individuals with AS use their verbal skills to reason through the cognitive aspects of a scenario or problem (in the lab) to pass ToM tasks. However, these same individuals often fail to perform as well in naturalistic situations (Baron-Cohen et al., 1997; Bowler, 1992; Dissanayake & Macintosh, 2003). The results from this study are consistent with those findings and suggest that individuals with AS have intact knowledge about how to reason through emotionally-based scenarios (ability EI) when provided with ample time to process information and evaluate options, yet feel that their performance in real life situations is poor (trait EI). Further, the Understanding Emotions subtest has been

demonstrated to correlate modestly with verbal IQ (Lopes, Salovey, & Straus, 2003), providing some evidence that verbal skills enhance performance for this aspect of EI.

Individuals with AS also performed significantly better than the normative group on Perceiving Emotions and Using Emotions. Again, this result suggests that knowledge and performance on tasks requiring the untimed processing of emotional information is not impaired for this particular group. Indeed, this may be considered a potential area of strength and may be related to the strong content level knowledge demonstrated on Understanding Emotions. In contrast, the mean score for the AS group was not statistically different on the remaining branch for the MSCEIT, Managing Emotions.

In contrast to performance on the ability measure, individuals with AS scored significantly lower on trait EI than the normative group. The mean Total EQ score for the BarOn-EQ-i:S was significantly lower than that of the normative group. Further, scores on the Intrapersonal, Interpersonal, Stress Management, and General Mood scales were also all significantly lower than the normative group. Although the mean score for the AS group on the Adaptability scale was slightly lower than the mean for the normative group, it was not significantly different. Given that impairments in adaptability are often regarded as a key feature in AS, this was a surprising result. However, an examination of items contributing to this index reveals that many items reflect a step by step, logical thinking approach to problem solving that is often present in individuals with AS (Baron-Cohen, 2003). It

**TABLE 8**

**Standardized Regression Coefficients for EI and BASC-2 social outcomes**

| <i>Predictor Variable</i> | <i>SRP Interpers. Skills</i> |                               | <i>SRP Social Stress</i> |                               | <i>PRS Social Skills</i> |                               |
|---------------------------|------------------------------|-------------------------------|--------------------------|-------------------------------|--------------------------|-------------------------------|
|                           | <i>Beta</i>                  | <i>Adjusted R<sup>2</sup></i> | <i>Beta</i>              | <i>Adjusted R<sup>2</sup></i> | <i>Beta</i>              | <i>Adjusted R<sup>2</sup></i> |
| BarOn Total EQ            | .79*                         | 0.566                         | -.52*                    | 0.19                          |                          |                               |
| MSCEIT Total EI           | -.48*                        |                               | .02                      |                               |                          |                               |
| BarOn EQ-i:S Adaptability |                              |                               |                          |                               | .57*                     | 0.31                          |
| MSCEIT Underst. Emotions  |                              |                               |                          |                               | -.48*                    |                               |

*Note.* An asterisk denotes a significant difference from the normative population

appears that Adaptability on the subscale of the trait measure we employed is not defined as flexible and novel thinking approaches to complex situations, but rather as a systematic and logical problem-solving style. Consequently, the results for this index are consistent with literature about the thinking styles of individuals with AS that describes logical and sequential approaches in this particular group (Klin & Volkmar, 2003; Klin, Volkmar, Sparrow, Cicchetti, & Rourke, 1995; Tsatsanis, 2004). It is important to point out that results for the BarOn-EQ-i:S indicated that the AS group tended to report positively about their own EI, yet their scores were lower than the mean scores for the normative group. Consequently, the values provided may actually underestimate the extent of difficulties.

The relationship between cognition and affect has been a controversial and ongoing topic of debate amongst philosophers and researchers. The interplay has been recognized as producing positive adaptive outcomes, while difficulties with affect or cognition can produce inefficient or unsatisfactory social experiences (see Forgas, 2008). The findings from this study indicated that trait EI assessed with the BarOn EQ-i:S, was significantly impaired for the AS group compared to the normative group. In contrast, individuals with AS performed the same as, or better than, the normative group on the ability EI approach (measured by the MSCEIT). Although there is some overlap between trait and ability EI, they have been demonstrated to be relatively distinct constructs (Papadogiannis, Logan, & Sitarenios, 2009; Wood, Parker, & Keefer, 2009). Interestingly, ability EI appears to be more related to reasoning with emotions, while trait EI appears to reflect “non-cognitive capabilities, competencies, and skills that influence one’s ability to succeed in coping with environmental demands and pressures” (BarOn, 1997, p. 14) that might be more analogous to the construct of ‘affect’. This difference in the conceptual framework for these two approaches is evident in the results from the current study. The results indicate that, in the AS population, the ability and trait measures evaluate differing skill sets. Indeed, the results of the present study imply that individuals with AS have intact “knowledge” in terms of EI but are deficient in their

integrative “actions” when presented with situations requiring the application of EI, providing some preliminary evidence for the dissonance between cognition and affect.

With reference to measuring social outcomes, the parent reports on the BASC-2 indicated that the youth with AS had poorly developed social skills. However, due to the normative restrictions of the BASC-2 in that only clinical norms are available for individuals over 18 years of age, only clinical scores (comparing those with AS to other clinical groups) for social outcomes were generated. As such, the results demonstrated a social impairment beyond others with clinical conditions that may also impact social interactions (e.g., ADHD, Depression, Learning Disabilities, etc) and would likely reflect an even greater level of impairment when compared to typically developing peers.

#### *Implications of Using EI measures with Individuals with AS*

Regression procedures using EI to predict social outcomes revealed several significant models predicting 19–51% of the variance. Both trait and ability EI were significant predictors of self-reported interpersonal skills, whereas only trait EI was a significant predictor of self-reported social stress. Further, the combination of subscales from each EI model (EQ-i:S Adaptability, MSCEIT Understanding Emotions) predicted parent reported social skills. These findings are consistent with reports that EI predicts important social outcomes (social network size, quality of interactions, etc.) for normative populations (Austin et al., 2005; Brackett, Mayer, & Warner, 2004) and has implications for investigations of EI interventions for the AS group. For example, if improving trait EI decreases social stress, then interventions designed to target this area may become important for individuals with AS. This finding will also have practical implications as clinicians may find including the individually mentioned subscales and branches useful in providing converging evidence of social deficits in clinical assessments. The findings also provide some preliminary support for the use of both EI constructs to understand social capacity and deficits in AS. Patterns of strength and weakness should be use-

ful information for intervention planning. From a strength-based perspective, well developed areas may be used to compensate for or support those areas that are less developed. For example, if an individual has intact reasoning skills for emotional content, but lacks the skills to fluently apply this knowledge in real life social interactions, intervention may be best focussed on ability based (reasoning) skills to increase understanding of oneself and one's own emotions. Future intervention studies might then investigate if, for example, practice and 'overlearning' of strategies in emotion-based (social) interactions improves performance in naturalistic situations. If fluency in natural situations is problematic (as is implied by low trait EI), strategies to provide extra time for reasoning in natural social situations may also be useful to individuals with AS. For example, it may be helpful to explicitly teach a number of responses for emotionally charged situations that may make it socially acceptable and adaptable to delay a response. It would be important to provide many opportunities to practice these strategies in settings that are as natural as possible, using a successive approximation approach. Although it was not the purpose of this study to test this particular hypothesis, these findings could provide the basis for further investigation in this area.

In contrast to average or better than expected performance on the ability measure of EI, results for the self-report trait measure revealed that those with AS: 1) perceive that their ability to navigate through such situations is impaired; and, 2) report significant stress as a result of poor interactions. In other words, even though actual knowledge and skills in emotional situations seems intact, performance in real life situations remains problematic. This information has implications for the type of interventions provided to individuals with AS. As an analogy, in the field of social skills training, Gresham (2002) noted that it is important to differentiate between individuals who do not possess the prerequisite social knowledge to successfully interact with others on a social level and those who possess the knowledge but fail to perform the skill associated with that knowledge. While the latter is referred to as a performance deficit, the former can be referred to as an acquisition

deficit. Individuals with an acquisition deficit are provided explicit training in the knowledge required for successful social situations, whereas performance deficits require instruction in skill sequences and repeated practice in naturalistic settings to promote generalization. The EI results for individuals in this study highlight a similar phenomenon. Although the results for the MSCEIT indicate that knowledge acquisition and the ability to process emotional information is intact, the results for the BarOn-EQ-i:S appear to indicate that individuals with diagnosed AS feel that their performance in naturalistic social situations is impaired.

Perhaps the most important implication of this research relates to the promise of training programs to increase trait EI. Emerging research supports the notion that trait EI can be increased and sustained through structured, explicit training of competencies and skills (see BarOn, 2003; Hansen, 2006; Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009). Further, there is a large literature base on teaching emotional intelligence in schools, and this movement appears to be palatable and popular for increasing the social-emotional competence of all children. Evidence-based interventions for social-emotional learning are accumulating and, as such, this is an exciting time for educators concerned with social outcomes for students (see Jones & Hutchins, 2004; Parker, Saklofske, Wood, & Collin, 2009; Weissberg & O'Brien, 2004;).

On a practical level, it is helpful to use ability EI measures to assess knowledge and cognitive processing aspects of emotion-based situations to target interventions efficiently. If ability EI is intact, as is the case in this study, yet social difficulties are present, interventions will need to focus more on practice, generalization, and social strategy instruction rather than explicit instruction on the prerequisite knowledge required for successful social interactions. In this way, the insights provided by using both instruments together is invaluable in providing information to assist in the design and implementation of interventions for individuals with low EI. Moreover, although the data generated from this study provides further evidence that the two models of EI are relatively distinct, it also illustrates the potential for the approaches to be used together to

provide complimentary perspectives to inform intervention.

#### *Limitations and Future Directions*

Future research should directly assess the intervention implications of these findings with appropriate experimental designs. Further, the information gathered from this study should be considered as preliminary evidence that is limited by a number of factors, and as such, caution is warranted in the interpretation of results. The relative rarity of AS, and therefore the small sample population from which to draw participants resulted in a limited sample size for this study and the use of a non-random sample restricts the generalizability of the results. However, although this sample of participants was self- and parent-referred, and thus a selection bias may be present, the demographic information for this particular sample is similar to that reported for the AS population in general. For example, the male: female ratio for this study is 4:1, similar to reported ratios in the most commonly cited epidemiological study presenting this information (Ehlers and Gillberg, 1993). In addition, co-morbidities for this particular group were high and similar to the estimates provided by many researchers (Ehlers et al., 1997; Ghaziuddin et al., 1998; Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Tantam, 1991). Finally, the age of diagnosis is similar to that reported for this particular group (Howlin & Asgharian, 1999).

The accuracy of self-report measures is a potential issue when assessing clinical groups. Although some authors report that individuals in the AS population can, and do, accurately self report on perceptions and behaviours (Aydemir, 2000; Berthoz & Hill, 2005), the use of several self-report measures makes it difficult to determine the precise amount of variance accounted for by the specific constructs. Literature on measurement error warns that using common rater forms can result in measurement error due to 'common method variance' and response bias (Campbell & Fiske, 1959; Podsakoff, MacKenzie, Podsakoff, & Lee, 2003), although some safeguards to protect against this were initiated here. For example, administration of procedures occurred in a random order so that the

order of administration did not influence reports, and different response formats were varied across measures. Further, participant anonymity was maintained and made explicit to reduce the chance of individuals producing socially desirable responses. Additionally, the EI measures were computer administered, whereas the outcome measure was a pencil and paper task. Podsakoff and colleagues assert that these steps can be used to minimize, or even eliminate, error due to common method.

Finally, in terms of limitations, this study utilized correlational and multiple regression procedures. Consequently, causation was not directly examined. Thus, randomized or quasi-randomized experimental designs to test the proposed model are necessary. Future research projects may also be designed with a target and control group to test the findings from this study. Further, while this study proposes an alternative model for understanding social deficits in individuals with AS, it did not compare the leading theories to understanding social deficits for this group. Consequently, an exploration of EI, ToM, and EF measures used singularly or in conjunction with EI measures to predict social outcomes may provide important additional information to further enhance understanding AS.

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