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ORIGINAL PAPER

# The Association Between Social Skills and Mental Health in School-Aged Children with Autism Spectrum Disorder, With and Without Intellectual Disability

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**Abstract** Autism Spectrum Disorder (ASD) is associated with social skills deficits and co-occurring mental health difficulties. ASD frequently co-occurs with Intellectual Disability (ID). There is scant literature exploring the association between social skills and mental health in children with ASD, with or without ID. Participants were 292 children aged six to 13 with ASD (217 without ID; 76 with Mild ID). Parents and teachers rated social skills and mental health using standardised questionnaires. Greater mental health difficulties were associated with greater social responsiveness difficulties and poorer social skills across the sample. Effect sizes were large. Social skills explained a significant proportion of the variance in mental health scores across the sample. The study has important implications for treatment and future research.

**Keywords** Autism Spectrum Disorder · ASD · Intellectual Disability · Social skills · Mental health

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## Introduction

Autism Spectrum Disorder (ASD) is a common neurodevelopmental condition in which social deficits are a core feature of the disorder (Matson et al. 2007). Compared to their typically developing (TD) peers, children with ASD have been found to have difficulties encoding social information (Embregts and van Nieuwenhuijzen 2009), impaired visual perspective taking (Hamilton et al. 2009), poor social functioning and limited play (Anderson et al. 2004), poor social orienting, joint attention, emotion perception, affective sharing and imitation (Bernier et al. 2006), impaired non-verbal expression of emotion (McGee et al. 1991) and poor social problem solving (Bernard-Opitz et al. 2001). Social-emotion difficulties have been found to differentiate children with ASD from those with other developmental disorders (Klin et al. 2007).

Children with ASD are at high risk of co-occurring conditions (Whitaker and Read 2006). For example, approximately 50–70 % of individuals with ASD have Intellectual Disability (ID) (Edelson 2006; Fombonne 2005). In addition, up to 72–73 % of individuals with ASD have at least one co-occurring mental health disorder in addition to ASD (Brereton et al. 2006; Einfeld and Tonge 1996; Leyfer et al. 2006) including both internalising and externalising disorders. Individuals with ASD are at risk of internalising disorders including co-morbid anxiety or fears (Brereton et al. 2006; Hallett et al. 2013; Leyfer et al. 2006), obsessive compulsive disorder (Leyfer et al. 2006) and mood disorders (Brereton et al. 2006; Ghaziuddin et al. 2002; Leyfer et al. 2006; Mazzone et al. 2013). Adolescents and adults with ASD are particularly prone to anxiety and depression (American Psychiatric Association 2013). Individuals with ASD are also at risk of externalising disorders including Attention Deficit Hyperactivity Disorder

(Brereton et al. 2006; Goldstein and Schwebach 2004). Approximately one in four children with ASD meet diagnostic criteria for a disruptive behaviour disorder such as oppositional defiant disorder or conduct disorder (Kaat and Lecavalier 2013).

The factors that place children with ASD at risk of developing co-occurring mental health disorders are poorly understood (Ghaziuddin et al. 2002). However, research from TD children suggests social and emotional skill deficits are risk factors for mental health issues in children and adolescents (Humphrey et al. 2007; Spence 2003). Extrapolating from the research on TD children, poor social skills may be a contributing factor to the very high levels of mental health disorders in children with ASD. However, there is scant research investigating the association in children with ASD.

A dearth of studies has investigated the association between social skills and mental health in children with ASD. For example, in one study, a negative association was found between self-reported quality of friendship and depression symptoms in adolescents with ASD without ID (Whitehouse et al. 2009). In another study, Lee (2010) found a significant correlation between self-perceived social competency measures and self-reported depression scores. A third study found a negative association between social competency and depression symptoms in children with ASD without ID based on parent, teacher and self-report (Vickerstaff et al. 2007). A final study reported depressive symptoms in individuals with ASD without ID to be associated with poorer global functioning, with a consequent impairment in social adjustment based on parent and clinician ratings (Mazzone et al. 2013). These studies were all limited by small samples of children with ASD ($n = 30$ or less). A larger study of 134 school-aged children with ASD found that higher anxiety levels were associated with a lower quality of social relations and lower symptom severity (Eussen et al. 2013). Thus, despite the range of both internalising and externalising disorders, which frequently co-occur in children with ASD, the scant literature to date has focused on depressive symptomology and specific aspects of social functioning. Moreover, previous research has found parents and teachers report distinct patterns of social skills profiles, suggesting specific social behaviours may be context dependent (Murray et al. 2009) however, most studies have focused on self or parent reported symptoms only. In addition, despite the high levels of co-occurring ID in ASD, to date, research has focused on ASD without ID.

This study aims to investigate the association between social skills and mental health in a community sample of children with ASD, with and without ID. Specifically, it was hypothesised that poorer social skills, would be associated with greater mental health difficulties in children with ASD, with and without ID, and this association would be observed both at home and at school. Further, it was hypothesised that social skills would explain a significant proportion of the variance in mental health difficulties in children with ASD, both with and without ID.

## Methods

### Participants

Participants were drawn from a confidential de-identified database held in the Centre for Emotion-Based Social Skills Training (EBSST), in the Children's Hospital at Westmead, Australia. The large database holds various demographic, social skills and mental health outcome data based on parent and teacher report for students with ASD, without ID, and with mild ID who participated in a treatment versus control trial of EBSST in NSW Department of Education and Communities Primary Schools. In the 'EBSST in Schools' study, 64 school counsellors nominated themselves to facilitate EBSST groups. They also nominated 3–8 eligible students in their schools to participate. Thus, participants were drawn from a non-clinical, school-based sample.

Baseline data from all 292 students aged 6–13 years who participated in the EBSST in Schools study were utilised for the current evaluation. 217 children had ASD without ID and 76 had an ASD and a mild ID. This study pre-dated the release of the fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association 2013). Therefore, for the purposes of this study, participants were eligible if they had a confirmed or suspected ASD diagnosis, based on having any of the following diagnoses contained in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV): Autistic Disorder, Asperger's Disorder or Pervasive Developmental Disorder, Not Otherwise Specified (PDDNOS; American Psychiatric Association 2000). Participants were classified as having no ID or a mild ID, which was defined as an IQ of 50–55 to 70 on a standardised measure of cognitive ability and concurrent deficits in adaptive behaviour (DSM-IV) (American Psychiatric Association 2000). Assessment and diagnosis of ASD and assessment of cognitive ability was made and documented prior to the study by a specialist medical practitioner or registered psychologist with appropriate clinical experience and relevant reports documenting students' diagnoses were placed on students' school files. School counsellors reviewed students' school files to confirm eligibility. Parents' pre-treatment *T*-scores on the Social Responsiveness Scale (SRS) (Constantino 2002) were in the severe range for every participant, which was strongly associated with a diagnosis of Autism (Murray et al. 2011; Wilkinson 2010a, b).

This gave an indication of the validity of school counsellor file reviews. Additional participant demographic information is displayed in Table 1 below.

### Ethics

Consent was sought from school counsellors, school principals, parents and teachers for all children involved. The study had ethics approval from the Human Research Ethics Committee at the Children's Hospital at Westmead, and was endorsed by the University of Sydney Human Ethics Committee.

## Materials

### Measures

*Demographic Questionnaire*

School counsellors, teachers and parents all completed brief background information surveys to obtain general demographic information.

*Autism Severity and Social Responsiveness*

The SRS (Constantino 2002) parent report version was used to provide an indication of the validity of participants' diagnoses of ASD. The SRS parent and teacher report was also used to provide a measure of participants' social responsiveness skills. The SRS is a standardised, norm-referenced questionnaire designed to capture the severity of autistic behaviours in 4–18 year old children and youth. The SRS can be completed in approximately 15 min and focuses on the child's reciprocal social interactions, which is are core impairments in ASD. The SRS items measure the ASD symptoms in the domains of social awareness, social information processing, reciprocal social communication, social anxiety/avoidance, and stereotypic behaviour/restricted interests. The scale demonstrates strong inter-rater reliability, acceptable internal consistency, and correlates highly with the *Autism Diagnostic Interview-Revised* (Rutter et al. 2003). The authors report satisfactory psychometric properties for the instrument: Cronbach's alpha = .97; test–retest reliability r = .88; inter-rater reliability, parents and teachers r = .73 (Constantino 2002).

*Social Skills*

Overall social skills were assessed using the teacher and parent report versions of the Social Skills Improvement System-Rating Scales (SSIS-RS) (Gresham and Elliott 2008). The SSIS-RS is a standardised norm referenced assessment of social skills for children and youth aged 3–18 years. Participants received a total social skills score, which included the subscales of communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. The standard total score, standard score (mean = 100, SD = 15) was utilised to provide an overview of participant's overall social skills. Higher scores indicated better skills. The SSIS-RS shows strong psychometric properties in terms of internal consistency and test–retest reliability estimates. Median scale reliabilities of the social skills scale are in the mid- to upper .90 s for every age group on each form. Median subscale reliabilities are in the high .80 s for the Teacher Form and the mid-.80 s for the Parent Form. All alpha coefficients are equal to or exceed .70. Test–retest indices for Total Social Skills were .82 for the Teacher Form and .84 for the Parent Form (Gresham et al. 2011).

*Mental Health*

*ASD Without ID* For children with ASD without ID, the teacher and parent informant report versions of the *Strengths and Difficulties Questionnaire (SDQ)* (Goodman 1997) was used to assess levels of mental health. The SDQ is a well-known, brief behavioural screening profile of children aged 5–16 years and is commonly used in Australian clinical practice (Hawes and Dadds 2004). The instrument produces scores for each of five subscales: conduct problems; hyperactivity; emotional symptoms; peer problems; and prosocial behaviour. Each of these consists of five items. A 'total difficulties' score is calculated by totalling the four deficit focused subscales (i.e. all except for prosocial behaviour). Participants' total

**Table 1** Participant's demographic information (N = 292)

| Group | *n* | Mean age (*SD*) | | Mean parent SRS *T*-scores (*SD*) |
|---|---|---|---|---|
| | | Male | Female | |
| ASD without ID | 195 | 22 | 9.49 (1.34) | 79.39 (12.14) |
| ASD with mild ID | 65 | 10 | 9.30 (1.43) | 80.02 (10.71) |
| Total | 260 | 32 | 9.40 (1.39) | 79.71 (11.42) |

*SRS* social responsiveness scale

difficulties score were utilised to provide an indication of overall level of mental health. Total difficulties scores of more than 11 (parent version) and 13 (teacher version) respectively are considered to be 'borderline/abnormal', and thus a possible cause for concern (Goodman 1997). The SDQ is psychometrically sound with satisfactory reliability. Mean Cronbach's α is 0.73, mean cross-informant correlation is 0.34 and mean retest stability after 4–6 months is 0.62 (Goodman 2001). The SDQ has excellent discriminant, factorial and construct validity (Goodman 1997; Smedje et al. 1999). Correlations between the SDQ subscales, teacher ratings, and diagnostic interviews have demonstrated sound external validity (Hawes and Dadds 2004).

*ASD and Mild ID*

For children with ASD and a Mild ID, the Developmental Behaviour Checklist—Parent and Teacher Report (DBC) (Einfeld and Tonge 1992) was used to assess levels of mental health. The DBC is a 96 item standardised, norm-referenced questionnaire, which is commonly used in Australian ID clinical practice and research. The DBC is designed to assess a broad range of behavioural and emotional disturbances in young people with ID. Norms are available for different levels of ID, including young people with Mild ID. The authors report robust reliability and validity characteristics. Cronbach's $\alpha = .94$; test–retest reliability $r = .88$. The total score on the DBC provides a measure of overall severity of psychiatric disturbance and correlates with child psychiatrists' ratings of severity of psychopathology (Cox and Rutter 1985). Subjects who have DBC total scores greater than 46 have clinically significant levels of psychiatric disorder, as determined by receiver operating characteristic analysis (Tonge and Einfeld 2000).

## Procedure

All participating school counsellors were sent data collection packs for each participant. Packs contained copies of the demographic and outcomes measures for teachers and parents to complete. School counsellors administered and collected all assessment information. School counsellors then forwarded de-identified, coded assessment protocol to the Children's Hospital at Westmead where clinical psychologists scored the assessment measures and entered the data into a database. Relevant baseline outcome measure data for all students participating in the EBSST in schools study were selected from the original database and a new database developed for the purposes of analysis in the present study.

## Statistical Method

To assess the strength of the relationship between social skills and mental health, Pearson product correlations were calculated between the measures of social skills (SRS and SSIS) and the measures of mental health (SDQ for children with ASD without ID; DBC for children with ASD and Mild ID) based on teacher and parent report. Coefficients were computed separately for children with ASD, with and without ID for teacher and parent report. The strength of the correlations was determined through a comparison to the scale developed by Cohen (1988). Correlations of .1–.29, .3–.49, and .5 or above were considered small, moderate, and large findings, respectively (Cohen 1988).

Next, to examine the contribution of social skills to mental health in children with ASD, with and without ID, standard multiple regressions were employed. Two regression analyses were computed for each group (ASD without ID; ASD with Mild ID), first for teachers, then parents, with the SRS and SSIS total scores as the criterion variable, and the SDQ or DBC scores as the predictor variables.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, homoscedasticity or collinearity.

# Results

Mean teacher and parent reported social skills scores (on the SSIS and SRS) and mean teacher and parent reported mental health scores (on the SDQ and DBC) for children with ASD, without ID, and children with ASD with Mild ID are reported in Table 2 below.

## ASD Without ID

*Correlational Analysis*

As displayed in Table 3, for children with ASD, without ID, greater mental health difficulties (as measured by the SDQ) were associated with greater social responsiveness difficulties (as measured by the SRS) and poorer overall social skills (as measured by the SSIS). All Pearson product moment correlations between the SDQ total difficulties score and teacher and parents reported overall scores on the SRS and the SSIS were large.

There were significant correlations for all subscales of the SDQ-P for both the SRS-P and the SSIS-P. Correlations between the SRS-P and subscales of the SDQ-P ranged from $r = .32$ for the conduct problems subscale to $r = .50$

**Table 2** Teacher and parent reported total mean social skills scores (SSIS and SRS) and total mean mental health scores (SDQ and DBC) for children with ASD, without ID, and children with ASD with mild ID

| Group | Teacher mean (SD) | Parent mean (SD) |
|---|---|---|
| ASD without ID | | |
| SSIS-RS | 85.26 (12.53) | 76.84 (14.66) |
| SRS | 63.19 (9.18) | 79.40 (12.15) |
| SDQ[a] | 17.19 (7.00) | 20.72 (6.20) |
| ASD with ID | | |
| SSIS-RS | 83.03 (13.79) | 73.15 (15.10) |
| SRS | 65.33 (10.04) | 80.02 (10.71) |
| DBC[b] | 48.03 (27.12) | 63.57 (26.76) |

*SSIS-RS* social skills improvement system–rating scales, *SRS* social reciprocity scales, *SDQ* strengths and difficulties questionnaire, *DBC* developmental behaviour checklist

[a] Scores for parents of 11 and teacher 13, are considered borderline and abnormal [b]Clinical cut-off is scores of 46 of greater

for both the emotional symptoms and peer problems subscales. Correlations between the SSIS-P and subscales of the SDQ-P ranged from r = -.34 for the emotional symptoms subscales to r = .64 for the prosocial subscale. All correlations were significant at the 0.01 level.

There were also significant correlations for all subscales of the SDQ-T at the 0.01 level for both the SRS-T and the SSIS-T. Correlations between the SRS-T and subscales of the SDQ-T ranged from r = .41 for the conduct problems subscale to r = .56 for the peer problems subscale. Correlations between the SSIS-T and subscales of the SDQ-T ranged from r = −.18 for the emotional symptoms subscales to r = −.58 for the hyperactivity subscale.

*Regression Analysis*

Results of the regression analyses for children with ASD without ID indicated that for parents' results, social skills (as measured by the SSIS and SRS) explained 49.7 % of the variance in overall mental health difficulties as measured by the SDQ total difficulties score, $R^2 = .50$, $F\ (2162) = 79.97$, $p < .001$. The SSIS and SRS total scores both contributed significantly to the prediction of total mental health difficulties as measured by the SDQ with the SRS recording a higher beta value (SRS; $\beta = 0.42$, $p < .001$) than the SSIS ($\beta = -.35$, $p < 0.001$). For teachers' ratings, social skills explained 54.5 % of the variance in mental health difficulties, $R^2 = .55$, $F\ (2189) = 113.29$, $p < .001$. The SSIS and SRS total scores both contributed significantly to the prediction of total mental health difficulties as measured by the SDQ (SRS: $\beta = .56$, $p < .001$) (SSIS: $\beta = -.24$, $p < 0.001$).

## ASD and Mild ID

*Correlational Analysis*

As displayed in Table 4, for children with ASD, with Mild ID, greater mental health difficulties (as measured by the DBC) were associated with greater social responsiveness difficulties (as measured by the SRS) and poorer overall social skills (as measured by the SSIS). All Pearson product moment correlations between the DBC total behaviour problems score and teacher and parent reported total scores on the SRS and the SSIS were large, except for the association between teacher reported DBC and SSIS, where the correlation was moderate.

**Table 3** Pearson product moment correlations between measures of mental health and social skills, based on teacher and parent report, for children with ASD without ID

| | Social skills measures | |
|---|---|---|
| | SRS − total score | SSIS − total score |
| *Mental health measures* | | |
| SDQ–teacher | | |
| Total difficulties score | .72[a] | −.60[a] |
| Emotional symptoms subscale | .54[a] | −.18[a] |
| Conduct problems subscale | .41[a] | −.48[a] |
| Hyperactivity subscale | .48[a] | −.58[a] |
| Peer problems subscale | .56[a] | −.44[a] |
| SDQ—parent | | |
| Total difficulties score | .66[a] | −.63[a] |
| Emotional symptoms subscale | .50[a] | −.34[a] |
| Conduct problems subscale | .32[a] | −.49[a] |
| Hyperactivity subscale | .37[a] | −.35[a] |
| Peer problems subscale | .50[a] | −.48[a] |

[a] Correlation is significant at the 0.01 level (2-tailed)

**Table 4** Pearson product moment correlations between measures of mental health and social skills, based on teacher and parent report, for children with ASD and Mild ID

| | Social skills measures SRS − total score | SSIS − total score |
|---|---|---|
| *Mental health measures* | | |
| DBC—teacher | | |
| Total behaviour problems score | .67[b] | −.48[b] |
| Disruptive/antisocial behaviour subscale | .21 | −.33[b] |
| Self-absorbed subscale | .71[b] | −.48[b] |
| Communication disturbance | .67[b] | −.28[a] |
| Anxiety | .44[b] | −.15 |
| Social relating | .71[b] | .55[b] |
| DBC—parent | | |
| Total behaviour problems score | .61[b] | −.55[b] |
| Disruptive/antisocial behaviour subscale | .41[b] | −.46[b] |
| Self-absorbed subscale | .59[b] | −.51[a] |
| Communication disturbance | .55[b] | −.37[b] |
| Anxiety | .41[b] | −.24 |
| Social relating | .44[b] | −.56[b] |

[a] correlation is significant at the 0.05 level (2-tailed)

[b] Correlation is significant at the 0.01 level (2-tailed)

There were significant correlations for all subscales of the DBC-P for both the SRS-P and the SSIS-P except the correlation between the SSIS-P and the anxiety subscale was not significant. Significant correlations between the SRS-P and subscales of the DBC-P ranged from r = .41 for the anxiety subscale to r = .59 for the self-absorbed subscale. Significant correlations between the SSIS-P and subscales of the DBC-P ranged from r = −.37 for the communication disturbance subscale to r = −.56 for social relating subscale. All significant correlations were significant at the 0.01 level.

There were also significant correlations for all subscales of the DBC-T at the 0.01 level for both the SRS-T and the SSIS-T, except the correlation between the SRS-T and the disruptive/antisocial subscale was not significant, nor was the SSIS-T and the anxiety subscale. Significant correlations between the SRS-T and subscales of the DBC-T ranged from r = .44 for the anxiety subscale to r = .71 for the social relating subscales. Significant correlations between the SSIS-T and subscales of the DBC-T ranged from r = −.28 for the communication disturbance subscale to r = .55 for the social relating subscale.

*Regression Analysis*

Results of the regression analyses for participants with ASD with Mild ID, indicated that for parents' ratings, social skills, as measured by the SSIS and SRS, explained 42.1 % of the variance in overall mental health difficulties as measured by the DBC total behaviour problems score, $R^2 = .42$, $F\ (2,54) = 19.63$, $p < .001$. The SSIS and SRS total scores both contributed significantly to the prediction of total mental health difficulties as measured by the DBC (SRS: $\beta = .44, p = .001$) (SSIS: $\beta = -.28, p = .035$). For teachers' ratings, social skills explained 44.7 % of the variance in mental health difficulties, $R^2 = .45$, $F\ (2, 60) = 24.46$, $p < .001$. The SRS total score contributed significantly ($\beta = -.66$, $p < 0.001$), but not the SSIS ($\beta = -.018$, $p = .90$).

## Discussion

Results of the current study supported the hypothesis that social skills difficulties in children with ASD, with and without ID, would be associated with greater mental health difficulties. For all children with ASD, increased social reciprocity deficits and worse overall social skills were strongly associated with increased mental health difficulties, based on both parent and teacher report. Large effect sizes were found across most key variables. Moreover, in this sample of children with ASD without ID, standard multiple regression analysis found that social skills explained 49.7 and 54.7 % of the variance in mental health scores based on parent and teacher report respectively. For children with ASD and Mild ID, social skills explained 42.1 and 44.7 % of the variance in mental health, based on parent and teacher report respectively.

The current results extend the extant literature exploring the association between social skills and mental health in children with ASD. A limited number of previous studies have found an association between aspects of social

functioning and depressive symptomology (Lee 2010; Mazzone et al. 2013; Vickerstaff et al. 2007; Whitehouse et al. 2009) and anxiety symptoms (Eussen et al. 2013) in children with ASD without ID. The current study expands these findings for children with ASD without ID. Overall mental health difficulties, as measures by the SDQ, as well as SDQ subscales measuring emotional symptoms, conduct problems, peer problems and hyperactivity were all associated with overall social skills and social reciprocity skills. In addition, despite previous research which has indicated that specific social behaviours may be context dependent (Murray et al. 2009), few studies have utilised both parent and teacher report. The current study adds to the literature in finding an association between social skills and mental health both at home and at school in children with ASD without ID. Moreover, social skills explain a significant proportion of the variance in overall mental health difficulties in both contexts.

In addition, although ASD frequently co-occurs with ID, previous research has focused on children with ASD without ID. The present study therefore extends the finding of an association between social skills and mental health in children with ASD, to children who also have co-occurring mild ID. Overall mental health difficulties, as measures by the DBC, as well as subscales measuring disruptive/anti-social behaviour, self-absorption, communication disturbance, anxiety and social relating were all associated with overall social skills and social reciprocity skills. However, in contrast to prior research, which found an association between social skills and anxiety in children with ASD without ID (Eussen et al. 2013), the present results found that for children with ASD and mild ID, there was no association between overall social skills as measured by the SSIS and either parent or teacher reported anxiety. The differential findings in this domain between children with ASD without ID, and with co-occurring mild ID highlights the importance of considering samples of children with ASD and co-occurring ID in future research in this area. For example, it may be that in children with ASD, who also have co-occurring mild ID, social skills difficulties may be associated with different types of mental health difficulties in children without ID, or children with ASD with different levels of ID.

The finding that social skills explain a significant proportion of the variance in overall mental health difficulties in both children with ASD without ID and children with ASD with mild ID is not unexpected. Social deficiencies have been found to be pervasive in children with ASD (Liber et al. 2008; Rao et al. 2008), regardless of whether an individual also has co-occurring ID. Similarly, the vulnerability of children with ASD to mental health difficulties is well established (Brereton et al. 2006). It is plausible that social skill deficits and mental health difficulties are compounded in children with ASD with co-occurring ID, (Kraijer 2000) due to associated difficulties with social judgement, self-management of behaviours, emotions and/or interpersonal relationships characteristic of ID (American Psychiatric Association 2013). Future research exploring social skills deficits and mental health difficulties separately, as well as the association between these variables would benefit from consideration of populations of children with ASD both without ID and with ID.

## Limitations

The current exploratory study aimed to investigate whether there was an association between social skills and mental health difficulties in a non-clinical school-based sample of children with ASD with and without co-occurring mild ID. Although elevated scores on the mental health measures have correlations with clinical diagnosis, the lack of clinical examination for co-occurring mental health disorders in participants is an important limitation of the present study. Previous researchers tend to assess mental health disorders in children with co-occurring ASD using measures designed for TD children due to the paucity of available measures for this purpose (Beaumont and Sofronoff 2008; Chalfant et al. 2007; Scattone and Mong 2013) Thus, it is possible that the instruments may not have been sensitive enough to distinguish between symptoms representing a mental health concern versus an ASD characteristic as there could have been overlap between symptoms. In addition, the lack of independent diagnostic validation of participants ASD diagnosis and cognitive ability is a significant limitation of the present investigation. Future studies could address these concerns through careful clinical assessment of participants for ASD, cognitive ability and co-occurring mental health disorders, utilising ASD specific measures when available.

### *Clinical Implications*

The strength of the association between social skills and mental health difficulties has substantial treatment implications. Prescription rates for psychotropic medication for children and adolescents with ASD and ID are high (Perumal et al. 2013). However, the current findings suggest that for children with ASD, with and without mild ID targeting social skills may be a way to help assist in treating mental health issues where to date there has been a focus on pharmacological treatments. There have been various interventions aimed at improving social skills in children with ASD and several meta-analyses in this area (Matson et al. 2007; McConnell 2002; Reichow et al. 2013; Scattone 2007). In general, reviews suggest that social skills interventions can produce positive changes in the

social behaviour of individuals with ASD. Effective social skills intervention techniques for children with ASD include a range of 'visual' teaching strategies including video modelling (Ayres and Langone 2005; Lantz 2005; McCoy and Hermansen 2007; Reichow and Volkmar 2010), social stories (Ozdemir 2008; Sansosti and Powell-Smith 2008; Scattone 2007; Stary et al. 2012), scripts (Ganz and Flores 2008) and visual activity schedules (Betz et al. 2008). A recent meta-analysis found that social skills groups improve overall social competence and friendship quality (Reichow et al. 2013). There is also evidence to suggest peer mediated approaches to social skills training is helpful (Bass and Mulick 2007). Social skills intervention approaches are rarely used in isolation; rather they are typically employed as a component of a treatment package (Lai et al. 2014). EBSST (Ratcliffe 2011; Ratcliffe et al. 2010; Wong et al. 2010) is one of few social-emotional intervention packages that explicitly aims to improve mental health by enhancing social-emotional skills, with different version available to cater for the learning needs of children with ASD, without ID (Ratcliffe et al. 2014; Wong et al. 2010) and children with ASD and Mild ID (Ratcliffe et al. 2010). Future researchers and clinicians investigating social skills or mental health interventions may benefit from assessing baseline levels in both areas and observing whether any changes in mental health are observed by improving social skills and vice versa. It may also be that pre-morbid psychopathology could impact upon social skills intervention outcomes, and this could be controlled for in future intervention studies.

## Conclusions

The current study is the first investigation of the association between social skills and mental health difficulties in children with ASD, without ID and with co-occurring mild ID. Greater levels of mental health difficulties were associated with greater social responsiveness difficulties and poorer social skills across the sample. Social skills explained a significant proportion of the variance in mental health scores for children with ASD without ID and mild ID. The association was found based on both parent and teacher report. The current study has important treatment implications as they imply targeting social skills may be a way to improve mental health. These preliminary findings provide a valuable basis for future research into social skills and mental health and the association between these two variables.

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