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**Controlled study of the impact on child behaviour problems of Intensive
Interaction for children with ASD**

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Abstract

Pupils with Autism Spectrum Disorder received six months of intensive interaction or treatment as usual. They were assessed for behaviour problems at the start and end of the period, and changes were related to child and parent factors. Intensive Interaction did not offer any greater advantages to child behaviour than treatment as usual. However, Intensive Interaction was more effective for pupils with less challenging behaviour. Levels of depression in mothers were related negatively to changes in child behaviours. These data suggest that intensive interaction may be of limited utility for reducing problem behaviours of pupils with ASD, but that the approach could be effective with less behaviourally-challenging pupils and that levels of parent distress may reduce its impact.

Key words: intensive interaction; problem behaviour; parent distress; ASD

‘Developmental’ interventions have become increasingly utilised for children with Autism Spectrum Disorders (ASD) in both home and school settings (Stahmer, Collings, and Palinkas, 2005; Matson, Mahan, and Matson, 2009; Schreibman, Dawson, Stahmer, et al., 2015). The research base concerning these interventions also has grown, and has shown some degree of effectiveness for these programmes (McConachie and Diggle, 2007; Oono, Honey, and McConachie, 2013; Hutchinson and Bodicoat, 2015; Reed, 2016; for reviews). The range of these developmental interventions is particularly wide (Reed, 2016, Chapters 8 and 9; Schreibman et al., 2015), but has been taken to include: Social Communication, Emotional Regulation and Transactional Support (Prizant, Wetherby, Rubin, and Laurent, 2003), Early Social Interaction (Wetherby and Wood, 2006), Reciprocal Imitation Training (Ingersoll and Schreibman, 2009), Joint Attention Symbolic Play Engagement and Regulation (Kasari, Kaiser, Goods, et al., 2014), some forms of the ‘Denver’ models (Rogers, Herbison, Lewis, Pantone, and Reis, 1986; Rogers, Hall, Osaki, Reaven, and Herbison, 2000; Dawson, Rogers, Munson, et al., 2010), Son Rise/Option programmes (Kaufman, 1991), and Intensive Interaction approaches (Nind and Hewett, 1994; Nind, 1999; see Hutchinson and Bodicoat, 2015, for a review). Although often quite different from one another in their specifics, most of these forms of intervention share features, such as a focus on key aspects of child behaviour that are impacted by alterations in developmental processes, and on promoting interactions between the child with ASD and their family or teachers (Odom, Boyd, Hall, and Hume, 2010; Oono et al., 2013; Schreibman et al., 2015; Reed, 2016).

Intensive Interaction is one such developmental approach that aims to facilitate the communication skills of individuals with a variety of special needs (Nind and Hewett, 1994). It focuses on teaching the pre-speech precursors of communication to those with learning difficulties or typically developing individuals who have poor communication development: from the person with developmental problems to people who may be social, but need to

develop further their ability to use and understand eye contacts or turn taking in exchanges. The intervention emphasizes developing communicative behavioural skills, such as eye contact, facial expressions, vocal mirroring, and joint focus activities, for individuals who are either at a pre-verbal level, have limited communicative behaviour, or who engage in stereotyped or self-stimulatory behaviours (Nind and Hewett, 2001). Thus, Intensive Interaction aims to meet the needs of people with little effective communication.

Intensive Interaction sessions are individually tailored to the children, but they typically include tasks targeted at developing mutual enjoyment between the facilitator and child, enhancing concentration and attention in the child, and supporting the child to share their personal space (Nind and Hewett, 1994; 2001). No equipment other than a tutor sensitive to the client is needed. The approach is said to work by progressively developing enjoyable interactions, which are repeated frequently, and that develop in duration and complexity. This is meant to entrain the fundamentals of communication. The style of teaching is relaxed and non-directive, being responsive to the client – the teacher builds the content of the activity by joining in the behavior of client. It is claimed that this reflects the principals at play in the first year of language leaning. The teaching sessions are frequent and intense, but with client and tutor at ease with session.

This approach has been recommended and offered by several education authorities across England and Wales (Irvine, 1998; Dee, Byers, Hayhoe and Maudslay, 2002; Nind and Cochrane, 2002). Moreover, the assumed positive outcomes following Intensive Interaction have been noted by governmental bodies, and the intervention has been suggested as one that could be used in school settings (e.g., QCA, 1999; Kellett, 2004). Although these recommendations are now a decade old, they have not received any amendment and nor have counter-instructions published.

Despite the increasing use of this intervention, there have been relatively few evaluative studies of Intensive Interaction, in any setting, that extend beyond case reports (Hutchinson and Bodicoat, 2015). Most reports have explored the effects of Intensive Interaction on children who have social-communicative difficulties in a school setting (Watson and Fisher 1997; Samuel and Maggs, 1998; Stothard, 1998; Kellett, 2003; 2005; Samuel, Nind, Volans, & Scriven, 2008).

Zeedyk, Caldwell, and Davies, 2009). For example, Kellett (2003; 2005) documented the impact of Intensive Interaction in case studies of children with complex learning difficulties, and suggested that the intervention is effective for such children, especially those who are excluded from social interaction opportunities in the classroom. Similarly, Watson and Fisher (1997) reported the results of two studies involving 5 and 6 children with complex learning difficulties, and documented some improvements based on analysis of videotaped sessions of the children interacting with their teacher. Samuel et al. (2008) studied the ability of staff to implement Intensive Interaction with individuals with learning disabilities who lived in supported housing, and assessed the impact of this program over a 20 week period. An interrupted time-series multiple-baseline design was employed, and data was collected through via video observations and staff questionnaires. The staff learned to use 'mirroring' and 'contingent' responding quickly, and the participants increased their ability to look at faces and engage in interactions and joint attention. However, there was little evidence for improved relationships.

Partly based on the growing use of Intensive Interaction for those with communication problems, Nind (1999) suggested that this intervention might also be usefully extended to children with ASD. However, there are few, if any, studies that have examined this intervention in relation to ASD, and there are some issues that require special consideration when applying Intensive Interaction to children with ASD (e.g., Nind and

Powell, 2000). For example, although Hutchinson and Bodicoat (2015) are cautiously positive about the impact of the intervention for some social skills, they noted that there was very limited existing evidence regarding the impact of Intensive Interaction on behavioural problems. Such externalising or challenging behaviours are often the most challenging for the parents of children with ASD (Floyd and Gallagher, 1997; Osborne and Reed, 2009), and also within a school setting (Frederickson, Osborne, and Reed, 2004).

Given the above gaps in the literature, the current study examined the degree to which problem behaviours emitted by children with ASD changed as a result of exposure to an Intensive Interaction programme. To this end, the change in levels of problem behaviours emitted by a group of children with ASD undergoing the Intensive Interaction programme at home was compared with a similar group not undergoing this programme. In addition, to comparing the changes in behaviour in the two groups, the degree to which the children demonstrated clinically significant change was also assessed. Such a controlled comparison with respect to clinically-significant change has not previously been documented in the literature for this intervention.

As well as assessing the impact of Intensive Interaction on problem behaviour, the current study also attempted to explore whether there were any predictors of the outcome of the intervention. In this regard, a number of child factors, such as the severity of the ASD, and their age, have been shown to be related to behaviour problems (Osborne and Reed, 2009; Reed, 2016). Given this, these variables were assessed as potential predictors of the outcome of Intensive Interaction, as very little is known about whether this form of intervention is influenced by any particular characteristics of the child involved or of their parents. Finally, as it has been noted that the mental state of parents impacts the progress of their children for some interventions for ASD (Robbins et al., 1991; Osborne, McHugh,

Saunders, and Reed, 2008), the current study also explored whether this would be true for Intensive Interaction as well.

Method

Participants

Forty male children with a diagnosis of ASD (autism or PDD:NOS) made by a paediatrician independent from the current study using the DSM-IV-TR criteria were recruited for this study. The paediatrician used a mixture of standardised tests (e.g., ADOS) and their clinical judgment to make this diagnosis. The children also all had a statement of special educational needs from an Educational Psychologist that included ASD. All of the children who participated in the current study attended the same school for pupils with Special Educational Needs for 20 hours per week.

The children ($n = 20$) in the Intensive Interaction group (12 Autism; 8 PDD:NOS) were recruited as they were about to commence an Intensive Interaction programme at home. The children in the control group (treatment as usual) were recruited from other children with ASD (10 Autism; 10 PDD:NOS) in the school who were not undergoing this intervention. These children were chosen to match as closely as possible the children in the Intensive Interaction group in terms of age and diagnosis. The characteristics of the two groups of participants are shown in Table 1. The groups did not differ from one another significantly on any variable at baseline, all $t_s < 1$.

Table 1 about here

Ethical permission for the study was obtained from the Department of Psychology Ethics Committee at the University, and informed consent was sought from the mothers of the children involved.

Materials

Leiter International Performance Scale–Revised (Leiter-R; Roid & Miller, 1997) measures intelligence and cognitive abilities in ages 2.0-20.11 years. For this study, the Visualisation/Reasoning Battery was employed, which emphasises nonverbal, fluid intelligence, and is not significantly influenced by the level and quality of the child's educational, social, and family experience. The internal-consistency reliability coefficients are above 0.80, and there is also good test–retest reliability for the younger age ranges. The Leiter IQ is a standardised test with a mean of 100 and a standard deviation of 15. It correlates 0.83 with the full-scale IQ on the Wechsler Intelligence Scale for Children (WISC-III).

British Abilities Scale (BAS II; Elliot, Smith, & McCulloch, 1996) includes three achievement scales (reading, spelling, and maths), which index educational achievement. The reading scale was used for this study, which gives a standardised score with a mean = 100 and a standard deviation = 15. It is suitable for use with children and adolescents from two years, six months old (2:6) to seventeen years, eleven months old (17:11).

Social Communication Questionnaire (SCQ; Rutter, Bailey, and Lord, 2003) is a brief parent-rated screen evaluating ASD symptoms in individuals above 4 years old. There are 40 items utilising a 'yes' or 'no' answer format, and the score can be used to assess symptom levels. The scale ranges from 0 (no symptoms) to 40 (high symptoms), with a cut-off score (15) that can be used to indicate the likelihood that an individual has an ASD. The SCQ has a sensitivity of 0.88 and a specificity of 0.86 for the discrimination of autism and

non-autism cases (Chandler et al., 2007).

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1977) is a brief behavioural screening questionnaire for emotional and behavioural disorders in children and adolescents aged 4-16 years. The SDQ consists of 25 items: emotional symptoms (5 items), conduct problems (5 items), hyperactivity/inattention (5 items), peer relationship problems (5 items) and prosocial behaviour (5 items). The maximum behaviour problem scale (summing all scales except the prosocial scale) is 40. The total score can be classified as normal (0-13), borderline (14-16), or abnormal (17-40). Internal reliability (α) for the total behaviour problem measure has been found to be between 0.72 and 0.83 (Becker, Woerner, Hasselhorn, Banaschewski, and Rothenberger, 2004).

Hospital Anxiety & Depression Scale (HADS; Zigmond and Snaith, 1983) is a short assessment for the presence or severity of anxiety and depression in patients. The HADS includes 14 statements (7 relating to anxiety, 7 relating to depression), each rated on a four-point scale. Each item is scored from 0-3, giving an overall score of 0-21. Total scores of 8-10 would be graded a borderline case of anxiety and depression and 11+ graded as a case. The internal reliability (α) for a nonclinical population is between .77 and .86 (Crawford, Henry, Crombie, and Taylor, 2001).

Interventions

Control (Treatment as Usual). The interventions used for the children during the typical school day were eclectic. Children would attend the school for 5 days a week, for a full school day. Typically, sessions would start and end with 6-8 children in a group with the teacher at the front, and a classroom assistant also in attendance. The teacher usually guided a group activity, and the children were encouraged to turn take in responding, whilst the others were encouraged to respond and comment. Other parts of the sessions included a free

choice of activities, with adults focusing their support on individuals who are encouraged to work towards their learning objectives, and all the time encouraging and prompting social interaction, turn-taking, shared attention, and commenting in the children. Some of the sessions involved group outdoor activities. There was always a 1-2 hour period of individual work with the classroom assistant or teacher, where individual needs of the pupils were addressed. None of the teachers or classroom assistants of these children had received training in intensive Interaction.

Intensive Interaction (Nind and Hewett, 2001). The programme was conducted in the child's home in a room devoted to the therapy. Each Intensive Interaction sessions occurred after school, and lasted for 1 to 2 hours, 5 days a week. The programme was monitored and overseen by a supervisor with 7-8 years' experience of using Intensive Interaction. The supervisor saw each child at least once a week. Each session was conducted by one of four tutors. The tutors were first or second year university students, and had each received three, 60 min sessions of instruction in Intensive Interaction delivered by the supervisor.

In line with the suggestions of Nind and Hewett (2001) there was no set programme for the current intervention, all of the Intensive Interaction sessions focused on the quality of interactions between the tutor and child. During these periods, the tutors interacted with the child, and adjusted their interpersonal behaviours to that of the child; paying attention to the child's voice, gaze, and body language to emphasise meaning. Tutors also took the child's lead in responding to the things that they did; for example, commenting on their actions, joining in with them, and imitating them. This procedure aimed to make the 'topic of conversation' fall within the realm of interest of the child. The tutor also attempted to use 'sensitive observation' to judge the quality of interaction, making sure that all social contact was positive and enjoyable for both partners. Timing and rhythm were also used in the

interactions to increase anticipation and structure to hold the child's attention and increase predictability and involve turn taking.

As the Intensive Interaction programme is a highly individualised programme, the precise nature of the interactions between the tutor and child varied widely between individual to individual, and also within individual from session to session. However, the supervisor responsible for the intervention did observe the interactions between each tutor and child at least once a week during the period of the programme, and gave feedback to the tutor on their approach in terms of Intensive Interaction principles.

Procedure

Assessments of the children's intellectual functioning (Leiter), and language functioning, using the reading scale of the BAS, had been taken by an educational psychologist, independent from this study, during the two months prior to the programme commencing. These data allowed matching between the Intensive Interaction group, and the group of children not undergoing this programme, so that the characteristics of the two groups could be matched on these functioning variables as well as age. However, as these intellectual functioning and reading ability data were not taken as part of the current study, unfortunately they were not available at follow-up.

In the week prior to the study commencing, the mothers of all children completed the SDQ (to assess the behaviour problems of the children), the SCQ (to assess the ASD severity of the children), and the HADS (to assess the mothers' depression and anxiety). The Intensive Interaction programme, and the treatment as usual sessions then ran for six months (this period was from late September to late March – i.e. the first two terms of a school year). After this six month period, all mothers rated their children's behaviour again using the SDQ,

the child's ASD severity (SCQ) and the mothers' depression/anxiety (HADS) were not re-assessed, as changes in these scores were not the focus of the current investigation.

Results

 Figure 1 about here

Figure 1 shows the group-mean SDQ scores for the two groups before and after the intervention period. Inspection of these data reveals that there were no differences in the SDQ scores between the groups prior to the intervention. The problem behaviour scores decreased over the six months for both groups, with the scores decreasing only slightly more in the Intensive Interaction group. A between-subject analysis of covariance was conducted on the post-intervention SDQ scores for the two groups, with pre-intervention SDQ scores as a covariate. This analysis revealed no statistically significant effect of intervention, $F(1,37) = 1.84, p > .10, \eta^2_p = .047$. A Bayes Factor (BF) for these data was calculated to show the ratio of the probability of null and experimental hypotheses being true given these data, and this showed a much greater probability of the null hypothesis being the case: $BF = 2.75, p(H_{null}/D) = .733, p(H_{experimental}/D) = .266$.

Of the sample in the intervention group, 15 pupils demonstrated a reduction in their total behaviour problem score, 2 showed no change, and 3 demonstrated an increase in behaviour problems. At baseline, there were 4 pupils in the normal range, 1 in the borderline range, and 15 in the abnormal range for behaviour problems. At follow-up, these numbers were: 4 pupils in the normal range, 2 in the borderline range, and 14 in the abnormal range. Using the criteria established by Jacobson, Follette, and Revenstorf (1984) based on a move between the clinical and control sample means, 3 participants in the Intensive Interaction

demonstrated a clinically significant reduction in their behaviour problems. In the control group, 14 pupils demonstrated a reduction in their total behaviour problem score, 1 showed no change, and 5 demonstrated an increase in behaviour problems. At baseline, there were 2 pupils in the normal range, 1 in the borderline range, and 17 in the abnormal range for behaviour problems. At follow-up, these numbers were: 2 pupils in the normal range, 2 in the borderline range, and 16 in the abnormal range. Using the criteria established by Jacobson et al. (1984), above, 3 participants in the control sample demonstrated a clinically significant reduction in their behaviour problems.

In terms of the child- and diagnosis-related predictors of the change in behaviour problems, for the Intensive Interaction group only, the level of change noted in the total problems scale of the SDQ (follow-up minus baseline) was not significantly related to: the child's age at baseline, $r = .211, p > .30$; the time since the diagnosis was made, $r = .123, p > .60$, the level of intellectual functioning (Leiter), $r = .026, p > .80$, the level of language functioning (BAS), $r = .056, p > .70$, or the ASD severity (SCQ), $r = .230, p > .30$. However, the level of behaviour problems at baseline (SDQ) was negatively correlated with change, $r = -.616, p < .01$. A backwards stepwise regression was conducted to predict change in SDQ using these four child variables, which revealed that only behaviour problems at baseline predicted the outcome individually, $\beta = -.200, t = 3.50, p < .01$.

The mean parent anxiety score (HADS-A) at baseline was 9.90 (± 5.73 , range = 1 – 21). This score was negatively correlated with the change in the child's SDQ score, $r = -.493, p < .05$. The mean parent depression score (HADS-A) at baseline was 8.30 (± 4.09 , range = 3 – 15), and this score was negatively correlated with the change in the child's SDQ score, $r = -.553, p < .01$. Mothers' age at baseline was not correlated with the change in child problem behaviours, $r = -.030, p > .90$. A backwards stepwise regression was conducted to

predict change in SDQ using these three parent variables, which revealed that only depression at baseline predicted the child outcome individually, $\beta = -.336$, $t = 2.82$, $p < .01$.

Discussion

The present report examined the impact of a home-based Intensive Interaction programme on changes in child behaviour problems after six months. The comparison with the control group revealed that, while the Intensive Interaction sample did demonstrate a numerically greater reduction in child behaviour problems than the control sample, this difference was not statistically reliable. In fact, the level of clinically-significant change in the two groups was almost identical with one another. This suggests that in terms of behaviour problems, Intensive Interaction is not a particularly effective approach for children with ASD.

It should be noted that this approach is not necessarily set up to decrease child problem behaviours in children with ASD. Other reports have noted that pupils with other problems than ASD have benefited from this approach in terms of their social skills (e.g., Watson and Fisher 1997; Samuel and Maggs, 1998; Stothard, 1998; Kellett, 2003; 2005). However, none of these studies have adopted a control group comparison, making it difficult to judge the extent to which this intervention is effective over and above treatment as usual. However, further study involving a wider range of outcome measures (including adaptive and social behaviours) would clearly be helpful in developing a better understanding of the aspects of child functioning that the intensive Interaction might impact.

There are also a number of factors that should be considered before it is concluded that this form of intervention is not effective. The current study was conducted using a control sample based in a special school for pupils with SEN whose staff are well training

and experienced in teaching pupils with ASD. Any advantage of employing an additional home-based approach, such as Intensive Interaction, may not be noticeable in these circumstances. The intervention was only conducted for 1-2 hours per day for six months, which may not be long or intensive enough to see a difference over and above the treatment received by the control group. It could also be that the sample size employed was not sufficiently large to establish an effect. In this regard, it might be noted that it is of similar size to many intervention studies that have established effectiveness for interventions (see Reed, 2015, for an overview). The adoption of a randomised control design also would clearly be of benefit in further assessing this approach. Notwithstanding these limitations, it should be noted that this study is the first to compare the effectiveness of the Intensive Interaction approach to a comparison group.

There were some positive findings in relation to the potential effectiveness of this approach for some pupils. In terms of the predictors of the improvement, the level of child behaviour problems at baseline, and the level of depression reported by the mothers at baseline, both negatively predicted improvements in child behaviour; that is, the worse the child behaviour problems, and the worse the depression, the fewer improvements were shown by the children over the exposure to the Intensive Interaction programme. This suggests that the above overall results may be mediated by a number of factors that could help in targeting the approach as a support for pupils in school. That the less behaviourally-challenging children responded best to the programme could suggest that these children would be optimally-targeted by such an approach. However, the finding that progress under the programme is impacted by the mother's level of depression could also be important. This certainly fits with previous work that has shown levels of maternal stress can negatively impact outcomes for children with ASD (Robbins et al., 1991; Osborne et al., 2008). This relationship highlights the necessity of working closely with parents in planning

interventions, and also of appropriate services being made available to the parents as well as to the children.

In summary, the current report offered little overall support to the notion that intensive Interaction might benefit the behaviour problems of children with ASD. However, some of the predictors of outcome using this approach did suggest that more appropriate targeting of the intervention could help some children.

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Figure Captions

Figure 1: Behaviour problem scores (SDQ total) for the two groups before (pre) and after (post) the intervention period for both groups. II = Intensive Interaction; Control = treatment as usual.

Table 1: Mean (standard deviation) of baseline characteristics of the two groups: child age, time since diagnosis, autism severity (Social Communication Questionnaire), intellectual function (Leiter), language ability (British Abilities Reading Achievement Scale), mother's age, and number of other children.

	Intensive Interaction	Control
Age	9.90 (3.39)	9.85 (3.11)
Time since Diagnosis	6.10 (3.70)	5.30 (2.41)
Autism (SCQ)	19.50 (5.73)	19.20 (4.83)
Intellectual (Leiter)	71.90 (17.94)	74.90 (15.20)
Language (BAS)	54.75 (16.57)	57.50 (15.31)
Mother's age	43.20 (7.25)	41.20 (5.82)
Other children	7 = 0, 6 = 1, 7 = 2	7 = 0, 8 = 1, 5 = 2

Figure 1

