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What is This?
A randomised group comparison controlled trial of ‘preschoolers with autism’: A parent education and skills training intervention for young children with autistic disorder

Bruce Tonge¹, Avril Brereton¹, Melissa Kiomall¹, Andrew Mackinnon² and Nicole J Rinehart¹

Abstract

Aim: To determine the effect of parent education on adaptive behaviour, autism symptoms and cognitive/language skills of young children with autistic disorder.

Method: A randomised group comparison design involving a parent education and counselling intervention and a parent education and behaviour management intervention to control for parent skills training and a control sample. Two rural and two metropolitan regions were randomly allocated to intervention groups (n = 70) or control (n = 35). Parents from autism assessment services in the intervention regions were randomly allocated to parent education and behaviour management (n = 35) or parent education and counselling (n = 35).

Results: Parent education and behaviour management resulted in significant improvement in adaptive behaviour and autism symptoms at 6 months follow-up for children with greater delays in adaptive behaviour. Parent education and behaviour management was superior to parent education and counselling. We conclude that a 20-week parent education programme including skills training for parents of young children with autistic disorder provides significant improvements in child adaptive behaviour and symptoms of autism for low-functioning children.

Keywords
autism, autism spectrum disorders, parent education, evidence-based, preschoolers

Introduction

Autism is associated with burden and stress for parents, families and carers, and the outcome for people with autism is generally poor, requiring ongoing care by families and the community (Billstead et al., 2005; Howlin et al., 2004). A wide variety of treatments for autism have been proposed. Bryson et al. (2003) concluded that there is now evidence that child-focused early intervention can significantly enhance the outcome for children with autism. However, it is still unknown what type of treatment, intensity, duration, for whom and for what domains of development these interventions are efficacious. Some approaches to intervention suggest that the addition of parental involvement in behavioural management training and the development of particular parenting skills and the engendering of a sense of parenting competence may reduce parental stress and also improve autistic behaviours in the child (Green et al., 2010; Harris, 1994; Ingersoll and Dvortcsak, 2006; Kasari et al., 2010). Young children learn and develop in the context of their family, and therefore, it makes sense that intervention techniques must be transferable across the settings in which the child and family participate (Dunst et al., 2001). Making use of natural environments also takes advantage of the learning activities that occur by being at the right place at the right time (serendipitous learning). The National Research Council (NRC, 2001) concluded that

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parent training must be an essential component of early intervention because of parents’ central role in guiding their child’s development, and as a consequence, any response to early intervention is more likely to be maintained. A range of approaches is currently used in parent education programmes. There is some evidence that approaches where the parent practices skills taught by the therapist during the 1:1 session with the child are more likely to result in better outcomes (Harrold et al., 1992; Ingersoll and Dvortcsak, 2006). Group parent education programmes have the added advantage of cost-effectiveness and increasing social support provided by the group dynamic (Steiner et al., 2012). Two group programmes for parents of young children (McIntyre, 2008; Whittingham et al., 2009) have been modified for parents of children with autism and have demonstrated improvements in child behaviour and parenting skills.

There is some evidence that parent education programmes for parents of young children with autism have a positive effect on parents themselves, including a reduction in parental stress and improved parental mental health (Brereton and Tonge, 2005; Howlin et al., 2004). Evidence of improved child outcomes from recent randomised controlled trials (RCTs) of parent education programmes is mixed. For example, an RCT multi-site trial of a one-to-one intervention for children with autism aged 2 to 4 years and 11 months aimed to improve parent–child communication using video feedback methods (preschool autism communication trial (PACT)). They found a benefit in parent–child social communication but no reduction in symptoms of autism compared to a treatment-as-usual group at 13 months follow-up (Green et al., 2010). An evaluation of a 24-session parent–child, clinic-based programme that aimed to improve joint engagement between child and caregiver found that at post-treatment, the intervention group had significant improvements in joint attention and functional play compared to a wait-list control group (Kasari et al., 2010). However, an RCT of a home-based programme focusing on promoting joint attention and language skills (Focus Parent Training) found no evidence of improved child social and communication skills or parenting skills compared to the care-as-usual group after 12 months (Oosterling et al., 2010). The Hanen ‘More than Words’ group programme (eight group sessions and three individual family sessions) designed to improve parent–child play and communication was evaluated with an RCT and showed no overall benefit but was of benefit to those lower functioning children with limited interest in objects compared with a ‘business-as-usual’ control group at 5.5 months follow-up after intervention (Carter et al., 2011). It can be concluded from previous studies that more research can be conducted from previous studies that more research is required to determine whether parent education leads to improvement in the child’s overall adaptation and specifically communication, socialisation and behaviour, the three core areas affected by autism. Furthermore, it remains to be determined whether the inclusion of specific parent skills training or coaching in addition to parent education enhances child outcomes. We have previously reported on the positive impact of a randomised controlled study of a manualised parent education and behaviour management (PEBM) skills training intervention (‘Preschoolers with Autism’) on the mental health and adjustment of parents with preschool children recently diagnosed with autism (Tonge et al., 2006).

Therefore, we sought to evaluate the effect of this PEBM skills training intervention on the adaptive behaviour of young children with autism. We hypothesised that the child’s adaptive behaviour would improve in the domains of communication and social skills. Further aims were to (a) investigate whether there were any improvements in symptoms of autism, the child’s emotional and behavioural state and level of cognitive and language development and (b) investigate whether the addition of specific parent skills training and coaching had a larger effect on child outcomes than parent education alone.

Method

Research design

A randomised group comparison design compared a parent education and counselling (PEAC) intervention, a PEBM skills training intervention and a control sample who did not receive either of these interventions to investigate whether either of these treatments are effective and whether there are any add-on therapeutic effects of parent skills training and coaching. All children in the study received ‘business-as-usual’ local early intervention services. Intervention subjects were randomly allocated by computer to either the PEBM intervention (n = 35) or the PEAC intervention (n = 35). The randomly selected metropolitan and rural control regions contributed 35 families. All families gave written consent and the study was approved by the Monash University Human Research and Ethics Committee.

Measures

Measures of each child’s adaptive behaviour, symptoms of autism, emotional and behavioural adjustment, developmental level and language development were taken at pretreatment assessment and 6 months follow-up after completion of the interventions or 11–12 months after initial assessment for the control group.

Adaptive behaviour. The primary outcome measure was the Vineland Adaptive Behavior Scales (VABS) (Sparrow et al., 1984), which was completed by a clinician following a parent interview and simultaneous child observation. The VABS gives standard scores in four domains of daily functioning, communication, socialisation and motor skills. The standard scores are summed up and an adaptive behaviour composite can be obtained (Sparrow et al., 1984). The VABS is reliable (inter-relater reliability intraclass correlation coefficient
were calculated as follows: (developmental age in months/chronological age in months) × 100. DQ scores based on PEP-R are significantly associated with composite IQ and verbal reasoning scores from the Stanford–Binet Intelligence Scales (4th ed.; Delmolino, 2006). PEP-R scales have been empirically tested and have clinical validity. The PEP-R also has a behavioural scale based on observation of the child, which can contribute to diagnosis. Language development was assessed using the Reynell Developmental Language Scales III (RDLS III) (Edwards et al., 1985), a clinician-completed assessment of comprehension and expressive language. It has an established role in the assessment of language in children with autism (Leekam et al., 1998; Sherratt, 2002; Watson, 1998).

Emotional and behavioural problems and autism symptoms. The measure of child emotional and behavioural problems and the severity of autism symptoms was determined using the Developmental Behaviour Checklist (DBC), a 96-item parent-completed questionnaire (Einfeld and Tonge, 2002). The DBC yields a total behaviour problem score (TBPS) that correlates with a psychiatrist’s rating of severity of psychopathology ($r = 0.81, p < 0.001$). This severity rating was based on assessment of 70 children with mild (37%), moderate (29%) and severe (34%) intellectual disability (mean age 11 years, range 3–18 years), including 20% children who also had autism (Einfeld and Tonge, 2002). It is reliable (parent inter-relater reliability ICC = 0.80, test–retest reliability ICC = 0.83) and has high internal consistency (Cronbach’s $\alpha = 0.94$). Content, criterion construct and concurrent validity have been demonstrated for the total score and subscales. Severity of symptoms of autism was assessed using the Developmental Behaviour Checklist–Autism Screening Algorithm (DBC-ASA). The DBC-ASA comprises a subset of DBC items and is sensitive and specific for the symptoms of autism (area under the curve (AUC) = 0.80; sensitivity = 0.86 (95% confidence interval (CI): 0.80–0.91) and specificity = 0.69 (95% CI: 0.62–0.76) (Brereton and Tonge, 2002). The Childhood Autism Rating Scale (CARS) (Schopler et al., 1986), a reliable and valid professionally completed observation rating scale, was also used to rate the severity of autistic symptoms.

Cognitive and language development. Cognitive development was assessed with the Psychoeducational Profile–Revised (PEP-R) (Schopler et al., 1990) designed specifically for use with children with developmental problems such as autism who are low functioning with limited verbal skills or who are challenging to test due to non-compliance or inattentiveness to task. A total developmental score and developmental quotient (DQ) are calculated along with a profile of the child’s performance in seven domains assessed relative to standardised age equivalents. DQs for the PEP-R were calculated as follows: (developmental age in months/chronological age in months) × 100. DQ scores based on PEP-R are significantly associated with composite IQ and verbal reasoning scores from the Stanford–Binet Intelligence Scales (4th ed.; Delmolino, 2006). PEP-R scales have been empirically tested and have clinical validity. The PEP-R also has a behavioural scale based on observation of the child, which can contribute to diagnosis. Language development was assessed using the Reynell Developmental Language Scales III (RDLS III) (Edwards et al., 1985), a clinician-completed assessment of comprehension and expressive language. It has an established role in the assessment of language in children with autism (Leekam et al., 1998; Sherratt, 2002; Watson, 1998).

Interventions

PEBM skills training. Parents in this treatment condition received the ‘Preschoolers with Autism’ manual-based education and behaviour management skills training package (Brereton and Tonge, 2005). The programme was broadly based on multiple early intervention and cognitive behavioural techniques and has several purposes. It aims to impart effective coping skills to parents using a systematic approach and structure. The programme alternates group and individual sessions and focuses on helping parents to discuss their reactions to the diagnosis and to understand more about the problem areas that characterise autism (communication, socialisation and behavioural difficulties) and how these affect their child. It also aims to help parents to understand their child’s current developmental level and any unevenness in the developmental profile and the implications for programme planning and goal setting. Further sessions teach parents about making use of positive behaviour support principles to understand and manage difficult behaviour and support the development of their child’s communication skills, social functioning and play skills (see Table 1).

Group sessions included education about autism; features of communication, social, play and behavioural impairments; principles of managing behaviour and change; teaching new skills; improving social interaction and communication; how to access available services; managing parental stress, grief and mental health problems and sibling, family and community responses to autism. Individual sessions included the child and were skills based and action-oriented through the provision of workbooks, modelling, videos, rehearsal, homework tasks and feedback.

PEAC group. Parents in this treatment only received a manual-based education programme. The educational material in the manual for PEAC group discussion sessions was the same as for the PEBM group. However, none of the ‘Preschoolers with Autism’ skills training activities or homework tasks provided to the PEBM group were set and emphasis was instead on non-directive interactive discussion and
counselling. Individual sessions were only for the parents and the child was not present. In the individual sessions, the parents were invited to discuss any child or family issues that they wished to raise. Most often the discussion centred on issues that arose from the theme of the previous group session. When parents had questions about how to manage particular problems, the clinician reiterated the approaches to management and teaching described in the PEAC education manual.

Both treatments were centre-based and delivered by special educators or psychologists who had experience working with children with autism and their parents. Ten 90-min small group (4–5 families) sessions alternated with ten 60-min individual family sessions over a 20-week period. Mothers and fathers of the children were encouraged to attend. All mothers attended and the majority of fathers attended (90%). In five families, the parents were separated or divorced. For these families, either both parents attended or the custodial parent and their new partner attended. Each group met at the most convenient time for the members, for example, in the evening, and child care was available. To sustain treatment integrity, (a) therapists received training in the procedures for each condition, (b) therapists were required to follow a manual that delineates each treatment on a session-by-session basis (Brereton and Tonge, 2005), (c) a random 10% sample of group therapy sessions for both conditions were videotaped for content review and intervention adherence and (d) therapists received ongoing clinical supervision and training throughout the study. To safeguard against possible confounding due to individual therapist effects, therapists were rotated across treatment conditions.

Non-intervention control group. This group consisted of children with autism and their families from the randomly allocated control regions who received ‘business-as-usual’ local early childhood services but no PEBM and PEAC interventions. Parents were informed that they were to part of a follow-up study of autism and receive initial and 12-month follow-up assessments.

Follow-up assessments. Participants in the treatment groups were reassessed 6 months after the completion of treatment (i.e. 12 months after pretreatment assessment). These measures were completed by a clinician blind to the results of the pretreatment assessments and to treatment group membership. The VABS was not completed post treatment because it was thought to be too soon after the intervention for any changes in adaptive behaviour to be evident.

Analysis
Analysis of covariance (ANCOVA) was used to assess intervention effects on each group at follow-up on all outcome variables. Group was the between-participants factor with the corresponding pretreatment score, centred at its overall pretest mean, and child age serving as covariates. The interaction of group by pretreatment was tested to evaluate the assumption that effect of treatment was invariant across the range of pretreatment scores (see Barrett, 2011; Leon et al, 1998). A significant interaction implies that differences between groups vary according to pretreatment severity. Under this circumstance, differences in outcome-adjusted means at three points on the pretreatment scale were explored. The selected points were the pretreatment

<table>
<thead>
<tr>
<th>Group sessions (education)</th>
<th>Individual sessions (parents and child), child-specific skills coaching and homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Outline and programme goals. What is autism?</td>
<td>What is autism? How it affects your child</td>
</tr>
<tr>
<td>2. Parent reaction to diagnosis</td>
<td>Issues for parents after diagnosis</td>
</tr>
<tr>
<td>3. Understanding and managing difficult behaviour. Principles of positive behaviour support</td>
<td>Understanding and managing difficult behaviour. Choosing and setting goals</td>
</tr>
<tr>
<td>4. Positive behaviour support: changing behaviour by manipulating consequences</td>
<td>Positive behaviour support: changing behaviour by manipulating consequences</td>
</tr>
<tr>
<td>5. Encouraging new behaviour (prompting, shaping and chaining)</td>
<td>Encouraging new behaviour (prompting, shaping and chaining)</td>
</tr>
<tr>
<td>6. and 7. Verbal and non-verbal communication</td>
<td>Verbal and non-verbal communication. How to improve communication (e.g. visual communication strategies)</td>
</tr>
<tr>
<td>8. Understanding and managing social impairment (teaching social rules, social stories and behaviour scripts)</td>
<td>Understanding and managing social impairment (teaching social rules, social stories and behaviour scripts)</td>
</tr>
<tr>
<td>9. How to work and play together</td>
<td>How to work and play together (how to gain and maintain attention and structure play)</td>
</tr>
<tr>
<td>10. Review and where to next? (e.g. maintaining informal contact)</td>
<td>Review and where to next? (e.g. linkage and working with service providers)</td>
</tr>
</tbody>
</table>
whole sample mean and 25th and 75th percentiles. These values correspond to ‘middle’ level severity and ‘middle low’ and ‘middle high’ severities, respectively, and are, thus, relevant in assessing the impact of the programme across the spectrum of severity found in the participants.

Results

Participants

A total of 107 children aged 2½ to 5 years consecutively diagnosed with pervasive developmental disorders (PDDs) of the autistic disorder type (APA, 1994) at two metropolitan and two rural regional autism assessment services were eligible for inclusion in the study. Exclusion criteria were the children diagnosed with a PDD of the Asperger’s disorder type and the not otherwise specified (PDD-NOS) type (APA, 1994), the parents who had insufficient English language skills to participate and those children who were undergoing intensive applied behaviour analysis (ABA) programme (Lovas, 1987). All but two eligible families agreed to participate (n = 105). To avoid the likelihood of exchange of information between the parents attending the same early intervention services, one of the metropolitan and one of the rural autism assessment services were randomly allocated to control group or treatment groups. Following this allocation of regions, treatment participants (rural (n = 35) and metropolitan (n = 35)) were randomly allocated to either the PEBM or PEAC interventions. The control group (n = 35) comprised 17 rural children and 18 metropolitan children.

Results are presented for the children of parents in the PEBM treatment (n = 35), PEAC treatment (n = 33) and control group (n = 35). Two PEAC group parents did not complete the parent training because work commitments involved moving interstate. Two low-functioning children in the PEAC group did not complete testing on the PEP-R and RDLS due to inattention and distressed behaviour.

The diagnosis was made by specialist multi-disciplinary autism assessment teams, which provided the public Child and Adolescent Mental Health Service assessment for regional and rural communities. Attendance at the local state-funded early intervention programmes was dependent on assessment and diagnosis by these autism assessment teams. In Victoria, the majority of families, regardless of social class and ethnic background, use these local community-based assessment and intervention services. The multi-disciplinary assessment included a medical review, a speech and language assessment, developmental and cognitive assessment, a family and developmental history, the Autism Diagnostic Interview–Revised (Lord et al., 1994), CARS (Schopler et al., 1986) and an observation of the child in the company of other children at preschool or school. The assessment concluded with a standardised clinical interview (Einfeld, 1992) with the parents and child during which an experienced clinician collated all information and made the diagnosis according to Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM-IV) (APA, 1994). Independent agreement between clinicians using this protocol has been previously reported as high (Cohen’s $\kappa = 0.98$) (Brereton et al., 2002). After allocation to treatment or control groups, a parent interview was conducted and demographic information was collected. This included information on parental age, ethnic background, parent employment and details of the type and number of hours of weekly early intervention the child is currently receiving. The participating families came from a broad range of social class and ethnic backgrounds typical of their regional communities. First-generation immigrant ethnic backgrounds included British (7), Irish (1), Italian (5), Greek (8), Vietnamese (2), Chinese (1), Cambodian (1), Sudanese (1), Saudi Arabian (1), Indian (2), Pacific Islander (1) and there was one Indigenous Australian family. On the basis of employment, each family was assigned to a social economic status as determined by the Australian Standard Classification of Occupations (2nd ed.; Australian Bureau of Statistics, 1997) as follows: professional (50), business management (5), farming (6), trades (20), semi-skilled and unskilled workers (14) and unemployed (8). No parents were excluded because all had adequate English language skills to complete the questionnaires and participate in the intervention programmes. All the children lived with their parents. Children in the treatment groups received local services for preschool-aged children, which consisted of, on average, 7.3 h intervention per week and children in the control group received, on average, 7.9 h intervention per week. This weekly intervention comprised attendance at the local preschool for 3–4 h, a child-focused early intervention therapy group for 2–3 h and individual speech and/or occupational therapy for 1–2 h.

Pretreatment differences. Table 2 presents a summary of pretreatment age, gender and cognitive development as measured by PEP-R DQ and language development as measured by RDLS. The mean age of the children was 46.5 (range 23–70 months, standard deviation (SD) = 8.2) and 84.5% were males (see Table 2). There were no significant differences between groups for child gender ($\chi^2(2) = 4.35, p = 0.114$), but children in the control group were significantly older than those in the PEAC or PEBM group ($F(2, 100) = 5.59, p = 0.005$). Consistent with this age difference, children in the control group performed significantly better than the PEAC and PEBM groups on the PEP-R DQ ($F(2, 98) = 3.78, p = 0.026$), the Reynell Expressive Language ($F(2, 97) = 6.41, p = 0.002$) and Comprehension Scales ($F(2, 97) = 5.42, p = 0.006$). These differences were due to the contrast between the controls and PEAC, with differences between controls and PEBM being smaller and not
was statistically significant. This pattern also applied to the CARS (see Table 5) where those in the PEAC group had more autism symptoms on the CARS than controls at pretreatment \(F(1, 100) = 4.92, p = 0.009\). While the overall test of group differences on the DBC-ASA was not significant \(F(1, 100) = 2.20, p = 0.116\), the contrast between PEAC and controls was significant \(F(1, 100) = 4.39, p = 0.039\). There were no significant differences on the DBC-TBPS.

For the VABS domains (see Table 3), no significant differences were found comparing PEAC to controls. Controls differed from the PEBM on daily living and socialisation domain scores \(F(1, 98) = 8.75, p = 0.004; F(1, 98) = 7.43, p = 0.008\), while PEAC and PEBM differed on communication, social and motor domain scores \(F(1, 98) = 8.55, p = 0.004; F(1, 98) = 7.60, p = 0.007\) and \(F(1, 98) = 3.98, p = 0.049\). Treatment groups did not differ significantly at pretreatment on parental socio-economic status as determined by the Australian Standard Classification of Occupations (2nd ed.; \(F(2, 102) = 2.67, p = 0.074\)) or on parental age \(F(2, 102) = 2.94, p = 0.058\).

### Principal outcome measures

**VABS daily living.** The overall (three-group) comparison was significant \(F(2, 95) = 3.53, p = 0.033\), with planned comparisons showing that the principal effects arose from differences between the controls and PEAC \(F(1, 95) = 4.18, p = 0.044\) and between PEBM to PEAC \(F(1, 95) = 4.18, p = 0.044\) and between PEBM to PEAC \(F(1, 95) = 6.15, p = 0.015\). The first contrast reflects slightly better outcomes for controls compared to PEAC across the spectrum of pretest scores. The second contrast reflects the superiority of PEBM to PEAC. At mean pretreatment values, this corresponds to effect sizes of \(d = −0.52\) (95% CI: −1.01 to −0.04) and \(d = −0.62\) (95% CI: −1.10 to −0.13), respectively. The only treatment by pretest interaction that was significant was that for the comparison of PEBM to controls \(F(2, 101) = 10.66, p = 0.002\), but not between other groups (see Table 4). The form of the interaction implied that benefits of PEBM compared to controls were greater from participants with lower scores at pretreatment. At the mean pretreatment score of 62.74, the effect size was only \(d = −0.02\) (95% CI: −0.49 to 0.45). However, at the 25th percentile (52.00), this increased to \(d = 0.50\) (95% CI: 0.03 to 0.98).

**VABS communication.** The overall test for treatment differences narrowly escaped statistical significance \(F(2, 95) = 2.81, p = 0.065\), but the group by pretest interaction was clearly significant \(F(2, 95) = 4.96, p = 0.009\) for this scale. Planned comparisons showed a significant
difference between PEAC and PEBM ($F(1, 95) = 5.50, p = 0.021$). This corresponded to an effect size at the mean pretest value of 60.99 that was $d = -0.60$ (95% CI: $-1.09$ to $-0.12$). Interactions between group and pretest for PEAC and PEBM against the control group were both significant (see Table 2). At the pretest mean (60.99), effect sizes were $d = -0.39$ (95% CI: $-0.87$ to $0.09$) and $d = 0.21$ (95% CI: $-0.26$ to $0.68$) for PEAC versus controls and for PEBM versus controls, respectively. At the 25th percentile (53.00), corresponding effects were $d = 0.18$ (95% CI: $-0.30$ to $0.65$) and $d = 0.64$ (95% CI: $0.16 – 1.12$). The pattern of results reflects equivocal relative outcomes at ‘average’ scale values, but clear superiority of PEAC and PEBM compared to controls for participants with lower pretest scores.

**VABS motor skills.** Neither the overall test of the effect of treatment group nor the interaction of pretest by group was statistically significant for the motor skills domain. However, a planned contrast of PEBM to PEAC was significant ($F(1, 95) = 5.33, p = 0.023$), reflecting the overall superiority of PEBM on this scale. At the pretreatment mean of 68.05, this corresponded to an effect size of $d = -0.59$ (95% CI: $-1.07$ to $-0.10$).

**DBC-ASA.** The main effect of treatment was significant for this scale ($F(2, 97) = 4.15, p = 0.019$). Planned contrasts showed that this was due to the significantly lower mean follow-up scores in the PEBM group compared to controls ($F(2, 97) = 8.11, p = 0.005$). While scores in PEAC were lower than controls, this difference escaped statistical significance ($F(2, 97) = 3.18, p = 0.077$). No pretreatment by group effects was significant. At the mean pretreatment score, the effect size comparing PEBM to controls was $d = -0.69$ (95% CI: $-1.17$ to $-0.21$), while that comparing PEAC to controls was $d = -0.45$ (95% CI: $-0.93$ to $0.03$).

**DBC-TBPS scores.** As can be seen in Table 4, neither the main effect of treatment nor its interaction with pretreatment status was significant at follow-up.

**Cognitive and language development measures**

Table 5 presents a summary of the PEP-R DQ; RDLS III Comprehension and Expression Standard score; CARS score; score means and SDs for the PEBM, PEAC and control groups at pretreatment and follow-up. There were no significant differences between treatment groups for PEP-R DQ ($F(2, 95) = 0.96, p = 0.390$), RDLS III Comprehension ($F(2, 89) = 0.92, p = 0.390$) and Expressive Language ($F(2, 89) = 0.94, p = 0.960$) or for the CARS ($F(2, 96) = 0.90, p = 0.409$). None of the interactions between treatment group and pretreatment status were significant.
In communication, socialisation and daily living skills for group, PEBM was associated with greater improvements alone, and compared to the ‘business-as-usual’ control training and coaching was superior to PEAC scores and the child’s age, parent education with the addition of skills training and coaching (PEBM) had a larger effect than PEAC, and the child’s daily living skills compared to both PEAC and control groups, for those children who had the most delay. Any improvements in adaptive behaviour in young low-functioning children with autism are important. The value of using the VABS as a measure is that it is relevant to the child’s daily functioning (Volkmar et al., 1993). Change specifically in communication and socialisation skills was hypothesised a priori because the ‘Preschoolers with Autism’ programme has specific sessions on these two skill areas. There are two group sessions and two individual sessions on how to encourage and develop verbal and non-verbal communication skills, for example, by using visual communication systems. There are two group and two individual sessions on how to improve social skills, for example, the use of teaching social rules using visual scripts and coaching parents in how to gain attention and structure play. Improvement in daily living skills, although demonstrated, was not hypothesised a priori because of some albeit conflicting evidence on the VABS that young children with autism have relative strength in daily living skills (Carter et al., 2011). There was significant improvement in socialisation skills of the children whose parents received PEBM compared to the ‘business-as-usual’ control group, but only for the children who had more communication delay. A study of a parent intervention based on the Hanen programme to improve parent–child communication and play also only found significant improvement in children with greater delays in communication skills (Carter et al., 2011). There was significant improvement in socialisation skills of the children whose parents received either PEAC or PEBM compared to the control group, but again, only for those children with greater delays in social skills. PEAC was also associated with a significant improvement in the child’s daily living skills compared to both PEAC and control groups, for those children who had the most delayed skills at pretreatment. PEAC was also associated with a more significant improvement in motor skills than PEAC. Therefore, when controlling for pretreatment scores and the child’s age, parent education with the addition of skills training and coaching was superior to PEAC alone, and compared to the ‘business-as-usual’ control group, PEBM was associated with greater improvements in communication, socialisation and daily living skills for children with the most delay. Any improvements in adaptive behaviour in young low-functioning children with autism are important. The value of using the VABS as a measure is that it is relevant to the child’s daily functioning (Volkmar et al., 1993). Change specifically in communication and socialisation skills was hypothesised a priori because the ‘Preschoolers with Autism’ programme has specific sessions on these two skill areas. There are two group sessions and two individual sessions on how to encourage and develop verbal and non-verbal communication skills, for example, by using visual communication systems. There are two group and two individual sessions on how to improve social skills, for example, with the use of teaching social rules using visual scripts and coaching parents in how to gain attention and structure play. Improvement in daily living skills, although demonstrated, was not hypothesised a priori because of some albeit conflicting evidence on the VABS that young children with autism have relative strength in daily living skills compared to socialisation and communication (Carter et al., 1998), although in lower functioning children Fenton et al. (2003) found no difference between these three domains. Furthermore, the ‘Preschoolers with Autism’ programme did not have any sessions specifically focused on daily living skills. In sessions on how to manage difficult behaviour and teach new skills, parents chose to work on behaviour and skills relevant to their own child, and these were not necessarily related to daily living skills such as dressing but included areas such as oppositional and self-injurious behaviour. The finding that PEBM was associated with significant improvements

### Table 4. Group and group by pretreatment interactions for VABS communication, daily living skills, socialisation and motor domains and DBC-ASA and TBPS at follow-up (n = 101).

<table>
<thead>
<tr>
<th>Effect</th>
<th>Group</th>
<th>Overall, F(2,82–97)</th>
<th>PEAC, F(1,82–97)</th>
<th>PEBM, F(1,87–97)</th>
<th>Control versus PEAC, F(1,82–97)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VABS Communication</td>
<td>Group</td>
<td>0.52</td>
<td>0.89</td>
<td>0.01</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>Group × pretest</td>
<td>5.77***</td>
<td>0.18</td>
<td>10.66**</td>
<td>2.38</td>
</tr>
<tr>
<td>Daily living</td>
<td>Group</td>
<td>3.53*</td>
<td>4.18*</td>
<td>0.13</td>
<td>6.15*</td>
</tr>
<tr>
<td></td>
<td>Group × pretest</td>
<td>2.58</td>
<td>0.03</td>
<td>4.03*</td>
<td>2.63</td>
</tr>
<tr>
<td>Social</td>
<td>Group</td>
<td>2.81</td>
<td>2.38</td>
<td>0.72</td>
<td>5.50*</td>
</tr>
<tr>
<td></td>
<td>Group × pretest</td>
<td>4.96***</td>
<td>8.93***</td>
<td>6.87**</td>
<td>0.79</td>
</tr>
<tr>
<td>Motor</td>
<td>Group</td>
<td>2.66</td>
<td>0.51</td>
<td>2.24</td>
<td>5.33*</td>
</tr>
<tr>
<td></td>
<td>Group × pretest</td>
<td>0.37</td>
<td>0.04</td>
<td>0.48</td>
<td>0.50</td>
</tr>
<tr>
<td>DBC</td>
<td>Group</td>
<td>4.15*</td>
<td>3.19</td>
<td>8.11**</td>
<td>0.96</td>
</tr>
<tr>
<td>ASA</td>
<td>Group × pretest</td>
<td>0.97</td>
<td>1.66</td>
<td>1.07</td>
<td>0.06</td>
</tr>
<tr>
<td>TBPS</td>
<td>Group</td>
<td>0.42</td>
<td>0.00</td>
<td>0.61</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Group × pretest</td>
<td>0.89</td>
<td>1.69</td>
<td>1.21</td>
<td>0.07</td>
</tr>
</tbody>
</table>


Degree of freedom for F ratios varies due to missing data for some measures.

*p < 0.05, **p < 0.01, ***p < 0.005.

### Discussion

The main aim of this study was to evaluate whether a PEAC programme for parents of young children with autism would improve the adaptive behaviour of the child in the domains of communication and social skills and to investigate whether the addition of specific parent skills training and coaching (PEBM) had a larger effect than parent education alone. We found that there was a significant improvement in the communication skills of the children whose parents received PEAC compared to the ‘business-as-usual’ control group, but only for the children who had more communication delay. A study of a parent intervention based on the Hanen programme to improve parent–child communication and play also only found significant improvement in children with greater delays in communication skills (Carter et al., 2011). There was significant improvement in socialisation skills of the children whose parents received either PEAC or PEBM compared to the control group, but again, only for those children with greater delays in social skills. PEAC was also associated with a significant improvement in the child’s daily living skills compared to both PEAC and control groups, for those children who had the most delayed skills at pretreatment. PEAC was also associated with a more significant improvement in motor skills than PEAC. Therefore, when controlling for pretreatment scores and the child’s age, parent education with the addition of skills training and coaching was superior to PEAC alone, and compared to the ‘business-as-usual’ control group, PEBM was associated with greater improvements in communication, socialisation and daily living skills for children with the most delay. Any improvements in adaptive behaviour in young low-functioning children with autism are important. The value of using the VABS as a measure is that it is relevant to the child’s daily functioning (Volkmar et al., 1993). Change specifically in communication and socialisation skills was hypothesised a priori because the ‘Preschoolers with Autism’ programme has specific sessions on these two skill areas. There are two group sessions and two individual sessions on how to encourage and develop verbal and non-verbal communication skills, for example, by using visual communication systems. There are two group and two individual sessions on how to improve social and play skills, for example, with the use of teaching social rules using visual scripts and coaching parents in how to gain attention and structure play. Improvement in daily living skills, although demonstrated, was not hypothesised a priori because of some albeit conflicting evidence on the VABS that young children with autism have relative strength in daily living skills compared to socialisation and communication (Carter et al., 1998), although in lower functioning children Fenton et al. (2003) found no difference between these three domains. Furthermore, the ‘Preschoolers with Autism’ programme did not have any sessions specifically focused on daily living skills. In sessions on how to manage difficult behaviour and teach new skills, parents chose to work on behaviour and skills relevant to their own child, and these were not necessarily related to daily living skills such as dressing but included areas such as oppositional and self-injurious behaviour. The finding that PEBM was associated with significant improvements...
in daily living skills, compared to PEAC and controls, might suggest that when parents learnt how to manage the specific difficult behaviour that their child presented with, that management skill generalised to also improve behaviours that were affecting the child’s capacity to learn daily living skills.

The finding that the addition of direct parent skills training and coaching is associated with better outcomes than PEAC alone confirms the conclusion of others who have suggested that having parents practice new skills, learn how to follow the child’s lead and act positively towards their child is likely to improve outcome (Ingersoll and Dvortcsak, 2006; Kaminski et al., 2008). Some studies of parent education have not found a significant intervention effect but perhaps this was because the parent training was more narrowly focused on parent–child communication and joint attention, whereas in this study, the intervention was broader.

A further aim was to investigate whether parent education led to improvements in symptoms of autism. Although there was no treatment effect on the DBC total score of emotional and behavioural problems, we found that PEBM, but not PEAC, was associated with a significant reduction in symptoms of autism as measured by the DBC-ASA compared to the control group. The rationale for including change in core autism symptoms was that the ‘Preschoolers with Autism’ programme targets the core problems of communication and social difficulties and also addresses approaches to the understanding and management of rigid and repetitive behaviours. The educational component of the programme highlights the link between core symptoms and associated emotional and behavioural disturbance. The DBC-ASA has not been factor analysed to determine if it has factors that relate to the three core impairments in autistic disorder. Therefore, it was not possible to analyse which core symptoms improved. There was no treatment effect on CARS score. It is possible that the CARS might not be a sensitive measure of change in symptoms of autism in very young children because language skills and level of intellectual disability are part of the total score and there is a negative correlation of CARS scores and developmental level (Perry et al., 2005; Pilowsky et al., 1998). This might account for the finding in this study. Another study of a parent-mediated communication-focused intervention (Green et al., 2010) did not find any significant treatment effect on autism symptoms but these authors comment that this might be because their outcome measure, the Autism Diagnostic Observation Schedule–Generic (ADOS-G) (Lord et al., 2000) might lack sensitivity as a measure of change. By contrast, it has been established that the DBC is a reliable measure of change (Einfeld and Tonge, 2002).

The mean DQ and language scores for both intervention groups and the control group improved across the course of
the study. No treatment effects were found for level of cognitive development or level of language development between the treatment and control groups. This might in part be due to the significantly more advanced cognitive and language development of the control group at initial assessment, but might also reflect the fact that all children in the study were receiving a relatively equivalent early intervention programme that included attending some speech therapy sessions and a child-focused intervention group for 2–3 h per week. This finding, of no clear benefit to parent education on language development, is consistent with several other RCTs of parent training that focused on the development of language skills (Carter et al., 2011; Oosterling et al., 2010).

Even though it is possible that the strongest response to treatment might have been at the end of the 20-week intervention, if a treatment is to have any developmental utility, then its effects need to be evident over time, given evidence that indicates the variability in developmental progress of children with autism (Howlin et al., 2009). Autistic disorder is a neurobiological disorder with high levels of emotional and behavioural problems both inherent in the condition and associated with it (Brereton et al., 2006); therefore, any developmental improvement that might be expected from a psychological intervention is likely to be gradual. For these reasons, we chose to follow-up the children 6 months after completion of the intervention rather than immediately after the 20-week parent programme. Further longer-term follow-up is required to determine whether the benefits of PEBM are sustained. This has been the strategy of some other studies that have delayed their post-treatment follow-up assessments to 1 year (Green et al., 2010; Kasari et al., 2010; Oosterling et al., 2010).

The finding that the lower functioning children in the PEBM group made more significant improvement than the control group in communication, socialisation and daily living skills indicates that parent education and skills training programmes should be offered as a priority to parents of the most delayed young children with autism. The demonstrated benefits of either the PEBM or PEAC treatments might also be due in part to the combination of group and individual sessions. A review of parent education for autism spectrum disorders (Steiner et al., 2012) suggested that these programmes need to include tailoring the programme to meet individual child and parent needs. Perhaps the format of combining group and individual sessions in this study enabled the parents to more effectively build on the learning from the group sessions in their individual sessions and tailor the skills training to meet the specific needs of the child. All the children in this study had autistic disorder, and therefore, we cannot comment on whether this parent education programme might also be of benefit for children with another form of PDD, such as Asperger’s disorder or PDD-NOS.

**Study limitations**

The measures of adaptive behaviour (VABS) and autism symptoms (DBC) rely on parent report. However, both the VABS and the DBC have good convergent validity with other assessments (Einfeld and Tonge, 2002; Sparrow et al., 1984). Furthermore, the VABS was completed by experienced clinicians during a parent interview with the child present as specified in the manual (Sparrow et al., 1984: 68). This allows the interviewer to structure the interview and determine which questions need elaboration on the basis of the discussion with the parent and observation of the child during the interview. The VABS was chosen as the primary outcome measure rather than the VABS-2, because at the time of the study, it was in routine use in the assessment clinics and there was also literature to support its use as a robust outcome measure independent of age and developmental level in autism (Carter et al., 1998; Fenton et al., 2003; Volkmar et al., 1993).

There were significant differences between the control group and the treatment groups for age, developmental level, level of language development, symptoms of autism and adaptive behaviour. In general, the control group was older and higher functioning at initial assessment. This issue was addressed in the analysis by pretreatment scores being centred at the overall pretest mean and child age serving as covariates (Frison and Pocock, 1992). The two rural and two regional autism assessment clinics were randomised to either the control or intervention condition to avoid exchange of information, including the parent manual, between parents who lived in the same region and were likely to meet each other at their child’s local intervention centre. It is possible that the randomisation of assessment services has inadvertently led to these significant differences between the control and treatment groups. The relatively small regions from which participants were drawn might also account for baseline differences, which a larger formal cluster randomised trial might address. The few existing similar studies of group parent education programmes also had similar numbers of 20–30 families in the intervention and control groups (Carter et al., 2011; Whittingham et al., 2009).

The clinicians conducting the follow-up assessments were blind to the results of the pretreatment assessments and group membership and were specifically instructed not to discuss group membership with the parents. However, it is possible that a parent might have disclosed group membership at this time, and therefore, the blind can only be regarded as partial. There was no formal fidelity measure of parent compliance with skills training tasks. However, the PEBM manual included homework worksheets for parents to complete and bring to the individual sessions. Therefore, the clinician was well aware of compliance, and completion of the worksheets provided
evidence that homework was completed for almost every session by all families. All families attended the 10 individual sessions because these were scheduled at a time to suit each family. For the group sessions, two families (1 in the PEBM and 1 in the PEAC groups) missed two sessions and five families (3 in the PEBM and 2 in the PEAC groups) missed one session (PEBM mean group sessions attendance = 9.86, SD = 0.43; PEAC mean group sessions attendance = 9.88, SD = 0.42). Each of the three therapists had two group sessions randomly videotaped without their knowledge. Review of these tapes by an independent reviewer confirmed that in all instances the scheduled session was delivered including all the educational material, and for PEBM sessions, the correct homework was discussed and allocated. This intervention adherence was probably achieved by supervision of the therapists prior to each session. At the final group session, all parents completed an anonymous consumer satisfaction rating scale and without exception provided positive feedback about the programme. All agreed that the programme had improved their knowledge of autism, increased their skills in helping their child and that they would recommend the programme to other parents.

Conclusions
This randomised group comparison controlled trial produced evidence that a manual-based PEBM intervention for parents of young children with autistic disorder was significantly associated with improvements in the child’s communication, socialisation and daily living skills, for children with greater delays in these skills compared to a ‘business-as-usual’ control group. The PEAC intervention was also associated with significant improvement in socialisation skills compared to the control group. PEBM was also associated with significant improvement in daily living and motor skills compared to PEAC and controls. PEBM was also associated with significant reduction in autism symptoms assessed by the DBC-ASA. Taken together with previously reported findings of empirical benefit for parental mental health and adjustment (Tonge et al., 2006), the addition of this parent education and skills training intervention to a child-focused early intervention programme for young children with autistic disorder is justified. The increased effectiveness of PEBM over PEAC indicates some added advantage for the use of a parent education skills training and coaching approach rather than parent education and non-directive counselling. A 2-year follow-up study of these parents and their children with autism is being undertaken to determine whether there are any long-term benefits of this early intervention.

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References


