**Table C-1. Evidence table**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Boyd et al.,  2013[1](#_ENREF_1)  **Country:** US  **Intervention setting:**  Public school classrooms  **Enrollment period:** NR  **Funding:**  Institute of Education Sciences, US Department of Education  **Design:**  Quasi-experimental study | **Intervention:**  LEAP and TEACCH, 6- week time window at the beginning and end of school year (at least 6 months apart)  **Assessments:** parent; teacher; researchers  **Groups:**  **G1:** TEACCH  **G2:** LEAP  **G3**: non-model specific practices  **Provider:** teachers  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  Classrooms:  **G1:** 25  **G2:** 22  **G3:** 27  Participants:  **G1:** 85  **G2:** 54  **G3:** 59  **N at follow-up:**  **G1**:81  **G2**:48  **G3**: 56 | **Inclusion criteria:**  Teachers**:**   * public school classrooms * teachers had to be certified to teach * TEACCH and LEAP teachers needed to attend formal training   Children**:**   * 3-5 years of age at time of enrollment * previous clinical diagnosis or educational label consistent with Autism spectrum disorder (ASD) or developmental delay * met diagnostic criteria on Autism Diagnostic Observation Schedule (ADOS) and/or Social Communication Questionnaire (SCQ)   **Exclusion criteria:**  Teachers**:**   * teaching < 2 years in their respective classroom types prior to enrollment * failing to meet prior determined classroom fidelity and/or quality rating scales   Children**:**   * previous exposure to the comparison comprehensive treatment model (CTM) * < 6 months of exposure to the treatment or control intervention * significant uncorrected vision or hearing impairment, uncontrolled seizure disorder or traumatic brain injury * family not proficient in English   **Age, mean/yrs ± SD:**  **G1:** 4.00 ± 0.57  **G2:** 3.96 ± 0.70  **G3:** 4.07 ± 0.64  **Mental age, mean/yrs (range):** NR  **Sex, n (%):**  Male:  **G1**: 71 (83.5)  **G2**: 42 (77.8)  **G3**: 52 (88.1)  Female:  **G1:** 14 (16.5)  **G2:** 12 (22.2)  **G3:** 7 (11.9)  Missing:  **G1:** 1 (1.2)  **G2:** 0 (0)  **G3:** 0 (0)  **Race/ethnicity, n (%):**  White:  **G1:** 32 (37.6)  **G2:** 25 (46.3)  **G3:** 35 (59.3)  Black:  **G1:** 14 (16.5)  **G2:** 3 (5.6)  **G3:** 6 (10.2)  Hispanic:  **G1:** 31 (36.5)  **G2:** 23 (42.6)  **G3:** 15 (25.4)  Asian:  **G1:** 5 (5.9)  **G2:** 2 (3.7)  **G3:** 3 (5.1)  Missing:  **G1:** 3 (3.5)  **G2:** 1 (1.9)  **G3:** 0 (0)  **SES:**  Caregiver education, n (%):  Less than college:  **G1**: 44 (51.8)  **G2**:25 (46.3)  **G3**: 25 (42.4)  College or higher:  **G1**: 39 (45.9)  **G2**:28 (51.9)  **G3**: 32 (54.2)  Missing:  **G1**: 2 (2.4)  **G2**:1 (1.9)  **G3**: 2 (3.4)  Household income, n (%):  ˂ $20K-$39,000:  **G1**: 30 (35.3)  **G2**:14 (25.9)  **G3**: 16 (27.1)  $40 k-$79,999:  **G1**: 22 (25.9)  **G2**:18 (33.3)  **G3**: 13 (22.0)  ˃$80K:  **G1**: 29 (34.1)  **G2**:18 (33.3)  **G3**: 25 (42.4)  Missing:  **G1**: 4 (4.7)  **G2**:4 (7.4)  **G3**: 5 (8.5)  **Diagnostic approach:**  Referral  Diagnostic tool/method:  Autism Diagnostic Observation Schedule (ADOS) and/or Social Communication Questionnaire (SCQ)  **Diagnostic category, n (%):** NR  **Other characteristics, n (%):** School setting:  **G1**:  Urban: 13 (52)  Suburban: 12 (48)  Rural: 0 (0.00)  **G2**:  Urban: 10 (45.45)  Suburban: 11 (50.0)  Rural: 1 (4.55)  **G3**: Urban: 18 (64.29)  Suburban: 10 (35.71)  Rural: 0 (0.00) | **Overall ratings:**  Autism characteristics and severity  **G1:** -0.11 ± 0.76  **G2:** 0.066 ± 0.765  **G3:** 0.381 ± 0.859  **Social skills, mean ± SD:**  Reciprocal social interaction, teacher-rated  **G1:** 0.014 ± 0.999  **G2:** 0.24 ± 0.877  **G3:** 0.18 ± 0.874  Reciprocal social interaction, parent-rated  **G1:** 0.005 ± 0.834  **G2:** -0.056 ± 1.015  **G3:** 0.325 ± 0.785  **Communication/ language, mean ± SD:**  Communication:  **G1:** 0.214 ± 0.858  **G2:** 0.081 ± 1.045  **G3:** -0.403 ± 0.784  **Repetitive behavior, mean ± SD:**  Sensory and repetitive behaviors, teacher-rated (SRB-T):  **G1:** -0.069 ± 0.809  **G2:** -0.176 ± 0.768  **G3:** 0.179 ± 0.92  Sensory and repetitive behaviors, parent-rated:  **G1:** 0.025 ± 0.879  **G2:** -0.017 ± 1.03  **G3:** 0.169 ± 1.06  **Motor skills:**  Fine motor (FM):  **G1:** 0.01 ± 0.632  **G2:** -0.165 ± 0.812  **G3:** -0.364 ± 0.648 | **Overall ratings:**  Autism characteristics and severity  **G1:** -0.299 ± 0.928  **G2:** -0.144 ± 0.837  **G3:** 0.124 ± 0.866  p=NS  **Social skills, mean ± SD:**  Reciprocal social interaction, teacher-rated  **G1:** -0.28 ± 1.149  **G2:** -0.152 ± 1.039  **G3:** -0.077 ± 0.926  p=NS  Reciprocal social interaction, parent-rated  **G1:** -0.257 ± 0.969  **G2:** -0.117 ± 1.012  **G3:** 0.17 ± 0.845  p=NS  **Communication/ language, mean ± SD:**  Communication:  **G1:** 0.441 ± 0.937  **G2:** 0.238 ± 1.102  **G3:** -0.317 ± 0.878  p=NS  **Repetitive behavior:**  Sensory and repetitive behaviors, teacher-rated:  **G1:** -0.069 ± 0.809  **G2:** -0.176 ± 0.768  **G3:** 0.179 ± 0.92  p=NS  Sensory and repetitive behaviors, parent-rated:  **G1:** 0.025 ± 0.879  **G2:** -0.017 ± 1.03  **G3:** 0.169 ± 1.06  p=NS  **Motor skills:**  Fine motor :  **G1:** 0.44 ± 0.763  **G2:** 0.072 ± 0.821  **G3:** -0.183 ± 0.682  p=NS  **Harms:** NR  **Modifiers:** NR |

**Comments:** All data reflect composite variables

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Casenhiser et al., 2013 [2](#_ENREF_2)  **Country:**  USA and  Canada  **Intervention setting:**  Treatment center, home  **Enrollment period:** NR  **Funding:** Harris Steel Foundation and the Harris  Family, Unicorn Foundation, Cure Autism Now, the Public  Health Agency of Canada, the Templeton Foundation, and York University  **Design:** RCT | **Intervention:**  Milton & Ethel Harris Research Initiative Treatment program (MEHRIT), 2hrs/week  Community treatment, 3.9hrs/week  **Assessments:**  Modified Child Behavior Rating Scale (mCBRS),  Pre School Language Scale IV (PLS) and Comprehensive Assessment of Spoken Language (CASL) conducted by licensed speech language pathologists at 0 and 12 months post intervention  Parent behavior scores from MEHRIT fidelity scale conducted by MEHRIT therapists at 0 and 12 months post intervention  **Groups:**  **G1:** MEHRIT  **G2:** Community treatment  **Provider:**  Speech language pathologists  Occupational therapists  **Treatment manual followed:** NR  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies:**  **G1:** NR  **G2:** Yes  **N at enrollment:**  **G1:** 25  **G2:** 26  **N at follow-up:**  **G1:** 16  **G2:** 13 | **Inclusion criteria:**  All children who had  completed 12 months of MEHRIT (or 12 months in the CT group) and  for whom a semi-structured parent-child interaction was videotaped both prior to  intervention and following 12 months of intervention.  Previously diagnosed with Autism Spectrum disorders(ASDs)  Diagnoses confirmed using ADOS and Autism Diagnostic Interview (ADI)  **Exclusion criteria:**  Neurological or developmental diagnoses other than ASD  Families not able to meet the time requirements of the study  **Age, mean/months** ± **SD:**  **G1:** 42.52± 8.76  **G2:** 46.38 ± 8.29  **Mental age, mean/yrs (range):** NR  **Sex:** NR  **Race/ethnicity, n (%):** NR  **SES:**  Maternal education, n (%):  Advance degree  **G1:** 2 (8)  **G2:** 6 (23.07)  Bachelor’s degree  **G1:** 15 (60)  **G2:** 11 (42.30)  Associates degree  **G1:** 1 (4)  **G2:** 3 (11.53)  Some University/college  **G1:** 7 (28)  **G2:** 4 (15.38)  High school **G1:** 0 (0)  **G2:** 2 (7.69)  Household income, n  >100,000 (in Canadian $)  **G1:** 12  **G2:** 11  50,000-100,000  **G1:** 6  **G2:** 4  <50,000  **G1:** 4  **G2:** 8  NR  **G1:** 3  **G2:** 3  **Diagnostic approach:**  In Study  Diagnostic tool/method:  For ASD diagnosis:  ADOS (Autism Diagnostic Observation Schedule); ADI (Autism Diagnostic Interview)  **Diagnostic category, n (%):**  ASD:  **G1:** 25  **G2:** 26  **Other characteristics**, n (%)**:** Parental marital status:  Married/partnered  **G1:** 24 (96)  **G2:** 22 (84.61)  Single/divorced/separated  **G1:** 1 (4)  **G2:** 4 (15.38)  Mother’s native language:  English  **G1:** 15 (60)  **G2:** 12 (46.15)  Other  **G1:** 10 (40)  **G2:** 14 (53.84)  Language most often spoken at home  English  **G1:** 23 (92)  **G2:** 23 (88.46)  Other  **G1:** 2 (8)  **G2:** 3 (11.53) | **Mean** ±  **SD:**  **mCBRS:**  Attention to Activity  **G1**: 2.96 ± 0.735  **G2**: 3.08 ± 0.796  Involvement **G1**: 2.56 ± 0.583  **G2**: 2.62 ± 0.697    Compliance **G1**: 2.68 ± 0.748  **G2**: 2.85 ± 0.784    Initiation of Joint Attention  **G1**: 1.28 ±0.542  **G2**: 1.31 ±0.987  Enjoyment in Interaction **G1**: 3.08 ±0.277  **G2**: 3.35 ±0.485  PLS and CASL:  Mean ± SD  Developmental quotient (DQ):  **G1:** 0.64 **±**0**.**32  **G2:** 0.54 **±**0 **.**26  **Parent behavior scores (from MRHRIT Fidelity scale), Mean ± SD:**  Co-regulation  **G1:** 1.32 ±1.0  **G2:** 1.23 ±.86  Expression of enjoyment  **G1:** 1.80 ±1.23  **G2:** 1.69 ±1.10  Sensory-motor  **G1:** 1.60 ±0.87  **G2:** 1.31 ±0.83  Joining  **G1:** 1.76 ±0.60  **G2:** 1.58 ±0.50  Reciprocity  **G1:** 1.12 ±0.78  **G2:** 0.85 ±0.73  Independent thinking  **G1:** 0.60 ±0.65  **G2:** 0.42 ±0.76  Use of Affect  **G1:** 1.92 ±0.15  **G2:** 1.65 ±0.80 | **Mean** ±  **SD:**  **mCBRS:**  Attention to Activity  **G1**: 3.72 ±0.614  **G2**: 3.38 ±0.752 p<0.05, d=0.69  Involvement  **G1**: 3.20 ±0.866  **G2**: 2.69 ±0.788 p<0.01,d=0.87  Compliance  **G1**: 3.48 ±0.963  **G2**: 3.35 ±0.797 p=ns, d=0.51  Initiation of Joint Attention  **G1**: 1.84 ±0.549  **G2**: 1.23 ±0.430 p<0.001, d=1.02  Enjoyment in Interaction  **G1**: 3.28 ±0.458  **G2**: 3.23 ±0.430 p<0.05, d=0.63  PLS and CASL:  Mean ± SD  DQ:  **G1:** 0.72 **±** 0**.**39  p = 0.038 d =0.451  **G2:** 0.64 **±** 0.32  p < 0.001 d = 0.915  **G1 vs G2**  p = 0.214    **Parent behavior scores (from MEHRIT Fidelity scale), Mean ± SD**  N=51  Co-regulation **G1:** 1.92 ±1.22  **G2:** 1.00 ±.69p<0.001 d=0.996  Expression of enjoyment **G1:** 2.60 ±1.23 **G2:** 1.53 ±1.03p<0.01 d=0.79  Sensory-motor **G1:**1.88 ±1.1 **G2:**1.19 ±.75p=ns d=0.393  Joining  **G1:** 2.16 (.80) **G2:** 1.19 (.63)p<0.01 d=0.92  Reciprocity **G1:** 1.76 ±1.13 **G2:** .65 ±.80p<0.01 d=0.863    Independent Thinking **G1:** 1.0 ±.87 **G2:** .50 ±.76p=ns d=0.389    Use of Affect **G1:** 2.48 ±.82 **G2:** 1.46 ±.71p<0.001 d=0.962  **Harms:** NR  **Modifiers:** NR |

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| **Table C-1. Evidence table, continued Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Fujii et al.  2013  **Country:** US  **Intervention setting:** university clinic or associated autism community clinic  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  CBT provided to individual families for 90 minutes (30 minutes separately with child and parents, 30 minutes conjointly with child and parent(s)) using Building Confidence CBT program modified for use with children with ASD; 32 weekly sessions  **Assessments:** child and parent report  **Groups:**  **G1:** intervention  **G2:** treatment as usual  **Provider:**   * 5 graduate students in clinical or educational psychology and 4 postdoctoral students in psychology or psychiatry   **Treatment manual followed:** No  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  yes  **Concomitant therapies, n (%):**  Medication:  **G1:** 2 (29) **G2:** 4 (80)  Therapy from psychologist, social worker, or behaviorist:  **G1:** NR  **G2:** 4 (80)  School services (aides, speech therapy, or social skills group)  **G1:** NR  **G2:** 5 (100)  Speech therapy:  **G1:** 4 (57)  **G2:** NR  Social skills group in year before enrollment:  **G1:** 6 (86)  **G2:** NR  N at enrollment:  **G1:** 10  **G2:** 6  N at follow-up:  **G1:** 7  **G2:** 5 | **Inclusion criteria:**  Children age 7-11 years old meeting ADOS and ADI-R criteria for ASD  > 1 anxiety disorder  **Exclusion criteria:**  Verbal IQ < 70  Primary comorbid diagnosis other than anxiety (e.g. dysthymic disorder)  **Age, mean/yrs ± SD:**  **G1:** 8.7 ± 1.8  **G2:** 9.0 ± 1.6  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1:** 5 (71)  **G2:** 4 (80)  F, n (%): **G1:** 2 (29)  **G2:** 1 (20)  **Race/ethnicity, n (%):**  White  **G1:** 6 (86)  **G2:** 3 (60)  Asian/Pacific Islander:  **G1:** 1 (14)  **G2:** 0 (0)  African American:  **G1:** 0 (0)  **G2:** 1 (20)  Multiracial:  **G1:** 0 (0)  **G2:** 1 (20)  **SES:**  Parent graduated from college, n (%):  **G1:** 5 (71)  **G2:** 3 (60)    **Diagnostic approach:**  In Study  Diagnostic tool/method:  ADOS and ADI-R; anxiety disorders diagnosed suing Anxiety Disorders Interview Schedule: Child and Parent versions  **Diagnostic category, n (%):**  Autism  **G1:** 7 (100)  **G2:** 4 (80)  PDD-NOS  **G1:** 0 (0)  **G2:** 1 (20)  **Other characteristics, n (%):** NR | **Overall ratings:**  Global Rating of Severity, mean ± SD: NR  Social skills: NR  Communication/ language: NR  Repetitive behavior**:**  NR  Problem behavior:  NR  Adaptive behavior:  NR  **Commonly occurring co-morbidities:**  Anxiety diagnoses, n (%):  Separation anxiety disorder:  **G1:** 3 (43)  **G2:** 2 (40)  Social phobia disorder:  **G1:** 2 (29)  **G2:** 3 (60)  Obsessive compulsive disorder:  **G1:** 1 (14)  **G2:** 0 (0)  Generalized anxiety disorder:  **G1:** 1 (14)  **G2:** 0 (0) | **Overall ratings:**  Global Rating of Severity, mean ± SD: NR  Social skills: NR  Communication/ language: NR  Repetitive behavior: NR  Problem behavior:  NR  Adaptive behavior: NR  **Commonly occurring co-morbidities:**  Anxiety diagnoses, n (%):  p=0.013 for any anxiety diagnosis at follow-up between groups vs. baseline  Separation anxiety disorder:  **G1:** 0 (0)  **G2:** 2 (40)  Social phobia disorder:  **G1:** 1 (14)  **G2:** 3 (60)  Obsessive compulsive disorder:  **G1:** 0 (0)  **G2:** 0 (0)  Generalized anxiety disorder:  **G1:** 1 (14)  **G2:** 0 (0)  **Harms:** NR  **Modifiers:** NR |

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| **Table C-1. Evidence table, continued Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Goods et al.  2013[3](#_ENREF_3)  **Country:** US  **Intervention setting:**  non-public preschool  **Enrollment period:**  2008-2010  **Funding:**  Organization for Autism Research grant 20072725; Autism Speaks grant 5666, NIH/NICHD, and Department of Health and Human Services  **Design:** RCT | **Intervention:**  Joint Attention and Symbolic Play/Engagement and Regulation Intervention (JASPER) for 12 weeks, 30 minutes twice weekly  **Assessments:** observation and researcher assessments  **Groups:**  **G1:** JASPER intervention  **G2:** Standard practice  **Provider:**  Study personnel (graduate students in educational psychology)  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  Yes  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 7  **G2:** 8  **N at follow-up:**  **G1:** 5  **G2:** 6 | **Inclusion criteria:**   * diagnosed with autism * between 3-5 years of age * attended non-public school * used less than 10 spontaneous, functional, and communicative words by parent and teacher report and during baseline or entry assessments   **Exclusion criteria:**   * see inclusion criteria   **Age, mean/months ± SD:**  **G1:** 48.73 ± 11.68  **G2:** 54.68 ± 10.25  **Mental age, mean/months ± SD:**  **G1:** 17.21 ± 3.91  **G2:** 13.91 ± 3.85  **Sex:** NR  **Race/ethnicity, n (%):**  NR  **SES:**  Maternal education, n (%):  NR  Household income, mean (range): NR  **Diagnostic approach:**  In Study  Diagnostic tool/method:  ADOS  **Diagnostic category, %)**  Autism: 100%  PDD-NOS: 0  Aspergers: 0  **Other characteristics**, n (%)**:** MSEL baseline development quotient, mean ± SD:  **G1:** 37.70 ± 15.21  **G2:** 26.67 ± 10.12  MSEL baseline, visual reception, mean ± SD:  **G1:** 22.42 ± 3.26  **G2:** 21.50 ± 4.44  MSEL baseline fine motor, mean ± SD:  **G1:** 21.71 ± 3.04  **G2:** 19.13 ± 4.29  MSEL baseline receptive language, mean ± SD:  **G1:** 13.86 ± 7.36  **G2:** 8.63 ± 4.66  MSEL baseline expressive language, mean ± SD:  **G1:** 10.86 ± 7.76  **G2:** 6.38 ± 3.74 | **Social skills:**  SPA (baseline, month 0)  Play types, mean ± SD:  **G1**: 21.14 ± 7.58  **G2**: 17.13 ± 6.83  Entry (3 months later)  **G1**: 11.00 ± 8.74  **G2**: 11.50 ± 5.10  **Communication/ language:**  RDLS verbal comprehension, mean ± SD:  **G1**: 12.14 ± 0.41  **G2**: 12.00 ± 0.34  RDLS expressive language, mean ± SD:  **G1**: 13.63 ± 4.57  **G2**: 11.93 ± 0.09  ESCS, initiating joint attention, mean ± SD:  **G1**: 2.57 ± 4.39  **G2**: 0.75 ± 2.12  ESCS, initiating requesting, mean ± SD:  **G1**: 5.00 ± 3.70  **G2**: 1.88 ± 1.55  Class observation (entry, month 3)  Initiating joint attention, mean ± SD:  **G1**: 1.50 ± 3.21  **G2**: 0.20 ± 0.45  Class observation, initiating requesting, mean ± SD:  **G1**: 1.50 ± 1.76  **G2**: 0.20 ± 0.45  Class observation, (entry, month 3) unengaged, mean % ± SD:  **G1:** 44.50 ± 14.86  **G2:** 57.40 ± 34.11 | **Social skills:**  SPA  Play types, mean ± SD:  **G1**: 22.00 ± 10.17  **G2**: 14.33 ± 9.69  p = 0.04  **Communication/ language:**  RDLS verbal comprehension, mean ± SD:  **G1**: 14.59 ± 5.36  **G2**: 12.05 ± 0.38  p=NS  RDLS, expressive language, mean ± SD:  **G1**: 14.52 ± 5.38  **G2**: 11.95 ± 0.16  p=NS  ESCS, initiating joint attention (IJAs), mean ± SD:  **G1**: 0.40 ± 0.89  **G2**: 1.00 ± 1.73  p=NS  ESCS, initiating requesting , mean ± SD:  **G1**: 4.00 ± 1.87  **G2**: 3.20 ± 2.39  p=NS  Class observation initiating joint attention, mean ± SD:  **G1**: 0.60 ± 1.34  **G2**: 0.25 ± 0.50  p=NS  Class observation, initiating requesting, mean ± SD:  **G1**: 4.80 ± 4.49  **G2**: 0.00 ± 0.00  p=0.01  Class observation, unengaged, mean ± SD:  **G1:** 12.60 ± 10.85  **G2:** 35.00 ± 16.08  p = 0.05  **Harms:** NR  **Modifiers:** NR |

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| **Table C-1. Evidence table, continued Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Ichikawa et al.  2013[4](#_ENREF_4)  **Country:** Japan  **Intervention setting:** Psychiatric medical center  **Enrollment period:** NR  **Funding:**  Grant from Meiji Yasuda Mental Health Foundation  **Design:** RCT | **Intervention:**  TEACCH-based social skills training: group intervention with weekly 2-hour sessions, with 20 sessions over 6 months.  Wait list control group: group meetings every 2 months for 6 months with 2 social workers for 30-60 minutes  **Assessments:** observed, parent report, teacher report  **Groups:**  **G1:** TEACCH  **G2:** wait list control  **Provider:**   * 2 psychologists, 2 nursery teachers, 2 social workers, and 2 graduate students, with supervision by an additional psychologist   **Treatment manual followed:** yes  **Defined protocol followed:** yes  **Measure of treatment fidelity reported:** no  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 5  **G2:** 6  **N at follow-up:**  **G1:** 5  **G2:** 6 | **Inclusion criteria:**  Age 5-6 years  Diagnosis of autism spectrum disorder confirmed by child psychiatrists  IQ > 75  CARS-TV > 25  **Exclusion criteria:**  Severe psychiatric comorbidities (e.g. obsessive compulsive disorder, conduct disorder, oppositional defiant disorder)  Mother with mental illness with a major obstacle in daily life (e.g. schizophrenia, severe depression, drug or alcohol dependency)  **Age, median months (range):**  **G1:** 64 (60 – 66)  **G2:** 62 (60 – 70)  **Mental age, median (range):**  DQ (Kyoto Scale of Psychological Development):  **G1:** 87 (84-117)  **G2:** 88 (78 – 145)  **Sex:**  M, n (%):  **G1:** 4 (80)  **G2:** 5 (83.3)  F, n (%): **G1:** 1 (20)  **G2:** 1 (16.7)  **Race/ethnicity, n (%):** NR  **SES:**  Maternal education, n (%):  High school:  **G1:** 2 (40) **G2:** 1 (16.7)  Junior college:  **G1:** 3 (60)  **G2:** 2 (33.3)  University:  **G1:** 0  **G2:** 3 (50)  Household income, mean (range): NR  **Diagnostic approach:**  In Study  Diagnostic tool/method: ICD-10  **Diagnostic category, n (%):**  Autism, high functioning:  **G1:** 0 (0)  **G2:** 3 (50)  PDD-NOS  **G1:** 4 (80)  **G2:** 2 (33.3)  Aspergers  **G1:** 1 (20)  **G2:** 1 (16.7)  **Other characteristics, n (%):**  Autism severity, CARS, median (range):  **G1:** 32.5 (27.5 – 33.5)  **G2:** 31.0 (26.5 – 33.0)  SQ (Japanese version of Social Maturity Scale), median (range):  **G1:** 90 (81 - 101)  **G2:** 96 (71 – 105) | **Social skills:**  Interaction Rating Scale, mean ± SD:  **G1:** 38.9 ± 4.8  **G2:** 41.5 ± 3.0  **Adaptive behavior:**  Strengths and Difficulties Questionnaire, mean ± SD:  **G1:** 19.0 ± 3.5  **G2:** 13.2 ± 3.3 | **Social skills:**  Interaction Rating Scale, mean ± SD:  **G1:** 40.2 ± 5.1  **G2:** 39.7 ± 6.0  Difference (95% CI): 2.72 (-5.83, 11.27)  Effect size (d): 0.69  **Adaptive behavior:**  Strengths and Difficulties Questionnaire, mean ± SD:  **G1:** 14.4 ± 4.7  **G2:** 12.5 ± 3.2  Difference (95% CI): -3.12 (-8.42, 2.18)  Effect size (d): 0.71  **Harms**  None  **Modifiers**  NR |

**Comments:** Does not report p-values for between group differences; between group differences account for baseline as a covariate

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kenworthy et al.  2013[5](#_ENREF_5)  **Country:** US  **Practice**  **setting:**  Children’s National Medical Center, Center for Autism Spectrum Disorders, Rockville, MD, USA  **Intervention setting:** School  **Enrollment period:** NR  **Funding:**  National Institute of Mental Health  Organization for Autism Research  Isadore and Bertha Gudelsky Family Foundation  NIH  **Design:** RCT | **Intervention:**  Unstuck and On Target (UOT) CBT intervention or  Social skills intervention (SS); both interventions for one school-year in 28, 30-40min lessons  **Assessments:**  Direct Child measures,  Parent-rated report, Teacher-rated report  IQ and Verbal mental age measured by WASI (Wechsler Abbreviated Scale of Intelligence) Verbal, Performance and Full Scale IQ scores  **Groups:**  **G1:** CBT  **G2:** Social skills  **Provider:**  Interventionists  School staff  Parents  **Treatment manual followed:** Yes  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, % :**  Psychometric medication:  **G1:** 54.5  **G2:** 60  **N at enrollment:**  **G1:** 47  **G2:** 20  **N at follow-up:**  **G1:** 43  **G2:** 19 | **Inclusion criteria:**  Full Scale IQ score >70, a verbal mental age ≥8 years old  Met criteria for ASD (ADOS diagnostic algorithm ≥‘ASD’ threshold  Met DSM-IV-TR (American Psychiatric Association, 1994) criteria for a Pervasive Developmental Disorder  **Age, mean/yrs** ± **SD (range):**  **G1:** 9.49 ± 1.00 (7.83–11.08)  **G2:** 9.58 ± 1.10 (7.92–11.08)  **Mental age, mean/yrs (range):** NR  **Sex, %**  M:  **G1:** 87 **G2:** 90  F:  **G1:** 13  **G2:** 10  **Race/ethnicity, %:**  White  **G1:** 70  **G2:** 55  **SES:**  **Education, mean ± SD**  Maternal education  **G1:** 1.91 **±** 0.88  **G2:** 1.95 **±** 0.76  Father’s education  **G1:** 2.04 **±**1.12  **G2:** 1.95 **±** 0.91  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  Diagnosis of ASD by ADOS (Autism Diagnostic Observation Schedule, Module 3)  Pervasive developmental disorder diagnosis met by DSM-IV-TR  **Diagnostic category, n :**  ASD  **G1:** 47  **G2:** 20  **Other characteristics**, %**:**  Public school:  **G1:** 96  **G2: 75**  **WASI FSIQ, mean ± SD [range]:**  **G1:** 108.80 **±** 18.52 [75-151]  **G2:** 107.63 **±** 17.20 [82-150]  **ADOS social + communication,**  **Mean ± SD (range):**  **G1:** 11.77 **±** 3.64  (7-21)  **G2:** 12.40 **±** 4.17  (7-20)  **ADOS stereotyped behavior, mean ± SD (range):**  **G1:** 1.98 **±** 1.71  (0-6)  **G2:** 1.90 **±** 1.33(0-5) | NR | **Overall ratings:**  Global Rating of Severity, mean ± SD: NR  **Direct child measures change scores (post intervention minus preintervention), n, mean ± SEM:**  WASI block design  **G1:** (n**=**41),  3.00 ± 1.03  **G2**: (n=17),  -0.94 **±**1.11  **G1 vs G2**  p<0.05  CI 0.65(0.18-1.17)  Challenge task flexibility:  **G1:** (n**=**43),  -0.53 **±** 0.07  **G2:** (n**=**19),  -0.15 **±** 0.14  **G1 vs G2**  p<0.05  CI -0.72(-1.38 to 0.14)  Challenge task plan:  **G1:** (n=43),  -0.33 **±** 0.07  **G2:** (n=19),  -0.22 **±** 0.06  -0.27(-0.77 to 0.18)  Challenge task social:  **G1:** (n=43),  0.47 **±** 0.16  **G2:** (n=19),  0.26 **±** 0.30  CI 0.17(-0.42 to 0.77)  **Teacher-rated measures change scores (post intervention minus pre intervention), n, mean ± SEM:**  BRIEF shift T score  **G1:** (n=27),  -24.44 **±** 3.30  **G2:** (n=18),  -9.78 **±** 3.59  **G1 vs G2**  p<0.01  CI -0.89(-1.62 to 0.33)  BRIEF plan/org T score  **G1:** (n=28),  -19.14 **±** 2.39  **G2:** (n=18),  -11.72 **±** 3.16  **G1 vs G2**  p<0.05  CI -0.57(-1.26 to 0.01)  SRS total score  **G1:** (n=25),  -5.40 **±**1.34  **G2:** (n=19),  -4.79 **±** 2.05  CI -0.08(-0.78 to 0.51)  **Parent-rated measures change scores (post intervention minus preintervention), n, mean ± SEM:**  BRIEF shift T score  **G1:** (n=41),  -9.56 **±** 2.31  **G2:** (n=19),  -0.16 **±** 2.99  **G1 vs G2**  p<0.01  CI -0.66(-1.24 to 0.15)  BRIEF plan/org T score  **G1:** (n=42),  -5.17 **±** 2.00  **G2:** (n=18)  0.61 **±** 2.90  **G1 vs G2**  p<0.05  CI -0.45(-0.97 t 0.07)  SRS total score  **G1:** (n=42)  -7.31 **±** 1.65  **G2:** (n=18)  -4.11 **±** 2.97  CI 0.28(-0.84 to 0.33)  **Classroom Observations:**  Ability to follow directions  **G1 vs G2**  p<0.001  Transition smoothly  **G1 vs G2**  p<0.001  Avoid getting stuck  **G1 vs G2**  p<0.05  Reduced negativity  **G1 vs G2**  p=0.053  Social reciprocity  **G1 vs G2**  p=ns  Classroom participation  **G1 vs G2**  p=ns  **Harms:** NR  **Modifiers:** NR |

**Comments:** Baseline measures not provided. Only post-pre treatment change scores reported.

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Malow et al.  2014[6](#_ENREF_6)  **Country:** US  **Intervention setting:** Home  **Enrollment period:** NR  **Funding:**  UDSHHS, HRSA, Maternal and Child Health Research Program; research was conducted as part of Autism Speaks Autism Treatment Network.  **Design:** RCT | **Intervention:**  Sleep education curriculum for parents. Parents in the group program received two 2-hour sessions conducted 1 week apart and parents in the individual received one 1-hour session with two follow-up phone calls.  **Assessments:** observed, parent report  (Actigraphy and parent questionnaires)  collected at baseline and 1 month after treatment  **Groups:**  **G1:** individual sleep education  **G2:** group sleep education  **Provider:**   * Trained educators   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  Yes  **Concomitant therapies, n (%):**  Medication type  Psychotropic  **G1:** 7 (15)  **G2:** 6 (18)  Melatonin  **G1:** 7 (15)  **G2:** 5 (15)  Stimulants  **G1:** 8 (17)  **G2:** 6 (18)  **N at enrollment:**  **G1+ G2:** 114 **N at follow-up:**  **G1:** 47  **G2: 33** | **Inclusion criteria:**  age 2-10 years  diagnosis of ASD based on interview conducted by psychologist or developmental pediatrician with expertise in ASD that incorporated DSM-IV-TR criteria and confirmation by ADOS  Sleep onset latency of at least 30 minutes on three out of 7 nights/week based on parent report and confirmed by 14 scorable days of actigraphy. Children with other sleep difficulties identified as problems by parents  Medication free or on stable dose of medication (no change within 30 days of enrolling) with parents agreeing to avoid medication changes during time of study participation  Ability to tolerate actigraphy and parental willingness to complete sleep diary  Family primary language English  Screening by developmental pediatrician to identify medical and behavioral comorbidities that affect sleep (see below)  **Exclusion criteria:**  children with untreated comorbidities that affect sleep including sleep apnea, epilepsy, gastrointestinal reflux disease, and depression were not enrolled in study until after co-occurring conditions were addressed.  Age, mean years ± SD:  **G1:** 5.6 ± 2.6  **G2:** 5.9 ± 2.8  **Mental age:**  IQ >70, n (%): **G1:** 27 (64%) **G2:** 15 (45%)  **Sex:**  M, n (%)  **G1:** 39 (83)  **G2:** 25 (76)  F, n (%) **G1:** 8 (17)  **G2:** (8 (24)  **Race/ethnicity, n (%):**  White **G1:** 37 (80)  **G2:** 26 (84)  **SES:**  Hollingshead Four-Factor Index, mean ± SD:  **G1:** 44.3 ± 13.5  **G2:** 44.7 ± 10.6  **Diagnostic approach:**  In Study  Diagnostic tool/method: DSM\_IV-TR, ADOS  **Diagnostic category, n (%):**  Autism  **G1:** 32 (68)  **G2:** 26 (79)  PDD-NOS  **G1:** 4 (8.5)  **G2:** 2 (6)  Asperger syndrome  **G1:** 11 (23.4)  **G2:** 5 (15)  **Other characteristics, n (%):** NR | Actigraphy results, mean ± SD  Sleep latency, minutes,  **G1:** 59.8 ± 31.6  **G2:** 56.0 ± 25.2  Sleep efficiency, %  **G1:** 76.2 ± 6.2  **G2:** 76.4 ± 8.0  WASO, min  **G1:** 63.8 ± 28.4  **G2:** 60.4 ± 22.1  Total sleep time, min  **G1:** 486.9 ± 48  **G2:** 482.4 ± 56.7 | Sleep latency, minutes, mean ± SD  **G1:** 39.5 ± 21.6  **G2:** 39.7 ± 21.5  **G1 vs G2:** p=0.63  Sleep efficiency, %  **G1:** 78.7 ± 5.1  **G2:** 79.8 ± 6.0  **G1 vs G2:** p=0.56  WASO, min  **G1:** 59.3 ± 27.3  **G2:** 58.3 ± 23.7  **G1 vs G2:** p=0.37  Total sleep time, min  **G1:** 481.1 ± 49.5  **G2:** 488.3 ± 50.3  **G1 vs G2:** p=0.37  **Harms**  NR  **Modifiers**  NR |

**Comments:** The Children’s Sleep Habits Questionnaire and Behavior and Family Questionnaire results are presented for both groups combined.

**Table C-1. Evidence table, continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Mandelberg et al. 2013[7](#_ENREF_7)  **Country:** US  **Intervention setting:** Home & school  **Enrollment period:** average of 43.2 months after initial intervention (2004-2008)  **Funding:** National Institute of Mental Health, NICHD, NIDCD and NINDS  **Design:** RCT  Note: See study reporting on this population[8](#_ENREF_8) in 2011 AHRQ review[9](#_ENREF_9) | **Intervention:**  UCLA Children’s Friendship Training (CFT) Program mode, with 12 weekly hour-long sessions involving separate groups for children and parents; children with other diagnoses were included as peer models  **Assessments:** parent and child report  **Groups:**  **G1:** CFT  **Provider:**  Psychologist  L.C.S.W.  Undergraduate psychology students  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):**  Report of other treatment(s) during follow-up:  **G1:** 16 (66)  Individual therapy at follow-up:  **G1:** 7 (29)  Psychotropic medication use at follow-up:  **G1:** 5 (21)  Complementary therapies used at follow-up:  **G1:** 7 (29)  **N at enrollment:**  **G1:** 66  **N at follow-up (1-5 years post-treatment):**  **G1:** 24 | **Inclusion criteria:**  Attending 2nd through 5th grade regular classroom for most of the day without a closely supervising adult  Wechsler Intelligence Scale for Children-III (WISC-III) Verbal IQ > 60  Able to switch topics in a conversation when the other person was interested in talking about something else  Adequate knowledge of rules in playing > 2 common age-appropriate board games  Knowledge of rules to play common school yard games  **Exclusion criteria:**  Currently prescribed any psychotropic medicine  Thought disorders  Clinical seizure disorder, gross neurologic disease, or other medical disorder  History of taking either CFT or teen adaptation of CFT (PEERS) during follow-up  **Age, mean/yrs ±SD:**  **G1:** 8.7 ± 1.4 (original)  G1: 12.6 (current)  **Mental age:**  WISC-III verbal IQ, mean ± SD:  **G1:** 104.1 ± 17.8  **Sex:**  M, n (%):  **G1:** 20 (83)  F, n (%):  **G1:** 4 (17)  **Race/ethnicity, n (%):**  White **G1:** 16 (67)  **SES:**  Hollingshead scale, mean ± SD:  **G1:** 46.2 ±12.9  **Diagnostic approach:**  In Study  Diagnostic tool/method: ADOS and ADI-R  **Diagnostic category, n (%):**  Autism:  **G1:** 24 (100)  **Other characteristics, n (%):** Wing score, mean ± SD:  **G1:** 24.3 ± 8.0 | **Social skills:**  Guest play dates, median:  **G1:** 1.0  Hosted play dates, median:  **G1:** 1.0  Conflict play dates, mean ± SD:  **G1:** 5.2 ± 5.0  Social Skills Rating System (SSRS), Social Skills, mean ± SD:  **G1:** 72.3 ±12.2  Loneliness, mean ±SD:  **G1:** 39.2 ± 12.5  **Problem behavior:**  SSRS, Problem Behaviors, mean ± SD:  **G1:** 118.7 ± 11.9 | **Social skills:**  Guest play dates, median:  **G1:** 1.8  p<0.05 vs. baseline  Hosted play dates, median:  **G1:** 1.7  p=NS vs. baseline  Conflict play dates, mean ± SD:  **G1:** 2.3 ±3.1  p<0.05 vs. baseline  Social Skills Rating System (SSRS), Social Skills, mean ± SD:  **G1:** 91.5 ± 14.7  p<0.001 vs. baseline  Loneliness, mean ±SD:  **G1:** 35.5 ± 14.0  P=0.05 vs. baseline  Parent report of > 1 friend that child was pretty close with:  **G1:** 20 (83)  Child report of > 1 pretty close friend:  **G1:** 21 (88)  **Problem behavior:**  SSRS, Problem Behaviors, mean ± SD:  **G1:** 109.3 ± 13.1  p<0.001 vs. baseline  **Harms:** NR  **Modifiers:** NR |

**Comments:** Original RCT included a wait list control; this paper combines the intervention group with the wait listers who later received the CFT intervention.

**Table C-1. Evidence table, continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  McNally et al., 2013 [10](#_ENREF_10)  **Country:** US  **Intervention setting:**  Academic (Alliant International University)  **Enrollment period:**  June 2009 – September 2009  **Funding:**  National Foundation for Autism Research; Autism Society of America – San Diego Chapter  **Design:** RCT | **Intervention:**  Modification of Coping Cat program (cognitive-behavioral therapy, CBT); one 60-90min session per week for 16 weeks    **Assessments:** structured interview, parent self-report, child self-report  **Groups:**  **G1:** cognitive-behavioral therapy  **G2:** waitlist  **Provider:**  Study staff  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:**  Yes  **Co-interventions held stable during treatment:**  No  **Concomitant therapies, n (%):**  SSRI:  **G1:** 2 (17)  **G2:** 1 (10)  Anti-psychotic:  **G1:** 3 (25)  **G2:** 0 (0)  Stimulant:  **G1:** 0 (0)  **G2:** 4 (40)  Psychological/behavioral:  **G1:** 3 (25)  **G2:** 2 (20)  School-based:  **G1:** 5 (42)  **G2:** 5 (50)  **N at enrollment:**  **G1:** 12  **G2:** 10  **N at follow-up:**  Post-treatment:  **G1:** 12  **G2:** 10  2 month follow-up:  **G1:** 11  **G2:** NR | **Inclusion criteria:**   * diagnosis of ASD * at least one primary anxiety disorder, e.g., separation anxiety (SAD), generalized anxiety (GAD), or social phobia (SP) * IQ ≥70 * ages 7 – 14 years * English as primary language   **Exclusion criteria:**   * see inclusion criteria   **Age, mean/yrs ± SD:**  **G1:** 11.65 ± 1.41  **G2:** 11.02 ± 1.69  **Mental age, mean/yrs (range):** NR  **Sex, n (%):**  M:  **G1:** 12 (100)  **G2:** 9 (90)  F:  **G1:** 0 (0)  **G2:** 1 (10)  **Race/ethnicity, n (%):**  Caucasian:  **G1:** 8 (66)  4 (40)Hispanic/Latino:  **G1:** 2 (17)  **G2:** 1 (10)  Other/mixed ethnicity:  **G1:** 2 (17)  **G2:** 1 (10)  Not reported:  **G1:** 0 (0)  **G2:** 4 (40)  **SES:**  Parent highest education, n (%):  High school graduate:  **G1:** 4 (33)  **G2:** 1 (10)  College graduate:  **G1:** 7 (59)  **G2:** 6 (60)  Graduate degree:  **G1:** 1 (8)  **G2:** 3 (30)  Household income, mean (range): NR Diagnostic approach:  In Study and Referral  Diagnostic tool/method:  For ASD diagnosis:  Referral: diagnosis of ASD by ADOS (Autism Diagnostic Observation Schedule); ADI-R (Autism Diagnostic Interview-Revised), and expert clinical judgment based on DSM-IV criteria  In Study: ADOS, ADI-R to confirm referral diagnosis  For anxiety diagnosis:  Referral: ADIS-P (Anxiety Disorders Interview Schedule-Parent Version)  In Study: ADIS-P to confirm referral diagnosis  **Diagnostic category, n (%):**  **G1:**  Autism:  **G1:** 3 (25)  **G2:** 3 (30)  Asperger syndrome:  **G1:** 9 (75)  **G2:** 6 (60)  PDD-NOS:  **G1:** 0 (0)  **G2:** 1 (10)  **Other characteristics**,  Parent marital status, n (%)**:**  Single:  **G1:** 1 (8)  **G2:** 2 (20)  Married/remarried:  **G1:** 11 (92)  **G2:** 7 (70)  Cohabitating:  **G1:** 0 (0)  **G2:** 1 (10) | **Commonly occurring co-morbidities:**  ADIS-P Interference Ratings:  **G1:** 7.00 ± 1.21  **G2:** 7.10 ± 1.10  SCAS total score:  **G1:** 27.08 ± 19.75  **G2:** 28.89 ± 17.15  SCAS-P total score:  **G1:** 34.92 ± 13.71  **G2:** 32.20 ± 16.54  ADIS-P comorbid diagnoses, mean ± SD:  **G1:** 4.00 ± 1.04  **G2:** 3.70 ± 1.06  Baseline anxiety diagnoses, n (%)  Separation Anxiety:  **G1:** 5 (42)  **G2:** SAD: 3 (30)  Generalized Anxiety:  **G1:** 11 (92)  **G2:** 7 (70)  Specific phobia:  **G1:** 8 (67)  **G2:** 7 (70)  OCD:  **G1:** 2 (17)  **G2:** 0 (0)  Baseline comorbid diagnoses, n (%)  ADHD:  **G1:** 8 (67)  **G2:** 8 (80)  Oppositional defiant disorder:  **G1:** 4 (33)  **G2:** 5 (50)  Major depressive disorder:  **G1:** 1 (8)  **G2:** 0 (0)  **Educational/ cognitive/ academic attainment, mean ± SD:**  IQ (WASI):  **G1:** 108.42 ± 17.70  **G2:** 110.40 ± 17.39  Verbal IQ:  **G1:** 105.83 ± 17.89  **G2:** 107.00 ± 15.71  Performance IQ:  **G1:** 108.58 ± 16.96  **G2:** 111.90 ± 18.62 | **Commonly occurring co-morbidities, n (%) or mean ± SD:**  Anxiety (n, % children no longer meeting criteria for primary anxiety diagnosis)  Post-treatment  **G1:** 7 (58)  **G2:** 0 (0)  p=0.003  2-month follow-up  **G1:** 4 (36)  **G2:** NR  ADIS-P Interference Ratings:  Post-treatment  **G1:**  3.67 ± 2.50  **G2:** 6.50 ± 1.18  Group x time: p<0.01  2-month follow-up  **G1:** 4.45 ± 2.54  **G2:** NR  SCAS total score,  Post-treatment  **G1:** 26.75 ± 20.79  **G2:** 36.11 ± 16.46  p=NS  2-month follow-up  **G1:** 29.00 ± 22.43  **G2:** NR  SCAS-P total score:  Post-treatment  **G1:** 20.08 ± 11.34  **G2:** 31.70 ± 13.36  Group x time: p=0.02  2-month follow-up  **G1:** 21.64 ± 9.15  **G2:** NR  ADIS-P comorbid diagnoses:  Post-treatment  **G1:** 2.42 ± 1.38  **G2:** 4.00 ± 1.25  Group x time: p<0.001  2-month follow-up  **G1:** 3.00 ± 1.67  **G2:** NR  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Paynter et al. 2013[11](#_ENREF_11)  **Country:**  Australia  **Intervention setting:** NR  **Enrollment period:** NR  **Funding:** NR  **Design:** Controlled trial | **Intervention:**  Thought bubble training including individual training on how to represent beliefs via cartoon bubbles and two dimensional cardboard stimuli; training targeted 5 key Theory of Mind concepts about thinking over the course of 1-3 sessions based on when the participant mastered each key task  **Assessments:** observed theory of mind measures  **Groups:**  **G1:** thought bubble intervention  **G2:** control  **Provider:** NR  **Treatment manual followed:** No  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 17  **G2:** 7  **N at final follow-up (mean 23 days after immediate post assessment):**  **G1:** 9  **G2:** 6 | **Inclusion criteria:**  diagnosis of an ASD by qualified clinicians  **Exclusion criteria:**  NR  **Age, mean, months (range):**  **G1:** 79.41 ±20.20  **G2:** 94.86 ±28.69  **Mental age, mean ± SD:**  Non-verbal mental age (raw Raven’s score):  **G1:** 5.41 ±2.81  **G2:** 6.14 ±5.46  Verbal mental age, months (Peabody Picture Vocabulary Test):  **G1:** 70.06 ±21.31  **G2:** 81.14 ±33.99  **Sex, n (%):**  M: 21 (87.5)  F: 3 (12.5)  **Race/ethnicity, n (%):** NR  **SES:** NR    **Diagnostic approach:**  Referral  Diagnostic tool/method: DSM-IV  **Diagnostic category, n (%):** NR  **Other characteristics, n (%):** Syntactic language skill, raw TROG-2, mean ± SD:  **G1:** 5.41 ± 2.81  **G2:** 6.14 ± 5.46 | **Social skills, mean ± SD:**  Sally-Ann false belief (out of 2):  **G1:** 0.29 ±0.47  **G2:** 0.71 ±0.76  Total false belief (out of 4):  **G1:** 1.18 ±0.73  **G2:** 1.86 ±1.22  Total Theory of Mind scale (out of 5):  **G1:** 2.00 ±0.94  **G2:** 2.71 ±1.11 | **Social skills:**  Sally-Ann false belief (out of 2):  Immediate post-assessment:  **G1:** 1.53 ±0.80  p<0.01 vs. baseline  **G2:** 0.57 ±0.79  p=NS vs. baseline  3 week follow-up:  **G1:** 1.56 ±0.73  p=0.02 vs. baseline  **G2:** 1.67 ±0.82  p=NS vs. baseline  Total false belief:  Immediate post-assessment:  **G1:** 2.94 ±1.25  p<0.01 vs. baseline  **G2:** 1.43 ±1.40  p=NS vs. baseline  3 week follow-up:  **G1:** 3.44 ±0.88  p<0.01 vs. baseline  **G2:** 3.00 ±1.55  p=NS vs. baseline  Total Theory of Mind scale:  Immediate post-assessment:  **G1:** 3.06 ±1.00  p<0.01 vs. baseline  **G2:** 2.86 ±1.68  p=NS vs. baseline  3 week follow-up:  **G1:** 4.11 ± 0.60  p<0.01 vs. baseline  **G2:** 3.33 ±1.51  p=NS vs. baseline  **Harms:** NR  **Modifiers:** NR |

**Comments:** G1 at final follow-up is calculated to be 10 in the text, and 9 in the table note. Study only includes within-group statistical comparisons; no between-group analysis reported

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Perry et al.  2013[12](#_ENREF_12)  **Country:**  Canada  **Intervention setting: Treatment centers in the community, and children’s homes**  **Enrollment period:** NR  **Funding:**  York University  **Design:** Retrospective chart review  Note: See study reporting on this population[13](#_ENREF_13) in 2011 AHRQ review; table includes data from comparative study only—related studies include Shine 2010,[14](#_ENREF_14) Freeman 2010,[15](#_ENREF_15) Perry 2011,[16](#_ENREF_16) Flanagan 2012[17](#_ENREF_17) | **Intervention:** Intensive behavioral Intervention (IBI) 20 hours/week  **Assessments:** Cognitive and adaptive outcomes  **Groups:**  **G1a:** Younger age group(2-5 years)  **G1b:** Older age group (6-14 years)  **Provider:**   * Psychologists and psychometrists   **Treatment manual followed:** Yes  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  N at enrollment:  **G1a:** 60  **G1b:** 60  **N at follow-up:**  **G1a:** 60  **G1b:** 60 | **Inclusion criteria:** Children (from the community effectiveness program conducted in Canada who had IBI) matched on their initial IQ prior to the intervention.  **Exclusion criteria:**  see inclusion  **Age, mean/yrs (range):**  **G1a:** 4.26 ± 1.09 (2.08–5.92)  **G1b:** 7.45 ± 1.87 ( 6.00–13.58)  **Mental age, mean/yrs (range):**  **G1a:** 1.67 ±.93 (.25–5.64)  **G1b:** 3.02 ± 1.57 ( .71–7.45)  **Sex:** NR  **Race/ethnicity, n (%):**  NR  **SES:** NR  **Diagnostic approach:** NR  Diagnostic tool/method: NR  **Diagnostic category, n (%):**  Autism: 100  **Other characteristics**:  **Duration IBI (months)** mean ± SD (range)  **G1a**: 20.53 ± 8.99 (10–42) **G1b**: 20.20 ± 8.23 (10–41) | **IQ, mean ± SD:**  **G1a:** 43.47 ± 21.26  **G1b:** 42.68 ± 21.38  **Cognitive rate:**  G1a: .42 ± .21  G1b: .43 ± .21  **Adaptive behavior**  VABS composite standard score:  **G1a**: 55.89 ± 9.11  **G1b:** 53.63 ± 12.63  Adaptive rate  **G1a:** .34 ±.14  **G1b:** .34 ± .14 | **IQ, mean ± SD:**  **G1a:** 60.11 ± 31.39  **G1b:** 44.44 ± 21.18  p <.001  **Cognitive rate:**  G1a:1.09 ± .92 G1b:.47 ± .65  p<.001  **Adaptive behavior**  VABS composite standard score:  **G1a:** 59.52 ± 17.40  **G1b:** 58.88 ± 13.81  p=.47  **Adaptive rate**  **G1a:**.86 ±.81  **G1b**: .62 ±.76  p=.09  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Peters-Scheffer et al. 2013 [18](#_ENREF_18)  **Country:** Netherlands  **Intervention setting:** School  **Enrollment period:** 2007-2011  **Funding:**  Stichting De Driestroom at Elst, The Netherlands  **Design:** nRCT | **Intervention:** School-based treatment based on ABA principles provided one-on-one for 4–10 hours/week over 2 years (1 year for 9 of the participants)  Children in the control group received standard care  **Assessments**: Parent, teacher & staff report  **Groups:**  **G1:** Low intensity behavioral treatment (LIBT)  **G2:** Treatment as usual  **Provider:**  **G1**: university-student therapists, pre-school staff and teachers, and MScS in psychology or special education  **G2**: Clinical psychologist or special educator (MSc)  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported: yes**  **Co-interventions held stable during treatment:** NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1**: 23  **G2**: 20  **N at follow-up:**  **G1**: 20  **G2**: 20 | **Inclusion criteria:**   * Previous DSM-IV or ICD-10 diagnosis of intellectual disability (ID) and autism or Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) by a clinician who was independent of the study   **Exclusion criteria:**  See inclusion  **Age, mean (SD) /months / range:**  **G1**+**G2**:62.52 months ± 16.96  **Mental age, mean/yrs (range):** NR  **Sex, n (%):**  M  **G1**: 18 (90)  **G2**: 18 (90)  F  **G1**: 2 (10)  **G2**: 2 (10)  **Race/ethnicity, n (%):**  NR  **SES:** NR  **Diagnostic approach:**  Referral & in study  Diagnostic tool/method:  ADOS, CARS  **Diagnostic category, n (%):**  **G1**: Autism:18, PDD-NOS:2  **G2**:Autism:19, PDD-NOS:1  **Other characteristics**, Mean (SD)/range:  No major medical diagnoses reported  **G1**: Received on average 4.98 h / week of treatment (SD = 1.45; range: 1.32–7.11).  **G1:** 9 children received only 1 year of behavioral intervention | **Mean (SD)**  Cognitive functioning  Developmental age, in months  **G1**:23.34 (7.32) **G2**:23.43 (6.34)  Ratio IQ **G1**:40.66 (20.07) **G2**:40.14 (18.27)  Visual reception **G1**:26.30 (8.47) **G2**:26.95 (5.46)  Fine motor **G1**:27.50 (6.20) **G2**:27.65 (6.43)  Receptive language **G1**:19.75 (9.26) **G2**:20.15 (8.57)  Expressive language **G1**:19.80 (8.32) **G2**:18.95 (9.12)    Adaptive behavior  Composite **G1**:18.35 (3.41) **G2**:19.82 (4.71)  Communication **G1**:23.94 (7.64) **G2**:24.35 (9.80)  Daily living skills **G1**:20.82 (6.12) **G2**:23.00 (9.26)  Socialization  **G1**:19.76 (3.36) **G2**:22.88 (5.79)  Social emotional development  Interpersonal relationships **G1**:14.44 (5.19) **G2**:16.94 (6.50)  Play and leisure time  **G1**:15.38 (5.82) **G2**:18.75 (5.87)  Early social communication  Initiating joint attention  **G1**:7.43 (6.02) **G2**:7.64 (9.52)  Responding to joint attention  **G1**:96.60 (62.68) **G2**:118.80 (58.92)  Initiating requests **G1**:24.64 (4.77) **G2**:25.71 (4.50)  Responding to requests  **G1**:69.16 (35.05) **G2**:70.07 (22.53)  Initiating social interaction **G1**:3.21 (1.48) **G2**:2.07 (1.49)  Responding to social interaction  **G1**:7.50 (2.74) **G2**:7.00 (2.91)  Receptive language **G1**:25.00 (4.48) **G2**:24.70 (3.21)  Expressive language **G1**:18.35 (6.72) **G2**:17.65 (6.64)  Autism; total score ADOS  **G1**:17.00 (3.28) **G2**:15.45 (2.72)  Autism; total score CARS  **G1**:43.84 (4.30)  **G2**:40.79 (6.20)  Emotional/behavioral problems  **G1**:67.00 (26.38)  **G2**:68.29 (33.47)  Behavioral ﬂexibility **G1**:10.00 (6.96)  **G2**:11.29 (6.64)  Maternal stress  **G1**:78.38 (28.75)  **G2**:95.08 (30.31) | **Mean (SD):**  **At 24 months**:  Cognitive functioning  Developmental age **G1**:39.70 (11.99)  **G2**:32.44 (11.55)  d=1.09, p=0.001  Ratio IQ  **G1**:48.12 (19.71)  **G2**:39.42 (19.89), d=0.40, p<0.001  Visual reception **G1**:44.50 (14.39) **G2**:36.10 (11.99)  Fine motor **G1**:44.45 (14.66) **G2**:34.65 (10.37)  Receptive language  **G1**:36.55 (11.63) **G2**:30.80 (13.27), d=1.22  Expressive language  **G1**:33.30 (12.02) **G2**:28.20 (14.03),  d=0.40    Adaptive behavior Composite **G1**:37.35 (13.05) **G2**:26.71 (9.84), d=1.74, p<0.001  Communication **G1**:43.71 (17.68) **G2**:32.35 (14.56), d=1.41  Daily living skills **G1**:39.29 (11.13) **G2**:29.71 (12.15), d=1.62  Socialization **G1**:39.35 (10.58) **G2**:29.71 (9.99), d=2.61  Social emotional development Interpersonal relationships **G1**:29.25 (9.60) **G2**:22.31 (6.59), d=1.57, p=0.001  Play and leisure time  **G1**:36.19 (12.97) **G2**:25.31 (7.58), d=2.42  Early social communication Initiating joint attention  **G1**:11.50 (7.62) **G2**:11.21 (7.75)  Responding to joint attention  **G1**:84.70 (73.19) **G2**:95.31 (83.88)  Initiating requests **G1**:26.36 (5.21 **G2**:26.86 (4.75),  P=ns  Responding to requests **G1**:88.21 (17.60) **G2**:89.33 (15.90),  P=ns  Initiating social interaction **G1**:3.79 (2.36) **G2**:3.29 (2.02), p=ns  Responding to social interaction **G1**:9.79 (3.98) **G2**:9.07 (3.45), p=ns  Receptive language **G1**:34.30 (10.54) **G2**:29.30 (7.42)  Expressive language **G1**:34.15 (14.54) **G2**:30.80 (15.12), d=0.40  Autism; total score ADOS  **G1**:12.05 (5.41) **G2**:15.15 (4.26), d=1.51  Autism; total score CARS  **G1**:34.89 (3.62) **G2**:39.95 (4.62), d=1.50  Emotional/behavioral problems  **G1**:52.86 (23.52) **G2**:65.21 (32.62)  p = .16  Behavioral ﬂexibility **G1**:9.14 (4.59)  **G2**:11.14 (6.49)  **G1** vs. **G2**, p=ns  Maternal stress **G1**:71.38 (30.76) **G2**:87.08 (31.43), d=0.33, p=0.29  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Reed et al.  2013[19](#_ENREF_19)  **Country:** UK  **Intervention setting:** Home  **Enrollment period:** NR  **Funding:** NR  **Design:** Prospective Cohort | **Intervention:**  Barnet Early Autism Model (BEAM)- home based program delivered by trained facilitators under direction of an advisory teacher; individualized program for each participant and daily visits by facilitator  Portage- a home-based teaching program; supervised by trained Portage worker who visits parents once a week; training sessions last about 40-60 min/day  **Assessments:** observed, parent report  **Groups:**  **G1:** BEAM  **G2:** Portage  **Provider:**   * Trained facilitators   **Treatment manual followed:** Yes  **Defined protocol followed:** No  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  Participants could not receive any other “major intervention” during the study  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 16  **G2:** 16  **N at follow-up:**  **G1:** 16  **G2:** 16 | **Inclusion criteria:**  diagnosis of autism or PDD-NOS made by pediatrician independent of the study  participants had to be at start of their intervention and not receiving any other major intervention for duration of study  < 5 years old  **Exclusion criteria:**  See above  Age, mean months ± SD:  **G1:** 43.6 ± 5.8  **G2:** 40.1 ± 8.3  **Mental age, mean/yrs:** NR  **Sex:** NR  **Race/ethnicity, n (%):** NR  **SES:**  Maternal education: NR  Household income, mean (range): NR  **Diagnostic approach:**  Referral  Diagnostic tool/method: DSM-IV  **Diagnostic category, n (%):** NR  **Hours per week of intervention**  **G1:** 6.4 ± 2.1  **G2:** 8.5 ± 6.8 | **Global Rating of Severity**  Autism Behavior Checklist, mean ± SD:  **G1:** 59.8 ± 16.1  **G2:** 58.8 ± 23.8  Intellectual functioning (Leiter overall):  **G1:** 83.3 ± 23.7  **G2:** 72.6 ± 12.5  Adaptive behavior (Vineland composite)  **G1:** 70.2 ± 4.1  **G2:** 68.6 ± 6.0  Language (Peabody overall)  **G1:** 59.9 ± 19.5  **G2:** 55.3 ± 14.7  Behavior Problems (DBC total)  **G1:** 41.1 ± 11.6  **G2:** 35.8 ± 12.8 | **Global Rating of Severity**  Autism Behavior Checklist, mean ± SD  No change between groups at follow-up  **Communication/ language:**  Mean group change scores were significantly different for G1 vs G2; F(1,30)=5.83, p<0.05  **Adaptive behavior:**  Mean group change scores were significantly different for G1 vs G2; F(1,30)=90.27, p<0.001  **Educational/ cognitive/ academic attainment:**  No change between groups at follow-up  **Harms:** NR  **Modifiers:**  No significant relationship between baseline parenting stress and follow-up child intellectual  functioning, r(30) = - 0.217, p > 0.10  Statistically significant negative relationships between parenting  stress at baseline and  followup linguistic functioning, r(30) = -0.355, p < 0.05 |

**Comments:** Outcome measures were reported in figure format only (results reported as change from baseline to follow-up).

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Schertz et al.  2013[20](#_ENREF_20)  **Country:** US  **Intervention setting:** home  **Enrollment period:** NR  **Funding:**  Autism Speaks  **Design:** RCT | **Intervention:**  Joint attention mediated learning (JAML), with weekly home visits to parents and child conducted by intervention coordinators  Participants spent a mean of 7 months (range 4-12 months) in either intervention or control  **Assessments:** observed, parent report  **Groups:**  **G1:** JAML  **G2:** Treatment as usual  **Provider:**   * 2 interventionists with master’s degrees in early childhood education and 1 with an Ed.S. degree in counseling   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  No  **Concomitant therapies, n (%):**  Weekly hours of intervention, mean ± SD (G1 includes JAML  hours):  Indiana:  **G1:** 7.41 ± 4.67  **G2:** 12.82 ± 14.06  Kansas  **G1:** 17.88 ± 9.06  **G2:** 21.35 ± 11.51  North Carolina:  **G1:** 2.89 ± 1.25  **G2:** 6.25 ± 6.49  **N at enrollment:**  **G1:** 11  **G2:** 12  **N at follow-up:**  **G1:** 11  **G2:** 12 | **Inclusion criteria:**  scores above designated cut-off levels on ADOS (4 on the Communication of Section 1 and 4 on the Social section)  absence of joint attention during interaction with parents based on direct observation  chronological age < 30 months at onset of intervention  **Exclusion criteria:**  confounding diagnosis (e.g. failure to thrive, premature birth > 6 weeks, other developmental disabilities such as Down syndrome)  **Age, mean months ± SD:**  **G1:** 24.6 ± 4.0  **G2:** 27.5 ± 3.4  **Mental age, mean months ± SD:** NR  **Sex:** NR  **Race/ethnicity, n (%):** NR  **SES:**  Participating parent education, mean years ± SD:  **G1:** 14.4 ± 2.3  **G2:** 15.8 ± 2.3  Household income, mean (range): NR  **Diagnostic approach:**  In Study  Diagnostic tool/method: initial screening with M-CHAT, followed by ADOS  **Diagnostic category, n (%):** NR  **Other characteristics, mean ± SD:** ADOS, Communication:  **G1:** 6.4 ± 1.1  **G2:** 6.0 ± 1.8  ADOS, Social:  **G1:** 11.0 ± 2.6  **G2:** 10.8 ± 1.8  ADOS, Play:  **G1:** 3.7 ± 0.8  **G2:** 2.8 ± 1.5  ADOS, Stereotypy:  **G1:** 1.0 ± 1.1  **G2:** 1.7 ± 1.8 | **Communication/ language:**  Focusing on faces, mean ± SD:  **G1:** 6.75 ± 5.18  **G2:** 6.28 ± 5.14  Turn-Taking, mean ± SD:  **G1:** 1.67 ± 1.66  **G2:** 1.94 ± 2.74  Responding to Joint Attention, mean ± SD:  **G1:** 0.06 ± 0.13  **G2:** 0.25 ± 0.32  Initiating Joint Attention, mean ± SD:  **G1:** 0.14 ± 0.26  **G2:** 0.19 ± 0.33  VABS, communication, mean ± SD:  **G1:** 63.73 ± 9.42  **G2:** 69.55 ± 10.73  MSEL, receptive language, mean ± SD:  **G1:** 21.0 ± 2.0  **G2:** 25.9 ± 9.1  MSEL, expressive language**,** mean ± SD:  **G1:** 24.6 ± 6.7  **G2:** 24.8 ± 6.9 | **Communication/ language:**  Focusing on faces, mean ± SD:  **G1:** 14.85 ± 8.99  **G2:** 7.33 ± 6.81  Time x group interaction: p=NS  Turn-Taking, mean ± SD:  **G1:** 2.47 ± 2.17  **G2:** 2.85 ± 3.06  Time x group interaction: p=NS  Responding to Joint Attention, mean ± SD:  **G1:** 5.61 ± 4.77  **G2:** 0.75 ± 1.18  Time x group interaction: p=NS  Initiating Joint Attention, mean ± SD:  **G1:** 4.40 ± 4.48  **G2:** 2.40 ± 3.72  Time x group interaction: p=NS  VABS, communication, mean ± SD:  **G1:** 75.90 ± 13.51  **G2:** 68.08 ± 19.77  Time x group interaction: p<0.05  MSEL, receptive language, mean ± SD:  **G1:** 28.27 ± 11.35  **G2:** 25.33 ± 8.52  Time x group interaction: p<0.05  MSEL, expressive language, mean ± SD:  **G1:** 33.27 ± 15.79  **G2:** 27.17 ± 11.21  Time x group interaction: p=NS  **Harms:** NR  **Modifiers:** NR |

**Comments:** outcome data is reported as a composite (mean) of 2 follow-up scoring sessions (4 and 8 weeks after intervention ceased)

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Schreibman et al.,  2013 [21](#_ENREF_21)  **Country:** US  **Intervention setting:** Laboratory and home  **Enrollment period:** NR  **Funding:**  USPHS grants from NIMH  **Design:** RCT | **Intervention:**  Picture Exchange Communication System (PECS)  Pivotal Response Training (PRT)  For the first 15 weeks parent and children participated in 2 weekly, 2 hour parent education sessions in the laboratory and children received additional five 2-hour sessions at home. Following 8 weeks of one 2-hour parent education session per week and two 2-hour/week home sessions.  Children received average of 247 hours of treatment during the study (range 181-263)  **Assessments:** observed, parent report  **Groups:**  **G1:** PECS  **G2:** PRT  **Provider:**   * Undergraduate student therapists trained in PECS and PRT. Parent educators were doctoral students   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, hours/week:**  Speech therapy and  occupational therapy: **G1:** .94  **G2**: .94  Preschool/daycare:  **G1**:.3  **G2:** 1.5  In-home early intervention **G1:** 2.4  **G2:** 3.4  (No significant differences in the amount of other treatments received)  **N at enrollment:**  **G1:** 19  **G2:** 20  **N at follow-up:**  **G1:** 19  **G2:** 20  \*some loss to followup but group not clearly reported | **Inclusion criteria:**  diagnosis of autistic disorder confirmed by ADI-R and ADOS-G  < 48 months old  No more than 9 intelligible words  Absence of evidence for diagnosis of primary mental retardation, neurological pathology or major sensory impairment  Absence of prior treatment involving PECS or PRT  Parental willingness to participate in training and to refrain from non-assigned treatment for duration of the study  **Exclusion criteria:**  See above  **Age, mean months ± SD**:  **G1:** 28.9 ± 4.2  **G2:** 29.5 ± 6.9  **Mental age, mean/yrs:** NR  **Sex:**  M, n (%)  **G1:** 16 (84.2)  **G2:** 18 (90)  F, n (%)  **G1:** 3 (15.8)  **G2:** 2 (10)  **Race/ethnicity, n (%):** NR  **SES:**  Maternal education: NR  Household income, mean (range): NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method: ADI-R, ADOS-G  **Diagnostic category, n (%):** Autism: 100  **Other characteristics, n (%):** Word use, n (%)  No words  **G1:** 11 (57.9)  **G2:** 10 (50)  1-10 words  **G1:** 8 (42.1)  **G2:** 10 (50)  Cognitive functioning, n (%)  Low  **G1:** 8 (42.1)  **G2:** 12 (60)  High  **G1:** 11 (57.9)  **G2:** 8 (40)  Parent satisfaction with intervention results (overall):  Mean rating:  **G1**: 6.0  **G2**: 5.7  Difficulty of the strategy:  **G1**: 4.6  **G2:** 5.6 **G1 vs G2**: p=0.005 | **Communication/ language:**  Mullen Scales of Early Learning, mean ± SD (n=38):  Expressive communication  (n=38)  **G1:** 20.3 ± 3.2  **G2:** 18.5 ± 2.8  MacArthur CDI, mean ± SD (n=35):  Words produced  **G1:** 5.3 ± 9.4  **G2:** 11.9 ± 20.5  VABS, mean ± SD (n=35):  Communication  **G1:** 62.2 ± 4.7  **G2:** 60.2 ± 7.5 | **Communication/ language:**  Mullen Scales of Early Learning, mean ± SD (n=38):  Expressive communication  **G1:** 28.7 ± 16.5  **G2:** 23.7 ±11.2  Group x time interaction: p=NS  MacArthur CDI, mean ± SD (n=35):  Words produced  **G1:** 129.8 ± 117.9  **G2:** 113.3 ± 108.3  Group x time interaction: p=NS  VABS, mean ± SD:  Communication  **G1:** 68.4 ± 14.5  **G2:** 62.6 ± 12.7  Group x time interaction: p=NS  **Harms:** NR  **Modifiers:** NR |

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| **Table C-1. Evidence table, continued Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Sharp et al.  2013 [22](#_ENREF_22)  **Country:** US  **Intervention setting:** Home  **Enrollment period:** NR  **Funding:**  2008 Applied Research Grant sponsored by the Organization for Autism Research  **Design:** RCT | **Intervention:** Autism Meal Plan involving eight, 1-h-long parent-training group sessions  covering topics as  general behavior management strategies applied during meals, specific interventions for feeding problems associated with ASD and strategies for promoting self-feeding  Waitlist control group received email correspondence involving handouts on nonfeeding-related topics with limited  behavioral content subsequently offered the educational curriculum  **Assessments:**  Social Responsiveness Scale (SRS)–parent report form.  Brief Autism Mealtime Behavior Inventory (BAMBI)  Parenting Stress Index–short form (PSI-SF)  Food Preference Inventory (FPI)  Social validity and parent perception of improvement  **Groups:**  **G1:** Autism Meal Plan  **G2:** Wait-list control  **Provider:**   * Behavioral psychologist and a post-doc psychology fellow   **Treatment manual followed:** yes  **Defined protocol followed:** yes  **Measure of treatment fidelity reported:** yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 15  **G2:** 15  **N at follow-up:**  **G1:** 10  **G2:** 9 | **Inclusion criteria:**  ASD diagnosis among children aged between 3 and 8 years  a total SRS score in the mild, moderate, or severe range (total standard score (T-score) > 60)  **Exclusion criteria:**  See inclusion  **Age, mean ± SD /months /range:**  **G1:** 70.8 ± 20.5/36–104  **G2:** 64.8 ± 6.9/45–94  **Mental age, mean/yrs (range):** NR  **Sex , n(%):**  G1+G2:  M: 8 (80) F: 7 (78)  **Race/ethnicity, n (%):** NR  **SES:** NR  **Diagnostic approach:**  In Study  Diagnostic tool/method:  Social Responsiveness Scale (SRS) parent report form  **Diagnostic category, (%):**  ASD : 100  **Other characteristics**, Mean ± SD/range:  SRS total score  **G1:**82.4 ± 8.4/70–91  **G2:**80.6 ± 7.9/68–91 | **Mean ± SD**  BAMBI total score **G1:**51. ± 1 7.1  **G2:**52. ± 1 7.8  BAMBI limited variety  **G1:**28.2 ± 5.1  **G2:**28.2 ± 5.1  BAMBI food refusal **G1:**12.9 ± 3.5  **G2:**11.9 ± 3.3  BAMBI autism features  **G1:**10.0 ± 2.1  **G2:**12.0 ± 3.54  FPI selectivity score **G1:**32.6 ± 22.3  **G2:**37.2 ± 17.8 | **Mean ± SD**  BAMBI total score **G1:**47.2 ± 9.6 **G2:**47.2 ± 12.6 p=.79 (F=.07)  BAMBI limited variety **G1:**26.0 ± 5.2 **G2:**26.8 ± 6.6 p=.55 (F=.36)  BAMBI food refusal **G1:**12.6 ± 4.1 **G2:**11.0 ± 3.0 p=.51 (F=.46)  BAMBI autism features  **G1:**8.6 ± 2.0 **G2:**9.5 ± 3.6 p=.57 (F=.34)  FPI selectivity score **G1:**38.8 ± 27.5 **G2:**37.2 ± 25.9 p=.21 (F=1.7)  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Siller et al.  2013[23](#_ENREF_23)  **Country:** US  **Intervention setting:** home  **Enrollment period:**  2004- to 2007  **Funding:**  National Institute of Child Health and Development, M.I.N.D. Institute Research Program, and PSC-CUNY grants  **Design:** RCT | **Intervention:**  Focused Playtime Intervention (FPI)- a parent education program involving 12 in-home training sessions (once/week for 12 weeks, 90 min each) follows standardized treatment manual uses capacity building approach to promote coordinated toy play between parent and child.  Parents in both groups received monthly sessions to enhance parent advocacy in multiple formats including workbook, teaching, video and demonstrations.  **Assessments:** Mullen Scales of Early Learning (MSEL); Early Social Communication Scale, Insightfulness Assessment (IA); observations of mother-child interaction; medical history questionnaire; survey of non-project services; ADI-R and ADOS  Baseline assessment (T1) conducted in three sessions (two at research lab and one at home), at exit (T2), Follow up approximately 12 mos after exit (T3).  **Groups:**  **G1:** intervention  **G2:** control  **Provider:**   * Trained graduate and postdoctoral students in developmental psychology and counseling   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  Yes  **Concomitant therapies, n (%):**  Medication to control seizures (n=3)  **N at enrollment:**  **G1:** 36  **G2:** 34  **N at follow-up:**  **G1:** 31  **G2:** 31 | **Inclusion criteria:**   * < 6 years old * previously diagnosed with ASD * limited or no use of spoken language (generally < 25 words and no phrases) * mother fluent in English and willing/available to participate in all assessment and treatment sessions * families lived reasonable distance from research lab (generally < 90 min)   **Exclusion criteria:**   * known genetic diagnosis including Fragile X, tuberous sclerosis or Rett syndrome.   **Age, mean/mos ± SD (range):**  **G1:** 58.3 ± 12.7 (33-82)  **G2:** 55.9 ± 11.9 (32-76)  **Mental age, mean/yrs (range):** NR  **Sex:**  M, 64 (91.4%): F, 6 (8.6%):  **Race/ethnicity, n (%):**  Hispanic/Latino  **G1:** 17 (47.2)  **G2:** 14 (41.2)  White **G1:** 8 (22.2)  **G2:** 6 (17.6)  Asian  **G1:** 4 (11.1)  **G2:** 9 (26.5)  Black  **G1:** 3 (8.3)  **G2:** 2 (5.9)  Mixed  **G1:** 4 (11.1)  **G2:** 3 (8.8)  **SES:**  Maternal education, n (%):  10th-11th grade **G1:** 1 (2.8)  **G2:** 0  High school graduate **G1:** 7 (19.4)  **G2:** 2 (5.9)  Partial college  **G1:** 13 (36.1)  **G2:** 13 (38.2)  Standard college graduate  **G1:** 8 (22.2)  **G2:** 10 (29.4)  Graduate degree  **G1:** 7 (19.4)  **G2:** 9 (26.5)  Household income, mean (range):  Below $19,999 **G1:** 6 (16.7)  **G2:** 2 (5.9)  $20,000-$39,999  **G1:** 9 (25.0)  **G2:** 4 (11.8)  $40,000-$74,999  **G1:** 7 (19.4)  **G2:** 10 (29.4)  Above $74,999  **G1:** 14 (38.9)  **G2:** 18 (52.9)  **Diagnostic approach:**  Referral  Diagnostic tool/method:  ADI-R and ADOS  **Diagnostic category,n (%):** NR  **Other characteristics, n (%):** NR | **Language/communication:**  Mullen scales of early learning, mean ± SD (range):  Fine motor  **G1:** 28.6 ± 10.4 (12-55)  **G2:** 28.3 ± 11.8 (10-59)  Visual reception  **G1:** 26.6 ± 9.4 (11-50)  **G2:** 24.6 ± 11.2 (1-11)  Receptive language  **G1:** 17.5 ± 8.0 (5-36)  **G2:** 16.5 ± 8.-0 (1-33)  Expressive language  **G1:** 16.5 ± 9.8 (4-36)  **G2:** 15.1 ± 8.2 (4-37)  ADOS  Social affect total  **G1:** 14.7 ± 3.3 (6-20)  **G2:** 14.8 ± 3.4 (4-20)  Restricted and repetitive behavior  **G1:** 4.9 ± 2.0 (0-8)  **G2:** 5.2 ± 2.2 (0-8)  Total  **G1:** 19.6 ± 4.1 (9-26)  **G2:** 20.0 ± 4.2 (7-26)  ESCS Response to joint attention  **G1:** 47.0 ± 24.1 (8-100)  **G2:** 39.6 ± 24.1 (5-88)  Non-project services  Twelve months prior to intake  **G1:** 8.8 ± 10.4 (0-44) n=36  **G2:** 8.8 ± 10.9 (0-46) n=32  Between intake and exit  **G1:** 12.4 ± 11.0 (0-40) n=34  **G2:** 12.1 ± 10.2 (0-44) n=30  Between exit and follow up  **G1:** 12.5 ± 11.7 (0-36) n=27  **G2:** 13.7 ± 9.5 (0-37) n=27  School programs  Twelve months prior to intake  **G1:** 11.5 ± 6.6 (0-29) n=36  **G2:** 12.6 ± 7.1 (0-25) n=32  Between intake and exit  **G1:** 14.6 ± 8.8 (0-30) n=34  **G2:** 14.8 ± 5.5 (1-28) n=30  Between exit and follow up  **G1:** 17.1 ± 9.0 (0-29) n=27  **G2:** 16.2 ± 6.9 (0-25) n=27  Maternal synchronization, mean ± SE  **G1:** 0.57 ± 0.03  **G2:** 0.63 ± 0.03  Expressive language, mean ± SE  **G1:** 3.70 ± 0.16  **G2:** 3.75 ± 0.16 | **Language/communication:**  Maternal synchronization, mean ± SE  Time 2  **G1:** 0.72 ± 0.04  **G2:** 0.61 ± 0.04  T1 to T2  **G1:** 0.06 ± 0.04  **G2: -**0.06 ± 0.04  Expressive language, mean ± SE  T2  **G1:** 4.02 ± 0.16  **G2:** 3.90 ± 0.17  T3  **G1:** 4.38 ± 0.17  **G2:** 4.17 ± 0.17  T1 to T3  **G1:** 0.08 ± 0.09  **G2: -**0.09 ± 0.10  **Harms:** NR  **Modifiers**  Children with baseline expressive language abilities < 11.3 months showed larger gains in expressive language when randomized to G1 |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Storch et al.  2013[24](#_ENREF_24)  **Country:** USA  **Intervention setting:**  University-based mental health clinic  **Enrollment period:** NR  **Funding:**  National Institutes of Health (NIH)  Centers for Disease Control (CDC)  Agency for Healthcare Research and Quality  National Alliance for Research on Schizophrenia and Affective Disorders (NARSAD)  International Obsessive-Compulsive Disorder Foundation (IOCDF)  Tourette Syndrome Association  Janssen Pharmaceuticals  **Design:** RCT | **Intervention:**  Cognitive-behavioral therapy (CBT),16 weekly sessions with 3 month follow-up  **Assessments:**  Clinician-rated measurements   * PARS * ADIS-C/P * Clinical Global Impression (CGI)-Severity and Improvement   Parent-rated measures   * Child Behavior Checklist (CBCL) * Columbia Impairment Scale-Parent Version (CIS-P) * Multidimensional Anxiety Scale for Children-Parent Version (MASC-P) * Social Responsiveness Scale (SRS) * SACA   Child-Rated Measures   * Revised Children’s Manifest Anxiety Scale (RCMAS)   **Groups:**  **G1:** CBT  **G2:** standard care  **Provider:**   * Therapists * Parents * Self-therapy   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):**  SSRI:  **G1:** 6 (25)  **G2:** 4 (19)  Atypical antipsychotic:  **G1:** 2 (8.3)  **G2:** 5 (23.8)  Stimulant, atomoxetine, or guanfacine:  **G1:** 7 (29.2)  **G2:** 7 (33.3)  Benzodiazepine:  **G1:** 0  **G2:** 1 (4.8)  **N at enrollment:**  **G1:** 24  **G2:** 21  **N at post-treatment:**  **G1:** 22  **G2:** 21  **N at 3 month follow-up:**  **G1:** 15  **G2:** NA | **Inclusion criteria:**   * diagnosis of autism, Asperger’s syndrome, or PDD-NOS diagnosed by ADI-R and ADOS * primary diagnosis of separation anxiety disorder (SAD), social phobia, generalized anxiety disorder (GAD), or obsessive compulsive disorder (OCD) * age 7-11 years old   **Exclusion criteria:**   * full scale or verbal comprehension IQ ˂ 70 on a standardized test * concurrent participation in psychosocial interventions * suicidality or suicidal behavior in the last six months * diagnosis of BPAD or psychotic disorder   **Age, mean/yrs ± SD:**  **G1:** 8.83 ± 1.31  **G2:** 8.95 ± 1.40  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1**: 19 (79.2)  **G2**: 17 (81)  F, n (%):  **G1**: 5 (20.8)  **G2**: 4 (19)  **Race/ethnicity, n (%):**  **G1**:  White:  **G1**: 22 (91.7) **G2**: 16 (76.2)  Asian/Pacific:  **G1**: 1 (4.2)  **G2:** 1 (4.8)  Latino/Latina:  **G1**: 1 (4.2)  **G2**: 4 (19)  **SES:**  **Household income, n (%)**:  ˂ $40,000:  **G1**: 1 (4.2)  **G2**: 3 (14.3)  Between $40,001 and $90,000:  **G1:** 6 (25)  **G2:** 6 (28.6)  ˃$90,000:  **G1:** 17 (70.8)  **G2**: 11 (52.4)  **Diagnostic approach:**  NR  **Diagnostic category, n (%):**  Autism:  **G1**: 10 (41.7)  **G2**: 3 (14.3)  PDD-NOS:  **G1**: 9 (37.5)  **G2**: 9 (42.9)  Asperger’s syndrome:  **G1**: 5 (20.8)  **G2**: 9 (42.9)  **Other characteristics, n (%):**  Primary anxiety disorder n (%):  Social Phobia:  **G1:** 10 (41.7)  **G2:** 8 (38.1)  SAD:  **G1:** 3 (12.5)  **G2:** 6 (28.6)  OCD: **G1:**2 (8.3)  **G2:** 2 (9.5)  GAD:  **G1:** 9 (37.5)  **G2:** 5 (23.8)  **Other comorbid diagnoses n (%):**  SAD:  **G1**: 6 (25.0)  **G2**: 5 (23.8)  Social phobia:  **G1**: 7 (29.2)  **G2**: 11 (52.4)  GAD:  **G1**: 11 (45.8)  **G2**: 11 (52.4)  ADHD:  **G1**: 17 (70.8)  **G2**: 16 (76.2)  Dysthymia/MDD:  **G1**: 1 (4.2)  **G2**: 2 (9.5)  ODD/CD:  **G1**: 9 (37.5)  **G2**: 11 (52.4)  Specific phobia:  **G1**: 16 (66.7)  **G2**: 13 (61.9)  **OCD:**  **G1:** 3 (12.5)  **G2:** 6 (28.6) | **Overall ratings:**  **Global Rating of Severity, mean** ±  **SD:**  CGI-Severity**:**  **G1:** 3.50 ± 0.72  **G2:** 4.00 ± 0.63  **Social skills:**  SRS total, mean ±SD:  **G1:** 100.83 ±25.10  **G2:** 110.14 ±22.41  SRS, awareness, mean ±SD:  **G1:** 12.67 ±3.94  **G2:** 12.67 ±3.14  SRS, motivation, mean ±SD:  **G1:** 14.33 ±4.86  **G2:** 19.10 ±5.37  SRS, mannerisms, mean ±SD:  **G1:** 19.63 ±5.86  **G2:** 20.62 ±6.75  **Communication/ language:**  SRS, communication, mean ±SD:  **G1:** 33.83 ± 9.31  **G2:** 36.67 ± 7.83  **Problem behavior:**  CIS-P, mean ±SD:  **G1:** 21.13 ± 9.51  **G2:** 24.71 ± 10.35  CBCL, internalizing, mean ±SD:  **G1:** 18.08 ± 9.09  **G2:** 23.71 ± 7.99  CBCL, externalizing, mean ±SD:  **G1:** 13.67 ± 9.58  **G2:** 20.10 ± 14.25  **Anxiety:**  PARS, mean ±SD:  **G1:** 16.33 ± 1.93  **G2:** 17.62 ± 2.04  ADIS Highest CSR, mean ±SD**:**  **G1:** 5.42 ± 0.72  **G2:** 5.62 ± 0.92  MASC-P, mean ±SD**:**  **G1:** 58.58 ± 13.15  **G2:** 63.19 ± 10.51  RCMAS, dysphoric mood, mean ±SD:  **G1:** 2.88 ± 2.01  **G2:** 3.33 ± 1.85  RCMAS, oversensitivity, mean ±SD:  **G1:** 2.21 ± 2.13  **G2:** 3.38 ± 2.01  RCMAS, worry, mean ±SD:  **G1:** 3.67 ± 2.35  **G2:** 4.05 ± 2.27  RCMAS, anxious arousal, mean ±SD:  **G1:** 2.50 ± 1.69  **G2:** 3.24 ± 1.87  **Educational/ cognitive/ academic attainment:**  SRS, cognition, mean ± SD:  **G1:** 19.00 ± 4.62  **G2:** 21.10 ± 5.02 | **Overall ratings:**  **Global Rating of Severity, mean** ±  **SD:**  CGI-Severity**:**  **G1:** 2.67 ± 0.48  **G2:** 3.57 ± 0.87  p ˂ 0.01  3-month follow-up  **G1:** 2.73 ± 0.96  p ˂ 0.01 vs. baseline  **Social skills:**  SRS total, mean ±SD:  **G1:** 88.88 ± 19.85  **G2:** 106.19 ± 26.00  p ˂ 0.05  3-month follow-up  **G1:** 93.33 ± 27.64  p=NS  SRS, awareness, mean ±SD:  **G1:** 12.04 ± 2.63  **G2:** 12.57 ± 3.67  p=NS  3-month follow-up  **G1:** 12.00 ± 3.32  p ˂ 0.05 vs. baseline  SRS, motivation, mean ±SD:  **G1:** 12.46 ± 3.91  **G2:** 17.57 ± 5.64  p=NS  3-month follow-up  **G1:** 14.00 ± 6.65  p=NS vs. baseline  SRS, mannerisms, mean ±SD:  **G1:** 17.46 ± 5.93  **G2:** 21.00 ± 5.91  p ˂ 0.05  3-month follow-up  **G1:** 17.00 ± 7.05  p ˂ 0.05  **Communication/ language:**  SRS, communication, mean ±SD:  **G1:** 29.71 ± 7.83  **G2:** 36.33 ± 9.83  p ˂ 0.05  3-month follow-up  **G1:** 31.07 ± 8.73  p=NS  **Problem behavior:**  CIS-P, mean ±SD:  **G1:** 15.54 ± 6.88  **G2:** 23.90 ± 10.25  p ˂ 0.01  3-month follow-up  **G1:** 14.13 ± 7.96  p ˂ 0.05 vs. baseline  CBCL, internalizing, mean ±SD:  **G1:** 11.79 ± 5.36  **G2:**19.57 ± 9.85  p ˂ 0.05  3-month follow-up  **G1:** 11.47 ± 6.21  p ˂ 0.01 vs. baseline  CBCL, externalizing, mean ±SD:  **G1:** 11.08 ± 8.35  **G2:** 17.24 ± 12.81  p=NS  3-month follow-up  **G1:** 9.33 ± 8.77  p ˂ 0.05 vs. baseline  **Anxiety:**  PARS, mean ±SD:  **G1:** 11.58 ± 3.15  **G2:** 16.05 ± 3.22  p ˂ 0.01  3-month follow-up  **G1:** 11.20 ± 4.28  p ˂ 0.01 vs. baseline  ADIS Highest CSR, mean ±SD**:**  **G1:** 3.38 ± 1.81  **G2:** 4.90 ± 1.51  p ˂ 0.01  3-month follow-up  **G1:** 3.47 ± 2.45  p ˂ 0.01 vs. baseline  MASC-P, mean ± SD**:**  **G1:** 51.96 ± 13.44  **G2:** 58.43 ± 12.81  p=NS  3-month follow-up  **G1:** 47.80 ± 9.78  p ˂ 0.01 vs. baseline  RCMAS, dysphoric mood, mean ±SD:  **G1:** 3.21 ± 1.93  **G2:** 3.10 ± 1.76  p=NS  3-month follow-up  **G1:** 1.93 ± 1.91  p≤0.05 vs. baseline  RCMAS, oversensitivity, mean ±SD:  **G1:** 2.54 ± 1.98  **G2:** 3.29 ± 1.90  p=NS  3-month follow-up  **G1:** 1.40 ± 2.03  p=NS vs. baseline  RCMAS, worry, mean ±SD:  **G1:** 3.58 ± 2.41  **G2:** 3.86 ± 2.41  p=NS  3-month follow-up  **G1:** 2.73 ± 2.49  p=NS vs. baseline  RCMAS, anxious arousal, mean ±SD:  **G1:** 2.29 ± 1.43  **G2:**3.48 ± 1.63  p ˂ 0.05  3-month follow-up  **G1:** 1.93 ± 1.67  p=NS vs. baseline  **Educational/ cognitive/ academic attainment:**  SRS, cognition, mean ± SD:  **G1:** 17.38 ± 5.33  **G2:** 18.86 ± 5.72  p=NS  3-month follow-up:  **G1:** 19.27 ± 6.13  p=NS vs. baseline  **Harms:** NR  **Modifiers:** NR |

**Comments:** Only CBT responders were analyzed in the 3-month follow-up phase.

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Warreyn et al. 2013[25](#_ENREF_25)  **Country:**  Belgium  **Intervention setting:** 10 rehabilitation centers  **Enrollment period:** NR  **Funding:**  Grants from Marguerite-Marie Delacroix Foundation; VVA, the Flemish Parent Association  **Design:** Quasi-RCT (patients matched in pairs before randomization) | **Intervention:**  Intervention promoting joint attention and imitation; training package delivered to usual therapist for execution; 30-minute sessions administered twice/week, 24 total sessions over mean 4.5-5 months  **Assessments:** observation  **Groups:**  **G1:** Joint attention and imitation intervention  **G2:** Usual care  **Provider:**   * Patient’s usual therapist (psychologist, speech-language therapist, or special educationalist)   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  No  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 24  **G2:** 24  **N at follow-up:**  **G1:** 18  **G2:** 18 | **Inclusion criteria:**  age 3-7 years  mental age < 7 years  basic language understanding (simple instructions and requests)  diagnosis of PDD-NOS or ASD  **Exclusion criteria:**  see inclusion criteria  **Age, mean/yrs ± SD (range):**  **G1:** 5.72 ± 0.59 (4.70 – 6.80)  **G2:** 5.74 ± 0.72 (4.07 – 6.92)  **Mental age, mean ± SD (range):**  Full-scale IQ:  **G1:** 78.94 ± 15.49 (50.00 – 103.00)  **G2:** 76.86 ± 16.79 (50.00 – 105.00)  Verbal IQ:  **G1:** 71.86 ± 13.55 (53.00 – 91.00)  **G2:** 79.33 ± 14.55 (53.00 – 101.00)  Performance IQ:  **G1:** 79.38 ± 16.19 (52.00 – 97.00)  **G2:** 77.66 ± 16.36 (56.00 – 110.00)  **Sex:**  M, n (%): **G1:** 14 (77.8)  **G2:** 13 (72.2)  F, n (%): **G1:** 4 (22.2)  **G2:** 5 (27.8)  **Race/ethnicity, n (%):** NR  **SES:**  Maternal education, n (%):  NR  Household income, mean (range): NR  **Diagnostic approach:**  Referral  Diagnostic tool/method: DSM-IV TR  **Diagnostic category, n (%):** NR  **Other characteristics**, n (%)**:**  **Language age, mean years ± SD (range):**  **G1:** 4.27 ± 1.12 (2.00 – 6.00)  **G2:** 4.48 ± 0.70 (2.90 – 5.80) | **Communication/ language, mean ± SD:**  Total joint attention:  **G1:** 1.46 ± 0.60  **G2:** 1.65 ± 0.60  Ambiguous behavior:  **G1:** 0.21 ± 0.21  **G2:** 0.17 ± 0.18  Gaze following:  **G1:** 0.61 ± 0.19  **G2:** 0.69 ± 0.16  Initiating requests:  **G1:** 0.33 ± 0.36  **G2:** 0.31 ± 0.31  Initiating declarative JA:  **G1:** 0.31 ± 0.39  **G2:** 0.47 ± 0.44  Spontaneous declarative JA:  **G1:** 0.89 ± 0.96  **G2:** 0.67 ± 1.33  Total imitation:  **G1:** 3.12 ± 0.70  **G2:** 3.16 ± 0.65  Gestural imitation:  **G1:** 0.67 ± 0.19  **G2:** 0.67 ± 0.25  Verbal imitation:  **G1:** 0.85 ± 0.27  **G2:** 0.90 ± 0.16  Object imitation:  **G1:** 0.54 ± 0.19  **G2:** 0.55 ± 0.15  Symbolic imitation actions:  **G1:** 0.69 ± 0.25  **G2:** 0.70 ± 0.31  Symbolic imitation vocalizations:  **G1:** 0.37 ± 0.30  **G2:** 0.35 ± 0.30 | **Communication/ language, mean ± SD:**  Total joint attention:  **G1:** 1.81 ± 0.73  **G2:** 1.24 ± 0.56  Group x time: p<0.01  Ambiguous behavior:  **G1:** 0.24 ± 0.23  **G2:** 0.08 ± 0.15  Group x time: p=NS  Gaze following:  **G1:** 0.82 ± 0.22  **G2:** 0.67 ± 0.29  Group x time: p<0.05  Initiating requests:  **G1:** 0.57 ± 0.38  **G2:** 0.30 ± 0.25  Group x time: p<0.05  Initiating declarative JA:  **G1:** 0.17 ± 0.30  **G2:** 0.19 ± 0.30  Group x time: p=NS  Spontaneous declarative JA:  **G1:** 1.72 ± 2.19  **G2:** 0.78 ± 1.00  Group x time: p=NS  Total imitation:  **G1:** 3.64 ± 0.61  **G2:** 3.42 ± 0.54  Group x time: p=NS  Gestural imitation:  **G1:** 0.69 ± 0.13  **G2:** 0.67 ± 0.29  Group x time: p=NS  Verbal imitation:  **G1:** 0.95 ± 0.10  **G2:** 0.88 ± 0.25  Group x time: p=NS  Object imitation:  **G1:** 0.62 ± 0.24  **G2:** 0.67 ± 0.15  Group x time: p=NS  Symbolic imitation actions:  **G1:** 0.88 ± 0.13  **G2:** 0.86 ± 0.11  Group x time: p=NS  Symbolic imitation vocalizations:  **G1:** 0.51 ± 0.29  **G2:** 0.35 ± 0.34  Group x time: p=NS  **Harms:** NR  **Modifiers**  No significant effect modification by age or FSIQ  Significant positive correlation between VIQ and progress on imitation (p<0.05) for G1 |

**Comments:** Baseline and population characteristics only reported for the subpopulation that completed the study (36 of 48 initial participants)

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Wong  2013[26](#_ENREF_26)  **Country:** US  **Intervention setting:** classroom  **Enrollment period:** NR  **Funding:**  Autism Speaks; Institute of Education Sciences  **Design:** RCT | **Intervention:**  Special education teachers trained during 8 1-hour sessions delivered weekly, with 4 sessions each on symbolic play (SP) and joint attention (JA)  Groups received the SP and JA training in random order (JA/SP or SP/JA), with the wait-list control group receiving no intervention for 1st 4 weeks, followed by randomization to either JA/SP or SP/JA  **Assessments:** observed  **Groups:**  **G1:** JA/SP  **G2:** SP/JA  **G3:** wait list control  **G3a:** JA/SP  **G3b:** SP/JA  **Provider:**   * Classroom teacher   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 14  **G2:** 10  **G3:** 10  **N at follow-up:**  **G1:** 14  **G2:** 10  **G3:** 9  **G3a:** 5  **G3b:** 4 | **Inclusion criteria:**  Children aged 3-6 years diagnosed with autism and in special education classroom  **Exclusion criteria:**  See inclusion criteria  **Age, mean months ±SD:**  **G1:** 56.21 ± 10.42  **G2:** 54.50 ± 5.06  **G3:** 59.67 ± 10.61  **Mental age, mean months ± SD:**  Mullen Scales of Early Learning (MSEL):  **G1:** 36.25 ± 11.00  **G2:** 27.39 ± 14.47  **G3:** 30.38 ± 13.19  MSEL, receptive language age, mean months ± SD:  **G1:** 38.55 ± 16.51  **G2:** 25.29 ± 15.77  **G3:** 29.50 ±13.58  MSEL, receptive language age, mean months ± SD:  **G1:** 29.73 ± 10.05  **G2:** 24.00 ±16.41  **G3:** 24.00 ± 11.22  MSEL, early learning composite, mean ± SD:  **G1:** 59.91 ± 16.42  **G2:** 56.14 ± 15.15  **G3:** 57.50 ± 10.61  **Sex:**  M, n (%):  **G1:** 12 (86)  **G2:** 9 (90)  **G3:** 8 (89)  F, n (%): **G1:** 2 (14)  **G2:** 1 (10)  **G3:** 1 (11)  **Race/ethnicity, n (%):**  African American:  **G1:** 6 (43)  **G2:** 5 (50)  **G3:** 5 (56)  Hispanic:  **G1:** 7 (50)  **G2:** 5 (50)  **G3:** 1 (11)  White:  **G1:** 1 (7)  **G2:** 0 (0)  **G3:** 3 (33)  **SES:**  Maternal education, n (%):  High school or less:  **G1:** 4 (29)  **G2:** 4 (40)  **G3:** 6 (67)  Some college/vocational training: **G1:** 5 (36)  **G2:** 3 (30)  **G3:** 2 (22)  College/professional/  graduate:  **G1:** 5 (36)  **G2:** 3 (30)  **G3:** 1 (11)  Household income, mean (range): NR  **Diagnostic approach:**  In Study  Diagnostic tool/method:  CARS  **Diagnostic category, n (%):**  Autism  **G1:** 14 (100)  **G2:** 10 (100)  **G3:** 9 (100)  **Other characteristics**, mean ±SD**:** CARS  **G1:** 35.93 ± 7.49  **G2:** 39.60 ± 7.74  **G3:** 38.89 ± 6.95 | **Social skills:**  Functional play, mean acts/min ±SD:  **G1+G3a:** 0.42 ± 0.45  **G2+G3b:** 0.94 ± 0.81  Symbolic play, mean acts/min ± SD:  **G1+G3a:** 0.06 ± 0.14  **G2+G3b:** 0.03 ± 0.08  Structured play level, mean ± SD:  **G1+G3a:** 8.41 ± 4.21  **G2+G3b:** 8.14 ± 3.82  **Communication/ language:**  Joint attention:  G1 vs. G2 vs. G3 at 4 weeks: p=NS  Joint engagement, mean % time of observation ±SD:  **G1+G3a:** 22.42 ± 14.07  **G2+G3b:** 15.85 ± 11.61  Joint attention responses, mean acts/min ±SD:  **G1+G3a:** 0.28 ± 0.24  **G2+G3b:** 0.51 ± 0.37  Joint attention initiations, mean acts/min ±SD:  **G1+G3a:** 0.11 ± 0.17  **G2+G3b:** 0.06 ± 0.12  Early Social Communication Scales (ESCS), mean joint attention responses ± SD:  **G1+G3a:** 6.61 ± 3.01  **G2+G3b:** 4,40 ± 3.22  ESCS, mean joint attention initiations ± SD:  **G1+G3a:** 10.94 ± 9.57  **G2+G3b:** 5.73 ± 8.70 | **Social skills:**  Play measures:  G1 vs. G2 vs. G3 at 4 weeks: p=NS  Functional play, mean acts/min ±SD:  **G1+G3a:** 0.62 ± 0.69  **G2+G3b:** 0.94 ±0.77  p=NS  Symbolic play, mean acts/min ± SD:  **G1+G3a:** 0.10 ±0.17  **G2+G3b:** 0.15 ± 0.26  p<0.05  Structured play level, mean ± SD:  **G1+G3a:** 8.30 ± 3.87  **G2+G3b:** 8.07 ± 4.53  p=NS  **Communication/ language:**  Joint attention measures:  G1 vs. G2 vs. G3 at 4 weeks: p=NS  Joint attention:  G1 vs. G2 vs. G3 at 4 weeks: p=NS  Joint engagement, mean % time of observation ±SD:  **G1+G3a:** 54.08 ± 21.86  **G2+G3b:** 28.88 ± 15.38  p<0.001  Joint attention responses, mean acts/min ±SD:  **G1+G3a:** 0.81 ± 0.61  **G2+G3b:** 0.53 ± 0.29  p<0.05  Joint attention initiations, mean acts/min ±SD:  **G1+G3a:** 0.27 ± 0.21  **G2+G3b:** 0.07 ± 0.11  p<0.05  Early Social Communication Scales (ESCS), mean joint attention responses ± SD:  **G1+G3a:** 8.11 ± 3.85  **G2+G3b:** 4.93 ± 3.49  p<0.05  ESCS, mean joint attention initiations ± SD:  **G1+G3a:** 6.72 ± 6.29  **G2+G3b:** 2.47 ± 4.00  p=NS  **Harms**  NR  **Modifiers**  Chronological age, autism severity as rated by CARS, and mental age by MSEL had no statistically significant effect on treatment response |

**Comments:** teachers were the unit of randomization, not the individual children

**G1:** 5 teachers; **G2:** 4 teachers; **G3:** 5 teachers; **G3a:** 2 teachers; **G3b:** 2 teachers

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Adkins et al.  2012[27](#_ENREF_27)  **Country:** US  **Intervention setting:** home  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  Sleep education pamphlet for parents  **Assessments:** actigraphy to measure sleep parameters;parents trained in use; and daily diary forms; CSHQ parental questionnaire describing sleep behaviors in children; Stanford Binet 5 or Mullen Scales of Early Learning.  Data collected two weeks after randomization  **Groups:**  **G1:** pamphlet  **G2:** no pamphlet  **Provider:**   * Parents   **Treatment manual followed:** No  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  Yes  **Concomitant therapies, n (%):**  Psychotropic  **G1:** 5 (27.8)  **G2:** 9 (50)  Melatonin  **G1:** 3 (16.7)  **G2:** 3 (16.7)  Stimulants  **G1:** 2 (11.1)  **G2:** 2 (11.1)  **N at enrollment:**  **G1:** 18  **G2:** 18  **N at follow-up:**  **G1:** 19 **G2:** 17 | **Inclusion criteria:**  aged 2-10 years  diagnosis ASD based on DSM-IV confirmed by ADOS  sleep onset latency of at least 30 minutes on 3 of 7 nights /week based on parent report and confirmed by 14 scorable days of actigraphy showing mean sleep latency of 30 minutes or more  medication free or on stable dose of medications (no changes within 30 days of enrollment) parents agreeing to avoid changes in current meds during study time  ability of child to tolerate actigraphy and willingness of parents to complete corresponding sleep diary  English family primary language  **Exclusion criteria:**  medical and behavioral comorbidities that affect sleep, including sleep apnea, epilepsy, gastrointestinal reflux disease, depression, anxiety, and attention deficit/hyperactivity disorder  untreated co-morbid conditions  **Age, mean/yrs (range):** 6.4 ± 2.6  **Mental age, mean/yrs (range):**  **Sex:**  M, n (%): **G1:** 10 (55.6)  **G2:** 14 (77.8)  F, n (%): **G1:** 8 (44.4)  **G2:** 4 (22.2)  **Race/ethnicity, n (%):**  White **G1:** 15 (83.3)  **G2:** 14 (77.8)  African American  **G1:** 3 (16.7)  **G2:** 3 (22.2)  **SES:**  Mean ± SD  **G1:** 34.0 ± 16.7  **G2:** 41.1 ± 11.9  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  DSM-IV and ADOS  **Diagnostic category, n (%):**  Autism  **G1:** 16 (88.9)  **G2:** 13 (72.2)  PDD-NOS  **G1:** 0  **G2:** 1 (5.6)  Aspergers  **G1:** 2 (11.1)  **G2:** 4 (22.2)  **Other characteristics**, n (%)**:**  IQ, mean ± SD  **G1:** 75.1 ± 25.5  **G2:** 85.6 ± 27.1 | Sleep latency, min mean ± SD:  **G1:** 56.7 ± 27.1  **G2:** 52.1 ± 25.1  Sleep efficiency, % mean ± SD:  **G1:** 75.5 ± 6.1  **G2:** 76.8 ± 6.0  Wake after sleep onset, min mean ± SD:  **G1:** 61.9 ± 27.4  **G2:** 53.2 ± 20.2  Total sleep time, min mean ± SD:  **G1:** 465.7 ± 66.3  **G2:** 461.4 ± 42.4  Fragmentation, min mean ± SD:  **G1:** 36.8 ± 9.0  **G2:** 32.2 ± 7.2 | Sleep latency, min mean ± SD:  **G1:** 49.5 ± 26.7  **G2:** 61.3 ± 47.0  p=0.16  Sleep efficiency, % mean ± SD:  **G1:** 77.8 ± 7.0  **G2:** 75.1 ± 6.7  p=0.04  Wake after sleep onset, min mean ± SD:  **G1:** 60.4 ± 32.1  **G2:** 59.9 ± 24.2  p=0.22  Total sleep time, min mean ± SD:  **G1:** 483.0 ± 67.8  **G2:** 470.8 ± 35.3  p=0.55  Fragmentation, min mean ± SD:  **G1:** 36.3 ± 10.9  **G2:** 33.3 ± 7.5  p=0.52  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Aldred et al.  2012[28](#_ENREF_28)  **Country:** UK  **Intervention setting:** Clinic  **Enrollment period:** NR  **Funding:**  Grant from Shirley Foundation  **Design:** RCT  Note: See initial publication in 2011 AHRQ review [29](#_ENREF_29) for efficacy results | **Intervention:**  Communication-focused parent mediated intervention over 12 months (6 months of monthly clinic sessions and 6 months of bi-monthly maintenance sessions)  **Assessments:** Parent-Child Interaction (PCI), Autism Diagnostic Observation Schedule, MacArthur Communicative Development Inventory  **Groups:**  **G1:** Parent mediated communication-focused intervention  **G2:** Treatment as usual  **Provider:**   * Speech and language therapists in clinic, with additional home program   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):**  NR  **N at enrollment:**  **G1:** 14  **G2:** 14  **N at follow-up:**  **G1:**  **G2:** | **Inclusion criteria:**   * clinical diagnosis of core autistic disorder confirmed by ADOS and ADI-R by assessing professional team   **Exclusion criteria:** NR  **Age, mean months ± SD:**  **G1:** 51.4 ± 11.8  **G2:** 50.9 ± 16.3  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1:** 13 (93)  **G2:** 12 (86)  F, n (%): **G1:** 1 (7)  **G2:** 2 (14)  **Race/ethnicity, n (%):** NR  **SES:** NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  ADOS and ADI-R  **Diagnostic category, n (%):** Autism (100)  **Other characteristics**, n (%)**:** Vineland adaptive behavior composite, mean ± SD  **G1:** 25.6 ± 9.2  **G2:** 22.0 ± 5.6  Vineland communication sub-domain  **G1:** 22.6 ± 13.3  **G2:** 20.0 ± 10.8  Vineland social sub-domain  **G1:** 18.2 ± 5.8  **G2:** 16.3 ± 3.6  MacArthur Communicative Developmental Inventory words produced, median (range):  **G1:** 69.5 (467)  **G2:** 78.5 (683)  MacArthur Communicative Developmental Inventory vocabulary comprehension, median (range):  **G1:** 95.0 (381)  **G2:** 144.0 (426)  PCI- Child Communication Acts, mean ± SD:  **G1:** 30.8 ± 10.2  **G2:** 30.1 ± 11.1 | Parent synchrony, mean ± SD:  **G1:** 57.8 ± 15.0  **G2:** 56.4 ± 16.5  ADOS social communication algorithm total, mean ± SD:  **G1:** 16.1 ± 4.5  **G2:** 15.6 ± 4.9 | Parent synchrony, mean ± SD:  **G1:** 65.1 ± 14.3  **G2:** 48.9 ± 19.5  ADOS social communication algorithm total, mean ± SD:  **G1:** 11.8 ± 6.4  **G2:** 16.1 ± 4.4  **Harms:** NR  **Modifiers**  Increase in parental synchronous response within parent-child interaction partly mediated positive intervention effect on ADOS social communication algorithm scores, accounting for 34% of effect |

**Comments:** Secondary analysis of communication intervention trial (Aldred et al. 2004)

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Cortesi et al.  2012[30](#_ENREF_30)  **Country:** Italy  **Intervention setting:**  Clinic and home  **Enrollment period:**  2007 to 2010  **Funding:** NR  **Design:** RCT | **Intervention:**  Melatonin- 3 mg controlled release administered daily at 21:00 h.  Cognitive behavioral therapy (CBT)- four weekly 50 min individual treatment sessions outpatient clinic. A sleep-focused multifactorial intervention involved cognitive, behavioral and educational components.  **Assessments:** Children’s Sleep Habits Questionnaire (CSHQ); actigraphy monitoring, sleep monitoring. Completed at baseline and after 12 weeks.  **Groups:**  **G1:** Combination therapy **(**Melatonin and CBT)  **G2:** Melatonin only  **G3:** CBT only  **G4:** Placebo  **Provider:**   * CBT- clinical psychologists   **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NA  **Concomitant therapies, n (%):**  All subjects drug free for at least 6 months prior to beginning of study and throughout the study  **N at enrollment:**  **G1:** 40  **G2:** 40  **G3:** 40  **G4:** 40  **N at follow-up:**  **G1:** 35  **G2:** 34  **G3:** 33  **G4:** 32 | **Inclusion criteria:**   * age 4-10 years * DSM-IV-TR diagnosis of autistic disorder confirmed by ADI-R * Mixed sleep onset and maintenance insomnia defined as sleep onset latency and wake after sleep onset > 30 min on 3 or more nights/week * Absence of other serious neurological, psychiatric or medical conditions   **Exclusion criteria:**   * see above   Age, mean/yrs ± SD:  **G1:** 6.4 ± 1.1  **G2:** 6.8 ± 0.9  **G3:** 7.1 ± 0.7  **G4:** 6.3 ± 1.2  **Mental age, mean/yrs (range):** NR  **Sex:**  M, %:  **G1:** 80  **G2:** 82  **G3:** 83  **G4:** 84  **Race/ethnicity, %:**  White  **G1:** 100  **G2:** 100  **G3:** 100  **G4:** 96  **SES:**  Low SES (index of 3 or less on Hollingshead Two-Factor Index of Social Position), %:  **G1:** 24  **G2:** 25  **G3:** 23  **G4:** 26  Maternal education, mean years ± SD:  **G1:** 13 ± 4  **G2:** 14 ± 7  **G3:** 13 ± 6  **G4:** 13 ± 5  **Diagnostic approach:**  Referral  Diagnostic tool/method:  DSM-IV-TR confirmed by ADI-R  **Diagnostic category, n (%):**  ASD: 100%  **Other characteristics**, n (%)**:** NR | Total sleep time (TST), mean ± SD:  **G1:** 414.03 ± 45.34  **G2:** 410.28 ± 45.07  **G3:** 408.08 ± 49.03  **G4:** 413.00 ± 45.13  Sleep onset latency (SOL), mean ± SD:  **G1:** 85.84 ± 20.02  **G2:** 81.21 ± 32.35  **G3:** 76.34 ± 31.70  **G4:** 78.20 ± 33.83  Wake after sleep onset (WASO), mean ± SD:  **G1:** 69.50 ± 23.35  **G2:** 73.71 ± 45.00  **G3:** 68.72 ± 31.77  **G4:** 69.75 ± 45.21  Naptime, mean ± SD:  **G1:** 28.26 ± 49.13  **G2:** 33.57 ± 56.63  **G3:** 35.31 ± 60.17  **G4:** 37.33 ± 56.19  Sleep efficiency (SE), mean ± SD:  **G1:** 70.26 ± 4.83  **G2:** 71.10 ± 4.91  **G3:** 71.37 ± 4.77  **G4:** 71.13± 4.99  Bedtime, mean ± SD:  **G1:** 23.33 ± 1.35  **G2:** 23.45 ± 1.15  **G3:** 23.39 ± 1.03  **G4:** 23.41 ± 1.19  CSHQ, total score, mean ± SD:  **G1:** 66.11 ± 5.47  **G2:** 66.67 ± 8.55  **G3:** 64.48 ± 5.48  **G4:** 64.20 ± 4.85  CSHQ, bed resistance, mean ± SD:  **G1:** 14.53 ± 1.82  **G2:** 13.85 ± 2.23  **G3:** 13.44 ± 2.08  **G4:** 13.63 ± 1.82  CSHQ, sleep onset delay, mean ± SD:  **G1:** 2.88 ± 0.32  **G2:** 2.85 ± 0.35  **G3:** 2.89 ± 0.30  **G4:** 2.90 ± 0.31  CSHQ, sleep anxiety, mean ± SD:  **G1:** 7.95 ± 1.83  **G2:** 8.35 ± 2.19  **G3:** 8.62 ± 1.98  **G4:** 7.66 ± 1.73  CSHQ, night-wakings, mean ± SD:  **G1:** 7.61 ± 0.89  **G2:** 7.67 ± 0.94  **G3:** 7.62 ± 0.94  **G4:** 7.76 ± 0.93  CSHQ, sleep duration, mean ± SD:  **G1:** 7.34 ± 1.35  **G2:** 7.17 ± 1.51  **G3:** 7.01 ± 1.48  **G4:** 6.46 ± 1.25  CSHQ, parasomnias, mean ± SD:  **G1:** 9.15 ± 1.68  **G2:** 9.10 ± 2.42  **G3:** 9.75 ± 2.11  **G4:** 8.96 ± 1.80  CSHQ, daytime sleepiness, mean ± SD:  **G1:** 13.92 ± 2.86  **G2:** 13.35 ± 3.84  **G3:** 13.31 ± 2.67  **G4:** 13.13 ± 3.11 | Total sleep time (TST), mean ± SD:  **G1:** 505.01 ± 31.18  **G2:** 481.10 ± 33.15  **G3:** 445.13 ± 48.37  **G4:** 416.23 ± 43.60  P< 0.001  Sleep onset latency (SOL), mean ± SD:  **G1:** 33.69 ± 14.40  **G2:** 45.21 ± 23.21  **G3:** 59.13 ± 27.60  **G4:** 79.60 ± 31.85  P<0.001  Wake after sleep onset (WASO), mean ± SD:  **G1:** 29.69 ± 12.97  **G2:** 42.21 ± 22.35  **G3:** 61.17 ± 28.93  **G4:** 70.15 ± 42.76  P<0.001  Naptime, mean ± SD:  **G1:** 9.20 ± 22.48  **G2:** 17.00 ± 33.11  **G3:** 12.29 ± 24.24  **G4:** 36.10 ± 33.28  P=0.23  Sleep efficiency (SE), mean ± SD:  **G1:** 84.46 ± 4.23  **G2:** 82.71 ± 4.00  **G3:** 79.58 ± 2.82  **G4:** 71.93± 4.62  P<0.001  Bedtime, mean ± SD:  **G1:** 22.06 ± 1.05  **G2:** 22.30 ± 1.10  **G3:** 22.55 ± 1.01  **G4:** 23.51 ± 1.12  P<0.001  CSHQ, total score, mean ± SD:  **G1:** 47.84 ± 2.94  **G2:** 54.78 ± 6.22  **G3:** 60.06 ± 4.71  **G4:** 64.80 ± 4.52  p <0.001  CSHQ, bed resistance, mean ± SD:  **G1:** 8.46 ± 1.39  **G2:** 10.50 ± 2.20  **G3:** 11.62 ± 2.22  **G4:** 14.10 ± 1.93  p <0.001  CSHQ, sleep onset delay, mean ± SD:  **G1:** 1.69 ± 0.73  **G2:** 2.10 ± 0.68  **G3:** 2.51 ± 0.57  **G4:** 2.93 ± 0.25  p <0.001  CSHQ, sleep anxiety, mean ± SD:  **G1:** 5.23 ± 0.95  **G2:** 7.21 ± 1.87  **G3:** 7.17 ± 1.48  **G4:** 7.93 ± 1.99  p <0.001  CSHQ, night-wakings, mean ± SD:  **G1:** 4.42 ± 0.90  **G2:** 5.03 ± 1.10  **G3:** 7.06 ± 1.06  **G4:** 7.86 ± 0.81  p <0.001  CSHQ, sleep duration, mean ± SD:  **G1:** 4.38 ± 1.02  **G2:** 4.82 ± 0.94  **G3:** 6.68 ± 1.16  **G4:** 6.40 ± 1.29  p <0.001  CSHQ, parasomnias, mean ± SD:  **G1:** 8.92 ± 1.38  **G2:** 9.35 ± 1.78  **G3:** 9.82 ± 2.25  **G4:** 9.16 ± 1.53  p =0.82  CSHQ, daytime sleepiness, mean ± SD:  **G1:** 10.84 ± 1.68  **G2:** 11.39 ± 2.34  **G3:** 11.96 ± 1.97  **G4:** 12.96 ± 1.97  p <0.001  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Dawson et al.  2012[31](#_ENREF_31)  **Country:** USA  **Intervention setting:** NR  **Enrollment period:** NR  **Funding:** NR  **Author industry relationship disclosures:** NR  **Design:** RCT  Note: See earlier study reporting on this population[32](#_ENREF_32) in 2011 AHRQ review[9](#_ENREF_9) | **Intervention:** ESDM intervention for 2hours,twice a day, 5 days a week, for 2 years.  Community intervention: Families were given resource manuals  And reading materials at baseline and twice yearly  **Assessments:** ADI-R, ADOS, MSEL, Vineland Scales of Adaptive Behavior, PDD Behavioral Inventory, EEG  **Groups:**  **G1:** ESDM  **G2:** Community intervention  **Provider:**   * Trained therapists   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 17  **G2:** 14  **N at follow-up:**  **G1:** 17  **G2:** 14 | **Inclusion criteria:**   * age <30 months at entry, * meeting criteria for an autistic disorder on the Toddler Autism Diagnostic Interview (ADI) and for autism or ASD on the Autism Diagnostic Observation Schedule(ADOS) and a clinical diagnosis based on DSM-IV criteria * residing within 30 minutes of the University of Washington.   **Exclusion criteria:**   * neurologic disorder of known genetic etiology, * significant sensory or motor impairment, major physical problems, seizures at the time of entry, * use of psychoactive medications, * a history of a serious head injury and/ or neurologic disease, alcohol or drug exposure during the prenatal period * -nonverbal IQ below 35   **Age, mean/yrs (range):**  **G1:** 54.1 months ± 4.9 months;  **G2:** 54.1 months, ± 7.8 months  **Mental age, mean/yrs (range):** NR  **Sex:** Male to female ratio:  **G1+G2:** 3.5:1  **Race/ethnicity, n (%):**  **G1+G2**: Asian  12.5%, white (72.9%), Latino (12.5%), and multiracial  14.6%)  **SES:** NR  **Diagnostic approach:**  In Study Diagnostic tool/method:  ADI, ADOS, DSM-IV  **Diagnostic category, n (%):** Autism : 100%  **Other characteristics, n (%):**  ADOS Social scores:  **G1:** 10.3, SD 2.3  **G2:** 11.1, SD 2.7)  ADOS Restricted and Repetitive Behaviors:  **G1:** 2.6, SD 1.3  **G2:** 3.6, SD 2.0) | MSEL Verbal IQ  **G1:** 45.3, ± 17.5;  **G2:** 48.1, ± 21.2    MSEL Nonverbal IQ  **G1:** 83.6, ± 13.3  **G2:** 79.2, ± 11.3 | Verbal IQ  **G1:** 95.1, ± 15.7  **G2:** 75.1, ± 18.4  (p=0.004)  Nonverbal IQ:  **G1:** 93.1, ± 16.5  **G2:** 80.0, ± 15.8  (p=0.04)  Vineland Communication  **G1:** 95.3 ± 15 **G2:**mean76.1, ± 14.7  (p=0.02)  Social  **G1:** 74.7,± 10.0  **G2:** 66.5 ± 8.3  (p=0.02)  Daily Living Skills  **G1:** 72 ± 11.9  **G2:** 58.9 ± 7.9  (p=0.006),  Aberrant Behaviors  **G1:** 76.9, ± 13.6  **G2:** 61.2, ± 7.9  (p=0.001)  PDD-BI Expressive Social Communication composite scores:  **G1:** 65.4, ± SD 6.5; **G2:**54.5, ± SD10.2;  (p=0.004)  PDD-BI Receptive/Expression Social Communication composite scores:  **G1:** 65.5, ± 5.6  **G2:**55.3, ± 10.3  (p=0.006)  **Harms:** NR  **Modifiers:** NR |

**Comments:** 11/15 children (73%) in G1 and 4/14 in G2 showed a faster Nc response to faces than to objects. ERP and cortical activation data not included here. Greater cortical activation while viewing faces associated with improved social behavior.

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Eikeseth et al.  2012[33](#_ENREF_33)  **Country:**  Sweden/Norway  **Intervention setting:**  Mainstream public preschools or kindergartens, and children’s homes  **Enrollment period:**  March 2008 – May 2010 (experimental group); 2005 – 2010 (control group)  **Funding:** NR  **Design:** Retrospective cohort | **Intervention:**  Early and Intensive Behavioral Intervention (EIBI) for 1 year (15-37 hours per week; mean = 23, sd = 5.3) in preschool/kindergarten classrooms and homes  **Assessments:**  Conducted by child’s supervisor:   * VABS (Vineland Adaptive Behavior Scales), adaptive and maladaptive behavior subscales * CARS (Childhood Autism Rating Scale)   **Groups:**  **G1:** EIBI  **G2:** standard care  **Provider:**  EIBI education team:   * Therapist: school staff, no academic degree, no training/experience with EIBI prior to study * Parents * Supervisor from Banyan Center (Sweden) with bachelor’s or master’s degrees * Other significant adults   Standard care education team:   * Special education teacher with minimum of bachelor’s degree   Teacher assistant, typically no academic degree  **Treatment manual followed:**  No – Based on UCLA model  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:** NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 35  **G2:** 24  **N at follow-up:**  VABS Adaptive:  1-year follow-up:  **G1:** 35  **G2:** NR  2-year follow-up:  **G1:** 15  **G2:** NR  VABS Maladaptive:  1-year follow-up:  **G1:** 24  **G2:** NR  2-year follow-up:  **G1:** 14  **G2:** NR  CARS:  1-year follow-up:  **G1:** 27  **G2:** NR  2-year follow-up:  **G1:** 13  **G2:** NR | **Inclusion criteria:**   * diagnosis of autism * no EIBI prior to enrollment (G1)   **Exclusion criteria:**   * prior EIBI treatment (G1)   **Age, mean/yrs ± SD:**  **G1:** 3.9 ± 0.9  **G2:** 4.4 ± 1.2  **Mental age, mean/yrs (SD):** NR  **Sex, n (%):**  **G1:**  M: 29 (83) F: 6 (17)  **G2:**  M: 20 (83)  F: 4 (17)  **Race/ethnicity, n (%):** NR  **SES:** NR  **Diagnostic approach:**  G1; NR  G2: all children diagnosed at Akershus University Hospital based on ICD-10 criteria  **Diagnostic category, n (%):**  Autism  **G1:** 35 (100)  **G2:** 24 (100)  **Other characteristics**, n (%)**:**  NR | **Overall ratings:**  Global Rating of Severity, mean ± SD:  CARS  **G1:** 37.2 ± 7.7  **G2:** NR  **Social skills, mean ± SD:**  VABS, socialization  **G1:** 65.4 ± 9.8  **G2:** 63.3 ± 7.0  **Communication/ language, mean ± SD:**  VABS, communication  **G1:** 67.1 ± 14.0  **G2:** 65.5 ± 14.2  **Repetitive behavior:** NR  **Problem behavior, mean ± SD:**  VABS maladaptive  **G1:** 19.5 ± 2.4  **G2:** NR  **Adaptive behavior, mean ± SD:**  VABS, total  **G1:** 67.0 ± 10.3  **G2:** 63.6 ± 8.1  VABS age equivalent:  **G1:** 1.9 ± 0.9  **G2:** 2.1 ± 0.8  VABS, ADL  **G1:** 71.8 ± 12.8  **G2:** 67.5 ± 10.9  **Motor skills, mean ± SD:**  VABS, motor  **G1:** 75.9 ± 12.8  **G2:** 72.5 ± 10.6 | **Overall ratings:**  Global Rating of Severity, mean ± SD:  CARS, 1-year follow-up:  **G1:** 30.6 ± 7.1  **G2:** NR  p < .001  2-year follow-up:  **G1:** 27.2 ± 6.2  **G2:** NR  p < **.**05  **Social skills, mean ± SD:**  1-year follow-up:  VABS, socialization  **G1:** 72.5 ± 12.3  **G2:** 64.3 ± 9.4  p<0.01  **Communication/ language:**  1-year follow-up:  VABS, communication  **G1:** 81.3 ± 16.9  **G2:** 63.6 ± 16.0  p<0.001  **Problem behavior, mean ± SD:**  1-year follow-up:  VABS, maladaptive  **G1:** 16.9 ± 2.5  **G2:** NR  **Adaptive behavior, mean ± SD:**  1-year follow-up:  VABS, total  **G1:** 75.3 ± 12.0  **G2:** 64.0 ± 12.5  p<0.01  VABS, ADL  1-year follow-up:  **G1:** 78.3 ± 14.4  **G2:** 68.0 ± 14.8  P<0.01  **Motor skills, mean ± SD:**  1-year follow-up:  VABS, motor  **G1:** 80.6 ± 10.6  **G2:** 71.8 ± 14.4  p<0.05  **Educational/ cognitive/ academic attainment:**  VABS, learning rate: mean ± SD  1-year follow-up:  **G1:** 1.13 ± 0.66  **G2:** 0.59 ± 0.43  2-year follow-up:  **G1:** 0.81 ± 0.72  **G2:** NR  p<0.001  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Eldevik et al.  2012[34](#_ENREF_34)  **Country:**  Norway  **Intervention setting:** school  **Enrollment period:**  January 2000 to February 2011  **Funding:** NR  **Design:** cohort | **Intervention:**  EIBI pre-school model  **Assessments:** Bayley Scales of Infant Development (BSID), Stanford-Binet Intelligence Scale: Fourth or Fifth Edition, Norwegian version of the Wechsler Preschool and Primary Scale Intelligence-Revised (WPPSI); Vineland Adaptive Behavior Scales I or II (VABS). Assessment done after two years.  **Groups:**  **G1:** EIBI intervention  **G2:** Treatment as usual  **Provider:**  Psychologist was consultant for the supervisors at the preschools- Supervisors had bachelor’s degrees and between 2-10 years of experience with EIBI programs; school staff also administered EIBI  **Treatment manual followed:**  “The intervention was based on several widely used EIBI manuals.”  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 31  **G2:** 12  **N at follow-up:**  **G1:** 31  **G2:** 12 | **Inclusion criteria:**   * independent diagnosis of autism or PDD-NOS based on ADI-R * between 2 and 6 years of age at intake * full-scale intelligence test and measure of adaptive behavior at intake and after two years of intervention * at least 5 hours/week of intervention   **Exclusion criteria:**  -See above  Age, mean/months ± SD (range):  **G1:** 42.2 ± 9.0 (26-70)  **G2:** 46.2 ± 12.4 (24-67)  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1:** 25 (80.6)  **G2:** 8 (66.7) F, n (%): **G1:** 6 (19.4)  **G2:** 4 (33.3)  **Race/ethnicity, n (%):**  16 of 31 children in EIBI group from ethnic minority groups in Norway (51.6%)  **SES:** NR    **Diagnostic approach:**  EIBI group: Referral from pedagogical-psychological services through local educational authorities to specialist evaluation  Diagnostic tool/method:  ADI-R  **Diagnostic category, n (%):**  Autism  **G1:** 25 (80.6)  **G2:** 9 (75)  PDD-NOS  **G1:** 5 (16.1)  **G2:** 3 (25))  Aspergers  **G1:** 1 (3.2)  **G2:** 0 (0)  **Other characteristics, n (%):**  Level of intellectual disability  No ID  **G1:** 4 (12.9)  **G2:** 2 (16.7)  Mild ID  **G1:** 10 (32.3)  **G2:** 4 (33.3)  Moderate ID  **G1:** 12 (38.7)  **G2:** 5 (41.7)  Severe ID  **G1:** 5 (16.1)  **G2:** 1 (8.3)  Profound  **G1:** 0 (0)  **G2:** 0 (0) | Intellectual functioning, mean ± SD (range)  **G1:** 51.6 ± 16.9 (24-94)  **G2:** 51.7 ± 18.1 (30-89)  **Adaptive behavior**:  VABS  Adaptive behavior composite  **G1:** 62.5 ± 8.2 (46-77)  **G2:** 58.9 ± 7.8 (50-73)  Communication  **G1:** 61.9 ± 10.2 (48-89)  **G2:** 60.0 ± 9.6 (49-81)  Daily living  **G1:** 69.9 ± 10.8 (48-89)  **G2:** 64.8 ± 10.6 (54-91)  Socialization  **G1:** 63.3 ± 9.8 (49-97)  **G2:** 63.1 ± 8.9 (53-82) | Intellectual functioning, mean ± SD (range)  **G1:** 66.6 ± 24.8 (23-110)  **G2:** 52.2 ± 22.0 (23-86)  **Adaptive behavior:**  VABS  Adaptive behavior composite  **G1:** 68.4 ± 12.6 (46-97)  **G2:** 59.6 ± 11.8 (47-83)  Communication  **G1:** 70.5 ± 16.9 (42-114)  **G2:** 60.0 ± 14.5 (42-84)  Daily living  **G1:** 72.0 ± 12.9 (47-93)  **G2:** 63.2 ± 14.2 (48-95)  Socialization  **G1:** 69.1 ± 12.0 (49-90)  **G2:** 60.8 ± 8.6 (41-80)  **Harms:** NR  **Modifiers**  Three variables associated with outcome in G1: Age at intake correlated positively with gains in ABC scores. Other diagnosis (PDD-NOS or Asperger, rather than autism) was associated with larger gains in ABC scores and larger gains in communication and daily living skills sub domain.  IQ at intake correlated positively with change in socialization sub domain of the VABS. |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures\*** | **Outcomes** |
| **Author:**  Scahill et al.  2012[35-38](#_ENREF_35)  **Country:** USA  **Intervention setting:** (e.g., clinic, home, etc.)  **Enrollment period:** NR  **Funding:**  Federal grant  **Author industry relationship disclosures:** 6/24  **Design:** RCT | **Intervention:**  Risperidone (0.5 to 3.5 mg/day) or aripiprazole if risperidone was ineffective ((aripiprazole started at 2 mg and adjusted up to 15 mg)or a combination of medication plus parent training (Combined group) . Parents of children in combined group received an average of 11.4 PT sessions.  **Assessments:** Home Situations Questionnaire (HSQ), Aberrant Behavior Checklist-Irritability (ABC-I), Vineland Adaptive Behavior Scales (VABS), Noncompliance index. Assessed weekly for 8 weeks then every 4 weeks until week 24. Follow-up study at 1 year  **Groups:**  **G1:** risperidone  **G2:** risperidone + parent training  **Co-interventions held stable during treatment:**  Yes  **Frequency of contact during study:** ~weekly across groups  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 49  **G2:** 75  **N at follow-up (1 year):**  **G1:** 36  **G2:** 51 | **Inclusion criteria:**  Age between 4 and 14 years  DSM-IV-TR diagnosis of autistic disorder, Asperger’s disorder, or PDD-NOS based on clinical assessment and corroborated by the ADI-R  Serious behavioral problems (e.g tantrums, aggression and self-injury) evidenced by score ≥ 18 on ABC-Irritability subscale and CGI-severity score ≥ 4  IQ ≥ 35 or mental age of 18 months from Stanford-Binet 5, Leiter International Performance Scale or Mullen Scales of Early Learning  Anticonvulsant treatment permissible if medication was stable (≥ 4 wks) and subject was seizure free (≥ 18 mos)  criterion 2  **Exclusion criteria:**  significant medical condition by history, exam or lab test  lifetime diagnosis of psychosis, bipolar disorder or current diagnosis of major depression, obsessive-compulsive disorder, substance abuse, or girls with positive Beta HCG pregnancy test  criterion 2  **Age, mean/yrs ± SD:**  **G1:** 7.5 ± 2.80  **G2:** 7.38 ± 2.21  **Mental age, mean/yrs (range):** NR  **Sex, n (%):**  G1+G2:  M: 105 (85)  F: 19 (15)  **Race/ethnicity, n (%):**  White/non Hispanic  **G1:** 34 (69.4)  **G2:** 59 (78.7)  Hispanic  **G1:** 7 (14.3)  **G2:** 4 (5.3)  African American  **G1:** 7 (14.3)  **G2:** 9 (12.1)  Asian American  **G1:** 0  **G2:** 3 (4.0)  Native American  **G1:** 1 (2.0)  **G2:** 0  **SES, mean ± SD:**  Income (US $)  <20,000  **G1:** 12 ± 25.0  **G2:** 14 ± 18.7  20,001-40,000  **G1:** 14 ± 29.2  **G2:** 21 ± 28.0  40,001-60,000  **G1:** 10 ± 20.8  **G2:** 11 ± 14.7  60,001-90,000  **G1:** 7 ± 14.6  **G2:** 16 ± 21.3  >90,000  **G1:** 5 ± 10.4  **G2:** 13 ± 17.3  Maternal education  <8th grade  **G1:** 1 ± 2.0  **G2:** 4 ± 5.3  Some high school  **G1:** 4 ± 8.2  **G2:** 3 ± 4.0  High school graduate/GED  **G1:** 15 ± 30.6  **G2:** 18 ± 24.0  Some collage  **G1:** 17 ± 34.7  **G2:** 28 ± 37.3  College graduate  **G1:** 10 ± 20.4  **G2:** 12 ± 16.0  Advanced degree  **G1:** 2 ± 4.1  **G2:** 10 ± 13.3  **Diagnostic approach:**  In Study  Diagnostic tool/method:  DSM-IV-TR diagnosis based on clinical assessment and corroborated by the ADI-R  **Diagnostic category, n (%):**  Autism  **G1:** 32 (65.3)  **G2:** 49 (65.3)  PDD-NOS  **G1:** 13 (26.5)  **G2:** 22 (29.3)  Aspergers  **G1:** 4 (8.2)  **G2:** 4 (5.3)  **Other characteristics:**  **Educational placement, n (%):**  F/T, regular education  **G1:** 10 (20.4)  **G2:** 18 (24.0)  F/T, regular education with aide  **G1:** 0  **G2:** 3 (4.0)  Regular education, some special  **G1:** 5 (10.2)  **G2:** 4 (5.3)  Special education classroom  **G1:** 8 (10.3)  **G2:** 14 (18.7)  Special elementary school  **G1:** 3 (6.1)  **G2:** 2 (2.7)  Home school  **G1:** 4 (8.2)  **G2:** 5 (6.7)  Special preschool  **G1:** 11 (22.4)  **G2:** 11 (14.7)  Regular preschool  **G1:** 6 (12.2)  **G2:** 8 (10.7)  No school  **G1:** 2 (24.1)  **G2:** 12 (16.0) | **HSQ, mean ± SD:** Average severity score  **G1:** 4.16 ± 1.47  **G2:** 4.31 ± 1.67  “Yes” count  **G1:** 18.9 ± 3.46  **G2:** 18.6 ± 4.65  **ABC, mean ± SD:** Irritability  **G1:** 29.7 ± 6.10  **G2:** 29.3 ± 6.97  Social withdrawal  **G1:** 17.1 ± 8.37  **G2:** 15.2 ± 9.01  Stereotypic behavior  **G1:** 10.6 ± 5.46  **G2:** 7.59 ± 5.20  Hyperactivity/non compliance  **G1:** 36.1 ± 6.86  **G2:** 35.3 ± 9.30  Inappropriate speech  **G1:** 6.37 ± 4.03  **G2:** 5.75 ± 3.43  **VABS, mean ± SD: Standard Score** Daily living skills  **G1:** 41.14 ± 19.81  **G2:** 50.79 ± 18.49  Socialization  **G1:** 53.48 ± 14.41  **G2:** 59.55 ± 15.01  Communication  **G1:** 53.18 ± 19.94  **G2:** 61.15 ± 20.95  Adaptive Composite  **G1:** 45.84 ± 15.5  **G2:** 53.15 ± 15.66  **Age Equivalent Score** Daily living skills  **G1:** 2.85 ± 1.52  **G2:** 3.63 ± 1.94  Socialization  **G1:** 2.09 ± 1.08  **G2:** 2.80 ± 1.84  Communication  **G1:** 3.12 ± 2.15  **G2:** 3.99 ± 2.65  Adaptive Composite  **G1:** 18.91 ± 14.18  **G2:** 16.59 ± 11.44  **Standard Observation Analog Procedure**  Free Play Condition  Child inappropriate mean % intervals, mean ± SD: 20 ± 23  Parent restrictive mean raw score, mean ± SD: 0.88 ± 1.72  Parent positive mean raw score, mean ± SD: 1.34 ± 2.01  Child+parent social attention, mean ± SD:  Child inappropriate mean % intervals, mean ± SD: 32 ± 29  Parent restrictive mean raw score, mean ± SD: 1.45 ±3.27  Parent positive raw score, mean ± SD: 0.30 ± 0.83  Demand Condition  Child inappropriate mean % intervals, mean ± SD: 40 ± 27  Child mean compliance, Child inappropriate mean % intervals, mean ± SD: 75 ± 25  Parent restrictive mean raw score, mean ± SD: 1.49 ± 2.05  Parent positive raw score, mean ± SD: 1.48 ± 1.99  Parent repeated mean raw score, mean ± SD: 10.25 ± 7.15  Parent mean contingent reinforcement, mean ± SD: 39 ± 29  Tangible Restriction Condition  Child inappropriate mean % intervals, mean ± SD: 42 ± 27  Parent restrictive mean raw score, mean ± SD: 2.32 ± 3.30  Parent positive raw score, mean ± SD: 1.13 ± 1.97 | **24 Week Follow-Up VABS, mean ± SD: Standard Score** Daily living skills  **G1:** 45.34 ± 20.48  **G2:** 55.65 ± 21.86  Socialization  **G1:** 56.59 ± 17.38  **G2:** 67.42 ± 18.48  Communication  **G1:** 53.57 ± 20.23  **G2:** 63.90 ± 22.65  Adaptive Composite  **G1:** 47.84 ± 15.81  **G2:** 57.87 ± 19.03  **Age Equivalent Score** Daily living skills  **G1:** 3.49 ± 1.72  **G2:** 4.36 ± 2.25  Socialization  **G1:** 2.71 ± 1.51  **G2:** 3.99 ± 2.56  Communication  **G1:** 3.42 ± 2.18  **G2:** 4.58 ± 2.85  Adaptive Composite  **G1:** 12.88 ± 10.83  **G2:** 8.41 ± 8.69  **One Year Follow-up\*\***  **(**G1, n=36, G2, n=51)  **HSQ-mean**  **G1:**  2.12 ± 1.87  **G2:** 1.84 ± 1.46  **HSQ “yes”**  **G1:** 13.67± 7.04  **G2:** 12.69 ± 5.91  **ABC, mean ± SD**  **I**rritability  **G1:**15.25 ± 3.36  **G2:** 14.10 ± 3.60  Lethargy  **G1:** 7.39 ±6.83  **G2:** 4.65 ± 5.21  Stereotypy  **G1:** 5.61 ± 5.31  **G2:** 4.06 ± 3.67 Hyperactivity  **G1:** 18.94 ± 11.42  **G2:** 17.37 ± 11.78  Inappropriate speech  **G1:**  3.22 ± 3.36  **G2:**  3.27 ± 2.77  **Predictors, F**  **HSQ Total Score**  Income: 0.02  Maternal education: 0.40  Child age: 4.96  IQ: 3.18  ABC-Irritability: 1.13  ABC-Hyperactivity: 0.36  CGI-S: 0.08  CASI-ADHD/Combined: 0.02  CASI-ODD: 0.06  CASI-GAD: 0.77  CASI-Mood disorder: 0.84  CASI-PDD: 0.11  CYBOCS: 0.42  HSQ: 7.23 (p=0.007)  PSI-Parental distress: 0.20  PSI-Total stress: 0.78  VABS-daily living: 0.18  VABS-socialization: 0.34  VABS-communication: 0.58  VABS-composite: 0.60  **ABC-Hyperactivity/Non-compliance**  Income: 1.02  Maternal education:0.02  Child age: 3.23  IQ: 3.43  ABC-Irritability: 0,02  ABC-Hyperactivity: 0.31  CGI-S: 0.21  CASI-ADHD/Combined: 0.30  CASI-ODD: 0.00  CASI-GAD: 0.17  CASI-Mood disorder: 0.04  CASI-PDD: 2.47  CYBOCS: 0.38  HSQ: 0.29  PSI-Parental distress: 0.54  PSI-Total stress: 0.84  VABS-daily living: 3.62  VABS-socialization: 1.45  VABS-communication: 5.04  VABS-composite: 4.56  **Moderators, F**  **HSQ Total Score**  Income: 0.58  Maternal education:0.08  Child age: 0.43  IQ: 0.04  ABC-Irritability: 0.08  ABC-Hyperactivity: 0.15  CGI-S: 0.32  CASI-ADHD/Combined: 0.01  CASI-ODD: 3.38  CASI-GAD: 0.43  CASI-Mood disorder: 1.14  CASI-PDD: 0.39  CYBOCS: 1.96  HSQ: 2.27  PSI-Parental distress: 0.05  PSI-Total stress: 0.11  VABS-daily living: 0.12  VABS-socialization: 0.00  VABS-communication: 0.00  VABS-composite: 0.12  **ABC-Hyperactivity/Non-compliance**  Income: 0.07  Maternal education: 0.67  Child age: 0.65  IQ: 0.96  ABC-Irritability: 0.04  ABC-Hyperactivity: 0.46  CGI-S: 2.13  CASI-ADHD/Combined: 0.73  CASI-ODD: 5.70  CASI-GAD: 0.84  CASI-Mood disorder: 1.92  CASI-PDD: 0.08  CYBOCS: 1.60  HSQ: 1.02  PSI-Parental distress: 0.01  PSI-Total stress: 0.00  VABS-daily living: 0.09  VABS-socialization: 0.09  VABS-communication: 0.22  VABS-composite: 0.04  **Standard Observation Analog Procedure**  Free Play Condition  Child inappropriate mean % intervals, mean ± SD: 17 ±21  G1 vs. G2: p=0.17  Parent restrictive mean raw score, mean ± SD: 1.10 ± 1.79  G1 vs. G2: p=0.27  Parent positive mean raw score, mean ± SD: 2.23 ± 3.19  G1 vs. G2: p=0.004  Child inappropriate mean % intervals, mean ± SD: 29 ± 27  G1 vs. G2: p=0.41  Parent restrictive mean raw score, mean ± SD: 0.65 (1.51)  G1 vs. G2: p=0.03  Parent positive raw score, mean ± SD:  0.53 ± 1.24  G1 vs. G2: 0.13  Demand Condition  Child inappropriate mean % intervals, mean ± SD:  29 ± 21  G1 vs. G2: p=0.0002  Child mean complains, Child inappropriate mean % intervals, mean ± SD: 84 ± 19  G1 vs. G2: p=0.004  Parent restrictive mean raw score, mean ± SD: 1.21 ± 2.06  G1 vs. G2: p=0.39  Parent positive raw score, mean ± SD: 2.42 ± 2.62  G1 vs. G2: p=0.001  Parent repeated mean raw score, mean ± SD: 7.33 ± 6.61  G1 vs. G2: p=<.0001  Parent mean contingent reinforcement, mean ± SD: 41 ± 25  G1 vs. G2: p=0.77  Tangible Restriction Condition  Child inappropriate mean % intervals, mean ± SD: 33 ± 24  G1 vs. G2: p=0.012  Parent restrictive mean raw score, mean ± SD: 1.62 ± 2.18  G1 vs. G2: p=0.10  Parent positive raw score, mean ± SD: 1.58 ± 2.33  G1 vs. G2: p=0.09  **Modifiers**  No predictors / moderators tested were significant at p<0.01 |

\*Baseline values for HSQ and ABC extracted from Scahill 2012, which reports on entire sample.

\*\*Mean differences in change from baseline to one-year followup for all measures was not significant

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Flanagan et al.  2012[17](#_ENREF_17)  **Country:**  Canada  **Intervention setting:** Treatment centers in the community, and children’s homes  **Enrollment period:** NR  **Funding:** Regional Autism Programs of Ontario Network, CIHR STIHR Program  **Design:** Retrospective cohort  Note: See study reporting on this population[13](#_ENREF_13) in 2011 AHRQ review; table includes data from comparative study only—related studies include Shine 2010,[14](#_ENREF_14) Freeman 2010,[15](#_ENREF_15) Perry 2011,[16](#_ENREF_16) Perry 2013[12](#_ENREF_12) | **Intervention:** Intensive  Behavioral Intervention (IBI) for 20 and 40 h per week, except when transitioning to or from treatment with a mean duration of 27.84 months, SD = 8.11  Wait-list control group had low intensity behavioral intervention <10 h/week with a mean duration of 17.01, SD = 2.81  **Assessments:** Autism severity, adaptive and cognitive skills assessed with Childhood Autism Rating Scale(CARS), Vineland Adaptive Behavior Scale (VABS), Mullen Scales of Early Learning, Weschler Preschool Primary Scale of Intelligence or Stanford-Binet Intelligence Scale  **Groups:**  **G1:** IBI  **G2:** Wait-List control  **Provider:**  Master’s level psychometrists or graduate-level psychology students working under the supervision of registered psychologists  **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NR **Concomitant therapies,%:**  Specialized diets or special supplements:  **G1:** NR  **G2:** 14  Speech therapy **G1:** NR  **G2:** 68  Occupational therapy **G1:** NR  **G2:** 53  Behavioral consultation **G1:** NR  **G2:** 34  Took medication for autism:  **G1:** NR  **G2:** 7  Low intensity (< 10 hours/week) behavioral intervention  **G1:** NR **G2:** 14  **N at enrollment:**  **G1:** 79  **G2:** 61  **N at follow-up:**  **G1:** 61  **G2:** 61 | **Inclusion criteria:**   * children who had completed IBI or left the waitlist within the previous 4 years * in IBI or on the waitlist for at least 12 months * complete information available about adaptive functioning, autism severity and cognitive skills, with all measures at the same time point completed within 3 months of one another * if on the waitlist: received fewer than 10 hours/week of IBI from private agencies * -if received IBI: received IBI for at least 80% of the interval between Time 1 and Time 2 testing   **Exclusion criteria:**   * received initial testing long before IBI program began * See inclusion   **Age, mean ± SD/months:**  **G1:** 42.93 ± 11.53  **G2:** 42.79 ± 10.51  **Mental age, mean/yrs (range):** NR    **Sex:**  Male (%)  **G1:** (87)  **G2:** (84)  **Race/ethnicity, n (%):** NR  **SES:**  **G1+G2:**  Education:  neither parent  attending college or university: 29% ,  at least one parent attending college or university : 51%,  at least one parent completing a professional or graduate degree: 20%  Household income, mean (range): NR  **Diagnostic approach:**  In Study  Diagnostic tool/method: CARS, in combination with  clinical observation and a diagnostic and adaptive interview  **Diagnostic category,%:**  Autism: 50  PDD-NOS: 50  **Other characteristics**, n (%)**:** NR | Mean ± SD  CARS  **G1:** 32.83 ± 3.99  **G2:** 32.62 ± 3.74  VABS standard scores composite  **G1:** 55.38 ± 7.00  **G2:** 55.49 ± 7.11  VABS Ratio scores  Composite  **G1:** 30.78 ± 10.78  **G2:** 30.79 ± 10.67  Communication  **G1:** 25.47 ± 15.81  **G2:** 25.50 ± 11.97  Daily Living Skills  **G1:** 42.79 ± 11.97  **G2:** 42.87 ± 12.11  Socialization  **G1:** 24.08 ± 9.36  **G2:** 23.99 ± 11.22 | Mean ± SD  CARS  **G1:** 30.20 ± 4.97  **G2:** 32.57 ± 5.55  Estimated marginal scores (adjusted for duration of treatment and age at time 2 and initial scores):  **G1:** 30.00  **G2:** 32.77 (p= 0.033)  VABS standard scores composite  **G1:** 56.34 ± 14.40  **G2:** 52.19 ± 8.77  Estimated marginal score:  **G1:** 56.96  **G2:** 50.66 (p=0.008)  Ratio scores composite  **G1:** 41.77 ± 20.26  **G2:** 31.15 ± 11.82  Estimated marginal score  **G1:** 40.75  **G2:** 30.32 (p=0.002)    Communication:  **G1:** 46.60 ± 29.91  **G2:** 30.33 ± 16.98  Estimated marginal score:  **G1:** 43.45  **G2:** 29.80 (p=0.006)  Daily Living Skills:  **G1:** 44.83 ± 14.01  **G2:** 40.03 ± 11.06  Estimated marginal score:  **G1:** 45.04  **G2:** 38.80 (p=0.023)  Socialization:  **G1:** 33.90 ± 19.04  **G2:** 23.11 ± 10.85  Estimated marginal score:  **G1:** 33.49  **G2:** 21.88 (p=0.001)  Cognitive skills:  IQ estimate  **G1:** 55.80 ± 26.97  **G2:** 39.50 ± 18.93  Estimated marginal score:  **G1:** 55.71  **G2:** 36.46 (p=0.002)  **Harms :** NR  **Modifiers :** Younger initial age predicted better cognitive outcomes in G1 but not in G2 |

**Comments:** Interval between test periods (duration) was longer for G1 so participants were older at time of second assessment. Differences in duration and age were statistically controlled for in analysis

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Ingersoll et al.  2012 [39](#_ENREF_39), [40](#_ENREF_40)  **Country:** US  **Intervention setting:**  Psychology clinic  **Enrollment period:** NR  **Funding:** NR  **Design:**  RCT | **Intervention:**  Reciprocal Imitation Training (RIT), 10 weeks, 1 hr/day, 3 days/week  **Assessments:** parent; observation in clinic  **Groups:**  **G1:** Reciprocal Imitation Training (RIT)  **G2:** Standard treatment  **Provider:**  Therapists  **Treatment manual followed:**  Yes  **Defined protocol followed:**  Yes  **Measure of treatment fidelity reported:**  Yes  **Co-interventions held stable during treatment:**  Yes  **Concomitant therapies, n (%):**  Outside intervention per week, mean hours ± SD:  **G1:** 11.0 ± 8.1  **G2:** 13.2 ± 8.8  **N at enrollment:**  **G1:** 15  **G2:** 14  **N at follow-up:**  **G1:** 14  **G2:** 13 | **Inclusion criteria:**   * diagnosed with autism * age between 27 and 47 months  **Exclusion criteria:** * see inclusion criteria   **Age, mean/months ± SD:**  **G1:** 39.3 ± 7.3  **G2:** 36.5 ± 8.0  **Nonverbal mental age, mean/months ± SD:**  **G1:** 20.8 ± 6.6  **G2:** 17.9 ± 7.5  **Expressive language age, mean/months ± SD:**  **G1:** 17.3 ± 5.5  **G2:** 16.2 ± 5.9  **Sex:**  M, n (%):  **G1:** 13(93)  **G2:** 11(85) F, n (%): **G1:** 1 (7)  **G2:** 2 (15)  **Race/ethnicity, n (%):**  % minority status:  **G1:** 36  **G2:** 39  **SES:**  Maternal education, n (%):  NR  Household income, mean (range): NR  **Diagnostic approach:**  In Study & Referral  Diagnostic tool/method:  DSM-IV-TR criteria by psychologic &  Autism Diagnostic Observation Schedule-Generic (ADOS-G)  **Diagnostic category, n (%):**  Autism: 29 (100)  PDD-NOS: 0  Aspergers: 0  **Other characteristics, n (%):**  NR | **Number of spontaneous play acts (SPA): G1:** 30.27 ± 19.43 **G2:** 20.10 ± 13.35  **Response to joint attention (ESCS): G1:** 51.72 ± 22.90 **G2:** 49.50 ± 24.37  **Initiation of joint attention (ESCS):** **G1:** 2.73 ± 2.72 **G2:** 2.10 ± 3.25 | **Social skills:**  Social-Emotional Scale:  Time x group: p = 0.02  **Communication/ language:**  ESCS  Initiating joint attention  p ˂ 0.05  **Elicited imitation: G1:** 20.64 ± 11.40 **G2:** 7.20 ± 6.65 p < 0.05  **Spontaneous imitation: G1:** 17.27 ± 11.56 **G2:** 4.70 ± 3.83 p < 0.05  **Harms:** NR  **Modifiers:** NR |

**Comments:** Pre- and post-treatment imitation data from 22 of these children were presented in a previous publication. The original numerical data is not presented, only conclusions.

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kaale et al.  2012[41](#_ENREF_41)  **Country:**  Norway  **Intervention setting:** clinic  **Enrollment period:**  October 2006 to August 2008  **Funding:**  South-Eastern Norway Regional Health Authority and Center for Child and Adolescent Mental Health, Eastern and Southern Norway  **Design:** RCT | **Intervention:**  Joint attention intervention (modification of Kasari manual); intervention was individualized and relied on combination behavioral and developmental model. Lasted 8 week with two daily sessions (5 days/week) each session was 20 minutes—5 min of table top training and 15 min of floor play.  Control group received regular preschool program  **Assessments:** Mullen Scale of Early Learning (MSEL), Early Social Communication Scale (ESCS), preschool teacher-child play observed  **Groups:**  **G1:** Joint Attention  **G2:** control  **Provider:**   * Preschool teachers   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 34  **G2:** 27  **N at follow-up:**  **G1:** 34  **G2:** 27 | **Inclusion criteria:**   * chronological age 24-60 months * confirmed ICD-10 diagnosis of childhood autism * attendance in preschool   **Exclusion criteria:**   * central nervous system disorders (e.g epilepsy, cerebral palsy) * non Norwegian speaking parents   **Age, mean/mos ± SD:**  **G1:** 47.6 ± 8.30  **G2:** 50.3 ± 8.3  **Mental age, mean/mos (range):**  **G1:** 25.6 ± 10.8  **G2:** 30.3 ± 12.0  **Sex:**  M, n (%): **G1:** 26 (76.5)  **G2:** 22 (81.5)  F, n (%): **G1:** 8 (23.5)  **G2:** 5 (18.5)  **Race/ethnicity, n (%):**  NR  **SES:**  **Mean education level (scale 1-5)**  **G1:** 3.2 ± 1.3  **G2:** 3.5 ± 1.0  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  Comprehensive clinical evaluation; 80% tested with ADOS and/or ADI-R  **Diagnostic category, n (%):**  Autism :100%  **Other characteristics, n (%):** Developmental quotient mean ± SD:  **G1:** 53.3 ± 19.2  **G2:** 59.9 ± 19.7  Receptive language age, mean/mos ± SD:  **G1:** 21.0 ± 10.3  **G2:** 25.8 ± 11.7  Expressive language age, mean/mos ± SD:  **G1:** 18.8 ± 10.5  **G2:** 24.9 ± 12.8  **Preschool placement, n (%)**  Mainstream preschool  **G1:** 30 (88)  **G2:** 24 (89)  ASD-unit in mainstream pre-school  **G1:** 2 (6)  **G2:** 2 (7)  ASD preschool  **G1:** 2 (6)  **G2:** 1 (4)  Program philosophy  ABA-based program  **G1:** 20 (59)  **G2:** 12 (44)  Eclectic program  **G1:** 14 (41)  **G2:** 15 (56)  Hours/week in school  **G1:** 36.4 ± 5.7  **G2:** 38.4 ± 3.6  1:1 training hours/week  **G1:** 11.0 ± 5.2  **G2:** 10.7 ± 6.9  1:1 support in group hrs/week  **G1:** 19.2 ± 7.6  **G2:** 19.0 ± 7.3  Ordinary group hr/week  **G1:** 6.1 ± 7.9  **G2:** 10.0 ± 7.7 | JA during ESCS  **G1:** 1.3 ± 2.8  **G2:** 1.3 ± 1.8  JA during teacher-child play  **G1:** 0.7 ± 1.3  **G2:** 0.4 ± 1.1  JE during teacher-child play (%)  **G1:** 53.1 ± 23.1  **G2:** 58.0 ± 23.8  JA during mother-child play  **G1:** 1.1 ± 1.6  **G2:** 1.4 ± 2.0  JE during mother-child play (%)  **G1:** 45.1 ± 23.4  **G2:** 50.2 ± 21.7 | JA during ESCS  **G1:** 1.6 ± 2.6  **G2:** 1.6 ± 2.2  p=0.99  JA during teacher-child play  **G1:** 1.8 ± 3.2  **G2:** 0.4 ± 0.7  p=0.036  JE during teacher-child play (%)  **G1:** 56.0 ± 22.2  **G2:** 62.7 ± 20.9  p=0.53  JA during mother-child play  **G1:** 2.4 ± 3.6  **G2:** 1.8 ± 3.2  p=0.09  JE during mother-child play (%)  **G1:** 57.3 ± 22.8  **G2:** 49.2 ± 19.9  p=0.015  **Harms:** NR  **Modifiers:** Chronological age, language age, DQ and program philosophy did NOT moderate the effect of JA intervention |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kasari et al., 2012 [42](#_ENREF_42), [43](#_ENREF_43)  **Country:** US  **Intervention setting:** Clinic  **Enrollment period:** NR  **Funding:**  NIH grant  **Design:** RCT  \*Note: see data from earlier studies[44](#_ENREF_44), [45](#_ENREF_45) reporting on this population in 2011 AHRQ review[9](#_ENREF_9) | **Intervention:**  Joint attention intervention: Goal to increase child’s joint attention initiations during novel play routines.  Symbolic play intervention to increase child’s level and frequency of play acts according to play scale adapted from Lifter.  Treatment sessions held every day for 5-6 weeks.  Control group received standard treatment (ABA)  **Assessments:**  Early Language Communication Scale (ESCS); Mullen Scales of Early Learning; Reynell Developmental Language Scales  **Groups:**  **G1:** joint attention intervention  **G2:** symbolic play  **G3:** control  **Provider:**   * see Kasari et al 2006   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 20  **G2:** 21  **G3:** 17  **N at follow-up:**  **G1:** 20  **G2:** 16  **G3:** 16  At 5 years follow-up:  **G1:**15  **G2:**14  **G3:**11 | **Inclusion criteria:**   * Diagnosis of autism on the ADI-R and ADOS * Age < 5 years old * Accessible for follow-up   **Exclusion criteria:**   * Seizures * Additional medical diagnoses (e.g., genetic syndromes) * Geographically inaccessible for follow-up visits * Did not plan to stay in the early intervention program for at least 4 weeks   **Age, mean/mos ± SD:**  **G1:** 43.05 ± 6.863  **G2:** 41.41 ± 6.491  **G3:** 41.31 ± 4.542  **Mental age, mean/ mos ± SD:**  **G1:** 26.29± 8.713  **G2:** 26.59 ± 7.550  **G3:** 22.05 ± 9.532  **Sex:**  M, n (%): **G1:** 15 (75)  **G2:** 11 (69)  **G3:** 14 (87.5) F, n (%): **G1:** 5 (25)  **G2:** 5 (31)  **G3:** 2 (12.5)  **Race/ethnicity, n (%):**  White **G1:** 16 (80)  **G2:** 12 (75)  **G3:** 9 (56.3)  Minority  **G1:** 4 (20)  **G2:** 4 (25)  **G3:** 7 (43.7)  **SES:**  Maternal education, n (%):  High school  **G1:** 0  **G2:** 0  **G3:** 1  Some College/technical  **G1:** 2  **G2:** 3  **G3:** 4  College/professional  **G1:** 18  **G2:** 13  **G3:** 11  Household income, mean (range): NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  ADOS/ADI-R  **Diagnostic category, n (%):** Autism (100)  **Other characteristics**, n (%)**:**  **Expressive language age, mean/ mos ± SD:**  **G1:** 20.6± 6.508  **G2:** 23.18 ± 7.418  **G3:** 19.75 ± 7.819  **Receptive language age, mean/ mos ± SD:**  **G1:** 20.55± 7.272  **G2:** 23.35 ± 9.380  **G3:** 17.94 ± 8.813 | Joint attention and shared positive effect, mean ± SD:  **G1:** 3.25± 5.37  **G2:** 3.25 ± 4.38  **G3:** 4.50 ± 6.57  Joint attention and shared positive effect and utterance (s) , mean ± SD:  **G1:** 1.05± 2.44  **G2:** 1.56 ± 4.00  **G3:** 2.50 ± 4.56 | At 6 month follow-up  Joint attention and shared positive effect, mean ± SD:  **G1:** 6.15± 5.72  **G2:** 7.91 ± 3.06  **G3:** 3.06 ± 4.39  Joint attention and shared positive effect and utterance, mean ± SD:  **G1:** 4.10± 4.64  **G2:** 3.19 ± 3.58  **G3:** 1.75 ± 3.38  At 12 month follow-up  Joint attention and shared positive effect, mean ± SD:  **G1:** 7.65± 6.80  **G2:** 9.44 ± 3.88  **G3:** 3.88 ± 5.32  Joint attention and shared positive effect and utterance (s) , mean ± SD:  **G1:** 5.30± 5.68  **G2:** 5.75 ± 7.02  **G3:** 1.56 ± 3.10  At 5 years follow-up (n=40/58):  Cognitive and language ability:  >30 Months:  **G1:** 13 (87%)  **G2:** 11 (79%)  **G3:** 8 (73%)  total: 32 (80%), p=0.67  DAS (standard score): **G1:**93.5 (22.32)  **G2:**87.73 (17.96) **G3:**89.23 (13.13)  total: 90.44 (18.51) p=0.75  EVT (standard score): **G1:**86.5 (18.9)  **G2:**86.4 (19.3)  G3:80.5 (22.3)  total: 85.0(19.4), p=0.77  Baseline play predicting spoken language at 5 years (Χ2= 18.15, p< .01, R2 = 0.58).and cognitive scores at 8 years of age (functional play types-  (F1,30=14.62, p<0.01)). For a 1-unit increase in  functional play types, there was a 2.12 (SE 0.55) standard score increase on the DAS.  Children gained a standard score of 1.1 (SE =0.3) in  spoken vocabulary ability per month that they  enter the treatment earlier and they gain a standard score of 2.1 (SE =0.9) in spoken vocabulary ability per one frequency increase in joint attention initiations  G1 scored an average of 12.5 (SE =5.8)  points higher than G3 on the language  measure, and G2 scores an average of 10.6 (SE = 6.2) points higher on the  language measure than G3. No group difference (p=0.61).  **Harms:** NR  **Modifiers**  Interactions of group and time were found for both types of joint attention quality. |

**Comments:** Used data from previous published RTC (Kasari et al 2006); Original study had 58 participants; 6 were not included in this analysis because portions of their ESCS data were missing.

Kasari et al 2012 followed 40/58 children at 5 years and 8 years after intervention

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kasari et al.  2012[46](#_ENREF_46)  **Country:** US  **Intervention setting:** School  **Enrollment  period:** August 2003 to September 2007  **Funding:** NIMH, HRSA, NCT  **Design:** RCT | **Intervention**: Child-assisted approach: Children with ASD given  20 min twice weekly sessions for 6 weeks with direct instruction, to develop strategies to engage socially with their peers  Peer-mediated: Three classroom peers of child with ASD taught strategies for engaging children with social challenges on the playground. Training given for 20 min twice weekly sessions for 6 weeks  **Assessments:** Social Network Survey, Teacher perception of social skills ( TPSS), Playground observation of peer engagement, behavioral assessment  (direct observations, and peer, self and teacher reports)  **Groups \*:**  G1: CHILD-assisted  G2: PEER-mediated  G3: Both PEER and CHILD Interventions  G4: Neither PEER nor CHILD  **Provider:**  Graduate students in Educational Psychology  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  N at enrollment:  **G1:** 15  **G2:** 15  **G3:** 15  **G4:** 15  **N at follow-up:**  **G1:** 14  **G2:** 15  **G3**: 15  **G4:** 15 | **Inclusion criteria:**   * met criteria for ASD on the ADI–R and ADOS administered by blind, * independent psychologists * fully included in a * regular education classroom for at least 80% of the school day * between the ages of 6–11 years old * in grades 1–5 * IQ of 65 or higher * did not have additional * diagnoses   **Exclusion criteria:**  See inclusion  **Age, mean ± SD:** 8.14 years ± 1.56  **Mental age, mean ± SD:**  IQ: 90.97 ± 16.33  **Sex:**  M, 90 %  F, 10 %  **Race/ethnicity, n (%):**  Caucasian 46.6%,  African American, 5%  Latino,21.7%  Asian: 16.7%  Other: 10%  **SES:** NR  **Diagnostic approach:** NR  Diagnostic tool/method: ADI-R, ADOS  **Diagnostic category, n (%):**  ASD: 100  **Other characteristics**, n**:**  first grade: 15  second grade: 18  third grade: 8  fourth grade: 11  fifth grade: 8 | **Mean ± SD**  Social network  Salience:  **Assigned to CHILD:**  0.26 ± 0.22  **Not assigned to CHILD:** 0.38 ± 0.26  **Assigned to PEER:**  0.35 ± 0.29  **Not assigned to PEER:** 0.29 ± 0.19  Received  friendship  nominations  (range 0–8)  **Assigned to CHILD:**  1.23 ± 1.48  **Not assigned to CHILD:** 1.80 ± 1.83  **Assigned to PEER:**  1.80 ± 2.01  **Not assigned to PEER:** 1.23 ± 1.22  Outward  nominations  (range 0–15)  **Assigned to CHILD:** 4.27 ± 2.89  **Not assigned to CHILD:** 3.43 ± 2.49  **Assigned to PEER:**  4.17 ± 2.93  **Not assigned to PEER:** 3.53 ± 2.47  Rejection  nominations  (range 0–9)  **Assigned to CHILD:** 1.71 ± 2.02  **Not assigned to CHILD:** 1.69 ± 1.85  **Assigned to PEER:** 2.17 ± 2.07  **Not assigned to PEER:** 1.19 ±1.62  Reciprocal  friendships  (%age)  (range 0–100)  **Assigned to CHILD:** 6.25 ± 25.00  **Not assigned to CHILD:** 18.18 ± 40.45  **Assigned to PEER:**  13.33 ± 35.19  **Not assigned to PEER:** 8.33 ± 28.87  Teacher  perceptions  **Assigned to CHILD:** 23.31 ± 4.61  **Not assigned to CHILD:** 23.31 ± 3.63  **Assigned to PEER:** 23.13 ± 4.02  **Not assigned to PEER:** 23.51 ± 4.27  Solitary engagement  Mean (SD):  Child: 0.36 ± 0.29  Peer: 0.34 ± 0.29  Joint engagement  Mean (SD):  Child: 0.41 ± 0.34  Peer: 0.43 ± 0.34 | **Mean ± SD**  Social network  salience  **Assigned to CHILD:**  0.46 ± 0.29, 0.34 ± 0.25  **Not assigned to CHILD:** 0.37 ± 0.21, 0.37 ± 0.30  **Assigned to PEER:**  0.51 ± 0.29, 0.41 ± 0.29  **Not assigned to PEER:** 0.32 ± 0.18, 0.30 ± 0.25  children who  received both the CHILD and PEER interventions  had significantly higher SNS scores (M = 0.60;  SD = 0.30) when compared to children who received  the CHILD intervention (M = 0.31; SD = 0.21),  t(28) = )2.99, p = .006, d = 1.12, as well as those  who received neither CHILD nor PEER intervention  (M = 0.32; SD = 0.15), t(28) = 3.23, p = .003,  d = 1.18.  Received  friendship  nominations  (range 0–8)  **Assigned to CHILD:**  2.00 ± 2.10, 1.41 ± 1.52  **Not assigned to CHILD:** 2.33 ± 1.49, 1.53 ± 1.55  **Assigned to PEER:** 2.80 ± 1.96, 1.73 ± 1.76  **Not assigned to PEER:** 1.53 ± 1.43, 1.21 ± 1.21  **Outward**  **nominations**  **(range 0–15)**  **Assigned to CHILD:** 4.67 ± 2.20, 4.10 ± 2.43  **Not assigned to CHILD:** 4.43 ± 3.22, 3.40 ± 2.19  **Assigned to PEER:** 4.63 ± 2.28, 4.10 ± 2.54  **Not assigned to PEER:** 4.47 ± 3.17, 3.38 ± 2.04  Rejection  nominations  (range 0–9)  **Assigned to CHILD:** 2.11 ± 2.82, 2.15 ± 2.54  **Not assigned to CHILD:** 2.03 ± 1.80, 1.93 ± 1.91  **Assigned to PEER:** 2.37 ± 2.25, 2.40 ± 2.27  **Not assigned to PEER:** 1.74 ± 2.43, 1.62 ± 2.12  Reciprocal  friendships  (%age)  (range 0–100)  **Assigned to CHILD:** 15.79 ± 37.46  12.50 ± 34.16  **Not assigned to CHILD:** 13.33 ± 35.19  5.56 ± 23.57  **Assigned to PEER:** 13.64 ± 35.13  10.00 ± 30.78  **Not assigned to PEER:** 16.67 ± 38.93  7.14 ± 26.73  Teacher  perceptions  **Assigned to CHILD:** 24.18 ± 3.33  24.76 ± 4.05  **Not assigned to CHILD:** 24.62 ± 4.47  23.97 ± 4.20  **Assigned to PEER:** 25.19 ± 3.45  24.95 ± 3.72  **Not assigned to PEER:** 23.49 ± 4.26  23.61 ± 4.50  End of Treatment:  Solitary engagement  Mean (SD):  Child: 0.33 ± 0.27)  Peer: 0.28 ± 0.26)  Joint engagement  Mean (SD):  Child: 0.43 ± 0.27  Peer: 0.44 ± 0.31  Follow-up:  Solitary engagement  Mean (SD):  Child: 0.33 ± 0.30  Peer: 0.19 ± 0.24  Joint engagement  Mean (SD):  Child: 0.43 ± 0.35  Peer: 0.51 ± 0.34  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Landa et al.  2011[47](#_ENREF_47), [48](#_ENREF_48)  **Country:** US  **Intervention setting:** Classroom at autism center  **Enrollment period:** NR  **Funding:**  National institutes of Mental Health;lHealth Resources and Services Agency  **Design:** RCT | **Intervention:**  Interpersonal synchrony (IS) four days per week for 2.5 hours / day for 6 months, home-based parent training (1.5 hours per month), parent education (38 hours), and instructional strategies,  + supplementary social curriculum.  Non-interpersonal synchrony includes everything as in the IS group except supplementary curriculum  Both groups received Assessment, Evaluation, and Programming System for Infants and Children (AEPS) curriculum.  **Assessments:**  Communication and Symbolic Behavior Scales Developmental Profile to measure initiation of joint attention (JA) and shared positive affect (SPA). Socially engage imitation (SEI) Socially engaged imitation (SEI) coded from videotapes of structured imitation task. MSEL Expressive Language (EL) and VR.  Assessments were conducted pre-intervention, immediately post-intervention, and at six-month follow-up.  **Groups:**  **G1:** Interpersonal synchrony (IS)  G2: Non-interpersonal synchrony (Non-IS)  **Provider:**   * Interventionists (Master’s level teacher and teaching assistants)   **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):**# hrs of Speech  Language treatment  (pre to post):  G1:24.45 (19.38)  G2:21.38 (16.20)  # hrs of Speech  Language treatment  (post to follow-up):  G1:28.07 (27.01)  G2:26.26 (18.82)  **N at enrollment:**  **G1:** 25  **G2:** 25  **N at follow-up:**  **G1:** 24  **G2:** 24 | **Inclusion criteria:**   * meeting criteria on the ADOS for ASD or autism and receiving ASD diagnosis by expert clinician * chronological age between 21-33 months * non-verbal mental age at least 8 months per Mullen Scales of Early Learning Visual Reception Scale * no siblings with ASD * English primary language spoken at home * no known etiology for ASD   **Exclusion criteria:**   * see inclusion   **Age, mean ± SD/ months (range):**  Range: 21-33 months  G1: 28.6 ± 2.6 G2: 28.8 ± 2.8  **Mental age:** NR  **Sex, n (%):**  Males:  **G1:** 20 (83.3)  **G2:** 20 (80)  Females:  **G1:** 4 (16.7)  **G2:** 5 (20)  **Race/ethnicity, n (%):**  Caucasian  **G1:**19 (79.2)  **G2:**19 (79.2)    **SES:**  Maternal education: NR  Household income, Hollingshead SES  score, mean ± sd  G1: 54.7 ± 8.7  G2: 53.3 ± 10.3  **Diagnostic approach:**  In Study  Diagnostic tool/method: Expert clinician  **Diagnostic category, n (%):** Autism: 100% ?  **Other characteristics**, n (%)**:** NR | **Primary outcomes, mean ±SD**  SEI**:**  **G1:** 0.17 ± 0.19  **G2:** 0.25 ± 0.24  IJA :  **G1:** 2.29 ± 3.16  **G2:** 2.79 ± 3.62  SPA:  **G1:** 2.42 ± 2.93  **G2:** 3.54 ± 3.56  **Secondary Outcomes, mean ± SD**  EL T scores:  **G1:** 23.92 ± 5.50  **G2:** 25.92 ± 8.12  VR T scores:  **G1:** 27.50 ± 8.27  **G2:** 31.12 ± 9.86 | Post-test:  SEI:  **G1:** 0.42 ± 0.24  **G2:** 0.35 ± 0.23  IJA:  **G1:** 7.70 ± 9.33  **G2:** 5.00 ± 7.91  SPA:  **G1:** 6.87 ± 7.55  **G2:** 5.33 ± 6.64  EL T:  **G1:** 34.08 ± 14.59  **G2:** 31.92 ± 13.67  VR T:  **G1:** 36.75 ± 14.54  **G2:** 32.24 ± 14.07  At 6 month follow-up:  Group Difference effect size (p value);  SEI: 0.86 (0.01)  IJA: 1.56 (0.07)  SPA:0.81 (0.27)  EL T: 0.57 (0.24)  VR T: 0.46 (0.33)    Growth trends:  Difference between G1 & G2:  Baseline to post-test:  Effect size (p value):  SEI: 76 (0.04)  IJA: 0.93 (0.11)  SPA:0.83 (0.17)  EL T: 0.60 (0.13)  VR T: 0.84 (0.02)  Post-test to follow-up;  SEI: 0.43 (0.24)  IJA: 0.68 (0.25)  SPA:0.41 (0.52)  EL T: 0.09 (0.83)  VR T: -0.10 (0.78)  T1–T4 change:  n, mean ± SD:  IQ:  N= 42, 21.4 ± 22.9, d= 1.02, p<0.001  Vineland Communication Domain standard score:  N= 46, 12.7 ± 19.4 , d=0.81, p<0.001  ASD severity:  N= 47, 0.1 ±2.5, d= 0.05, p=NS  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Lawton et al.  2012 [49](#_ENREF_49)  **Country:** US  **Intervention setting:**  Preschool classrooms  **Enrollment period:**  Fall 2008 to Fall 2009  **Funding:** NR  **Design:**  RCT | **Intervention:**  Joint Attention and Symbolic Play/Engagement and Regulation Intervention (JASP/ER) for 6 weeks; teachers received training once/week; interventionists met with the dyads twice/week for 30 minutes  **Assessments:**  Class observation; Early Social Communication Scales (ESCS); taped play interaction  **Groups:**  **G1:** JASP/ER intervention  **G2:** Delayed treatment with standard practice  **Provider:**  Preschool teachers  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 9 dyads (dyad= 1 instructor and student)  **G2:** 7 dyads  **N at follow-up:**  **G1:** 9 dyads  **G2:** 7 dyads | **Inclusion criteria for child:**   * school district label of autism or autism spectrum disorder (ASD) * met research criteria for autism or ASD on the Autism Diagnostic Observation System-Generic * between 3-5 years of age * attended public preschool at least 4 hours a day, 3 times a week * attends a classroom with a teacher willing to participate in the study  **Inclusion criteria for teacher or paraprofessional:** * able to work with one child in the classroom through the entire study * available to attend the intervention meetings  **Exclusion criteria:** * children with seizures, associated physical disorders, or co-morbidity with other syndromes or diseases   **Age, mean/months ± SD:**  **G1:** 46.0 ± 5.00  **G2:** 43.01 ± 6.00  **Mental age, mean/months SD:**  **G1:** 30.3 ± 5.01  **G2:** 33.8 ± 8.74  **Sex:** NR **Race/ethnicity, n (%):**  Child:  Caucasian:  **G1:** 4 (44.4)  **G2:** 5 (71.4)  Minority:  **G1:** 5 (55.6)  **G2:** 2 (28.6)  Instructor:  Caucasian:  **G1:** 7 (77.8)  **G2:** 3 (42.9)  Minority:  **G1:** 2 (22.2)  **G2:** 4 (57.1)  **SES:** NR    **Diagnostic approach:**  Diagnostic tool/method: Autism Diagnostic Observation System-Generic (ADOS-G)  **Diagnostic category, n (%):**  Autism: 100%  PDD-NOS: 0  Aspergers: 0  **Other characteristics**, n (%)**:**  Instructors  Teacher:  **G1:** 2 (22.2)  **G2:** 2 (28.6)  Paraprofessional, n:  **G1:** 7 (77.8)  **G2:** 5 (71.4)  Instructor years of experience, mean ± SD:  **G1:** 12.8 ± 12.5  **G2:** 7.33 ± 9.29  Instructor age, mean/yrs ± SD:  **G1:** 42.3 ± 16.3  **G2:** 34.3 ± 16.9 | **Social skills:**  Engagement States  Duration of engagement states in minutes:  Object engagement, mean ± SD:  **G1**: 4.12 ± 1.99  **G2**: 4.28 ± 1.71  Supported engagement, mean ± SD:  **G1**: 4.27 ± 1.77  **G2**: 3.94 ± 1.89  **Communication/ language:**  Class observation Frequency of joint attention initiations (IJAs):  Total IJA, mean ± SD:  **G1**: 1.67 ± 2.60  **G2**: 2.43 ± 2.51  Point, mean ± SD:  **G1**: 1.33 ± 2.59  **G2**: 0.29 ± 0.49  Show, mean ± SD:  **G1**: 0.33 ± 0.50  **G2**: 0.71 ±1.11  Give, mean ± SD:  **G1**: 0.00 ± 0.00  **G2**: 0.71 ± 1.25  Look, mean ± SD:  **G1**: 0.00 ± 0.00  **G2**: 0.71 ± 1.11  ESCS  Frequency of Joint Attention Initiations (IJAs):  Total IJA, mean ± SD:  **G1**: 11.89 ± 10.01  **G2**: 13.29 ± 7.34  Point, mean ± SD:  **G1**: 5.78 ± 5.70  **G2**: 7.57 ± 5.09  Show, mean ± SD:  **G1**: 1.13 ±1.81  **G2**: 0.43 ± 0.79  Give, mean ± SD:  **G1**: 0.33 ± 1.00  **G2**: 0.14 ± 0.38  Look, mean ± SD:  **G1**: 4.78 ± 4.52  **G2**: 5.14 ± 3.53  Taped play interaction  Frequency of joint attention initiations :  Total IJA, mean ± SD:  **G1**: 4.78 ± 3.05  **G2**: 7.29 ± 6.04  Point, mean ± SD:  **G1**: 2.33 ± 2.29  **G2**: 2.14 ± 2.19  Show, mean ± SD:  **G1**: 1.44 ± 3.25  **G2**: 0.71 ± 1.25  Give, mean ± SD:  **G1**: 0.56 ± 0.73  **G2**: 0.29 ± 0.49  Look, mean ± SD:  **G1**: 0.44 ± 0.73  **G2**: 4.14 ± 5.33 | **Social skills:**  Engagement States Duration of engagement states in minutes:  Object engagement, mean ± SD:  **G1**: 2.87 ± 1.31  **G2**: 4.94 ± 1.71  p ˂ 0.01  Supported engagement, mean ± SD:  **G1**: 5.58 ± 4.11  **G2**: 4.11 ± 1.68  p ˂ 0.05  **Communication/ language:**  Class observation Frequency of joint attention initiations (IJAs):  Total IJA, mean ± SD:  **G1**: 7.00± 4.15  **G2**: 1.83 ± 1.00  p ˂ 0.005  Point, mean ± SD:  **G1**: 2.77 ± 1.99  **G2**: 0.14 ± 0.38  p ˂ 0.005  Show, mean ± SD:  **G1**: 1.11 ± 1.05  **G2**: 0.00 ±0.00  p ˂ 0.01  Give, mean ± SD:  **G1**: 2.22 ± 2.49  **G2**: 0.14 ± 0.38  p=NS  Look, mean ± SD:  **G1**: 0.89 ± 1.45  **G2**: 0.71 ± 1.89  p=NS  ESCS  frequency of joint attention initiations (IJAs):  Total IJA, mean ± SD:  **G1**: 15.33 ± 10.89  **G2**: 9.00 ± 7.23  p=NS  Point, mean ± SD:  **G1**: 8.67 ± 9.66  **G2**: 4.29 ± 6.24  p=NS  Show, mean ± SD:  **G1**: 1.00 ±0.87  **G2**: 0.00 ± 0.00  p=0.025  Give, mean ± SD:  **G1**: 1.44 ± 3.61  **G2**: 0.43 ± 1.13  p=NS  Look, mean ± SD:  **G1**: 4.22 ± 1.99  **G2**: 4.29 ± 5.02  p=NS  Taped play interaction  frequency of joint attention initiations (IJAs):  Total IJA, mean ± SD:  **G1**: 6.22 ± 5.19  **G2**: 4.00 ± 2.31  p=NS  Point, mean ± SD:  **G1**: 1.11 ± 1.57  **G2**: 1.29 ± 1.89  p=NS  Show, mean ± SD:  **G1**: 1.77 ± 2.63  **G2**: 0.29 ± 0.49  p=NS  Give, mean ± SD:  **G1**: 1.11 ± 1.69  **G2**: 0.71 ± 1.11  p=NS  Look, mean ± SD:  **G1**: 2.22 ± 2.99  **G2**: 1.71 ± 2.56  p=NS  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Lerner et al.  2012[50](#_ENREF_50)  **Country:** US  **Intervention setting:** After-school?  **Enrollment period:** NR  **Funding:**  Jefferson Scholars’ Foundation Graduate Fellowship  **Design:** RCT | **Intervention:**  Sociodramatic Affective Relational Intervention (SDARI)  90 minute meetings once/week for 4 weeks; each session included two 40 minute sessions using abridged versions of the curricula  Skillstreaming: 90 minute meetings once/week for 4 weeks; each session included two 40 minute sessions using abridged versions of the curricula  **Assessments:** parents completed standardized measures of children’s social functioning before and after SSI; intervention staff completed standardized measure of social functioning after first and last session.  Social Interaction observation system (SIOS) and sociometrics; Social Skill rating system – teacher (SSRS-T)  Parent reported: SCQ, SRS, Social Skills Rating System- Parent (SSRS-P)  And post-treatment satisfaction questionnaire  **Groups:**  **G1:** SDARI  **G2:** Skillstreaming  **Provider:**   * Intervention staff members, who received 3 hours training in intervention and weekly supervision in intervention administration and behavior management   **Treatment manual followed:** Yes  **Defined protocol followed:** NR **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 7  **G2:** 6  **N at follow-up:**  **G1:** NR  **G2:** NR | **Inclusion criteria:**   * previous diagnosis of HFASD from a licensed professional * clinical cutoff scores on SCQ   **Exclusion criteria:** NR  **Age, mean/yrs (range):**  **G1:** 10.86 ± 1.68  **G2:** 11.33 ± 1.63  **Mental age, mean/yrs (range):** NR    **Sex:**  M, 13 (100%):  **Race/ethnicity, n (%):**  White Asian  **SES:**  Parental educationa, mean ± SD :  **G1:** 5.43 ± 0.79  **G2:** 5.33 ± 0.82  Household income, mean (range):  **G1:** $70,000 ± $27,080  **G2:** $86,700 ± $19,660  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  **Diagnostic category, n (%):**  Autism  **G1:** 0  **G2:** 2 (33)  PDD-NOS  **G1:** 1 (14)  **G2:** 1 (17)  Asperger syndrome  **G1:** 6 (86)  **G2:** 3 (50)  **Other characteristics, n (%):** Grade  **G1:** 5.29 ± 1.50  **G2:** 5.33 ± 2.07  SCQ, mean ± SD  **G1:** 17.57 ± 3.55  **G2:** 16.83 ± 6.27 | **Social Skills**  SRS, mean ± SD  **G1:** 76.57 ± 10.47  **G2:** 82.17 ± 10.68  SSRS parent, mean ± SD  **G1:** 77.57 ± 8.70  **G2:** 82.33 ± 17.76  Reciprocated friend nominations, mean ± SD  **G1:** 0.14 ± 0.12  **G2:** 0.13 ± 0.10  Social preference, mean ± SD  **G1:** 0.43 ± 0.30  **G2:** 0.00 ± 0.31  SSRS- Teacher, mean ± SD  **G1:** 80.43 ± 11.87  **G2:** 73.17 ± 19.17  SIOS- Positive, mean ± SD  **G1:** 0.69 ± 0.54  **G2:** 0.43 ± 0.35  SIOS- Negative, mean ± SD  **G1:** 0.18 ± 0.21  **G2:** 0.05 ± 0.13  SIOS- Low level, mean ± SD  **G1:** 1.63 ± 0.52  **G2:** 1.34 ± 0.81 | **Social Skills**  SRS, mean ± SD  **G1:** 75.57 ± 13.05  **G2:** 76.17 ± 9.56  SSRS parent, mean ± SD  **G1:** 79.71 ± 9.59  **G2:** 82.33 ± 15.65  Reciprocated friend nominations, mean ± SD  **G1:** 0.24 ± 0.09  **G2:** 0.27 ± 0.21  Social preference, mean ± SD  **G1:** 0.29 ± 0.44  **G2:** 0.43 ± 0.46  SSRS- Teacher, mean ± SD  **G1:** 94.00 ± 13.92  **G2:** 88.17 ± 13.80  SIOS- Positive, mean ± SD  **G1:** 0.37 ± 0.29  **G2:** 1.00 ± 0.45  SIOS- Negative, mean ± SD  **G1:** 0.05 ± 0.09  **G2:** 0.28 ± 0.25  SIOS- Low level, mean ± SD  **G1:** 1.41 ± 0.62  **G2:** 1.42 ± 0.36  **Harms:** NR  **Modifiers:** NR |

**Comments:** a Parental education scale: 1= 8th grade or less, 2= some high school, 3= some college, 4= some college, 5= college graduate and 6= graduate degree

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Reaven et al.  2012[51](#_ENREF_51)  **Country:** US  **Intervention setting:** clinic  **Enrollment period:** NR  **Funding:**  Cure Autism Now, Autism Speaks, USDHHS grants  **Design:** RCT | **Intervention:**  Facing Your Fears (FAF)  12 multifamily group sessions, 1 ½ hours, supported by manuals for facilitators, parents and youth. Duration of intervention was 4 months  **Assessments:** ADOS, Anxiety Disorders Interview Schedule for Children – parent version; Clinical Global Impressions Scale- Improvement ratings  **Groups:**  **G1:** facing your fears  **G2:** control (usual treatment)  **Provider:**   * 13 clinicians   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  Yes, n  **G1:** 23  **G2:** 23  **Concomitant therapies, n (%):**  Psychiatric medication use - any **G1:** 10  **G2:** 14  SSRI  **G1:** 5  **G2:** 7  Atypical antipsychotic  **G1:** 4  **G2:** 3  Stimulant  **G1:** 5  **G2:** 4  Anticonvulsants  **G1:** 1  **G2:** 3  Alpha-blockers  **G1:** 1  **G2:** 5  Mood stabilizers  **G1:** 0  **G2:** 1  **N at enrollment:**  **G1:** 24  **G2:** 26  **N at follow-up:**  **G1:** 21  **G2:** 26  **N for analysis (ITT):**  **G1:** 24  **G2:** 26 | **Inclusion criteria:**   * chronological age between 7 and 14 years * confirmed diagnosis of ASD, determined by one of three expert clinical psychologists using recent ADOS and SCQ * speaking in full complex sentences reflected in recent standardized cognitive assessment * clinically significant symptoms of anxiety (score above clinical significance cutoff on separation, social and/or generalized anxiety subscales of the SCARED  **Exclusion criteria:** * see above   **Age, mean ± SD months:**  **G1:** 125.75 ± 21.47  **G2:** 125.00 ± 20.45  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%)  **G1:** 24 (100)  **G2:** 24 (92.3)  F, n (%) **G1:** 0  **G2:** 2 (7.7)  **Race/ethnicity, n (%):**  White  **G1:** 22 (91.7)  **G2:** 20 (76.9)  Asian/Pacific Islander  **G1:** 0  **G2:** 1 (3.8)  African-American  **G1:** 1 (4.2)  **G2:** 2 (7.7)  Multi-racial  **G1:** 1 (4.2)  **G2:** 3 (11.5)  **SES:**  Maternal education:  Graduated from college, n(%):  **G1:**  15 (62.5)  **G2:**  15 (57.7)  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  **Diagnostic category, n (%):**  Autistic disorder  **G1:** 16 (67.7)  **G2:** 15 (58.9)  PDD-NOS  **G1:** 0  **G2:** 3 (11.5)  Asperger syndrome  **G1:** 8 (33.3)  **G2:** 8 (30.8)  Other characteristics: **Full scale IQ estimate, mean ± SD (range):**  **G1:** 107.08 ± 16.85 (70-139)  **G2:** 102.23 ± 17.33 (70-134)  **Verbal IQ, mean ± SD (range):**  **G1:** 107.00 ± 19.51 (65-133)  **G2:** 100.73 ± 18.98 (67-134)  **Nonverbal IQ, mean ± SD (range):**  **G1:** 109.67 ± 16.38 (75-133)  **G2:** 105.04 ± 17.86 (70-134)  **# Psychiatric diagnoses other than ASD**  **G1:** 1-7  **G2:** 2-8 | **Anxiety Disorders Interview schedule for children** Separation  **G1:** 2.45 ± 2.33 (0-5)  **G2:** 2.22 ± 2.49 (0-6)  Social  **G1:** 3.85 ± 2.13 (0-6)  **G2:** 3.70 ± 2.36 (0-7)  Specific phobia  **G1:** 3.45 ± 2.35 (0-7)  **G2:** 3.09 ± 2.09 (0-6)  Generalized anxiety  **G1:** 4.46 ± 2.02 (0-7)  **G2:** 5.09 ± 1.44 (0-7)  ADIS-P principal anxiety diagnoses (SAP, SOC, GAD, SpP)  **G1:** 2.90 ± 0.91 (1-4)  **G2:** 2.91 ± 0.95 (1-4) | **Anxiety Disorders Interview schedule for children** Separation  **G1:** 1.05 ± 1.90 (0-5)  **G2:** 1.87 ± 2.70 (0-7)  Social  **G1:** 2.40 ± 2.30 (0-5)  **G2:** 3.61 ± 2.55 (0-7)  Specific phobia  **G1:** 1.88 ± 1.80 (0-6)  **G2:** 3.65 ± 1.70 (0-6)  Generalized anxiety  **G1:** 2.55 ± 2.50 (0-6)  **G2:** 4.61 ± 1.70 (0-7)  ADIS-P principal anxiety diagnoses (SAP, SOC, GAD, SpP)  **G1:** 2.25 ± 0.91 (1-4)  **G2:** 2.83 ± 0.98 (1-4)  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Reed et al.  2012[52](#_ENREF_52)  **Country:** UK  **Intervention setting:**  School/home  **Enrollment period:** NR  **Funding:** NR  **Design:** Cohort | **Intervention:**  ABA: Followed well-recognized ABA procedures of discrete trial type. Overseen by trained supervisors and conducted by trained tutors in accordance with appropriate intervention manuals. All programs were home-based and mainly 1:1 with mean intensity of 30 hours/wk.  Special Nursery Placement: 7 schools in south east England. Children taught in classes of 6-8, under supervision of teacher with postgraduate qualifications and specialist training.  Portage: Home based program for preschool children with special ed needs, conducted in three authorities in south-east England. Relatively low-intensity (mean 8.5 hours/week) with majority of work conducted 1:1; supervised by trained portage supervisor with graduate level qualification and followed a written manual.  Local authority: Home based program for pre-school children. Begins with intensive 5 day training class for parents. Home based supervision and support sessions delivered by educational psychologist up to 4 sessions/wk. These are 1:1 teaching sessions based on discrete trials and reinforcement, conducted by trained teaching assistants.  **Assessments:** Gilliam Autism Rating Scale (GARS), Psycho-Educational Profile (PEP-R), British Abilities Scale (BAS II), Vineland Adaptive Behavior Scale (VABS)  Conducted by experienced educational psychologist, blinded to group assignment, who completed PEP-R and BAS; assisted parents in completing GARS and VABS. Post intervention measures taken by same person at nine months after initial assessment.  **Groups:**  **G1:** ABA  **G2:** Special Nursery  **G3:** Portage  **G4:** Local authority  **Provider:**   * See above   **Treatment manual followed:** ABA and Potage-yes  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  Yes – “Receiving no other teaching interventions”  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 14  **G2:** 21  **G3:** 18  **G4:** 13  **N at follow-up:**  **G1:** 14  **G2:** 21  **G3:** 18  **G4:** 13 | **Inclusion criteria:**   * between 2 years 6 months and 4 years old * at the start of first intervention * no other teaching interventions * independent diagnosis of autistic disorder or PDD-NOS made by specialist pediatrician according to DSM-IV-TR criteria   **Exclusion criteria:**   * see above   **Age, mean/mos ± SD:**  **G1:** 39.0 ± 6.9  **G2:** 41.5 ± 4.0  **G3:** 39.5 ± 6.3  **G4:** 40.2 ± 6.3  **Mental age, mean/yrs (range):** NR  **Sex: M, n:**  **G1:** 13  **G2:** 18  **G3:** 16  **G4:** 12  F, n:  **G1:** 1  **G2:** 3  **G3:** 2  **G4:** 1  **Race/ethnicity, n (%):** NR  **SES:** NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  DSM-IV-TR  **Diagnostic category, n (%):** NR  **Other characteristics**, n (%)**:**  Intervention hours mean (range) **G1:** 30.4 (20-40)  **G2:** 12.7 (3-23)  **G3:** 8.5 (2-15)  **G4:** 12.6 (11-22)  1:1 Intervention hours mean  **G1:** 28.3  **G2:** 3.1  **G3:** 6.5  **G4:** 12.2 (2.5)  Group Intervention hours mean  **G1:** 2.1  **G2:** 9.6  **G3:** 2.0  **G4:** 0.5 (0.9)  Tutors (family tutors) mean number  **G1:** 4.4 (1.0)  **G2:** 4.0 (1.0)  **G3:** 4.0 (2.0)  **G4:** 3.1 (1.) | GARS Autism Quotient, mean ± SD  **G1:** 91.1 ± 14.4  **G2:** 97.1 ± 9.7  **G3:** 88.9 ± 24.4  **G4:** 99.0 ± 9.7  Psycho-Educational Profile (PEP-R) overall score,  mean ± SD  **G1:** 55.1 ± 17.3  **G2:** 52.2 ± 17.7  **G3:** 54.0 ± 15.4  **G4:** 51.7 ± 14.5  BAS Cognitive Ability  mean ± SD  **G1:** 56.1 ± 18.6  **G2:** 57.1 ± 11.8  **G3:** 52.7 ± 10.4  **G4:** 51.5 ± 8.6  VABS composite  mean ± SD  **G1:** 58.4 ± 10.6  **G2:** 53.3 ± 4.2  **G3:** 56.6 ± 7.0  **G4:** 54.0 ± 4.5 | VABS composite change score  mean ± SD  **G1:** 11.9 ± 7.7  **G2:** 6.8 ± 15.7  **G3:** 2.5 ± 6.1  **G4:** 2.7 ± 8.7  **Adaptive behavior:**  VABS change score  mean ± SD  **G1:** 2.1 ± 4.9  **G2:** 3.8 ± 5.9  **G3:** 0.2 ± 4.9  **G4:** 0.8 ± 5.1  **Educational/ cognitive/ academic attainment:**  PEP-R change score  mean ± SD  **G1:** 14.5 ± 16.0  **G2:** 10.4 ± 28.5  **G3:** 0.6 ± 11.1  **G4:** 3.2 ± 16.4  BAS change score  mean ± SD  **G1:** 18.8 ± 13.6  **G2:** 6.6 ± 18.0  **G3:** 7.3 ± 8.2  **G4:** 4.2 ± 7.3  **Harms:** NR  **Modifiers**  Autism severity- for special nursery, portage and local authority (G2, G3, G4) gains made by children inversely related to autism severity and directly related to time-input. The converse was true for ABA. |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Rogers et al.  2012[53](#_ENREF_53), [54](#_ENREF_54)  **Country:** US  **Intervention setting:** University clinics for parent training  **Enrollment period:** NR  **Funding:**  Autism speaks grants, NIMH, NICHD  **Design:** RCT | **Intervention:** Parent delivery - Early Start Denver Model (P-ESDM**)** 12-week, low-intensity (1-hour/wk of therapist contact), intervention for toddlers at risk for ASD  Treatment duration (hours), mean (SD):  P-ESDM: 1.48 (1.94)  Community treatment as usual: 3.68 (3.91)  **Assessments:** Parent acquisition of ESDM intervention skills, developmental gains and core autism symptoms at baseline and 12 weeks later, immediately after the end of parent coaching sessions. Developmental Measures:  Mullens Scales of Early Learning (MSEL), MacArthur-Bates Communicative Development Inventory: Words and Gestures (MCDI), VABS-II. Child Moderating variables: Imitation and Orienting to Social, Nonsocial, and Joint Attention Stimuli. Parent measures: General Family Demographic Data, Symptom Checklist-90-R (SCL-90-R), ESDM Parent Fidelity Tool, Child Intervention Hours  **Groups:**  **G1:** Parent-delivered ESDM  **G2:** Community interventions  **Provider:**   * Therapists provided parent training   **Treatment manual followed:** Yes  **Defined protocol followed:** yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 49  **G2:** 49  **N at follow-up:**  **G1:** 49  **G2:** 49 | **Inclusion criteria:**   * Met risk criteria for ASD on two screeners (Early Screening of Autistic Traits Questionnaire, Infant Toddler Checklist, Modified Checklist for Autism in Toddlers) * Met criteria for ASD in a clinical assessment * Ambulatory (crawling or walking), * Had developmental quotients (DQ) of 35 or higher, * Had English as one language spoken daily in the home   **Exclusion criteria:**   * Parental self-reported significant mental illness or substance abuse, * Child significant medical conditions including cerebral palsy, gestational age of less than 35 weeks, genetic disorders related to developmental disabilities, * DQ below 35, * Current or previous enrollment in intensive 1:1 autism intervention of more than 10 hours per week.   **Age, mean ± SD/months (range): 14 to 24 months**  **G1:** 21.02 ± 3.51 **G2**: 20.94 ± 3.42  **Mental age, mean/yrs (range):** NR  **Sex**, n (%)**:**  Male  **G1:** 37 (75.5)  **G2:** 39 (62.5)  **Race/ethnicity, n (%):**  White  **G1:** 34 (69.4)  **G2:** 37 (75.5)  **SES, n (%):**  Maternal education  Less than high school  **G1:** 6 (12.8)  **G2:** 13 (27.1)  Some college  **G1:** 10 (21.3)  **G2:** 8 (16.7)  College  **G1:** 17 (36.2)  **G2:** 21 (43.8)  Some graduate school or graduate school  **G1:** 14 (29.8)  **G2:** 6 (12.5)  Household income:  <50K  **G1:** 10 (22.2)  **G2:** 15 (32.6)  50K–75K  **G1:** 5 (11.1)  **G2:** 9 (19.6)  75K–100K  **G1:** 15 (33.3)  **G2:** 12 (26.1)  >100K  **G1:** 15 (33.3)  **G2:** 10 (21.7)  **Diagnostic approach:**  In Study  Diagnostic tool/method: ADOS-T  **Diagnostic category, n (%):**  ASD: 100%  **Other characteristics, n (%):** NR | **Mean ± SD**:  Modified ADOS social affect  **G1:**29.45 ± 9.16  **G2:**34.14 ± 8.69  ADOS–Restrictive and Repetitive  **G1:** 3.92 ± 2.01  **G2:**4.31 ± 1.92  Mullen DQ  **G1:**64.88 ± 17.22  **G2:**63.08 ± 15.93  Mullen Verbal DQ  **G1:** 47.78 ± 22.19  **G2:** 44.45 ± 20.37  Mullen Nonverbal DQ  **G1:** 80.96 ± 16.68  **G2:** 80.73 ± 15.51  MCDI Part I: Phrases Understood  **G1:** 8.22 ± 7.02  **G2**: 9.38 ± 7.95  MCDI Part I: Vocabulary Comprehension  **G1:** 64.53 ± 65.73  **G2:** 70.31 ± 78.34  MCDI Part I: Vocabulary Production  **G1:** 12.24 ± 35.6  **G2:** 12.44 ± 39.72  MCDI Part II: Total Gestures  **G1:**19.89 ± 10.12  **G2:** 20.33 ± 11.15  VAB II: Communication  **G1:**67.66 ± 13.19  **G2:**67.29 ± 11.05  VAB II: Daily Living Skills  **G1:** 83.07 ± 12.4  **G2:** 83.21 ± 10.6  VAB II: Socialization  **G1:** 76.68 ± 8.74  **G2:** 77.95 ± 8.01  VAB II: Adaptive Behavior Composite  **G1:** 76.76 ± 10.3  **G2:** 78.22 ± 8.88  imitative Sequences  **G1:** 3.78 ± 3.12  **G2:** 2.53 ± 2.6  Mean Social Orient l  **G1:** 0.47 ± 0.33  **G2:** 0.41 ± 0.29  Mean Nonsocial Orient  **G1:** 0.65 ± 0.3  **G2:** 0.62 ± 0.35  Mean Orient to Joint Attention  **G1:** 0.35 ± 0.35  **G2:** 0.28 ± 0.33 | **Mean ± SD**:  Modified ADOS social affect  **G1:** 26.61 ± 10.14  **G2:** 27.33 ± 10.62  ADOS–Restrictive and Repetitive  **G1:** 3.96 ± 1.86  **G2:** 3.82 ± 2.04  Mullen DQ  **G1:** 69.82 ± 17.9  **G2:** 67.92 ± 17.93  Mullen Verbal DQ  **G1:** 56.65 ± 23.65  **G2:** 54.35 ± 21.94  Mullen Nonverbal DQ **G1:** 81.98 ± 14.82  **G2:** 80.57 ± 18.45  MCDI Part I: Phrases Understood  **G1:** 12.73 ± 9.11  **G2:** 14.77 ± 8.14  MCDI Part I: Vocabulary Comprehension  **G1:** 106.51 ± 96.81 **G2:** 125.72 ± 106.39  MCDI Part I: Vocabulary Production  **G1:** 42.27 ± 61.99  **G2:** 38.87 ± 73.71  MCDI Part II: Total Gestures  **G1:** 28.02 ± 12.62  **G2:** 29.79 ± 13.51  VAB II: Communication **G1:** 72.55 ± 12.06  **G2:** 74.29 ± 14.55  VAB II: Daily Living Skills  **G1:** 82.25 ± 13.82  **G2:** 84.04 ± 13.5  VAB II: Socialization **G1:** 77.32 ± 9.19  **G2:** 78.67 ± 10.78  VAB II: Adaptive Behavior Composite  **G1:** 77.43 ± 9.59  **G2**: 80.33 ± 11.34  Imitative Sequences **G1:** 4.58 ± 3.45  **G2:** 3.76 ± 3.44  Mean Social Orient l **G1:** 0.47 ± 0.28  **G2:** 0.43 ± 0.35  Mean Nonsocial Orient **G1:** 0.74 ± 0.28  **G2:** 0.6 ± 0.37  Mean Orient to Joint Attention  **G1:** 0.34 ± 0.29  **G2:** 0.34 ± 0.34  **Harms:** NR  **Modifiers:**  younger age and more  intervention hours positively affect developmental rates (p=0.002), and related to the degree of improvement in children’s behavior for most variables |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Strauss et al.  2012[55](#_ENREF_55)  **Country:** Italy  **Intervention setting:** clinic and home  **Enrollment period:** NR  **Funding:** NR  **Design:**  Prospective Cohort  Note see related study, Fava 2011[56](#_ENREF_56) | **Intervention:**  EIBI – cross-setting, staff and parent mediated. For 12 months, alternated between one week of 25 hours of therapist-led center-based intervention and 3 weeks of an average of 14 hrs/week parent-led home intervention.  Comparison (eclectic): parents not actively seeking parental involvement; approximately 12 hours per week of in-home developmental intervention and cognitive behavioral treatment without active parental inclusion in therapy sessions.  \*\* Group assignments not random. Parents were able to choose which group their children were assigned to.  **Assessments:** ADOS, Griffith Mental Developmental Scales for ages 2-8 (GMDS-ER 2-8), VABS, MacArthur Communication Developmental Inventories (CDI), video coded challenging behaviors (including amount/difficulty of behavior targets), Parental Stress Index-Short Form (PSI-SF)  **Groups:**  **G1:** EIBI  **G2:** eclectic  **Provider:**  Eclectic: In-home therapists with monthly or no supervision  EIBI: Program director led parent trainings; staff therapists provided child treatment in centers  **Treatment manual followed:** NR  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 24  **G2:** 20  **N at follow-up:**  **G1:** NR  **G2:** NR | **Inclusion criteria:**   * diagnosis of autism or PDD-NOS * absence of major medical issues other than autism or mental retardation * completed first 6 months of treatment progress * re-evaluated by child psychiatrist after 6 mos.   **Exclusion criteria:**   * see above   Age, mean/mos ± SD (range):  **G1:** 55.67 ±17.63 (26-81)  **G2:** 41.94 ± 13.07 (27-69)  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1:** 22 (92)  **G2:** 19 (95)  F, n (%): **G1:** 2 (8)  **G2:** 1 (5)  **Race/ethnicity, n (%):**  NR  **SES:** NR  **Diagnostic approach:**  Confirmed In Study  Diagnostic tool/method:  DSM and ADI-R  **Diagnostic category, n (%):** NR | Autism severity, mean ± SD  Social interaction  **G1:** 10.54 ±2.34  **G2:** 9.63 ± 3.24  Communication  **G1:** 6.04 ±1.88  **G2:** 4.94 ± 2.23  ADOS total  **G1:** 15.96 ±4.33  **G2:** 14.56 ± 5.05  GMDS-ER GQ  **G1:** 55.65 ±20.06  **G2:** 74.29 ± 29.37  Early language skills  CDI Comprehension  **G1:** 53.83 ±28.81  **G2:** 47.17 ± 27.80  CDI production  **G1:** 35.29 ±35.97  **G2:** 19.17 ± 28.12  VABS standard scores  Communication  **G1:** 71.00 ±39.24  **G2:** 60.78 ± 30.42  Daily living  **G1:** 78.43 ±33.39  **G2:** 56.44 ± 23.81  Socialization  **G1:** 61.96 ±21.31  **G2:** 56.88 ± 19.21  Motor  **G1:** 105.78 ±22.38  **G2:** 92.00 ± 19.97  ABC  **G1:** 79.29 ±22.84  **G2:** 66.92 ± 19.25 | Outcomes at 6 months post-treatment initiation:  Autism severity, mean ± SD  Social interaction  **G1:** 8.83 ±2.70  **G2:**  9.00± 2.97  Communication  **G1:** 4.38 ±1.34  **G2:** 4.56 ± 1.97  ADOS total  **G1:** 13.21 ±3.83  **G2:** 13.56 ± 4.72  **Communication/ language:**  Early language skills  CDI Comprehension  **G1:** 70.33 ±27.04  **G2:** 61.33 ± 32.37  CDI production  **G1:** 51.81 ±35.23  **G2:** 33.17 ± 42.27  **Adaptive behavior:**  VABS standard scores  Communication  **G1:** 91.43 ±40.44  **G2:** 83.56 ± 41.32  Daily living  **G1:** 100.26 ±35.60  **G2:** 88.33 ± 37.29  Socialization  **G1:** 67.78 ±19.93  **G2:** 70.50 ± 24.04  Motor  **G1:** 112.87 ±13.30  **G2:** 106.59 ± 21.63  ABC  **G1:** 93.09 ±23.61  **G2:** 84.88 ± 29.03  **Educational/ cognitive/ academic attainment:**  GMDS-ER GQ  **G1:** 68.75 ±19.58  **G2:** 76.00 ± 26.08  **Harms:** NR  **Modifiers**  EIBI group: Older children achieved better adaptive behavior outcomes; younger children made more gains in early language comprehension and production. Children who gained more language comprehension had higher adaptive behavior scores pre-treatment. Pre-treatment language comprehension predicted post-treatment language production.  Eclectic group: Higher pre-treatment mental development state and early language skills predicted better outcome on adaptive behaviors. Initial higher adaptive behaviors predicted better post-treatment early language comprehension.  In both groups, the predictive power of parental stress on outcome autism severity was modified by perception of difficult child, with higher perceptions of difficulty associated with lower decreases in autism severity.  In both groups, child outcomes on early language skills, mental developmental state and adaptive behaviors are significantly influenced by parental stress, child ability to respond correctly to prompts, number and difficulty of treatment targets, and child problem behaviors in sessions. |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Fava et al.  2011[56](#_ENREF_56)  **Country:** Italy  **Intervention setting:**  Treatment center and home  **Enrollment period:** NR  **Funding:**  Foundation Vodafone Italy; Anima, Foundation BNL, Federalalberghi, Insurance Consulting Group, Azienda Romana Mercat, Hotel Hilton, Sky, Promusic, Ms. Adelaide Mazzeo, Mr. Mauro Paissan  **Design:** Retrospective cohort  Note: See related study Strauss 2011[55](#_ENREF_55) | **Intervention:**  **G1:** Rotated between 3 weeks of center-based EIBI and parent training (approx. 26 hours per week) followed by 3 weeks of parent-mediated home treatment (approx. 12 hours/week) and a 1-week follow-up in a clinic setting for 1 year  **G2:** Eclectic mix of in-home developmental and cognitive behavioral treatment (approx 12 hours/week)  **Assessments:**  Independent professionals/raters:  Autism Diagnostic Observation Schedule; Griffith Mental Development Scales; MacArthur Communication Developmental Inventories;  Video ratings of challenging behaviors  Parent reports:  Vineland Adaptive Behavior Scales; Child Behavior Checklist 1.5-5;; Parenting Stress Inventory – Short Form  Assessments made at baseline and at 6 months  **Groups:**  **G1**: EIBI  **G2**: Eclectic  Group assignment based on parental preference  **Provider:**  Staff and parents  **Treatment manual followed:** No  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1**: 12  **G2**: 10  **N at follow-up:**  **G1**: 12  **G2**: 10 | **Inclusion criteria:**   * + Diagnosis of autism or PDD-NOS   + Absence of major medical issues other than ASD or mental retardation   + Completed 6 month evaluation   **Exclusion criteria:** NR  **Age, mean/months ± SD:**  **G1:** 52.0 ± 19.5  **G2:** 43.7 ± 26.9  **Mental age, mean/yrs (range):**  GMDS-ER GQ  **G1:** 62.1 (38-103)  **G2:** 69.8 (44-87)  **Sex, n (%):**  **G1 :**  M: 10 (83) F: 2 (17)  **G2:**  M: 9 (90)  F: 1 (10)  **Race/ethnicity, n (%):**  NR  **SES:** NR    **Diagnostic approach:**  Referral (“diagnosis …made independently of the study by external neuro-psychiatrists and child psychologists…”)  Diagnostic tool/method:  DSM and ADI-R  **Diagnostic category, n (%):**  Autism: NR  PDD-NOS: NR  Aspergers: NR  **Other characteristics**, n (%)**:** NR | **Overall ratings:**  **Global Rating of Severity, mean** ±  **SD:**  ADOS total:  **G1**: 15.6 ± 4.0  **G2**: 12.8 ± 5.0  **Social skills, mean ± SD:**  ADOS social interaction:  **G1**: 10.0 ± 2.9  **G2**: 8.6 ± 2.7  VABS socialization:  **G1**: 69.9 ± 24.5  **G2**: 44.9 ± 14.2  **Communication/ language, mean ± SD:**  ADOS communication:  **G1**: 5.8 ± 2.1  **G2**: 4.2 ± 2.7  CDI comprehension:  **G1**: 48.6 ± 32.5  **G2**: 84.5 ± 4.9  CDI production:  **G1**: 33.7 ± 38.6  **G2**: 29.0 ± 7.1  VABS communication:  **G1**: 77.3 ± 45.2  **G2**: 49.3 ± 30.6  **Problem behavior, mean ± SD:**  Parent session:  Aggression:  **G1:** 11.7 ± 6.6  **G2:** NR  Stereotypes:  **G1:** 17.0 ± 5.9  **G2:** NR  Dysfunctional:  **G1:** 14.5 ± 5.1  **G2:** NR  Staff session:  Aggression:  **G1:** 6.5 ± 4.4  **G2:** NR  Stereotypes  **G1:** 12.3 ± 5.2  **G2:** NR  Dysfunctional  **G1:** 10.1 ± 0.8  **G2:** NR  **Adaptive behavior, mean ± SD:**  VABS ABC:  **G1**: 63.3 ± 25.9  **G2**: 44.3 ± 16.4  VABS daily living:  **G1**: 74.5 ± 36.3  **G2**: 47.4 ± 16.3  **Commonly occurring co-morbidities, mean ± SD:**  CBCL affective problems  **G1**: 58.0 ± 7.2  **G2**: 56.8 ± 7.1  CBCL anxiety problems:  **G1**: 56.1 ± 6.8  **G2**: 59.6 ± 14.6  CBCL pervasive developmental:  **G1**: 69.0 ± 8.9  **G2**: 67.7 ± 9.8  CBCL attention deficit/ hyperactivity:  **G1**: 57.1 ± 5.3  **G2**: 57.2 ± 5.8  CBCL oppositional defiant:  **G1**: 54.1 ± 5.5  **G2**: 55.3 ± 6.9  **Motor skills, mean ± SD:**  VABS motor:  **G1**: 99.7 ± 17.9  **G2**: 84.9 ± 14.2  **Educational/ cognitive/ academic attainment:** GMDS-ER GQ:  **G1**: 62.1 ± 21.5  **G2**: 69.8 ± 16.6  **Parental quality of life, mean ± SD±±SD:**  PSI total:  **G1**: 92.0 ± 13.1  **G2**: 88.7 ± 2.3  PSI, parental distress  **G1**: 29.4 ± 10.4  **G2**: 26.1 ± 10.9  PSI, parent-child difficult interaction:  **G1**: 25.9 ± 5.9  **G2**: 26.1 ± 5.9  PSI, difficult child:  **G1**: 37.3 ± 8.2  **G2**: 39.3 ± 4.5 | \*\*Note: all p-values represent within-group changes vs. baseline over a six month time period. “Not all measures were available for all included children,” but specific ns are not provided.  **Overall ratings:**  **Global Rating of Severity, mean** ±  **SD:**  ADOS total:  **G1**: 12.3 ± 3.2  p=0.001  **G2**: 12.0 ± 4.5  p=NS  **Social skills, mean ± SD:**  ADOS social interaction:  **G1**: 8.3 ± 2.1  p=0.004  **G2**: 8.1 ± 2.6  p=NS  VABS socialization:  **G1**: 70.8 ± 24.7  p=NS  **G2**: 57.0 ± 15.5  p<0.001  **Communication/ language, mean ± SD:**  ADOS communication:  **G1**: 4.0 ± 1.3  p=0.011  **G2**: 3.9 ± 2.2  p=NS  CDI comprehension:  **G1**: 59.4 ± 32.5  p=0.001  **G2**: 72.6 ± 41.7  p=NS  CDI production:  **G1**: 48.0 ± 39.7  p=0.049  **G2**: 52.5 ± 28.6  p=NS  VABS communication:  **G1**: 89.3 ± 48.4  p=0.010  **G2**: 66.0 ± 38.2  p<0.001  **Problem behavior, mean ± SD:**  Parent session:  Aggression:  **G1:** 4.6 ± 3.5  p<0.0001  **G2:** NR  Stereotypes:  **G1:** 7.8 ± 2.9  p<0.0001  **G2:** NR  Dysfunctional:  **G1:** 5.9 ± 1.7  p<0.0001  **G2:** NR  Staff session:  Aggression:  **G1:** 3.0 ± 2.2  P=0.0003  **G2:** NR  Stereotypes  **G1:** 6.0 ± 2.7  p<0.0001  **G2:** NR  Dysfunctional  **G1:** 4.2 ± 1.6  p<0.0001  **G2:** NR  **Adaptive behavior, mean ± SD:**  VABS ABC:  **G1**: 77.4 ± 34.4  p=0.010  **G2**: 65.0 ± 23.0  p=0.006  VABS daily living:  **G1**: 101.5 ± 40.8  p<0.001  **G2**: 67.8 ± 17.8  p<0.001  **Commonly occurring co-morbidities, mean ± SD:**  CBCL affective problems  **G1**: 55.3 ± 6.3  p=NS  **G2**: 59.9 ± 8.7  p=NS  CBCL anxiety problems:  **G1**: 54.6 ± 5.6  p=NS  **G2**: 60.2 ± 11.7  p=NS  CBCL pervasive developmental:  **G1**: 66.6 ± 7.6  p=NS  **G2**: 68.9 ± 6.7  p=NS  CBCL attention deficit/ hyperactivity:  **G1**: 53.8 ± 3.6  p=0.030  **G2**: 56.8 ± 8.1  p=NS  CBCL oppositional defiant:  **G1**: 53.1 ± 3.6  p=NS  **G2**: 53.8 ± 5.3  p=NS  **Motor skills, mean ± SD:**  VABS motor:  **G1**: 109.9 ± 14.6  p=0.007  **G2**: 102.8 ± 11.2  p=0.002  **Educational/ cognitive/ academic attainment:**  GMDS-ER GQ:  **G1**: 76.4 ± 21.6  p=0.005  **G2**: 95.5 ± 9.7  p=NS  **Parental quality of life, mean ± SD:**  PSI total:  **G1**: 94.3 ± 9.7  p=NS  **G2**: 81.0 ± 12.1  p=0.023  PSI, parental distress:  **G1**: 31.1 ± 9.5  p=NS  **G2**: 28.3 ± 19.2  p=NS  PSI, parent-child difficult interaction:  **G1**: 25.8 ± 5.9  p=NS  **G2**: 40.1 ± 25.5  p=NS  PSI, difficult child  **G1**: 37.5 ± 10.8  p=NS  **G2**: 49.6 ± 28.8  p=NS  **Harms:** NR  **Modifiers:** NR |

**Comments:** Paper only provided significance testing results for within-group differences; no between-group differences analyzed or reported

**Table C-1. Evidence table, continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Thomeer et al.  2012[57](#_ENREF_57)  **Country:** US  **Intervention setting:** Clinic  **Enrollment period:** NR  **Funding:**  John R. Oishei Foundation  **Design:** RCT | **Intervention:**  Skillstreaming psychosocial intervention 5 days per week, five 70 minute treatment cycles per day for 5 weeks.  Treatment groups were divided by age (7-8 year, 9-10 year, and 11-12 year olds) with 6 children and 3 staff per group.  **Assessments:**  Adapted Skillstreaming Checklist, Social Responsiveness Scale, BASC-2-PRS and BASC-2 Teacher Rating Scales, Skillstreaming Knowledge Assessment, Diagnostic Analysis of Nonverbal Accuracy-2, Parent, Child and Staff Satisfaction Surveys, Comprehensive Assessment of Spoken Language, WISC-IV, ADI-R  **Groups:**  **G1:** intervention  **G2:** wait-list control  **Provider:**   * Staff were undergraduate and graduate students.   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  Yes  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 17  **G2:** 18 **N at follow-up:**  **G1:** NR  **G2:** NR | **Inclusion criteria:**   * prior clinical diagnosis of HFASD * Wechsler Intelligence Scale test for Children-4th edition short form IQ > 70 (and verbal comprehension index or perceptual reasoning index score ≥ 80) * Comprehensive Assessment of Spoken Language short form expressive or receptive language >80 * score meeting ASD criteria on ADI-R   **Exclusion criteria:**   * IQ a/o language score below minimum * elevated physical aggression   **Age, mean/yrs (range):**  **G1:** 9.24 ± 1.64  **G2:** 9.39 ± 1.91  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%)  **G1:** 14 (82.4)  **G2:** 16 (88.9)  F, n (%) **G1:** 3 (17.6)  **G2:** 2 (11.1)  **Race/ethnicity, n (%):**  White **G1:** 14 (82.4)  **G2:** 14 (77.8)  African American  **G1:** 1 (5.9)  **G2:** 1 (5.6)  Hispanic  **G1:** 1 (5.9)  **G2:** 0  Asian American  **G1:** 0  **G2:** 1 (5.6)  Other  **G1:** 1 (5.9)  **G2:** 2 (11.1)  **SES:**  Parent education, years mean :  **G1:** 15.32 ± 2.42  **G2:** 14.69 ± 1.21  **Diagnostic approach:**  In Study/Referral  **Diagnostic category, n (%):**  HFA  **G1:** 1 (5.9)  **G2:** 0  PDD-NOS  **G1:** 3 (17.6)  **G2:** 6 (33.3)  Asperger syndrome  **G1:** 13 (76.5)  **G2:** 12 (66.7)  **Other characteristics**, n (%)**:** WISC-IV Short form IQ, mean ± SD:  **G1:** 104.26 ± 14.13  **G2:** 103.42 ± 13.26  CASL Expressive Language  **G1:** 101.29 ± 13.90  **G2:** 99.17 ± 13.54  CASL Receptive Language  **G1:** 102.88 ± 15.59  **G2:** 109.44 ± 13.71  ADI-R Social  **G1:** 19.59 ± 5.50  **G2:** 16.22 ± 5.66  ADI-R Communication  **G1:** 14.00 ± 5.61  **G2:** 13.72 ± 4.87  ADI-R Repetitive Behavior  **G1:** 6.65 ± 2.06  **G2:** 6.11 ± 2.17 | ASC Total Score, mean ± SD  **G1:** 107.29 ± 19.85  **G2:** 102.82 ± 17.65  SRS Total Score  **G1:** 83.24 ± 17.27  **G2:** 83.06 ± 12.61  BASC-2 PRS withdrawal  **G1:** 72.65 ± 17.34  **G2:** 71.53 ± 16.07  BASC-2 PRS Social Skills  **G1:** 36.53 ± 9.00  **G2:** 33.94 ± 4.96  SKA Total  **G1:** 33.74 ± 13.00  **G2:** 36.11 ± 14.28  DANVA-2 Child Faces  **G1:** 93.79 ± 12.59  **G2:** 94.67 ± 18.76  CASL Idioms  **G1:** 9.94 ± 6.02  **G2:** 11.65 ± 7.66 | ASC Total Score, mean ± SD  **G1:** 118.65 ± 12.82  **G2:** 100.59 ± 21.63  SRS Total Score  **G1:** 75.24 ± 13.54  **G2:** 84.29 ± 13.84  BASC-2 PRS  **G1:** 69.76 ± 13.86  **G2:** 74.53 ± 14.50  BASC-2 PRS Social Skills  **G1:** 40.94 ± 6.04  **G2:** 34.94 ± 7.16  SKA Total  **G1:** 50.47 ± 17.58  **G2:** 34.11 ± 13.22  DANVA-2 Child Faces  **G1:** 97.94 ± 12.36  **G2:** 94.22 ± 20.75  CASL Idioms  **G1:** 12.65 ± 6.22  **G2:** 11.94 ± 7.79  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Venker et al.  2012[58](#_ENREF_58)  **Country:** US  **Intervention setting:**  Research clinic  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  More than Words (MTW) a parent training intervention that teaches parents how to better understand children’s communication and adapt their interactions to support language learning  Five parent education sessions (two hours each) and two individual coaching sessions (45 min each) plus a small group component on twice weekly basis led by graduate student  **Assessments:** Preschool Language Scale, Mullen Scales of Early Learning, Infant and Toddler forms of MacArthur Communicative Development Inventory (CDI)  Pre-treatment and post-treatment (approximately 10 weeks)  **Groups:**  **G1:** MTW immediate treatment  **G2:** delayed treatment  **Provider:**   * Hanen certified speech language pathologist   **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 7  **G2:** 7  **N at follow-up:**  **G1: 7**  **G2: 7** | **Inclusion criteria:**   * NR (Families recruited from an ongoing longitudinal study of language development in autism)   **Exclusion criteria:** NR  **Age, mean/mos ± SD (range): G1+G2:** 41.14 ± 10.40 (28-68)  **Mental age, mean/yrs (range):** NR  **Sex:** NRRace/ethnicity, n (%):  NR  **SES:** NR  **Diagnostic approach:**  Referral  Diagnostic tool/method:  Confirmed in study with ADOS or ADI-R  **Diagnostic category, n (%):** ASD (100)  **Other characteristics**, **mean ± SD (range):** ADOS severity score  **G1+G2**: 8 ± 2.13 (4-10)  Preschool language scale-4 Auditory comprehension age equivalent months  **G1+G2**: 14.79 ± 7.04 (6-32)  Preschool language scale-4 Expressive communication age equivalent months  **G1+G2**: 20.21 ± 7.47 (12-41)  Communicative Development Inventory (CDI) words understood (infant form**)**  **G1+G2**: 181 ± 143.05 (20-396)  CDI Words produced infant form  **G1+G2**: 108.23 ± 151.00 (0-384)  CDI words produced toddler form  **G1+G2**: 148.38 ± 223.87 (0-657)  Mullen Visual reception age equivalent  **G1+G2**: 28.79 ± 13.80 (12-60) | Parent Variables, mean ± SD (range):  Follow-in commenting  **G1:** 53.43 ± 24.35 (14-75)  **G2:** 73.86 ± 25.91 (42-125)  Linguistic mapping and expansions  **G1:** 0.14 ± 0.38 (0-1)  **G2:** 0.71 ± 0.76 (0-2)  Prompts  **G1:** 1.14 ± 1.46 (0-4)  **G2:** 3.14 ± 3.29 (0-8)  Redirects  **G1:** 14.00 ± 8.58 (2-28)  **G2:** 12.29 ± 10.00 (3-32)  Child Variables, mean ± SD (range):  Prompted communication acts  **G1:** 0.29 ± 0.49 (0-1)  **G2:** 2.00 ± 2.24 (0-6)  Spontaneous verbal communication acts  **G1:** 1.29 ± 3.40 (0-9)  **G2:** 11.71 ± 13.70 (0-34)  Spontaneous nonverbal communication acts  **G1:** 0.57 ± 0.79 (0-2)  **G2:** 0.57 ± 0.53 (0-1) | Parent Variables, mean ± SD (range):  Follow-in commenting  **G1:** 74.57 ± 33.51 (31-111)  **G2:** 73.00 ± 19.04 (47-100)  Linguistic mapping and expansions  **G1:** 7.57 ± 7.37 (0-21)  **G2:** 1.57 ± 1.81 (0-5)  Prompts  **G1:** 13.43 ± 11.91 (0-32)  **G2:** 1.43 ± 2.30 (0-6)  Redirects  **G1:** 4.29 ± 3.35 (1-10)  **G2:** 14.29 ± 15.39 (0-45)  Child Variables, mean ± SD (range):  Prompted communication acts  **G1:** 9.71 ± 14.08 (0-40)  **G2:** 1.86 ± 2.67 (0-7)  Spontaneous verbal communication acts  **G1:** 4.71 ± 6.13 (0-15)  **G2:** 12.57 ± 19.81 (0-54)  Spontaneous nonverbal communication acts  **G1:** 2.43 ± 3.15 (0-9)  **G2:** 2.14 ± 2.73 (0-7)  **Proportion of parents and children who improved, n**  Follow-in commenting  **G1:** 7  **G2:** 4  p=0.037  Linguistic mapping and expansions  **G1:** 6  **G2:** 3  p=0.070  Prompts  **G1:** 6  **G2:** 1  p=0.007  Redirects  **G1: 6**  **G2:** 3  p=0.070  Prompted communication acts  **G1:** 5  **G2:** 1  p=0.022  Spontaneous verbal communication acts  **G1:** 5  **G2:** 3  p=0.172  Spontaneous nonverbal communication acts  **G1:** 5  **G2: 3**  p=0.172  **Group comparisons of parents and child variables, median gain score**  Follow-in commenting  **G1:** 17  **G2:** 9  p=0.029  Linguistic mapping and expansions  **G1:** 6  **G2:** 0  p=0.025  Prompts  **G1:** 12  **G2:** -1  p=0.002  Redirects  **G1:** -7  **G2:** 1  p=0.004  Prompted communication acts  **G1:** 4  **G2: -**1  p=0.007  Spontaneous verbal communication acts  **G1:** 1  **G2:** 0  p=0.196  Spontaneous nonverbal communication acts  **G1:** 1  **G2: 0**  p=0.320  **Harms:** NR  **Modifiers:** NR |

**Comments:** all reported p-values from one-tailed test

**Table C-1. Evidence table, continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Williams et al.  2012[59](#_ENREF_59)  **Country:**  Australia  **Intervention setting:** home  **Enrollment period:**  October 2009 to January 2011  **Funding:**  Financial Marets Foundation for Children, Australia  **Design:** RCT | **Intervention:**  *Transporters* DVD has 15 five minute episodes. Watched at home for 15 minutes/day over 4 weeks  Control group watched Thomas the Tank DVD- series 5  **Assessments:** WPPSI-III; Socialization Domain of Vineland-II; ADOS; emotion identification and emotion masking tasks; NEPSY-II affect recognition and Theory of Mind (TOM) tasks  Baseline, post intervention and three month follow-up.  **Groups:**  **G1:** intervention DVD  **G2:** control DVD  **Provider:**   * Clinician conducted assessments   **Treatment manual followed:** NR  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** Yes parents completed daily diary recording DVD viewing hours  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 29  **G2:** 31  **N at follow-up:**  **G1:** 28  **G2:** 27 | **Inclusion criteria:**   * met criteria for diagnosis of autistic disorder based on current assessments including ADOS and case review * age 4-7 at baseline * able to complete WPPSI-III cognitive assessment at baseline or within previous 12 months (cognitively ≥ 30 months) * not previously watched the *Transporters*   **Exclusion criteria:** NR  **Age, mean/mos ± SD (range):**  **G1:** 62.83 ± 11.17 (48.20-84.24  **G2:** 61.93 ± 9.91 (48.10-83.09)  **Mental age, mean ± SD (range):**  WPPSI FSIQ  **G1:** 77.93 ± 13.96 (54-107)  **G2:** 74.56 ± 13.59 (42-96)  **Sex:**  M, %:  **G1:** 89.3  **G2:** 85.2  **Race/ethnicity, n (%):**  NR  **SES:** NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  ADOS  **Diagnostic category, n (%):**  Autism = NR  PDD-NOS = NR  Aspergers = NR  **Other characteristics**, n (%)**:**  **ADOS Severity scores, mean ± SD G1:** 6.79 ± 1.5  **G2:** 7.56 ± 2.29  WPPSI VIQ, mean ± SD  **G1:** 73.61 ± 14.26 (48-93)  **G2:** 74.33 ± 14.59 (46-107)  WPPSI PIQ, mean ± SD  **G1:** 87.89 ± 16.24 (59-122)  **G2:** 82.22 ± 15.57 (47-112)  DVD hours, mean ± SD  **G1:** 11.76 ± 9.16 (3.33-47.12)  **G2:** 7.41 ± 3.21 (1.58-14.67)  P= 0.03  F SIQ  , %  < 69  **G1:** 25.0  **G2:** 33.3  70-79  **G1:** 32.1  **G2:** 33.3  ‘> 79  **G1:** 42.9  **G2:** 33.3 | **Identification of emotions, mean ± SD**  Total emotions (max score 12)  **G1:** 8.12 ± 2.62  **G2:** 7.00 ± 2.32  Happiness (max score 3)  **G1:** 2.68 ± 0.56  **G2:** 2.42 ± 0.83  Sadness (max score 3)  **G1:** 1.64 ± 1.08  **G2:** 1.17 ± 0.82  Anger (max score 3)  **G1:** 1.88 ± 1.09  **G2:** 1.58 ± 1.14  Fear (max score 3)  **G1:** 1.92 ± 1.15  **G2:** 1.79 ± 1.06  **Matching of emotions, mean ± SD**  Total emotions (max score 16)  **G1:** 10.64 ± 4.08  **G2:** 10.63 ± 3.77  Happiness (max score 4)  **G1:** 3.21 ± 1.17  **G2:** 3.04 ± 1.22  Sadness (max score 4)  **G1:** 2.68 ± 1.31  **G2:** 2.41 ± 1.39  Anger (max score 4)  **G1:** 2.00 ± 1.54  **G2:** 2.41 ± 1.34  Fear (max score 4)  **G1:** 2.75 ± 1.30  **G2:** 2.74 ± 1.26  **NEPSY-II, mean ± SD**  Affect recognition (max score 25)  **G1:** 12.33 ± 4.20  **G2:** 12.72 ± 3.53  TOM verbal (max score 15)  **G1:** 7.60 ± 3.68  **G2:** 6.28 ± 3.10  TOM contextual (max score 6)  **G1:** 3.63 ± 1.67  **G2:** 2.83 ± 1.10  **Mindreading and social skill, mean ± SD**  Mindreading situational (max score 6)  **G1:** 4.35 ± 1.50  **G2:** 4.55 ± 1.91  Mindreading desire based (max score 6)  **G1:** 4.22 ± 1.59  **G2:** 4.00 ± 1.29  **Vineland-II socialization domain**, **mean ± SD**  **G1:** 74.22 ± 13.66  **G2:** 71.93 ± 9.94 | **Time 3 (3 month follow-up)**  **Identification of emotions, mean ± SD**  Total emotions (max score 12)  **G1:** 9.00 ± 2.29  **G2:** 7.36 ± 3.25  Happiness (max score 3)  **G1:** 2.88 ± 0.33  **G2:** 2.52 ± 0.96  Sadness (max score 3)  **G1:** 1.80 ± 1.08  **G2:** 1.40 ± 1.19  Anger (max score 3)  **G1:** 2.12 ± 1.05  **G2:** 1.84 ± 1.07  Fear (max score 3)  **G1:** 2.20 ± 0.87  **G2:** 1.64 ± 1.11  **Matching of emotions, mean ± SD**  Total emotions (max score 16)  **G1:** 11.82 ± 3.66  **G2:** 10.26 ± 4.11  Happiness (max score 4)  **G1:** 3.61 ± 0.79  **G2:** 3.30 ± 1.10  Sadness (max score 4)  **G1:** 2.79 ± 1.34  **G2:** 2.48 ± 1.37  Anger (max score 4)  **G1:** 2.54 ± 1.23  **G2:** 2.00 ± 1.44  Fear (max score 4)  **G1:** 2.89 ± 1.17  **G2:** 2.48 ± 1.25  **NEPSY-II, mean ± SD**  Affect recognition (max score 25)  **G1:** 16.00 ± 4.66  **G2:** 13.17 ± 3.43  TOM verbal (max score 15)  **G1:** 9.67 ± 3.27  **G2:** 6.94 ± 3.40  TOM contextual (max score 6)  **G1:** 3.70 ± 1.49  **G2:** 3.80 ± 1.40  **Mindreading and social skill, mean ± SD**  Mindreading situational (max score 6)  **G1:** 5.05 ± 0.91  **G2:** 4.50 ± 1.61  Mindreading desire based (max score 6)  **G1:** 4.32 ± 1.46  **G2:** 4.42 ± 1.54  **Vineland-II socialization domain**, **mean ± SD**  **G1:** 76.35 ± 13.11  **G2:** 73.52 ± 9.80  **Harms:** NR  **Modifiers:** NR    **Predictors**  Age and VIQ were predictors for outcome measures |

**Comments:** Attrition problems due to challenging behaviors interfering with intervention adherence

**Table C-1. Evidence table, continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Young et al.  2012[60](#_ENREF_60)  **Country:**  Australia  **Intervention setting:** Home  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  *The Transporters* DVD children’s animated series designed to enhance emotion recognition and social understanding  Control group watched *Thomas the Tank Engine* DVD. Both groups received user guides. Participants were asked to watch at least 3 episodes per day for 3 weeks. Parents kept log books.  **Assessments:** Wechsler Scales (WPPSI-III or WISC-IV subtests) to measure non-verbal and general language abilities; Affect Recognition subset of NEPSY-II and the Faces Task; Parent SCQ  **Groups:**  **G1:** *The Transporters* DVD  **G2:** Thomas the Tank DVD  **Provider:**  Parent/Caregiver  **Treatment manual followed:** NR  **Defined protocol followed:** No  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 13  **G2:** 12  **N at follow-up:**  **G1:** 13  **G2:** 12 | **Inclusion criteria:**   * children between 4 and 8 years old * met DSM-IV criteria for PDD * minimum score of 11 on Social Communication Questionnaire (SCQ)   **Exclusion criteria:** NR  **Age, mean/yrs (range):**  **G1 + G2:** (4-8)  **Mental age, mean/yrs (range):** NR  **Sex:** NRRace/ethnicity, n (%):  NR  **SES:** NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  DSM-IV  **Diagnostic category, n (%):**  Autism =NR  PDD-NOS =NR  Aspergers =NR  **Other characteristics**, n (%)**:** Autism severity scale, mean ± SD:  **G1:** 18.38 ± 5.59  **G2:** 18.08 ± 4.81  Block Design, mean ± SD:  **G1:** 11.31 ± 4.17  **G2:** 8.67 ± 4.05  Comprehension, mean ± SD:  **G1:** 7.08 ± 5.06  **G2:** 3.67 ± 3.87  Vocabulary, mean ± SD:  **G1:** 9.62 ± 4.39  **G2:** 7.83 ± 2.92 | NEPSY-II affect recognition, mean ± SD:  **G1:** 6.15 ± 3.26  **G2:** 6.75 ± 3.62  Faces task, mean ± SD:  **G1:** 10.62 ± 3.64  **G2:** 8.58 ± 3.92  Social behavior, mean ± SD  Social peer interest  **G1:** 3.15 ± 1.21  **G2:** 2.50 ± 0.81  Eye Contact  **G1:** 2.92 ± 1.10  **G2:** 2.83 ± 1.03  Gaze Aversion  **G1:** 3.00 ± 1.00  **G2:** 3.08 ± 1.24  Stereotyped behavior  **G1:** 2.15 ± 1.07  **G2:** 2.58 ± 1.16 | **Social skills**  NEPSY-II affect recognition, mean ± SD:  **G1:** 12.00 ± 3.71  **G2:** 6.42 ± 3.23  Faces task, mean ± SD:  **G1:** 14.08 ± 3.59  **G2:** 9.33 ± 4.05  Social behavior, mean ± SD  Social peer interest  **G1:** 3.31 ± 1.18  **G2:** 2.92 ± 1.10  Eye Contact  **G1:** 3.46 ± 0.78  **G2:** 3.42 ± 1.08  Gaze Aversion  **G1:** 3.00 ± 1.21  **G2:** 2.85 ± 0.80  Stereotyped behavior  **G1:** 2.15 ± 1.07  **G2:** 2.50 ± 1.09  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Begeer et al.,  2011[61](#_ENREF_61)  **Country:**  Netherlands  **Intervention setting:**  Academic center  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  Theory of Mind training, including 16 weekly sessions of 1.5 hrs each, with parent involvement in last 15 minutes of each session  **Assessments:** standardized child interviews and assessments, parent report  **Groups:**  **G1:** Theory of Mind intervention  **G2:** wait list controls  **Provider:**   * Certified therapists   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 20  **G2:** 20  **N at follow-up:**  **G1:** 19  **G2:** 17 | **Inclusion criteria:**   * clinical diagnosis within the autism spectrum * IQ scores within the normal range (> 70) * age 8-13 years old  **Exclusion criteria:** * see inclusion criteria   **Age, mean/yrs;months ± SD (range):**  **G1:** 10;3 ± 1;3 (8;5 – 13;7)  **G2:** 10;3 ± 1;1 (8;3 – 12;7)  **Mental age, mean ± SD (range):**  Full-scale IQ:  **G1:** 100.1 ± 15.3 (79 - 133)  **G2:** 103.3 ± 12.9 (82 – 126)  Verbal IQ:  **G1:** 101.3 ± 16.2 (68 – 123)  **G2:** 109.1 ± 11.1 (89 – 130)  Nonverbal IQ:  **G1:** 98.4 ± 16.8 (73 – 132)  **G2:** 96.6 ± 17.9 (67 – 125)  **Sex:**  M, n (%):  **G1:** 18 (94.7)  **G2:** 15 (88.2)  F, n (%): **G1:** 1 (5.3)  **G2:** 2 (11.8)  **Race/ethnicity, n (%):** NR  **SES:** NR    **Diagnostic approach:**  In Study  Diagnostic tool/method: DSM-IV-TR, SRS and/or ASQ  **Diagnostic category, n (%):** Autism  **G1:** 2  **G2:** 0  PDD-NOS  **G1:** 14  **G2:** 10  Aspergers  **G1:** 3  **G2:** 7  **Other characteristics**, n (%)**:** Autism quotient score, mean ± SD:  **G1:** 125.7 ± 19.4  **G2:** 138.9 ± 19.8  Social responsiveness scale, mean ± SD:  **G1:** 74.9 ± 21.6  **G2:** 80.2 ± 22.54 | **Social skills, mean ± SD:**  Theory of Mind total score:  **G1:** 50.89 ± 5.31  **G2:** 54.00 ± 5.93  Theory of Mind precursors:  **G1:** 18.05 ± 1.51  **G2:** 17.94 ± 1.89  Elementary Theory of Mind:  **G1:** 25.10 ± 3.30  **G2:** 27.59 ± 3.12  Advanced Theory of Mind scale:  **G1:** 7.44 ± 1.00  **G2:** 8.47 ± 1.91  LEAS-C total:  **G1:** 32.89 ± 8.64  **G2:** 31.53 ± 5.95  LEAS-C mixed emotions:  **G1:** 1.83 ± 1.72  **G2:** 2.94 ± 3.11  LEAS-C complex emotions:  **G1:** 1.89 ± 2.87  **G2:** 4.52 ± 4.45  Self-reported empathy:  **G1:** 3.95 ± 2.07  **G2:** 4.65 ± 2.18  CSBQ:  **G1:** 36.67 ± 14.76  **G2:** 42.94 ± 13.77  ±  **Commonly occurring co-morbidities**  ADHD:  **G1:** 4  **G2:** 3  Learning disorder:  **G1:** 1  **G2:** 0 | **Social skills, mean ± SD:**  Theory of Mind total score:  **G1:** 58.21 ± 4.00  **G2:** 58.00 ± 5.78  p=0.03  Theory of Mind precursors:  **G1:** 19.37 ± 1.38  **G2:** 19.05 ± 1.71  p=NS  Elementary Theory of Mind:  **G1:** 29.84 ± 2.36  **G2:** 29.24 ± 3.70  p=0.005  Advanced Theory of Mind scale:  **G1:** 9.00 ± 2.11  **G2:** 9.71 ± 1.45  p=NS  LEAS-C total:  **G1:** 37.72 ± 10.73  **G2:** 33.47 ± 6.40  p=NS  LEAS-C mixed emotions:  **G1:** 4.72 ± 5.40  **G2:** 2.24 ± 3.19  p=0.02  LEAS-C complex emotions:  **G1:** 4.16 ± 4.40  **G2:** 1.71 ± 3.06  p=0.001  Self-reported empathy:  **G1:** 4.00 ± 2.62  **G2:** 4.41 ± 2.11  p=NS  CSBQ:  **G1:** 34.80 ± 17.60  **G2:** 40.00 ± 14.54  p=NS  **Harms:** NR  **Modifiers**  PDD-NOS group performed similar to the overall analysis, including treatment effects on total Theory of Mind score (p<0.05), elementary Theory of Mind tasks (p<0.05), understanding of mixed emotions and complex emotions (both p<0.05). The high-functioning autism/Asperger group only showed improvement on understanding of complex emotions (p<0.01). No effect of ASD diagnostic group on self-reported empathy or parent reported social skills. |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Carter et al.  2011[62](#_ENREF_62)  **Country:** US  **Intervention setting:**  Clinic and home  **Enrollment period:** NR  **Funding:**  Autism Speaks and Marino Autism Research Institute  **Design:** RCT conducted at 3 sites | **Intervention:**  Hanen’s “More than Words” (MTW) over 3.5 months; 8 group sessions with parents only and 3 in-home individualized parent –child sessions  Time 2: 5 months (m = 5.3, sd = .47)  Time 3: 9 months (m = 9.3, sd = .56)  **Assessments:** Screening Tool for Autism in Two year olds (STAT), Mullen Scales of Early Learning (MSEL), Vineland Adaptive Behavior Scales – Second Edition (VABS), Autism Diagnostic Observatoin Schedule (ADOS), Parent Interview Autism-Clinical Version, Early Social Communication Scales, Parent Child Free Play procedure, Parent Interview for Autism – Clinical Version, Developmental Play Assessment, questionnaires assessing parent treatment satisfaction  **Groups:**  **G1:** intervention (MTW)  **G2:** control (“business as usual”)  **Provider:**   * Speech/language pathologist and parent   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  No  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 32  **G2:** 30  **N at follow-up:**  **G1:** 29  **G2:** 26 | **Inclusion criteria:**  see below  **Exclusion criteria:**   * child > 24 months * genetic disorder * failed to obtain predetermined “at risk” score on STAT and/or did not meet symptom criteria for ASD based on expert clinical impression * Fragile X diagnosis   Age, mean/months ± SD (range):  **G1:** 21.11 ± 2.71  **G2:** 21.51 ± 2.82  **Mental age, mean/yrs (range):** NR    **Sex:**  M, 51 (82%) F, 11 (18%)  **Race/ethnicity, (%):**  White (47.4) Asian /White (5.3)  Hispanic or Latino (38.6)  Black (3.5)  American Indian/Alaskan Native/White (3.5)  American Indian/Alaskan Native /Hispanic (1.8)  **SES:**  Maternal education, (%):  High school (16) Some college, an associate’s degree or vocational/trade degree (33)  College degree (35  Advanced degree (16)  Household income, mean (range):    **Diagnostic approach:**  Referral  Diagnostic tool/method:  ADOS and DSM-IV-based clinical impressions of a clinical psychologist familiar with ASD in early childhood  **Diagnostic category, n (%):**  Autism 46/50 (92%) at Time 3  PDD-NOS - NR  Aspergers - NR  **Other characteristics**, n (%)**:** NR | Mullen Expressive Language Age (mos), mean ± SD  **G1:** 8.22 ± 6.01  **G2:** 7.33 ± 3.71  Mullen Receptive Language Age (mos), mean ± SD  **G1:** 8.41 ± 5.42  **G2:** 8.17 ± 4.44  Vineland Socialization SS, mean ± SD  **G1:** 73.95 ± 6.46  **G2:** 72.42 ± 6.59  Vineland Communication SS, mean ± SD  **G1:** 66.61 ± 12.87  **G2:** 63.21 ± 9.13  Parent-Child Free Play (PCFP) proportion of codable intervals with parental responsivity, mean ± SD  **G1:** 0.32 ± 0.06  **G2:** 0.29 ± 0.08  ESCS initiating joint attention, mean ± SD  **G1:** 5.90 ± 5.41  **G2:** 5.59 ± 6.14  ESCS initiating behavior requests, mean ± SD  **G1:** 11.87 ± 10.09  **G2:** 9.00 ± 6.22  PCFP weighted frequency of intentional communication, mean ± SD  **G1:** 5.55 ± 6.29  **G2:** 8.20 ± 12.63  PIA-CV nonverbal communication, mean ± SD  **G1:** 2.30 ± 0.64  **G2:** 2.28 ± 0.73 | **Social skills:**  Vineland Socialization SS, mean ± SD  **G1:** 71.42 ± 7.07  **G2:** 70.70 ± 6.89  PCFP proportion of codable intervals with parental responsivity, mean ± SD  **G1:** 0.34 ± 0.07  **G2:** 0.30 ± 0.10  T1 to T3 residualized gain scores, mean ± SD  Effect size (95% CI)  **G1:** 0.03 ± 0.08  **G2:** -0.02 ± 0.10  0.50 (-0.18, 1.18)  **Communication/ language:**  ADOS Social-Communication Total  **G1:** 15.56 ± 4.56  **G2:** 13.60 ± 4.89  Mullen Expressive Language Age (mos), mean ± SD  **G1:** 16.20 ± 7.23  **G2:** 16.68 ± 7.88  Mullen Receptive Language Age (mos), mean ± SD  **G1:** 15.52 ± 6.93  **G2:** 17.48 ± 8.33  Vineland Communication SS, mean ± SD  **G1:** 76.14 ± 13.85  **G2:** 76.43 ± 14.05  ESCS initiating joint attention, mean ± SD  **G1:** 10.33 ± 9.82  **G2:** 8.68 ± 9.26  T1 to T3 residualized gain scores, mean ± SD  Effect size (95% CI)  **G1:** 0.06 ± 1.21  **G2:** -0.06 ± 1.01  0.12 (-0.46, 0.70)  ESCS initiating behavior requests, mean ± SD  **G1:** 16.50 ± 14.33  **G2:** 15.48 ± 13.20  T1 to T3 residualized gain scores, mean ± SD  Effect size (95% CI)  **G1:** 0.03 ± 0.34  **G2:** -0.03 ± 0.37  0.16 (-0.42, 0.74)  PCFP weighted frequency of intentional communication, mean ± SD  **G1:** 18.91 ± 20.50  **G2:** 20.75 ± 21.14  T1 to T3 residualized gain scores, mean ± SD  Effect size (95% CI)  **G1:** 0.18 ± 1.69  **G2:** -0.16 ± 2.21  0.15 (-0.57, 0.88)  PIA-CV nonverbal communication, mean ± SD  **G1:** 2.89 ± 0.67  **G2:** 2.92 ± 0.65  T1 to T3 residualized gain scores, mean ± SD  Effect size (95% CI)  **G1: -**0.05 ± 0.63  **G2:** 0.06 ± 0.58  -0.19 (-0.81, 0.43)  **Adaptive behavior:**  Vineland Daily Living SS:  **G1:** 77.84 ± 7.07  **G2:** 72.95 ± 10.11  **Motor skills:**  Mullen Fine Motor Age (mos):  **G1:** 22.00 ± 3.50  **G2:** 21.92 ± 4.09  Vineland Motor SS:  **G1:** 83.16 ± 7.36  **G2:** 81.55 ± 9.26  **Educational/ cognitive/ academic attainment:**  Mullen Visual Reception Age (mos)  **G1:** 22.42 ± 5.75  **G2:** 21.64 ± 6.53  Mullen Early Learning Composite:  **G1:** 62.88 ± 18.41  **G2:** 64.88 ± 13.94  **Harms:** NR  **Modifiers**  Treatment effects on child communication games to Time 3 were moderated by children’s Time 1 object interest. Children with lower levels of T1 object interest (playing with fewer than 3 toys) had greater facilitated growth in communication; higher levels of object interest (playing with more than 5 or 6 toys) led to growth attenuation |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Castorina et al., 2011 [63](#_ENREF_63)  **Country:**  Australia  **Intervention setting:** Clinic  **Enrollment period:** NR  **Funding:** NR  **Design:**  Partially randomized (first 15 participants randomly assigned to one of 3 groups; later recruits assigned based on whether they had an older sibling; if no sibling, randomly assigned to “no sibling” training or wait-list control group) | **Intervention:**  Social skills training, adapted from training package by Spence (1995), 8 weekly 2-hour sessions  **Assessments:** observed/standardized assessment by study staff; parent report; teacher report  **Groups:**  **G1:** social skills training with older sibling (no more than 4 years older than subject)  **G2:** social skills training alone  **G3:** wait-list control  **Provider:**  Co-therapists (Master of Psychology students) supervised by a clinical psychologist  **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 7  **G2:** 8  **G3:** 6  **N at follow-up:**  **G1:** 7  **G2:** 8  **G3:** 6 | **Inclusion criteria:**   * boys between ages of 8 and 12 years * diagnosis of Asperger syndrome   **Exclusion criteria:**   * female **Sex** * age younger than 9 or older than 12   **Age, mean/yrs ± SD:**  10.30 ± 1.15  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%): 21 (100) F, n (%): 0  **Race/ethnicity, n (%):**  White Asian  **SES:**  Maternal education, n (%):  High school  College  NR  Household income, mean (range): NR  **Diagnostic approach:**  In Study and Referral:  Referral (previous diagnosis of Asperger syndrome by a specialist diagnostic team)  In study (parent questionnaire and cross-referencing tool)  Diagnostic tool/method:  Autism Spectrum Screening Questionnaire (ASSQ), by semi-structured interview of parents; Australian Scale for Aspberger’s Syndrome (ASAS), for cross-referencing, by semi-structured interview of parents  **Diagnostic category, n (%):**  Autism: 0  PDD-NOS : 0  Aspergers: 21 (100)  **Other characteristics**, n (%)**:**  Attending mainstream primary school: 21 (100) | **Social skills:**  SSRS-parents (general social skills), mean ± SD:  Pre-test, mean ± SE  **G1:** NR  **G2:** NR  **G3:** NR  Overall:33.50 ± 2.16  SSRS-teachers (general social skills), mean ± SD:  NR  CASP Cues (Social competence), mean ± SD:  Pre-test (p=.52)  **G1:** 14.00 ± 8.33  **G2:** 15.50 ± 7.69  **G3:** 10.67 ± 7.26  CASP Emotions, mean ± SD:  Pre-test, mean ± SE  **G1:** NR  **G2:** NR  **G3:** NR  **Overall:** 16.15 ± 1.40 | **Social skills:**  SSRS-parents (general social skills), mean ± SD:  Post-test, mean ± SE  **G1:** NR  **G2:** NR  **G3:** NR  **Overall:** 35.96 ± 2.32  3-month follow-up, mean ± SE  **G1:** NR  **G2:** NR  **G3:** NR  **Overall:** 40.49 ± 1.34  SSRS-teachers (general social skills), mean ± SD:  Post-test  NR  3-month follow-up: NR  CASP Cues (Social competence), mean ± SD:  Post-test  **G1:** 38.00 ± 12.46  **G2:** 37.50 ± 6.59  **G3:** 15.33 ± 7.47  Between groups: p<0.001  G1+G2 vs. G3: p<0.001  3-month follow-up:  **G1:** 34.43 ± 9.78  **G2:** 38.88 ± 10.56  **G3:** 13.17 ± 8.38  Between groups: p<0.001  **G1 vs. G3:** p=0.003  **G2 vs. G3:** p<0.001  **G1 vs. G2:** p=NS  CASP Emotions, mean ± SD:  Post-test, mean ± SE  **G1:** NR  **G2:** NR  **G3:** NR  **Overall:** 20.84 ± 1.4  Between groups over time: p=NS  G1 and G2 vs. baseline: p<0.001  G3 vs. baseline: p=NS  3-month follow-up, mean ± SE  **G1:** NR  **G2:** NR  **G3:** NR  **Overall:** 21.32 ± 1.53  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  DeRosier et al.  2011[64](#_ENREF_64)  **Country:** US  **Intervention setting**: Private, community based practice  **Enrollment period:** NR  **Funding:** NIMH  **Design:** RCT | **Intervention:**Social  skills intervention, Social Skills GRoup INtervention-High  Functioning Autism (S.S.GRIN-HFA)  Fifteen 60-minute group social skills sessions during consecutive weeks. Parents attended and participated in four of the sessions (1, 5, 10, and 15) with their child. Children in the  traditional S.S.GRIN condition participated in ten 60-min group sessions during consecutive weeks  **Assessments:** Parents completed: Demographic questionnaire, Social Responsiveness Scale (SRS), Achieved Learning Questionnaire (ALQ). Child completed Social Dissatisfaction Questionnaire.  Parent and Child completed Social Self-efficacy. Completed 2 weeks before intervention and within two weeks after treatment.  **Groups:**  **G1:** S.S.GRIN-HFA  **G2:** Traditional  S.S.GRIN-control  **Provider:**  Trained group leaders with experience conducting social  skills groups with children  **Treatment manual followed:** yes  **Defined protocol followed:** yes  **Measure of treatment fidelity reported**: yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 27  **G2:** 28  **N at follow-up:**  **G1:** 27  **G2:** 28 | **Inclusion criteria:**   * between ages of 8 and 12 years * prior diagnosis of high functioning autism, Asperger’s Disorder, or Pervasive Developmental Disorder-NOS (by parent report) * IQ ≥ 85   **Exclusion criteria:**   * children with CBCL * Aggressive scale T score > 70   **Age, mean ± SD yrs (range): (**8-12 years) **G1:** 10.2 ± 1.3 **G2:** 9.9 ± 1.1  **Mental age, mean/yrs (range):** IQ ≥ 85  **Sex:**  Male, %  **G1:** 96.3  **G2:** 100  **G1+G2:** 98.2  **Race/ethnicity, %:**  White  **G1:** 89  **G2:** 96  Asian  **G1:** 7  **G2:** 0  African American  **G1:** 0  **G2:** 4  American Indian  **G1:** 4  **G2:** 0  **SES:**  Maternal education  College degree or greater, %  **G1:** 66.7  **G2:** 88.5  **G1+G2:** 78.2  Household income, %  $25,001-$50,000  **G1:** 22.2  **G2:** 10.7  **G1+G2:** 16.4  $50,001-$75,000  **G1:** 18.5  **G2:** 10.7  **G1+G2:** 14.5  $75,001-$100,000  **G1:** 22.2  **G2:** 35.7  **G1+G2:** 29.1  >$100,00  **G1:** 37  **G2:**: 42.9  **G1+G2:** 40  **Diagnostic approach:**  Referral  **Diagnostic tool/method:**  SCQ, ASSQ, CAST  **Diagnostic category, %:**  Autism-high functioning: 42  PDD-NOS: 16  Asperger syndrome: 38  **Other characteristics**, n (%)**:** NR | **Mean ± SD:**  Parent report:  SRS total score  **G1:** 70.4 ± 6.1  **G2:** 68.0 ± 5.7  Awareness  **G1:** 70.1 ± 7.2  **G2:** 69.5 ± 7.4  Cognition:  **G1:** 70.9 ± 6.9)  **G2:** 69.7 ± 7.6    Communication:  **G1:** 69.6 ± 6.6  **G2:** 66.0 ± 5.1  p<0.05  Motivation:  **G1:** 65.4 ± 7.0  **G2:** 64.6 ± 10.1  Mannerisms:  **G1:** 61.0 ± 8.2  **G2:** 58.7 ± 9.7  Self-efficacy:  **G1:** 2.6 ± 0.7  **G2:** 2.8 ± 0.7  ALQ:  **G1:** 1.2 ± 0.3  **G2:** 1.4 ± 0.4  Child report:  Self-efficacy:  **G1:** 2.8 ± 0.6  **G2:** 2.5 ± 0.8  Social  Dissatisfaction:  **G1:** 54.6 ± 10.3  **G2:** 55.0 ± 11.2 | **Effect size:**  **Standardized change scores over time**  Parent report:  SRS, mean ± SD,  Effect size (Cohen’s d)  Awareness  **G1:** -0.33 ± 1.17  **G2:** 0.38 ± 0.86  ES=-.69  p< 0.05  Cognition:  **G1:** -0.13 ± 1.22  **G2:** 0.24 ± 0.97  ES= NS  p= NS  Communication:  **G1:** -0.38 ± 1.07  **G2:** 0.50 ± 0.78  ES=-0.94  p< 0.01  Motivation:  **G1:** -0.22 ± 0.77  **G2:** 0.31 ± 0 .82  ES= -0.67  p< 0.05  Mannerisms:  **G1:** -0.35 ± 1.18  **G2:** 0.35 ± 0.86  ES= -0.68  p< 0.05  ALQ:  **G1:** 0.33 ±(.86)  **G2:** -0.31 ±(.84)  ES= 0.75  p< 0.05  Self-efficacy:  **G1:** 0.28 ±(1.06)  **G2:** -0.25 ±(1.01)  ES = 0.51  Child report  Self-efficacy:  **G1:** -0.05 ± 1.06  **G2:** 0.08 ± 1.00  ES = NS  p= NS  Social dissatisfaction:  **G1:** 0.08 ± 1.23  **G2:** -0.07 ± 0.79  ES= NS  p= NS  **Harms:** NR  **Modifiers:** NR |

**Comments:** Three children in G1 dropped out of study and were excluded from analysis. Two parents in G2 were excluded from parent report analysis (mother filled out pre-assessments and father completed post-assessments).

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Drahota et al.  2011[65](#_ENREF_65)  **Country:** US  **Intervention setting:** clinic  **Enrollment period:** NR  **Funding:**  NIMH, Cure Autism Now Foundation, UCLA Center for Autism Research and Training  **Design:** RCT  Note: See earlier studies reporting on this population[66](#_ENREF_66), [67](#_ENREF_67) in 2011 AHRQ review[9](#_ENREF_9) | **Intervention:**  Cognitive behavioral therapy, 16 weekly sessions, 90 min (30 with child and 60 with parents) implementing the Building Confidence CBT program modified for use with children with ASD  **Assessments:** ADIS-C/P Clinical Severity Rating scale, VABS, Parent Child Interaction Questionnaire (PCIQ); Assessments at baseline and at final day or treatment or within one week; for control group post assessments were completed after 3 months  **Groups:**  **G1:** intervention  **G2:** waitlist  **Provider:**   * Therapists 11 doctoral students in clinical or educational psychology and 2 doctoral level psychologists   **Treatment manual followed:** Yes  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:** NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 17  **G2:** 23  **N at follow-up:**  **G1:** 14 (82)  **G2:** 22 (96) | **Inclusion criteria:**   * met research criteria for diagnosis of autism, Asperger syndrome or PDD-NOS * met research criteria for one of the following: separation anxiety disorder, social phobia or obsessive compulsive disorder * not taking any psychiatric medicine at baseline assessment or were taking a stable dose of psychiatric medicine (at least one month of same dosage prior to baseline) * if medication was being used, maintained same dosage during study   **Exclusion criteria:**   * verbal IQ < 70 (assessed in previous testing, or questions noted by independent examiner at baseline, on basis of Wechsler Intelligence Scale for Children IV * currently in psychotherapy or social skills training or receiving behavioral interventions such as applied behavioral analysis * family currently in family therapy or parenting class * child began taking psychiatric medication or changed dosage during the intervention * child or parents appeared unable to participate in intervention program   **Age, mean/yrs (range):**  **G1:** 9.18 ± 1.42  **G2:** 9.22 ± 1.57  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1:** 12 (71)  **G2:** 15 (65)  **Race/ethnicity, n (%):**  White  **G1:** 8 (47)  **G2:** 11 (48)  Latino/Latina  **G1:** 2 (12)  **G2:** 3 (13)  Asian  **G1:** 4 (23)  **G2:** 2 (9)  African American  **G1:** 0  **G2:** 1 (4)  Multiracial/other  **G1:** 3 (18)  **G2:** 6 (26)  **SES:**  Parental education, n (%):  Graduated College  **G1:** 12 (71)  **G2:** 13 (60)  Household income, (n=37):  < $40,000  **G1+G2:** 9 (24.3)  $40,001-$90,000  **G1+G2:** 10 (27.1)  Over $90,000  **G1+G2:** 18 (48.6)  **Diagnostic approach:**  Referral  Diagnostic tool/method:  **Diagnostic category, n (%):**  Autistic disorder  **G1:** 9 (53)  **G2:** 11 (48)  PDD-NOS  **G1:** 6 (35)  **G2:** 11 (48)  Asperger syndrome  **G1:** 2 (12)  **G2:** 1 (4)  **Other characteristics**, n (%)**:** NR | VABS- total daily living skills, mean ± SD  **G1:** 93.47 ± 29.91  **G2:** 97.43 ± 23.91  Mean standard score  **G1:** 50.06  **G2:** 55.61  Mean age equivalency  **G1:** 5.2 years  **G2:** 5.4 years  VABS- personal daily living skills, mean ± SD  **G1:** 55.54 ± 10.85  **G2:** 57.49 ± 9.27  Mean age equivalency  **G1:** 4.1 years  **G2:** 4.5 years  PCIQ-parental involvement  Mean raw score ± SD  **G1:** 13.53 ± 3.78  **G2:** 14.30 ± 3.78 | **Post-treatment**  VABS- total daily living skills, mean ± SE  **G1:** 109.63 ± 4.07  **G2:** 98.80 ± 3.50  Mean standard score  **G1:** 60.24  **G2:** 55.62  Mean age equivalency  **G1:** 6.0 years  **G2:** 5.7 years  VABS- personal daily living skills, mean ± SE  **G1:** 62.81 ± 1.54  **G2:** 58.30 ± 1.32  Mean age equivalency  **G1:** 5.0 years  **G2:** 4.6 years  PCIQ-parental involvement  Mean raw score ± SE  **G1:** 11.93 ± 0.55  **G2:** 13.53 ± 0.48  **3-month follow-up (n=10 families in G1 only)**  VABS- total daily living skills, mean ± SD  **G1:** 114.24 ± 25.66  Mean standard score  **G1:** 70.00  Mean age equivalency  **G1:** 6.7 years  VABS- personal daily living skills, mean ± SD  **G1:** 63.65 ± 9.33  Mean age equivalency  **G1:** 5.2 years  PCIQ-parental involvement  Mean raw score ± SD  **G1:** 10.89 ± 2.93  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Zachor and Itzchak, 2010 [68](#_ENREF_68), [69](#_ENREF_69)  **Country:**  Israel  **Intervention setting:**  Preschool  **Enrollment period:** NR  **Funding:**  Private support (Mr. Dov Moran)  **Design:**  Prospective cohort | **Intervention:**  Applied Behavioral Analysis (ABA) or eclectic (integration of several intervention approaches) interventions implemented in autism-specific preschool settings; 8 hours per day for 1 year  **Assessments:** parent; clinician  **Groups:**  **G1:** ABA  **G2:** eclectic  **Provider:**  **G1:** Program supervisors, trained therapists, speech and language pathology, occupational therapy and special education preschool teachers, and parents (for home treatment)  **G2:** Clinical psychologist, special education preschool teacher, speech and language pathology, occupational therapy, cognitive trainer, music therapist, and teacher’s aids.  **Treatment manual followed:** NR  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 45  **G2:** 33  **N at follow-up:**  **G1:** NR  **G2:** NR  **N for each measure:**  ADOS  baseline: 78  follow-up: 77  Vineland  baseline: 71  follow-up: 75  MSEL  baseline: 71  follow-up: 69 | **Inclusion criteria:**   * clinical diagnosis of autism based on DSM-IV criteria and cut-off points on the ADI-R * age 15-35 months   **Exclusion criteria:**   * additional major medical diagnoses * incomplete post-intervention assessments   **Age, mean/months ± SD (range):**  **G1:** 25.1 ± 3.9 (17-35)  **G2:** 26.0 ± 4.6 (15-33)  **Mental age, mean/yrs (range):** NR    **Sex:**  M, n (%): 71 (91) F, n (%): 7 (8)  **Race/ethnicity, n (%):** NR  **SES:**  Maternal education, years ± SD (range):  **G1:** 14.3 ± 2.2 (11-20)  **G2:** 15 ± 2.7 (11-22)  Paternal education, years ± SD (range):  **G1:** 14.4 ± 2.8 (8-20)  **G2:** 14.9 ± 3.1 (10-20)  Household income, mean (range): NR    **Diagnostic approach:**  In Study  Diagnostic tool/method:  Autism Diagnostic Interview-Revised (ADI-R) and Autism Diagnostic Observation Schedule (ADOS)  **Diagnostic category, n (%):**  Autism: 78 (100)  PDD-NOS  Aspergers  **Other characteristics**, n (%)**:**  NR | **Overall ratings:**  **Global Rating of Severity, mean** ±  **SD (range):**  ADOS new algorithm  **G1:** 20.9 ± 4.3 (10-26)  **G2:** 20.1 ± 4.6 (10-26)  **G1+G2**: 20.5 ± 4.4  ADOS severity score  **G1+G2**: 8.4 ± 2.0  **Social skills, mean** ±  **SD:**  Vineland-Socialization raw score  **G1:** 25.8 ± 5.5  **G2:** 28.0 ± 6.2  Vineland-Socialization standard score  **G1:** 67.8 ± 7.7  **G2:** 70.7 ±7.7  **Communication/ language, mean** ±  **SD:**  MSEL-Receptive language raw score  **G1:** 20.6 ± 9.7  **G2:** 17.5 ± 8.5  MSEL-Receptive language standard score  **G1:** 34.4 ± 15.2  **G2:** 29.6 ± 14.8  MSEL-Expressive language raw score  **G1:** 17.0 ± 8.4  **G2:** 16.8 ± 7.8  MSEL-Expressive language standard score  **G1:** 28.8 ± 11.3  **G2:** 31.4 ± 12.5  MSEL-Verbal  **G1+G2**: 60.9 ± 24.4  Vineland-Communication raw score  **G1:** 19.0 ± 9.0  **G2:** 22.8 ± 12.1  Vineland-Communication standard score  **G1:** 67.0 ± 7.8  **G2:** 69.5 ± 10.7  **Adaptive behavior, mean** ±  **SD (range):**  Vineland composite score  **G1:** 66.2 ± 9.6 (49-75)  **G2:** 68.6 ± 6.3 (59-81)  **G1+G2**: 67.4 ± 6.4  Vineland-Daily Living raw score  **G1:** 17.4 ± 6.7  **G2:** 19.5 ± 6.5  Vineland-Daily Living standard score  **G1:** 67.7 ± 7.0  **G2:** 69.4 ± 6.0  **Motor skills, mean** ±  **SD:**  MSEL-Fine motor raw score  **G1:** 25.2 ± 4.9  **G2:** 24.2 ± 4.1  MSEL-Fine motor standard score  **G1:** 33.0 ± 14.0  **G2:** 34.1 ± 12.9  Vineland-Motor skills raw score  **G1:** 33.5 ± 5.8  **G2:** 35.1 ± 4.6  Vineland-Motor skills standard score  **G1:** 86.2 ± 11.4  **G2:** 88.1 ± 11.0  **Sensory, mean** ±  **SD:**  MSEL-Visual raw score  **G1:** 29.9 ± 5.3  **G2:** 25.6 ± 4.7  MSEL-Visual standard score  **G1:** 42.3 ± 12.7  **G2:** 37.7 ± 12.1  **Educational/ cognitive/ academic attainment, mean** ±  **SD (range):**  MSEL-cognitive composite  **G1:** 72.2 ± 19.2 (49-135)  **G2:** 73.3 ± 22.2 (49-132)  MSEL Nonverbal  **G1+G2**: 73.9 ± 23.7 | **Overall ratings:**  **Global Rating of Severity mean** ±  **SD:**  ADOS new algorithm  **G1:** NR  **G2:** NR  **G1+G2**: 17.9 ± 5.0  ADOS severity score\*  **G1+G2**: 7.8 ± 1.9  ADOS-improved classification  **G1:** 3 (6.7)  **G2:** 2 (6)  **Diagnosis stability, n (%):**  ADOS-autism diagnosis  **G1+G2**: 71 (91)  **Social skills, mean** ±  **SD:**  Vineland-Socialization Socialization raw score  **G1:** 38.8 ± 10.7  **G2:** 42.4 ± 11.5  Vineland-Socialization standard score  **G1:** 69.6 ± 12.4  **G2:** 77.4 ± 14.4  **Communication/ language, mean** ±  **SD:**  MSEL-Receptive language raw score  **G1:** 28.7 ± 10.7  **G2:** 26.1 ± 8.2  MSEL-Receptive language standard score  **G1:** 40.1 ± 14.2  **G2:** 37.7 ± 12.8  MSEL-Expressive language raw score  **G1:** 26.8 ± 11.0  **G2:** 25.9 ± 10.0  MSEL-Expressive language standard score  **G1:** 35.6 ± 15.0  **G2:** 39.0 ± 14.3  MSEL-Verbal  **G1+G2**: 75.0 ± 27.0  Vineland-Communication raw score  **G1:** 42.0 ± 16.3  **G2:** 44.3 ± 15.7  Vineland-Communication standard score  **G1:** 72.9 ± 14.7  **G2:** 78.8 ± 16.2  **Repetitive behavior:** NR  **Problem behavior:** NR  **Adaptive behavior, mean** ±  **SD (range):**  Vineland composite score  **G1:** NR  **G2:** NR  **G1+G2**: 68.9 ± 13.0  Vineland-Daily Living-raw score  **G1:** 35.8 ± 13.5  **G2:** 36.7 ± 15.2  Vineland-Daily Living standard score  **G1:** 67.8 ± 10.9  **G2:** 73.0 ± 14.6  **Commonly occurring co-morbidities:** NR  **Medical:** NR  **Motor skills, mean** ±  **SD:**  MSEL-Fine motor raw score  **G1:** 30.7 ± 6.0  **G2:** 27.9 ± 4.6  MSEL-Fine motor standard score  **G1:** 33.0 ± 14.6  **G2:** 33.7 ± 14.5  Vineland-Motor skills raw score  **G1:** 43.1 ± 7.0  **G2:** 45.8 ± 6.1  Vineland-Motor skills standard score  **G1:** 72.0 ± 12.9  **G2:** 84.5 ± 13.0  **Sensory, mean** ±  **SD:**  MSEL-Visual raw score  **G1:** 35.9 ± 7.5  **G2:** 32.6 ± 7.4  MSEL-Visual standard score  **G1:** 42.4 ± 18.2  **G2:** 43.1 ± 17.0  **Educational/ cognitive/ academic attainment, mean** ±  **SD:**  MSEL-cognitive composite  **G1:** NR  **G2:** NR  MSEL Nonverbal  **G1+G2**: 75.5 ± 29.2  **Harms:** NR  **Modifiers:** Cognitive and adaptive ability, maternal age |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kovshoff et al.  2011[70](#_ENREF_70)  **Country:** UK  **Intervention setting:**  Home, school, clinic  **Enrollment period:** NR  **Funding:**  Esmee Fairbairn Foundation, Research Autism, Autism and Developmental Disorders Education Research  **Design:** Prospective Cohort  Note: See earlier study[71](#_ENREF_71) reporting on this population in 2011 AHRQ review[9](#_ENREF_9) | **Intervention:**  EIBI- 24 month study. Follow-up 2 years after study ended.  **Assessments:** Stanford-Binet Intelligence Scale – Fourth Edition, Bayley Scales of Infant Development-Second Edition; Vineland Adaptive Behavior Scale-Survey form; Reynell Developmental Language Scales – Third Edition; Positive Social Subscale of the Nisonger Child Behavior Rating Form, Autism Diagnostic Interview-Revised, Developmental Behavior Checklist  **Groups:**  **G1:** EIBI intervention (mix of university-based and private providers)  **G2:** treatment as usual  **Provider:**  University-based or privately hired behavioral intervention providers  **Treatment manual followed:** NR  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:** NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 23  **G2:** 21  **N at follow-up:**  **G1:** 23  **G2:** 18 | **Inclusion criteria:**   * meet criteria for diagnosis of autism based on both ADI-R and independent clinical assessment and diagnostic procedure * no chronic medical conditions * reside in family home   **Exclusion criteria:**   * see above   **Age, mean/yrs (range):**  At follow-up: Mean of 7 years, 2 months (range: 6.5-8 years)  **Mental age, mean/yrs (range):** NR    **Sex:** NRRace/ethnicity, n (%): NR  **SES:**  Maternal education, n (%):  High school  College  Household income, mean (range):    **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  **Diagnostic category, n (%):**  Autism  PDD-NOS  Aspergers  **Other characteristics, n (%):** NR | IQ, mean ± SD  **G1:**  61.43 ± 16.43  **G2:**  63.83 ± 13.98  Vineland Composite  **G1:**  60.22 ± 5.82  **G2:**  57.17 ± 7.05  Vineland Communication  **G1:**  61.52 ± 7.56  **G2:**  58.17 ± 8.63  Vineland Daily Living  **G1:**  63.26 ± 5.40  **G2:**  62.22 ± 8.14  Vineland Socialization  **G1:**  63.30 ± 6.74  **G2:**  59.94 ± 7.94  Nisonger Child Behavior Rating Form: positive social behavior  Mother  **G1:**  10.57 ± 4.24  **G2:**  9.61 ± 3.50  Father  **G1:**  8.94 ± 3.47  **G2:**  8.64 ± 3.79  DBC total  Mother  **G1:**  50.26 ± 22.75  **G2:**  65.61 ± 18.70  Father  **G1:**  46.67 ± 22.15  **G2:**  57.15 ± 16.23 | Two year follow-upa  IQ, mean ± SD  **G1:**  64.65 ± 33.04  **G2:**  61.94 ± 31.09  *p*= 0.339  DBC total  Mother  **G1:**  53.70 ± 21.13  **G2:**  63.56 ± 26.39  *p*= 0.627  Father  **G1:**  48.86 ± 26.21  **G2:**  56.14 ± 21.22  *p*= 0.719  **Social skills:**  Nisonger Child Behavior Rating Form: positive social behavior  Mother  **G1:**  14.87 ± 5.29  **G2:**  11.33 ± 5.26  *p*= 0.059  Father  **G1:**  14.73 ± 6.70  **G2:**  11.64 ± 7.31  *p*= 0.321  **Adaptive behavior:**  Vineland Composite  **G1:**  55.13 ± 19.40  **G2:**  49.5 ± 17.39  *p*= 0.79  Vineland Communication  **G1:**  62.65 ± 25.11  **G2:**  57.72 ± 24.54  *p*= 0.784  Vineland Daily Living  **G1:**  52.35 ± 19.61  **G2:**  43.67 ± 18.15  *p*= 0.177  Vineland Socialization  **G1:**  62.57 ± 16.93  **G2:**  59.33 ± 15.58  *p*= 0.822  **Harms:** NR  **Modifiers:** NR |

**Comments:** a p-values refer to ANCOVA that compared group scores at 24-month treatment termination and two year follow-up.See Remington et al. 2007 for original study data.

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Murdock and Hobbs, 2011 [72](#_ENREF_72)  **Country:** US  **Intervention setting:**  Autism treatment center with preschool program  **Enrollment period:** NR  **Funding:** NR  **Design:**  Prospective cohort | **Intervention:**  Picture Me Playing; consisted of four 15-minute group sessions and one 5-minute individualized session with a typically developing peer. Group sessions included 3 participants and 2 typical peers at a time. Sessions included story and role-playing opportunities.  **Assessments:** observation  **Groups:**  **G1:** Picture Me Playing  **G2:** comparison group  **Provider:**   * Second author implemented the intervention   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 6  **G2:** 6  **N at follow-up:**  **G1:** 6  **G2:** 6 | **Inclusion criteria:**   * ages 55-75 months * diagnosis of autism or PDD-NOS * able to follow group directed instructions * able to comply and attend to group activities   **Exclusion criteria:** NR  **Age, mean/months ± SD:**  **G1:** 69.33 ± 5.9889  **G2:** 62.17 ± 6.2102  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%): **G1:** 5 (83.3)  **G2:** 5 (83.3)  F, n (%): **G1:** 1 (16.7)  **G2:** 1 (16.7)  **Race/ethnicity, n (%):**  White: NR Asian: NR  **SES:**  Maternal education, n (%):  NR  Household income, mean (range): NR  **Diagnostic approach:**  Referral  Diagnostic tool/method: NR  **Diagnostic category, n (%):**  Autism or PDD-NOS:  **G1:** 6 (100)  **G2:** 6 (100)  **Other characteristics, mean ± SD:**  **PPVT-4:**  **G1:** 84.5 ± 11.077  **G2:** 88.5 ± 7.6092  **K-BIT:**  **G1:** 86.5 ± 5.8907  **G2:** 72.33 ± 13.456 Peers:  **G1:** 105.5 ± 13.026  **G2:** 108.75 ± 7.5884  **PLS-4:**  **G1:** 85.667 ± 13.064  **G2:** 86.5 ± 13.368 | **Communication/ language:**  Types of utterances, n:  Total utterances:  **G1:** 250  **G2:** 206  Structural:  **G1:** 141  **G2:** 139  Play dialogue:  **G1:** 50  **G2:** 28  Sound effects:  **G1:** 38  **G2:** 28  Self-talk:  **G1:** 21  **G2:** 11 | **Communication/ language:**  Types of utterances, n:  Total utterances:  **G1:** 307  **G2:** 304  p=NS  Structural:  **G1:** 89  **G2:** 176  p=NS  Play dialogue:  **G1:** 180  **G2:** 66  p=NS  Sound effects:  **G1:** 29  **G2:** 36  p=NS  Self-talk:  **G1:** 9  **G2:** 26  p=NS  Types of utterances, percent change from baseline:  Total utterances:  **G1:** 23%  **G2:** 48%  p=NS  Structural  **G1:** -37%  **G2:** 27%  p=NS  Play dialogue  **G1:** 260%  **G2:** 136%  p=0.041  Sound effects  **G1:** -24%  **G2:** 29%  p=NS  Self-talk  **G1:** -57%  **G2:** 13.6%  p=NS  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Pajareya et al.  2011[73](#_ENREF_73)  **Country:**  Thailand  **Intervention setting:**  Home  **Enrollment period:** NR  **Funding:** NR  **Design:**  RCT with four groups stratified based on age (24-47 months, 48-72 months) and symptom severity: (mild autism: Childhood Autism Rating Scale score of 30-40; severe autism: CARS score of 41-60) | **Intervention:**  Parent-administered DIR/Floortime for an average of 15.2 hours/wk for 3 months  **Assessments:** Functional Emotional Assessment Scale, Childhood Autism Rating Scale, Functional Emotional Questionnaires  **Groups:**  **G1:** DIR/Floortime  **G2:** treatment-as-usual  **Provider:**   * Parents (attended one day training workshop, received 3-hour DVD lecture, and had two one-hour home visits with a trainer)   **Treatment manual followed:**  Individualized manual with activity suggestions based upon Greenspan’s affect-based language curriculum  **Defined protocol followed:**  Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:** NR  **Concomitant therapies, n (%):**  On medication  **G1:** 5 (31)  **G2:** 5 (31)  11 children in G1 continued to receive one-on-one treatment intervention based on behavioral or discrete trial principles throughout the study period.  **N at enrollment:**  **G1:** 16  **G2:** 16  **N at follow-up:**  **G1:** 15  **G2:** 16 | **Inclusion criteria:**   * met clinical criteria for autistic disorders according to DSM-IV criteria * age 2-6 years   **Exclusion criteria:**   * additional medical diagnosis (e.g. genetic syndromes, diagnosed hearing impairment, diagnosed visual impairment or seizures) * geographically inaccessible for follow-up visits * parents not literate or with known chronic psychiatric or physical illness   **Age, mean/months ± SD:**  **G1:** 56.6 ± 10.1  **G2:** 51.5 ± 13.9  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1:** 15 (94)  **G2:** 13 (81)  F, n (%): **G1:** 1 (6)  **G2:** 3 (19)  **Race/ethnicity, n (%):**  NR (Thai)  **SES:**  Maternal education, n (%):  Bachelor degree or higher  **G1:** 10 (62.5)  **G2:** 14 (87.5)  Household income, mean (range): NR  **Diagnostic approach:**  Diagnosis confirmed by developmental pediatrician  Diagnostic tool/method:  DSM-IV  **Diagnostic category, n (%):**  Autism  **G1:** 13 (81) **G2:** 10 (62.5)  PDD-NOS  **G1:** 3 (19)  **G2:** 6 (37.5)  Aspergers  **0**  **Other characteristics**, n (%)**:**  Overall status  No affective engagement  **G1:** 0  **G2:** 0  Only intermittent engagement  **G1:** 3  **G2:** 4  Intermittent reciprocal communication, no symbolization  **G1:** 3  **G2:** 6  Islands of symbolization  **G1:** 10  **G G2:** 6  Associated with moderate to severe motor planning problem  **G1:** 5  **G2:** 6  Participation in special education (or regular) preschool program  **G1:** 11  **G2:** 11  Average hours per week of paramedical services (e.g., speech therapy), mean ± SD  **G1:** 3.1 ± 1.8  **G2:** 3.3 ± 1.4 | **CARS, mean ± SD**  **G1:** 37.2 ± 6.2  **G2:** 39.7 ± 6.6  **FEAS, mean ± SD**  **G1:** 24.4 ± 12.7  **G2:** 23.5 ± 12.6  **FEDQ, mean ± SD**  **G1:** 44.0 ± 12.9  **G2:** 40.7 ± 15.3 | **Severity**  CARS, mean changes ± SD  **G1:** 2.9 ± 2.0  **G2:** 0.8 ±1.2  *p*=0.002    FEAS, mean changes ± SD  **G1:** 7.0 ± 6.3  **G2:** 1.9 ±6.1  *p*=0.031  FEDQ, mean changes ± SD  **G1:** 7.7 ± 8.1  **G2:** 0.8 ±1.4  *p*=0.006  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Roberts et al.  2011[74](#_ENREF_74)  **Country:**  Australia  **Intervention setting:**  1) home  2) center  **Enrollment period:**  2006 & 2007 (two consecutive 12-month offerings of program) with recruitment in late 2005 and late 2006  **Funding:**  Australian Research Council Linkage Projects grant; Autism Spectrum Australia (Aspect)  **Design:** RCT | **Intervention:**  Two variations of the Building Blocks® program, including an individualized home-based program (40 weeks duration, 2 h visit every 2 weeks, 20 sessions max) or a small group center-based program with parent training and support group (40 weeks duration, weekly 2 h sessions)  **Assessments:**  Autism Diagnostic Observation Schedule, Beach Centre Family Quality of Life Scale, Vineland Adaptive Behavior Scales-II, Reynell Developmental Language Scales III, The Pragmatics Profile of Everyday Communication, Developmental Behavior Checklist, Parenting Stress Index, Parent Perception Questionnaire, Parent interview  **Groups:**  **G1:** individualized home-based program  **G2**: small group center-based program combined with parent training and support group  **G3**: waitlist (non-randomized treatment comparison)  **Provider:**  Multidisciplinary teams of teachers, speech pathologists, occupational therapists and psychologists  **Treatment manual followed:**  **G2** only: Autism Association of NSW manual (2004) – child and parent components  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  No  Concomitant therapies, mean number ± SD: ASD-specific interventions used during intervention period:  **G1:**  0.22 ± 0.42  **G2**: 0.14 ± 0.35  **G3**: 0.54 ± 0.79  Educational interventions used during intervention period:  **G1:** 2.37 ± 1.28  **G2**: 2.41 ± 1.50  **G3**: 3.11 ± 1.64  **N at enrollment:**  **G1:** 34  **G2**: 33  **G3**: 28  **N at follow-up:**  **G1:** 27  **G2**: 29  **G3**: 28 | **Inclusion criteria:**   * preschool age * diagnosis of Autistic Disorder, Asperger or PDD-NOS (DSM-IV) by referring clinician * home within reasonable distance of center-based group * child’s readiness for center-based program (determined by parents and staff)   **Exclusion criteria:**   * see inclusion criteria   **Age mean/months (range):**  **G1:** 41.5 (26.5 – 59.4)  **G2**: 43.1 (26.3 – 60.0)  **G3**: 43.7 (27.6 – 60.3)  **Mental age:**  Griffiths developmental quotient, mean ± SD:  **G1:** 57 ± 11.7  **G2**: 66 ± 17.7  **G3**: 63.3 ± 15.5  **Sex, n (%):**  M: NR (90.5%) F: NR (9.5%)  **Race/ethnicity, n (%):** NR  **SES:**  Maternal education, n (%), (n=73):  High school: 10 (13.7)  College/post-high school: 28 (38.4%)  Bachelors: 23 (31.5)  Postgraduate: 12 (16.4)  Household income, n (%), (n=78):  >$75,000: 45 (57.7)  $60,000-$70,000: 10 (12.8)  $50,000-$60,000: 11 (14.1)  $40,000-$50,000: 4 (5.1)  <$40,000: 8 (10.3)  Language spoken at home. n (%):  Language other than English exclusively: 2 (2.6)  Language in addition to English: 12 (15.4)  Family members supported by income, mean ± SD (n=78):  4.0 ± 1.2  SES (ranking within New South Wales), mean ± SD (n=80):  73.0 ± 23.0  Mother’s age, mean/yrs ± SD (n=75):  36.6 ± 4.3    **Diagnostic approach:**  In Study and Referral  Referral of autism and ASD diagnosed by clinicians; diagnosis in-study  Diagnostic tool/method:  DSM-IV (referral), ADOS (in-study)  **Diagnostic category, n (%):**  Autistic disorder:  **G1:** 24 (87.5)  **G2:** 20 (69.0)  **G3:** 17 (60.7)  ASD:  **G1:** 4 (14.3)  **G2:** 4 (13.8)  **G3:** 5 (17.9)  Non ASD:  **G1:** 0 (0)  **G2:** 5 (17.2)  **G3:** 6 (21.4)  **Other characteristics**, n (%)**:** NR | **Social skills, mean ± SD:**  VABS social  **G1**: 68.7 ± 7.3  **G2**: 70.1 ± 7.3  **G3**: 70.8 ± 9.9  **Communication/ language, mean ± SD:**  VABS communication  **G1:** 64.4 ± 12.8  **G2**: 66.9 ± 12.5  **G3**: 68.5 ± 17.0  Reynell comprehension, standard score:  **G1:** 4.2 ± 9.2  **G2**: 5.5 ± 10.6  **G3**: 7.2 ± 15.2  Reynell comprehension, raw score:  **G1:** 6.9 ± 9.7  **G2**: 11.3 ± 13.8  **G3**: 12.2 ± 14.9  Reynell expression, standard score:  **G1:** 3.4 ± 8.3  **G2**: 8.2 ± 16.6  **G3**: 6.0 ± 10.9  Reynell expression, raw score:  **G1:** 3.2 ± 5.4  **G2**: 6.9 ± 9.9  **G3**: 5.8 ± 7.9  Pragmatics Profile, total Q range:  **G1:** 50.4 ± 17.5  **G2**: 58.3 ± 16.8  **G3**: 56.7 ± 16.2  **Adaptive behavior, mean ± SD:**  Developmental Behavior Checklist, total:  **G1:** 44.7 ± 19.0  **G2**: 58.5 ± 20.4  **G3**: 43.9 ± 21.9 | **Social skills, mean ± SD:**  VABS social  **G1:** 66.4 ± 7.7  **G2**: 72.6 ± 11.2  **G3**: 73.1 ± 10.8  **G1** vs. **G2**: p=0.02  **G1** vs. **G3**: p=0.02  **G2** vs. **G3**: p=NS  3-group comparison: p=0.03  **Communication/ language, mean ± SD:**  VABS communication  **G1:** 68.4 ± 15.6  **G2**: 76.1 ± 17.1  **G3**: 74.2 ± 15.5  **G1 vs. G2**: p=NS  **G1 vs. G3**: p=NS  **G2 vs. G3**: p=NS  3-group comparison: p=NS  Reynell-comprehension, standard score:  **G1:** 2.6 ± 8.4  **G2**: 10.5 ± 17.4  **G3**: 5.7 ± 12.1  **G1 vs. G2**: p=0.03  **G1 vs. G3**: p=NS  **G2 vs. G3**: p=NS  3-group comparison: p=NS  Reynell-comprehension, raw score  **G1:** 17.5 ± 6.3  **G2**: 23.7 ± 19.9  **G3**: 22.0 ± 17.8  **G1 vs. G2**: p=NS  **G1 vs. G3**: p=NS  **G2 vs. G3**: p=NS  3-group comparison: p=NS  Reynell-expression, standard score:  **G1:** 2.8 ± 7.5  **G2**: 7.0 ± 15.1  **G3**: 4.4 ± 8.7  **G1 vs. G2**: p=NS  **G1 vs. G3**: p=NS  **G2 vs. G3**: p=NS  3-group comparison: p=NS  Reynell-expression, raw score:  **G1:** 8.8 ± 8.9  **G2**: 11.4 ± 10.9  **G3**: 11.1 ± 9.9  **G1 vs. G2**: p=NS  **G1 vs. G3**: p=NS  **G2 vs. G3**: p=NS  3-group comparison: p=NS  Pragmatics Profile, total Q range:  **G1:** 62.8 ± 19.4  **G2**: 73.0 ± 19.0  **G3**: 72.2 ± 18.8  **G1 vs. G2**: p=NS  **G1 vs. G3**: p=NS  **G2 vs. G3**: p=NS  3-group comparison: p=NS  **Adaptive behavior:**  Developmental Behavior Checklist, total:  **G1:** 52.9 ± 29.3  **G2**: 55.7 ± 19.5  **G3**: 42.9 ± 24.3  **G1 vs. G2**: p=NS  **G1 vs. G3**: p=NS  **G2 vs. G3**: p=NS  3-group comparison: p=NS  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Scarpa et al.  2011[75](#_ENREF_75)  **Country:** US  **Intervention setting:** clinic  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  CBT, one hour group meetings for 9 consecutive weeks. Intervention focused on skill-building via affective education, stress management, and understanding expression of emotions.  Parent group meetings occurred simultaneously with children’s sessions.  **Assessments:** Child’s emotion regulation ability  **Groups:**  **G1:** intervention  **G2:** wait list control  **Provider:**   * Therapists (3 clinical graduate students and two trained staff members) supervised by licensed clinical psychologist   **Treatment manual followed:** Yes  **Defined protocol followed:** No  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 5  **G2:** 6  **N at follow-up:**  **G1:** NR  **G2:** NR | **Inclusion criteria:**   * meet ASD criteria on ADOS * 5-7 years old at time of intervention * In kindergarten or first grade * verbal and able to understand and follow verbal directions   **Exclusion criteria:**   * see above   **Age,/yrs (range):** (4.5-7 years)  **Mental age, mean/yrs (range):** NR  **Sex:**  M, 9 (%)  F, 2 (%)  **Race/ethnicity, n (%):**  White, 11 (100)  **SES:**  Maternal education: NR  Household income, median (range): $85,000 ($14,400-$175,000)  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  ADOS  **Diagnostic category, n (%):**  Autism  PDD-NOS  Asperger syndrome  **Other characteristics**, n (%)**:** NR | Emotion Regulation Checklist  Emotion Regulation Subscale  **G1+ G2:** 22.82 ± 2.56  Negativity/Lability Subscale  **G1+ G2:** 38.00 ± 5.33  Behavioral Monitoring Sheet  Frequency of episodes per hour  **G1+ G2:** 0.31 ± 0.16  Duration in minutes per episode  **G1+ G2:** 7.13 ± 6.68  Ben and the Bullies and James and the Reading Group Vignettes Quantity scores  **G1+ G2:** 1.36 ± 0.81  Self Confidence Rating Scale  Parental self-confidence- anger  **G1+ G2:** 5.60 ± 1.58  Parental self-confidence- anxiety  **G1+ G2:** 4.73 ± 1.90  Confidence in child- anger  **G1+ G2:** 3.73 ± 1.49  Confidence in child- anxiety  **G1+ G2:** 2.82 ± 1.25 | **Problem behavior:**  Emotion Regulation Checklist  Emotion Regulation Subscale  **G1+ G2:** 24.91 ± 6.17  Negativity/Lability Subscale  **G1+ G2:** 33.73 ± 5.00  Behavioral Monitoring Sheet  Frequency of episodes per hour  **G1+ G2:** 0.18 ± 0.09  Duration in minutes per episode  **G1+ G2:** 3.32 ± 2.20  Ben and the Bullies and James and the Reading Group Vignettes Quantity scores  **G1+ G2:** 3.27 ± 2.24  Self Confidence Rating Scale  Parental self-confidence- anger  **G1+ G2:** 7.20 ± 1.81  Parental self-confidence- anxiety  **G1+ G2:** 7.36 ± 1.12  Confidence in child- anger  **G1+ G2:** 5.45 ± 1.92  Confidence in child- anxiety  **G1+ G2:** 5.55 ± 1.81  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Strain et al.  2011[76](#_ENREF_76)  **Country:**  USA  **Intervention setting:**  Preschool classrooms  **Enrollment period:** NR  **Funding:**  Institute for Educational Sciences, U.S. Department of Education  **Design:** RCT | **Intervention:**  LEAP (Learning Experiences and Alternative Program for Preschoolers and Their Parents) manuals, videos, and training manuals with training and mentoring relationship with study staff for 2 years (average of 17 hours per week)  **Assessments:**  Childhood Autism Rating Scale (CARS), Preschool Languge Scale-4th Edition (PLS-4), Social Skills Rating System (SSRS)  **Groups:**  **G1:** Full replication: Teachers received full LEAP training/coaching  **G2:** Teachers provided with intervention manuals and related written materials only  **Provider:**   * Preschool teachers, family members   **Treatment manual followed:** Yes  **Defined protocol followed:**  Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  Classrooms:  **G1:** 28  **G2:** 28  **N at follow-up:**  Classrooms:  **G1:** 27  **G2:** 23  Teachers:  **G1:** 123  **G2:** 107  Children with ASD:  **G1:** 177  **G2:** 117 | **Inclusion criteria:**   * classrooms “willing and able” to be LEAP replication sites. * “Able” criteria: * intensity of services provided * enrollment of children with ASD in inclusive settings * minimum ratio of adults to children (1:5) * minimum ratio of typical peers to children with ASD (2:1)   **Exclusion criteria:** NR  **Age, mean/months ± SD:**  **G1:** 50.1 ± 4.6  **G2:** 50.7 ± 4.2  **Mental age, mean/yrs ± SD:** NR  **Sex:** NRRace/ethnicity, n (%): NR  **SES:** NR  **Diagnostic approach:**  Based upon school district standards for educational diagnoses of ASD  **Diagnostic category, n (%):**  Autism: 100%  PDD-NOS: 0  Aspergers: 0  **Other characteristics**, n (%)**:**  Geographic:  **G1** schools, n):  Metropolitan: 14  Suburban: 10  Rural: 3  G2 schools, n:  Metropolitan: 12  Suburban: 8  Rural: 3 | **Overall ratings:**  **Global Rating of Severity, mean** ±  **SD:**  CARS:  **G1:** 39.0 ± 6.2  **G2:** 37.4 ± 5.9  **Social skills:**  SSRS-positive, mean ± SD:  **G1:** 13.5 ± 21.5  **G2:** 20.7 ± 20.2  SSRS-negative, mean ± SD:  **G1:** 63.5 ± 15.2  **G2:** 53.4 ± 16.5  **Communication/ language:**  PLS-4 (total language), mean ± SD:  G1: 32.8 ± 7.5  G2: 34.4 ± 7.2  Mullen (receptive language), mean ± SD:  **G1:** 30.8 ± 7.6  **G2:** 33.4 ± 9.0  Mullen (expressive language), mean ± SD:  **G1:** 28.9 ± 7.4  **G2:** 30.3 ± 8.2  **Motor skills:**  Mullen (fine motor), mean ± SD:  **G1:** 31.9 ± 6.4  **G2:** 34.8 ± 6.2  **General intelligence:**  Mullen (visual reception), mean ± SD:  **G1:** 32.3 ± 6.6  **G2:** 34.6 ± 7.0  Mullen ELC (early learning composite), mean ± SD:  **G1:** 59.6 ± 6.9  **G2:** 63.2 ± 6.6 | \*\*Note: all p-values represent G1 delta (change after 2 years of study participation) vs. G2 delta  **Overall ratings:**  **Global Rating of Severity, mean** ±  **SD:**  CARS:  **G1:** 32.9 ± 3.9  **G2:** 34.6 ± 4.2  p<0.05  **Social skills:**  SSRS-positive, mean ± SD:  **G1:** 42.1 ± 12.6  **G2:** 32.7 ± 11.9  p<0.01  SSRS-negative, mean ± SD:  **G1:** 56.5 ± 4.2  **G2:** 49.1 ± 4.1  p<0.05  **Communication/ language:**  PLS-4 (total language), mean ± SD:  **G1:** 51.3 ± 8.1  **G2:** 43.8 ± 7.7  p<0.01  Mullen (receptive language), mean ± SD:  **G1:** 49.3 ± 7.9  **G2:** 40.7 ± 7.7  p<0.01  Mullen (expressive language), mean ± SD:  **G1:** 38.7 ± 6.4  **G2:** 35.9 ± 4.4  p<0.05  **Motor skills:**  Mullen (fine motor), mean ± SD:  **G1:** 43.3 ± 5.2  **G2:** 39.8 ± 4.9  p<0.05  **General intelligence:**  Mullen (visual reception):, mean ± SD  **G1:** 52.7 ± 11.5  **G2:** 46.3 ± 11.6  p<0.01  Mullen ELC (early learning composite), mean ± SD:  G1: 68.5 ± 7.5  G2: 61.4 ± 9.0  p<0.01  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Sung et al.  2011[77](#_ENREF_77)  **Country:**  SIngapore  **Intervention setting:** clinic  **Enrollment period:**  February 2007 to August 2008  **Funding:**  National Medical Research Council grant  **Design:**  RCT | **Intervention:**  Cognitive behavioral therapy (CBT) sixteen 90-minute weekly sessions delivered in small groups of 3-4 participants. Sessions 1-3 focused on recognition and understanding of emotions; Sessions 4-9 focused on anxiety management techniques and sessions 10-16 focused on problem-solving strategies based on the STAR strategy.  The social recreational (SR) group received 16 week manualized SR program. 90 minute weekly sessions in groups of 3-4 participants.  **Assessments:** observed, parent report, context  Spence Child Anxiety Scale- Child (SCAS-C) administered pre and post treatment and at 3 and 6 month follow-up  **Groups:**  **G1:** cognitive behavioral therapy  **G2:** social recreational  **Provider:**   * CBT and SR delivered by two trained therapists   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:**  **Co-interventions held stable during treatment:**  Yes **Concomitant therapies, n (%):**  On medication  **G1:** 6 (17)  **G2:** 5 (15)  Not on medication  **G1:** 29 (81)  **G2:** 28 (82)  Unknown  **G1:** 1 (3)  **G2:** 1 (3)  **N at enrollment:**  **G1:** 36  **G2:** 34  **N at follow-up:**  **G1:** 30  **G2:** 29  **ITT analysis**  **G1:** 36  **G2:** 34 | **Inclusion criteria:**   * 9-16 years old * clinical diagnosis of autism, Asperger syndrome, PDD (NOS) or ASD by DSM-IV criteria * classification of autism or autism spectrum on ADOS * verbal comprehension ≥ 80 and perceptual reasoning skills ≥ 90 on Wechsler Intelligence Scale for Children, 4th edition * no change in medication dosage one month prior to start of study and throughout duration of study   **Exclusion criteria:**  -see above  **Age, mean ± SD yrs:**  **G1:** 11.33 ± 2.03  **G2:** 11.09 ± 1.53  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%)  **G1:** 34 (94)  **G2:** 32 (94)  F, n (%) **G1:** 2 (6)  **G2:** 2 (6)  **Race/ethnicity, n (%):**  Chinese  **G1:** 35 (97)  **G2:** 30 (88)  Malay  **G1:** 1 (3)  **G2:** 2 (6)  Indian  **G1:** 0  **G2:** 1 (3)  Others  **G1:** 0  **G2:** 1 (3)  **SES:** NR  **Diagnostic approach:** Referral  Diagnostic tool/method:  DSM-IV, ADOS  **Diagnostic category, n (%):**  Autism/PDD-NOS  **G1:** 30 (83)  **G2:** 28 (82)  Asperger syndrome  **G1:** 6 (17)  **G2:** 6 (18)  Other characteristics**, n (%)**:  **Cognitive functioning, mean ± SD:**  Verbal Comprehension  **G1:** 100.25 ± 13.97  **G2:** 93.06 ± 12.81  Perceptual reasoning  **G1:** 108.00 ± 12.26  **G2:** 105.94 ± 11.07 | **SCAS-C, mean ± SD:**  Total score  **G1:** 29.96 ± 14.91  **G2:** 35.03 ± 14.13  Panic attack  **G1:** 4.00 ± 3.42  **G2:** 4.34 ± 3.90  Separation anxiety  **G1:** 4.39 ± 2.99  **G2:** 5.28 ± 3.45  Physical injury  **G1:** 3.50 ± 2.43  **G2:** 5.03 ± 2.65  Social phobia  **G1:** 5.71 ± 3.71  **G2:** 6.31 ± 3.97  Obsessive compulsive  **G1:** 6.39 ± 3.73  **G2:** 8.24 ± 3.38  Generalized anxiety  **G1:** 5.96 ± 3.55  **G2:** 5.83 ± 3.10 | **SCAS-C, mean ± SD:**6 month follow-up  Total score  **G1:** 21.54 ± 14.82  **G2:** 21.17 ± 11.97  Panic attack  **G1:** 2.54 ± 3.53  **G2:** 1.97 ± 2.11  Separation anxiety  **G1:** 3.21 ± 3.05  **G2:** 3.10 ± 3.28  Physical injury  **G1:** 3.11 ± 2.51  **G2:** 3.28 ± 2.51  Social phobia  **G1:** 4.68 ± 3.51  **G2:** 4.55 ± 3.34  Obsessive compulsive  **G1:** 4.79 ± 3.65  **G2:** 5.34 ± 3.64  Generalized anxiety  **G1:** 3.21 ± 1.95  **G2:** 2.93 ± 2.07  **SCAS-C, n (%)**  Deterioated  **G1:** 3 (10.34)  **G2:** 0  No change  **G1:** 13 (44.83)  **G2:** 13 (44.83)  Improved  **G1:** 13 (44.83)  **G2:** 16 (55.17)  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kasari et al.  2010[78](#_ENREF_78)  **Country:** US  **Intervention setting:** Laboratory  **Enrollment period:**  01/2002 to 09/2005  **Funding:**  Grant NIMH  **Design:** RCT | **Intervention:**  Joint attention intervention. !0 modules completed in 24 sessions (3 per week) for 8 weeks  **Assessments:** 15 minute videotapedcaregiver-child interaction observed at end of intervention (8 weeks) and 12 months later (14 month from study start) Mullen scales at baseline and at 12 month follow-up  **Groups:**  **G1:** Immediate treatment  **G2:** Wait list  **Provider:**   * Trained interventionists (graduate students in educational psychology experienced with children with autism. Videotapes coded by blinded reviewer   **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 19  **G2:** 19  **N at follow-up:**  **G1:** 19  **G2:** 16 | **Inclusion criteria:**   * age < 36 months * met DSM-IV criteria for autism by independent clinician * no additional syndromes   **Exclusion criteria:**   * see above   **Age, mean/mos ± SD**:  **G1:** 30.35 ± 0.93  **G2:** 31.31 ± 0.90  **Mental age, mean/mos ± SD Mullen scales:**  **G1:** 19.83 ± 1.80  **G2:** 18.57 ± 1.09  **Sex:**  M, n (%):  **G1:** 15 (79)  **G2:** 14 (74)  F, n (%): **G1:** 4 (21)  **G2:** 5 (26)  **Race/ethnicity, n (%):**  White **G1:** 10 (53)  **G2:** 12 (63)  Minority  **G1:** 9 (47)  **G2:** 7 (37)  **SES:**  Caregiver’s highest level education, n (%):  Some college/vocational training  **G1:** 3 (16)  **G2:** 2 (11)  College  **G1:** 12 (63)  **G2:** 11 (58)  Professional/graduate  **G1:** 4 (21)  **G2:** 6 (31)  Caregiver’s employment status, n (%):  Not employed  **G1:** 14 (74)  **G2:** 12 (63)  Employed part or full time  **G1:** 5 (26)  **G2:** 7 (37)  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  DSM-IV confirmed by ADI-R  **Diagnostic category, n (%):** NR  **Other characteristics, n (%):** Mullen scales Developmental quotient, mean ± SD:  **G1:** 64.80 ± 5.35  **G2:** 59.81 ± 3.14  Birth order, n (%)  Only child  **G1:** 10 (53)  **G2:** 7 (36)  First born  **G1:** 7 (36)  **G2:** 5 (26)  Second born  **G1:** 2 (11)  **G2:** 2 (11)  Twin  **G1:** 0  **G2:** 2 (11)  Missing  **G1:** 0  **G2:** 3 (16) | Object and joint engagement, mean ± SD  Unengaged/other engagement  **G1:** 20.80 ± 19.03  **G2:** 19.52 ± 14.95  Object engagement  **G1:** 48.58 ± 21.87  **G2:** 54.97 ± 17.43  Joint engagement  **G1:** 30.26 ± 14.91  **G2:** 24.98 ± 10.74  Frequency of joint attention initiations  **G1:** 3.0 ± 2.77  **G2:** 3.62 ± 5.92  Frequency of joint attention responses  **G1:** 0.42 ± 0.69  **G2:** 0.63 ± 0.23  Type of functional play acts  **G1:** 3.00 ± 2.38  **G2:** 4.42 ± 3.17  Type of symbolic play acts  **G1:** 0.11 ± 0.46  **G2:** 0.42 ± 0.84 | Object and joint engagement, mean ± SD  8 weeks post treatment  Unengaged/other engagement  **G1:** 22.01 ± 18.24  **G2:** 17.31 ± 10.17  Object engagement  **G1:** 34.75 ± 18.39  **G2:** 54.69 ± 18.15  Joint engagement  **G1:** 42.85 ± 19.96  **G2:** 27.87 ± 14.01  Frequency of joint attention initiations  **G1:** 3.11 ± 3.41  **G2:** 3.77 ± 3.76  Frequency of joint attention responses  **G1:** 0.79 ± 0.23  **G2:** 0.05 ± 0.23  Type of functional play acts  **G1:** 5.29 ± 2.37  **G2:** 3.29 ± 2.30  Type of symbolic play acts  **G1:** 0.26 ± 0.65  **G2:** 0.53 ± 1.43  Object and joint engagement, mean ± SD  Follow-up IT group only  Unengaged/other engagement  **G1:** 15.87 ± 13.55  Object engagement  **G1:** 28.35 ± 15.87  Joint engagement  **G1:** 52.27 ± 20.56  Frequency of joint attention initiations  **G1:** 4.44 ± 5.61  Frequency of joint attention responses  **G1:** 0.61 ± 0.70  Type of functional play acts  **G1:** 8.44 ± 4.77  Type of symbolic play acts  **G1:** 1.11 ± 2.37  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Keen et al.  2010[79](#_ENREF_79)  **Country:**  Australia  **Intervention setting:**  clinic/home  **Enrollment period:** NR  **Funding:** NR  **Design:** Prospective cohort | **Intervention:**  Parent-focused intervention- professional supported- two day parent group workshop and series of 10 home-based consultations with facilitator. Workshop provided information and parent education on the following topics: autism, social, communication, play, sensory, behavior, strategies to improve social interaction and communication, embedding strategies within daily routines, using a balanced approach, and selecting a child-focused early intervention program.  Comparator: self-directed parent intervention group received an interactive instructional DVD “Being Responsive: You and Your Child with Autism”  Intervention lasted for 6 weeks. Follow-up assessments conducted 3 months after completion of intervention  **Assessments:** Scales of independent behavior revised- early development form (SIB-R), communication and symbolic behavior scales developmental profile (CBS-DP), Mullen scales of early learning, parenting stress index (PSI), Parenting sense of competence (PSOC)  **Groups:**  **G1:**Professional parent intervention  **G2:** Self-directed parent intervention  **Provider:**   * Facilitator (doctoral students experienced in working with families of young children with ASD) conducted home-based consultations   **Treatment manual followed:**  NR  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:**  17 families (17 mothers/16 fathers)  **G2:** 22 families (22 mothers/21 fathers)  **N at follow-up:**  **G1:** NR  **G2:** NR | **Inclusion criteria:**   * families with child aged 2-4 with clinical diagnosis of ASD received within 6 months of study entry * not receiving more than 20 hours/week of services for child * not enrolled in an intensive behavior intervention   **Exclusion criteria:** NR  **Age, mean/yrs (range):**  **G1:** 36.38 ± 7.54  **G2:** 35.71 ± 6.92  **Mental age, mean/yrs (range):**  Mullen score (DQ) mean ± SD  **G1:** 53.06 ± 9.06  **G2:** 52.86 ± 6.53  **Sex:**  M, n (%): **G1:**  15 (88.2)  **G2:** 16 (72.7)  **Race/ethnicity, n (%):**  NR  **SES:**  Maternal education, n (%):  High school (9-12 grade)  **G1:** 6 (35.3)  **G2:** 2 (9.1)  Vocational **G1:** 4 (23.5)  **G2:** 5 (22.7)  College graduate  **G1:** 0  **G2:** 5 (22.7)  University graduate  **G1:** 7 (41.2)  **G2:** 10 (45.5)  Paternal education, n (%):  High school (9-12 grade)  **G1:** 6 (35.3)  **G2:** 5 (22.7)  Vocational **G1:** 1 (5.9)  **G2:** 6 (27.3)  College graduate  **G1:** 0  **G2:** 2 (9.1)  University graduate  **G1:** 10 (58.8)  **G2:** 9 (40.9)  Household income, mean (range): NR  **Diagnostic approach:** Referral  Diagnostic tool/method:  DSM-IV. Diagnosis confirmed by ADOS administered by research team.  **Diagnostic category, n (%):**  Autistic disorder 30(77)  Autism spectrum disorder 9 (23)  **Other characteristics**, n (%)**:**  SIB-R standard score, mean ± SD  **G1:** 52.29 ± 23.14  **G2:** 43.18 ± 20.57  CSBS-DP behavior sample  mean ± SD  **G1:** 56.36 ± 31.84  **G2:** 55.57 ± 38.24  Social (raw scores)  **G1:** 27.34 ± 10.91  **G2:** 25.07 ± 12.10  Speech (raw scores)  **G1:** 17.56 ± 14.78  **G2:** 15.95 ±16.51  Symbolic (raw scores)  **G1:** 11.47 ± 10.04  **G2:** 14.55 ± 12.55 | PSI Mother, mean ± SD  Child  **G1:** 147 ± 23.3 (n=17)  **G2:** 146 ± 18.6 (n=22)  Parent  **G1:** 141 ± 21.2  **G2:** 146 ± 18.0  PSI Father, mean ± SD  Child  **G1:** 140 ± 23.2 (n=16)  **G2:** 145 ± 17.8 (n=21)  Parent  **G1:** 141 ± 29.2  **G2:** 137 ± 21.6  PSOC Mother, mean ± SD  Satisfaction  **G1:** 33.6 ± 5.27 (n=17)  **G2:** 32.8 ± 7.22 (n=22)  Efficacy  **G1:** 24.8 ± 4.70  **G2:** 27.0 ± 5.86  PSOC Father, mean ± SD  Satisfaction  **G1:** 34.4 ± 4.89 (n=17)  **G2:** 36.1 ± 6.58 (n=21)  Efficacy  **G1:** 24.8 ± 4.23  **G2:** 25.4 ± 4.98 | PSI Mother, mean ± SD  Child  **G1:** 132 ± 21.3 (n=17)  **G2:** 141 ± 19.1 (n=21)  Parent  **G1:** 133 ± 23.9  **G2:** 143 ± 16.7  PSI Father, mean ± SD  Child  **G1:** 137 ± 21.8 (n=16)  **G2:** 145 ± 17.8 (n=17)  Parent  **G1:** 141 ± 20.6  **G2:** 138 ± 15.4  PSOC Mother, mean ± SD  Satisfaction  **G1:** 37.5 ± 5.82 (n=16)  **G2:** 34.5 ± 7.53 (n=21)  Efficacy  **G1:** 29.6 ± 4.32  **G2:** 28.8 ± 5.21  PSOC Father, mean ± SD  Satisfaction  **G1:** 35.9 ± 6.10 (n=15)  **G2:** 36.9 ± 5.61 (n=18)  Efficacy  **G1:** 29.1 ± 3.33  **G2:** 28.4 ± 4.97  **Harms:** NR  **Modifiers**  Fathers reported higher levels of stress than mothers in both groups. |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Koenig et al.  2010[80](#_ENREF_80)  **Country:** US  **Intervention setting:** clinic  **Enrollment period:** NR  **Funding:**  Organization for Autism Research, Beatrice-Renfield- Yale School of Nursing clinical Initatives fund, Research Units on Pediatric Psychopharmacology, NIMH  **Design:** RTC | **Intervention:**  Social skills intervention, once weekly 75 minute group intervention 75 minutes for 16 weeks.  Groups had 4-5 participants plus 2 peer tutors, led by two licensed clinicians  **Assessments:** Characterization of subjects: Social Communication Questionnaire (SCQ), ADOS, PDD-BI.  Outcomes: Clinical Global Impressions Scale (CGI) – improvement item, Social Competency Inventory, Parent Satisfaction survey  **Groups:**  **G1:** intervention  **G2:** control/other intervention  **Provider:**   * Licensed clinicians (included one advanced practice RN, two social workers, four clinical psychologists)   **Treatment manual followed:** Yes  **Defined protocol followed:** NR  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 25  **G2:** 19  **N at follow-up:**  **G1:** 23  **G2:** 18 | **Inclusion criteria:**   * age 8-11 years * full scale IQ score ≥ 70 * clinical diagnosis of PDD * met criteria for PDD on ADOS, SCQ, and Pervasive Developmental Disorders Behavior Inventory   **Exclusion criteria:**   * participants were screened for psychiatric problems- severe aggression, self-injury or oppositional behavior * score > 18 on irritability scale of ABC * score in clinically significant range on any CSI scale   **Age, mean/yrs ± SD:**  **G1:** 9.2 ± 1.2  **G2:** 9.3 ± 1.2  **Mental age, mean/yrs (range):** NR  **Sex:**  M, 34 (77%): F, 10 (23%):  **Race/ethnicity, n (%):**  White  **G1+G2:** 98% African American  **G1+G2:** 2%  **SES:**  Maternal education, n (%): NR  Household income, mean (range): NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method:  **Diagnostic category, n (%):**  Autism  **G1:** 7  **G2:** 3  PDD-NOS  **G1:** 11  **G2:** 12  AD  **G1:** 6  **G2:** 3  **Other characteristics, n (%):** CGI severity score, mean ± SD:  **G1:** 3.67 ± 0.56  **G2:** 3.78 ± 0.55  FSIQ score, mean ± SD:  **G1:** 96.4 ± 20.5  **G2:** 95.9 ± 17.3  SCQ score, mean ± SD:  **G1:** 17.8 ± 7.1  **G2:** 19.6 ± 6.6  ADOS Com total, mean ± SD:  **G1:** 4.5 ± 1.6  **G2:** 4.1 ± 2.1  ADOS Soc total, mean ± SD:  **G1:** 7.1 ± 4.0  **G2:** 6.8 ± 3.7  ADOS Soc. And Com algorithm total, mean ± SD:  **G1:** 12.0.2 ± 5.2  **G2:** 10.9 ± 5.3 | **SCI pro social index, mean ± SD:**  **G1:** 2.52 ± 0.48  **G2:** 2.67 ± 0.64  **SCI social initation index, mean ± SD:**  **G1:** 2.52 ± 0.90  **G2:** 2.60 ± 0.64 | **Social skills:**  **SCI pro social index, mean ± SD:**  **G1:** 2.83 ± 0.53  **G2:** 2.77 ± 0.56  **SCI social initation index, mean ± SD:**  **G1:** 2.98 ± 0.71  **G2:** 3.00 ± 0.46  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kouijzer et al.,  2010 [81](#_ENREF_81)  **Country:**  Netherlands  **Intervention setting:** NR  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  40 neurofeedback sessions comprising seven 3-min intervals of active neurofeedback training separated by 1-min rest intervals; during active training, criterion line placement adapted to participant ability to be rewarded 50-80% of the time; sessions conducted twice weekly  **Assessments:** parent and teacher report, testing by researchers  Timing: at baseline, end of Treatment and again 6 months after Treatment  **Groups:**  **G1:** neurofeedback  **G2:** control  **Provider:** Researchers  **Treatment manual followed:** No  **Defined protocol followed:** No  **Measure of treatment fidelity reported:** No  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 10  **G2:** 10  **N at follow-up:**  **G1:** 10  **G2:** 10  **N at 12 month follow-up (G1 only): G1:** NR | **Inclusion criteria:**   * age 8-12 years * IQ score > 80 * presence of autistic disorder, Asperger disorder, or PDD-NOS   **Exclusion criteria:**   * use of medication * history of severe brain injury * co-morbidity (e.g. ADHD, epilepsy)   **Age, mean/yrs ± SD:**  **G1:** 9.43 ± 1.44  **G2:** 9.14 ± 1.34  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%):  **G1:** 9 (90)  **G2:** 8 (80)  F, n (%):  **G1:** 1 (10)  **G2:** 2 (20)  **Race/ethnicity, n (%):**  NR  **SES:** NR    **Diagnostic approach:**  Referral  Diagnostic tool/method:  Met criteria for DSM-IV diagnosis of autistic disorder, Asperger disorder, or PDD-NOS  **Diagnostic category, n (%):**  Autism  **G1:** 6 (60)  **G2:** 2 (20)  PDD-NOS  **G1:** 4 (40)  **G2:** 4 (40)  Aspergers  **G1:** 0 (0)  **G2:** 4 (40)  **Other characteristics, n (%):** SCQ total, mean ± SD:  **G1:** 14.2 ± 6.56  **G2:** 16.67 ± 3.97 | **Parent Report:**  **Social skills:**  SCQ total:  **G1:** 14.20 ± 6.56  **G2:** 16.67 ± 3.96  SRS total:  **G1:** 79.60 ± 35.90  **G2:** 89.11 ± 19.47  CCC-2 total:  **G1:** 106.20 ± 16.01  **G2:** 104.22 ± 15.96  Social awareness:  **G1:** 11.80 ± 5.02  **G2:** 12.77 ± 2.81  Social cognition:  **G1:** 14.00 ± 7.27  **G2:** 17.55 ± 3.60  Social motivation:  **G1:** 15.00 ± 7.48  **G2:** 14.55 ± 5.43  Social relations:  **G1:** 13.50 ± 3.34  **G2:** 15.33 ± 1.41  Interests:  **G1:** 13.00 ± 1.94  **G2:** 14.56 ± 1.66  Reciprocal social interactions:  **G1:** 4.10 ± 2.46  **G2:** 3.78 ± 2.22  **Communication/ language:**  Communication (SRS):  **G1:** 25.80 ± 11.97  **G2:** 27.77 ± 8.34  Speech production:  **G1:** 12.60 ± 3.89  **G2:** 10.89 ± 3.78  Syntax:  **G1:** 12.70 ± 2.66  **G2:** 12.11 ± 3.37  Sematics:  **G1:** 13.10 ± 1.66  **G2:** 11.33 ± 2.78  Coherence:  **G1:** 13.70 ± 3.02  **G2:** 12.00 ± 4.24  Inappropriate initialization:  **G1:** 12.70 ± 3.33  **G2:** 14.11 ± 1.36  Stereotyped conversation:  **G1:** 13.20 ± 3.64  **G2:** 14.00 ± 2.44  Context use:  **G1:** 13.70 ± 3.62  **G2:** 15.44 ± 1.67  Non-verbal communication:  **G1:** 14.50 ± 1.95  **G2:** 14.33 ± 2.59  Pragmatics:  **G1:** 54.10 ± 10.07  **G2:** 57.89 ± 6.13  Communication (SCQ):  **G1:** 5.90 ± 2.92  **G2:** 6.11 ± 1.83  **Repetitive behavior:**  Autistic mannerisms:  **G1:** 13.00 ± 7.31  **G2:** 16.44 ± 5.17  Restricted, repetitive, and stereotyped behavior:  **G1:** 3.50 ± 2.63  **G2:** 5.89 ± 1.16  **Educational/ cognitive/ academic attainment:**  Auditory selective attention:  **G1:** 54.30 ± 25.72  **G2:** 42.66 ± 23.01  Inhibition of verbal responses:  **G1:** 97.00 ± 57.33  **G2:** 71.10 ± 38.00  Inhibition of motor responses:  **G1:** 86.48 ± 12.87  **G2:** 84.05 ± 12.43  Cognitive flexibility, set shifting:  **G1:** 31.20 ± 43.12  **G2:** 21.30 ± 22.652  Cognitive flexibility, concept generation:  **G1:** 3.36 ± 1.52  **G2:** 3.09 ± 1.32  Goal setting:  **G1:** 71.09 ± 15.54  **G2:** 59.00 ± 14.51  Speed and efficiency:  **G1:** 1.14 ± 0.10  **G2:** 1.05 ± 0.17 | **Parent report (end of Treatment):**  **Social skills:**  SCQ total:  **G1:** 5.80 ± 4.16  **G2:** 15.56 ± 5.79  p=0.006  SRS total:  **G1:** 52.50 ± 33.07  **G2:** 88.22 ± 41.13  p=NS  CCC-2 total:  **G1:** 86.80 ± 23.47  **G2:** 106.11 ± 17.98  p=0.021  Social awareness:  **G1:** 8.90 ± 4.0  **G2:** 12.11 ± 5.44  p=NS  Social cognition:  **G1:** 8.80 ± 4.89  **G2:** 18.44 ± 8.11  p=NS  Social motivation:  **G1:** 10.20 ± 8.68  **G2:** 14.66 ± 7.15  p=NS  Social relations:  **G1:** 12.90 ± 3.31  **G2:** 14.22 ± 3.49  p=NS  Interests:  **G1:** 10.50 ± 3.10  **G2:** 13.89 ± 2.36  p=NS  Reciprocal social interactions:  **G1:** 1.90 ± 1.44  **G2:** 5.33 ± 2.64  P<0.05  Communication (SRS):  **G1:** 17.00 ± 12.02  **G2:** 27.77 ± 14.37  p=NS  Speech production:  **G1:** 9.20 ± 2.82  **G2:** 10.56 ± 3.97  p=NS  Syntax:  **G1:** 10.70 ± 3.74  **G2:** 12.56 ± 2.74  p=NS  Sematics:  **G1:** 9.70 ± 3.46  **G2:** 12.33 ± 2.00  p=0.01  Coherence:  **G1:** 11.20 ± 3.55  **G2:** 13.67 ± 3.39  p=0.004  Inappropriate initialization:  **G1:** 10.00 ± 3.46  **G2:** 13.67 ± 3.04  p=0.042  Stereotyped conversation:  **G1:** 11.20 ± 3.76  **G2:** 13.33 ± 3.57  p=NS  Context use:  **G1:** 12.00 ± 4.24  **G2:** 15.56 ± 2.29  p=NS  Non-verbal communication:  **G1:** 11.80 ± 3.15  **G2:** 14.67 ± 1.93  p=0.022  Pragmatics:  **G1:** 45.00 ± 13.44  **G2:** 60.56 ± 16.68  p=NS  Communication (SCQ):  **G1:** 2.50 ± 2.12  **G2:** 5.22 ± 2.43  p=0.037  **Repetitive behavior:**  Autistic mannerisms:  **G1:** 7.60 ± 6.36  **G2:** 16.33 ± 10.25  p=NS  Restricted, repetitive, and stereotyped behavior:  **G1:** 1.20 ± 1.31  **G2:** 4.56 ± 2.96  p=NS  **Educational/ cognitive/ academic attainment:**  Auditory selective attention:  **G1:** 58.09 ± 31.08  **G2:** 55.84 ± 20.98  p=NS  Inhibition of verbal responses:  **G1:** 43.50 ±21.69  **G2:** 43.50 ± 22.98  p=NS  Inhibition of motor responses:  **G1:** 91.56 ± 9.78  **G2:** 88.68 ± 12.25  p=NS  Cognitive flexibility, set-shifting:  **G1:** 13.40 ± 16.74  **G2:** 35.20 ± 26.35  p=0.045  Cognitive flexibility, concept generation:  **G1:** 5.55 ± 0.69  **G2:** 4.41 ± 0.81  p=NS  Goal setting:  **G1:** 78.41 ± 13.70  **G2:** 62.97 ± 10.73  p=NS  Speed and efficiency:  **G1:** 1.06 ± 0.13  **G2:** 1.00 ± 0.16  p=NS  All p-values represent time x group interactions  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Lopata et al.  2010[82](#_ENREF_82)  **Country:** US  **Intervention setting:** college campus  **Enrollment period:** NR  **Funding:** NR  **Design:** RCT | **Intervention:**  Manualized social treatment program conducted over 5 weeks with five treatment cycles per day, 70 minutes each (20 min of intensive instruction and 50 minute therapeutic activity). Instruction and therapeutic activities targeting social skills, face-emotion recognition, interest expansion, and interpretation of non-literal language.  **Assessments:** Adapted Skillstreaming Checklist (ASC), Social Responsiveness Scale (SRS), Skillstreaming Knowledge Assessment (SKA), Diagnositc Analysis of Nonverbal Accuracy2 (DANVA2), Parent, Child and Staff satisfaction surveys, Comprehensive Assessment of Spoken Language (CASL), Wechsler Intelligence Scale for Children, 4th edition (WISC-IV)  **Groups:**  **G1:** Skillstreaming intervention  **G2:** waitlist  **Provider:**   * Graduate and undergraduate students from psychology and education   **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  Yes  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 18  **G2:** 18  **N at follow-up:**  **G1:** 18  **G2:** 18 | **Inclusion criteria:**   * written diagnosis of HFASD * WISC-IV short form IQ > 70, WISC-IV Verbal Comprehension index (VCI) or Perceptual Reasoning Index (PR) ≥ 80 * expressive or receptive language score ≥ 80 on short form of the Comprehensive Assessment of Spoken Language (CASL)   **Exclusion criteria:**   * severe physical aggression   **Age, mean/yrs ± SD:**  **G1:** 9.39 ± 1.72  **G2:** 9.56 ± 1.54  **Mental age, mean/yrs (range):** NR  **Sex:**  M, n (%): **G1:** 17 (94.4)  **G2:** 17 (94.4)  F, n (%): **G1:** 1 (5.6)  **G2:** 1 (5.6)  **Race/ethnicity, n (%):**  White  **G1:** 16 (88.9)  **G2:** 16 (88.9)  African-American  **G1:** 1 (5.6)  **G2:** 1 (5.6)  Other  **G1:** 1 (5.6)  **G2:** 1 (5.6)  **SES:**  Parent education, years mean ± SD:  **G1:** 14.78 ± 2.50  **G2:** 15.58 ± 2.08  Household income, mean (range): NR  **Diagnostic approach:**  In Study/Referral  Diagnostic tool/method: NR  **Diagnostic category, n (%):**  Asperger’s  **G1:** 15 (83.3)  **G2:** 13 (72.2)  PDD  **G1:** 2 (11.1)  **G2:** 5 (27.8)  HFA  **G1:** 1 (5.6)  **G2:** 0  **Other characteristics**, n (%)**:** WISC-IV short form IQ, mean ± SD  **G1:** 101.63 ± 13.75  **G2:** 104.45 ± 15.46  CASL4 Expressive language  **G1:** 101.11 ± 13.57  **G2:** 104.78 ± 17.59  CASL4 Receptive language  **G1:** 106.17 ± 11.96  **G2:** 107.83 ± 16.92 | **Parent ratings**  ASC Total score, mean ± SD:  **G1:** 109.67 ± 15.76  **G2:** 101.78 ± 20.47  SRS Total score, mean ± SD:  **G1:** 79.94 ± 11.02  **G2:** 81.12 ± 13.78  Withdrawal, mean ± SD:  **G1:** 68.78 ± 12.14  **G2:** 74.68 ± 12.48  Social Skills, mean ± SD:  **G1:** 39.22 ± 9.10  **G2:** 34.22 ± 7.84  **Direct child measures ratings**  SKA Total score, mean ± SD:  **G1:** 46.39 ± 17.72  **G2:** 48.64 ± 12.08  DANVA-2 Child faces score, mean ± SD:  **G1:** 88.97 ± 22.45  **G2:** 91.44 ± 15.96  CASL Idioms, mean ± SD:  **G1:** 8.89 ± 6.82  **G2:** 11.44 ± 7.97 | **Parent ratings**  ASC Total score, mean ± SD:  **G1:** 119.67 ± 17.13  **G2:** 103.72 ± 17.23  SRS Total score, mean ± SD:  **G1:** 73.67 ± 11.42  **G2:** 82.53 ± 13.77  Withdrawal, mean ± SD:  **G1:** 63.39 ± 8.76  **G2:** 76.83 ± 10.38  Social Skills, mean ± SD:  **G1:** 41.39 ± 7.27  **G2:** 35.11 ± 7.65  **Direct child measures ratings**  SKA Total score, mean ± SD:  **G1:** 58.83 ± 11.50  **G2:** 43.31 ± 13.86  DANVA-2 Child faces score, mean ± SD:  **G1:** 99.03 ± 11.44  **G2:** 91.86 ± 19.38  CASL Idioms, mean ± SD:  **G1:** 12.94 ± 7.26  **G2:** 12.50 ± 9.34  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  McConkey et al. 2010[83](#_ENREF_83)  **Country:**  Northern Ireland  **Intervention setting:** Home  **Enrollment period:** NR  **Funding:** Grants to Autism NI from the Department of Health, Social Services and Public Safety and by special project funding from the Southern Health and Social Services Board  **Design:** Prospective cohort | **Intervention:** Early intervention program (known as Keyhole), based mainly around  TEACCH, Picture Exchange Communication System (PECS) and Hanen approaches; Delivered to families through 15–18 home visits over a nine-month  period in 2 separate geographical  areas  **Assessments:**  Psycho-Educational Profile – Revised (PEP-R)  Gilliam Autism Rating Scale, Vineland Adaptive Behavior Scales, The General Health Questionnaire (GHQ).  Independent personnel who had not been involved in delivering the intervention collected the post-intervention data  **Groups:**  **G1:** Early intervention program  **G2:** contrast  **Provider:** Early intervention therapists (speech and language therapists with an interest in ASD)  **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 36  **G2:** 26  **N at follow-up:**  **G1:** 35  **G2:** 26 | **Inclusion criteria:**   * confirmed diagnosis of ASD from a specialist clinic that served the geographical area in which the project was located. * not older than four years of age and should not be attending nursery school (attendance at a playgroup was permitted) * not in receipt of Speech and Language Therapy services provided by the Health and Social Care (HSC) Trusts in which the project was located * families had to consent to taking part in both the intervention and its evaluation, and to being interviewed at home by a university researcher   **Exclusion criteria:**  see inclusion criteria  **Age, mean/yrs :**  **G1:** 2.8 years **G2:** 3.4 years  **Mental age, mean/yrs (SD):** NR  **Sex, n (%):**  M: 55 (90%) F: 6 (10%).  **Race/ethnicity, n (%):**  % minority status:  **SES:** 44 families (73%) owned their own homes with 7 (13%) renting and 4 (7%) living with their parents.  **Maternal education, n (%**):  completed third level:  22 (37%)  taken GCSEs: 28 (47%) Left school: 7 (12%)  **Household income:**  There was a wage-earner in 36 (64%) of families but not in 20  (36.0%).  Diagnostic approach:  In Study  Diagnostic tool/method: diagnosis at a  specialist clinic  **Diagnostic category, n (%):**  Autism : 61 (100%)  **Other characteristics, n (%):**  Sensory impairment:  8 (13);  Epilepsy 8 (13%)  Physical impairment 1 (2%) | **PEP-R, mean (SD):**  **G1:**  Imitation: 4.9 ± 4.7  Perception: 7.9 ± 3.3  Fine-motor: 7.07 ± 3.5  Gross-motor: 10.8 ± 3.4  Eye–hand: 4.2 ± 2.7  Cognitive – non-verbal: 5.2 ± 4.6  Cognitive – verbal : 2.8 ± 3.7  Developmental age: mean ± sd  G1: 20.1 ± 7.4  **Behavior:**  % children with problems reported to be ‘getting better’ in each group:    Problems with language **G1:** 2.8  **G2:** 32.1  Problems with play  **G1:** 2.8  **G2:** 17.9  Relating to other people **G1:** 8.3  **G2:** 21.4  Unusual interest in toys/objects  **G1:** 5.6 **G2:** 3.7  Difficulty in imitating  **G1:** 2.8  **G2:** 25  Adaptation to change  **G1:** 5.6  **G2:** 17.9  **Vineland scores, Mean (SD):**  Vineland – communication **G1:** 61.5 ± 8.2  **G2:** 62.6 ± 11.9  Vineland – socialization **G1:** 63.7 ± 8.8  **G2:** 64.2 ± 8.5  Vineland – daily living **G1:** 65.9 ± 8.9  **G2:** 68.5 ± 14.8  Vineland – motor skills **G1:** 75.7 ± 16.4  **G2:** 77.0 ± 16.6  Vineland – adaptive behaviour **G1:** 61.3 ± 8.5  **G2:** 62.3 ± 9.6  **Mean (SD):**  GARS – autism quotient **G1:** 85.4 ± 15.3  **G2:** 88.6 ± 10.9  GARS – percentile scores **G1:** 24.9 ± 25.2  **G2:** 27.1 ± 18.1  **Mean (SD):**  GHQ – overall score **G1:** 7.2 ± 4.4  **G2:** 5.7 ± 4.4  GHQ – somatic **G1:** 2.8 ± 1.4  **G2:** 1.7 ± 1.7  GHQ – anxiety **G1:** 2.7 ± 2.1  **G2:** 2.3 ± 2.2  QRS total score **G1:** 8.7 ± 7.6  **G2:** 16.6 ± 6.2 | **PEP-R, mean (SD):**  **G1:**  Imitation: 8.8 ± 5.0  Perception: 10.4 ± 3.1  Fine-motor: 10.5 ± 3.8  Gross-motor: 15.0 ± 3.5  Eye–hand: 7.0 ± 3.1  Cognitive – non-verbal: 12.2 ± 6.4  Cognitive – verbal: 7.57 ± 5.8  Developmental age: mean ± sd  G1: 29.7 ± 11.2  Significant improvement in all subscales at p<0.001  **Behavior:**  % children with problems reported to be ‘getting better’ in each group; p-values are within-group change comparisons over time:  Problems with language **G1:** 60 (p< .001)  **G2:** 41.7 (NS)  Problems with play  **G1:** 54.3 (p<.001)  **G2:** 37.5 (p<.005)  Relating to other people **G1:** 25.7 (p<.005)  **G2:** 29.2 (NS)  Unusual interest in toys/objects **G1:** 22.9 (NS)  **G2:** 16.7 (NS)  Difficulty in imitating  **G1:** 22.9 (p<.005)  **G2:** 29.2 (NS)  Adaptation to change **G1:** 45.7 (NS)  **G2:** 25 (NS)  **Vineland scores, Mean (SD):**  Vineland – communication **G1:** 69.5 ± 16.2  **G2:** 60.7 ± 12.3    Vineland – socialization **G1:** 75.9 ± 20.6  **G2:** 69.5 ± 13.1  Vineland – daily living **G1:** 71.2 ± 15.5  **G2:** 66.1 ± 15.3   Vineland – motor skills **G1:** 78.1 ± 20.1  **G2:** 72.9 ± 18.5   Vineland – adaptive behavior **G1:**67.7 ± 11.8  **G2:**61.7 ± 11.8  **Mean (SD):**  GARS – autism quotient **G1:** 89.2 ± 13.2  **G2:** 99.4 ± 20.4    GARS – percentile scores **G1:** 29.7 ± 25.2  **G2:** 48.1 ± 31.4   **Mean (SD):**  GHQ – overall score  **G1:** 1.6 ± 2.3  **G2:** 5.3 ± 6.0    GHQ – somatic **G1:** .5 ± .8  **G2:** 1.8 ± 2.4    GHQ – anxiety **G1:** .9 ± 1.8  **G2:** 2.4 ± 2.4    QRS total score **G1:** 14.3 ± 6.5  **G2:** 16.0 ± 7.6  **Harms** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Oosterling et al.  2010[84](#_ENREF_84)  **Country:**  Netherlands  **Intervention setting:**  Clinic/home  **Enrollment period:**  Spring/2004-spring/2007  **Funding:**  Grant from Korczak Foundation and European Union  **Design:** RCT | **Intervention:**  ‘Parent Focus Training:’ Two-year home-based parent training program, focused on stimulating joint attention and language skills. Started with 4 weekly 2-hour group sessions with parents, followed by individual home visits every 6 weeks during first year. Home visits were at three month intervals in second year  **Assessments:** Dutch version of MacArthur Communicative Development Inventory (NCD-I), Child Behavior Checklist 1 ½-5, Symptom Checklist-90, Nijmeegse Ouderlijk Stress Index, Infant Characteristics Questionnaire, Clinical Global Impression-Improvement Scale, Erickson scales, Autism Diagnostc Observation Schedule, Autism Diagnostic Interview-Revised, Mullen Scales of Early Learning, Psycho Educational Profile – Revised,  **Groups:**  **G1:** nonintensive parent training + care as usual  **G2:** care as usual (special nursery with music, speech, play, and motor therapy)  **Provider:**   * Psychologists or sociotherapists worked as parent-trainers   **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Co-interventions held stable during treatment:**  **Concomitant therapies, n (%):**  Care as usual, mean ± SD  Day care, average number of daily periods in child special day care of medical nursery  **G1:** 5.2 ± 1.7  **G2:** 4.2 ± 2.9  Speech and language therapy, minutes per week  **G1:** 16.7 ± 22.4  **G2:** 19.1 ± 22.0  Physical therapy, minutes per week  **G1:** 8.3 ± 18.4  **G2:** 6.4 ± 14.9  Other individual therapy, min/week  **G1:** 24.9 ± 59.5  **G2:** 22.7 ± 39.7  Parental counseling, min/week  **G1:** 21.0 ± 30.9  **G2:** 28.2 ± 36.2  **N at enrollment:**  **G1:** 40  **G2:** 35  **N at follow-up:**  **G1:** 36  **G2:** 31 | **Inclusion criteriaa:**   * age 12-42 months * clinical diagnosis of autism and developmental age at least 12 months * clinical diagnosis of PDD-NOS and developmental age at least 12 months and Developmental Quotient < 80   **Exclusion criteria:**   * substantial other problems in family (severe parental psychopathology, financial/housing problems, marital conflicts) * insufficient parental proficiency in Dutch   **Age, mean/months ± SD:**  **G1:** 35.2 ± 5.5  **G2:** 33.3 ± 6.4  **Mental age, mean/yrs (range):**NR    **Sex: Male %**  **G1:** 75  **G2:** 80.6  **Race/ethnicity, n (%):**  NR  **SES:**  Maternal education, %:  Low  **G1:** 41.7  **G2:** 41.9  Middle  **G1:** 33.3  **G2:** 35.5  High  **G1:** 25.0  **G2:** 22.6  Paternal education, %:  Low  **G1:** 34.3  **G2:** 56.7  Middle  **G1:** 20.0  **G2:** 26.7  High  **G1:** 45.7 **G2:** 16.7  Household income, mean (range): NR  **Diagnostic approach:**  Referral based on screening positive on the Early Screening of Autistic Traits Questionnaire  Diagnostic tool/method:  Consensus diagnosis of two professionals, ADOS, ADI-R and psychometric testing of developmental abilities  **Diagnostic category, %:**  Autism  **G1:** 91.7  **G2:** 83.9  PDD-NOS  **G1:** 8.3  **G2:** 16.1  **Other characteristics**, n (%)**:** SCL-90  Mothers (n = 57)  **G1:** 126.7 (31.2)  **G2:** 123 (28.0)  Fathers (n = 47)  **G1:** 113.2 (33.7)  **G2:** 112.3 (21.9) | DQ, mean ± SD  **G1:** 58.4 ± 16.8  **G2:** 58.0 ± 16.9  ADOS, mean ± SD  SA  **G1:** 15.0 ± 4.6  **G2:** 14.8 ± 4.9  RRB  **G1:** 2.8 ± 1.7  **G2:** 2.8 ± 1.9  ADI-R  RSI:  **G1:** 16.3 (5.1)  **G2:** 14.7 (4.5)  Communication:  **G1:** 11.2 (2.4)  **G2:** 10.3 (2.8)  RRSPB:  **G1:** 4.1 (2.1)  **G2:** 3.0 (1.8)  MacArthur N-CDI  Words understood  **G1:** 177.9 ± 122.5  **G2:** 181.5 ± 121.4  Words said  **G1:** 106.8 ± 122.2  **G2:** 101.7 ± 109.7  Gestures produced  **G1:** 29.1 ± 13.7  **G2:** 30.1 ± 13.6  Erikson scales, mean ± SD  Non-negativity  **G1:** 5.9 ± 1.8  **G2:** 6.2 ± 0.8  Non-avoidance  **G1:** 3.9 ± 1.5  **G2:** 4.1 ± 1.3  Compliance  **G1:** 3.8 ± 1.6  **G2:** 4.2 ± 1.3  CBCL mean ± SD  Internalizing  **G1:** 21.3 ± 9.4  **G2:** 16.9 ± 7.3  Externalizing  **G1:** 21.2 ± 11.1  **G2:** 19.4 ± 9.0  ICQ mean ± SD  Total score  **G1:** 146.4 ± 27.0  **G2:** 141.0 ± 18.0 | ADOS, change  Level of non-echoed language on 6 point scale  **G1:** -1.6 ± 1.1  **G2:** -1.3 ± 1.2  *p* < 0.001  Joint attention factor  **G1:** -0.8 ± 2.3  **G2:** -0.9 ± 0.2  Social affect  **G1:** -2.5 ± 4.0  **G2:** -2.3 ± 3.7  *p* < 0.05  **Social skills:**  **Communication/ language, mean change ± SD:**  MacArthur N-CDI  Words understood  **G1:** 62.0 ± 75.0  **G2:** 35.2 ± 66.1  *p* < 0.01  Words said  **G1:** 75.5 ± 78.8  **G2:** 56.1 ± 97.2  *p* < 0.05  Gestures produced  **G1:** 6.7 ± 10.2  **G2:** 6.3 ± 9.0  *p* < 0.01  Erikson scales  Non-negativity  **G1:** 0.7 ± 2.1  **G2:** 0.3 ± 1.3  *p* =ns  Non-avoidance  **G1:** 0.7 ± 1.5  **G2:** 0.5 ± 1.4  *p* =ns  Compliance  **G1:** 0.9 ± 1.5  **G2:** 0.5 ± 1.5  *p* =ns  **Harms:** NR  **Modifiers:** NR |

**Comments: a** Authors note that 8 participants who did not meet these criteria were included in the study (G1: 5 G2: 3). They were included based on clinical judgment of room for improvement. 2 of these had no endpoint data.

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Peters-Scheffer et al. 2010[85](#_ENREF_85)  **Country:**  Netherlands  **Intervention setting:** Preschool- day care centers  **Enrollment period:** NR  **Funding:** Stichting De Driestroom, Elst (The Netherlands)    **Design:** Non-RCT pre-post | **Intervention:** Low intensity behavioral treatment (elements of TEACCH) on average  6.5 hrs / week + 5–10 (M= 6.29; SD = 1.31) hrs of one-to-one treatment / week, based on Lovaas + informal use of ABA by teachers  Control group attended preschools in which no one-to-one behavioral treatment was given  **Assessments:** Wechsler Preschool and Primary Scale of Intelligence-Revised, SON-2.5–7, Bayley Scales of Infant Development, VABS-composite, CBCL, PDD-MRS, BSID-II or SON-2.5-7 administered pre-treatment and after 8 months. VABS, CBCL, and PDD-MRS administered pre- and post-treatment; also at two, four, and six months of treatment.  **Provider:**  Trainers and teachers of the preschool; treatment supervised by special educator with 5 years of experience in applying ABA in young children  **Treatment manual followed:** Yes  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** Yes  **Groups:**  **G1:** Early intervention  **G2:** control  **Co-interventions held stable during treatment:**  NR  **Frequency of contact during study:** baseline, 2, 3,4 months of Treatment and end of 8 months of Treatment  **Concomitant therapies, n (%):**  Individual physiotherapy, speech therapy, music therapy or play therapy with a maximum of 1hr /week :100%  **N at enrollment:**  **G1:** 12  **G2:** 22  **N at follow-up:**  **G1:** 12  **G2:** 22 | **Inclusion criteria:**   * a diagnosis of Autistic Disorder or PDD-NOS and intellectual disabilities (ID) based on DSM-IV criteria established by licensed and independent psychologist or psychiatrist; level of ID assessed by standard intelligence tests (e.g., Wechsler Preschool and Primary Scale of Intelligence- revised, SON-2.5-7, Bayley Scales of Infant Development) * chronological age below 7 years * absence of medical conditions (e.g., visual impairment; uncontrolled epilepsy) that could interfere with treatment   **Exclusion criteria:**   * see inclusion   **Age, mean ± SD months (range):**  **G1:** 53.50 ± 5.52 (42–62) **G2:** 52.95 ±11.14 (38–75**)**  **Mental Developmental Index/IQ, mean ± SD (range):**  **G1:** 47.00 ± 10.33 (31-64) **G2:** 45.73 ± 15.99 (21-77)  **Sex:** NR  **Race/ethnicity, n (%):** NR  **SES:** NR  **Diagnostic approach:**  Referral  Diagnostic tool/method: DSM-IV  **Diagnostic category, n (%):** NR  **Other characteristics, n (%):** NR | Developmental age in months  **G1:** 25.92 ± 7.57  **G2:**23.32 ± 6.33  Mental developmental index/IQ  **G1:** 47.00 ± 10.33  **G2:** 45.73 ± 15.99  VABS-composite in months **G1:** 20.83 ± 6.69  **G2:** 19.18 ± 4.14  VABS-communication in months  **G1:** 26.92 ± 12.12  **G2:** 25.00 ± 10.00  VABS-daily living in months  **G1:** 23.83 ± 7.28  **G2:** 20.14 ± 4.68  VABS-socialization **G1:** 20.75 ± 4.54  **G2:** 24.64 ± 8.18  CBCL-total  **G1:** 60.00 ± 8.37  **G2:** 66.91 ± 7.70  CBCL-internalizing **G1:** 60.58 ± 5.58  **G2:** 67.55 ± 6.27  CBCL-externalizing **G1:** 58.92 ± 10.82  **G2:** 63.59 ± 7.89  PDD-MRS raw score **G1:** 11.58 ± 4.42  **G2:** 12.91 ± 3.79 | Developmental age in months  **G1:** 34.83 ± 10.89  **G2:** 25.73 ± 8.26  Mental developmental index/IQ  **G1:** 55.83 ±14.94  **G2:** 43.73 ± 16.74  VABS-composite in months  **G1:** 31.75 ± 10.96  **G2:** 22.05 ± 7.47  VABS-communication in months  **G1:** 39.42 ± 15.39  **G2:** 29.95 ± 13.39  VABS-daily living in months  **G1:** 33.25 ± 9.04  **G2:** 23.23 ± 7.70  VABS-socialization  **G1:** 34.08 ± 8.14  **G2:** 25.14 ±7.21  CBCL-total  **G1:** 58.25 ± 8.02  **G2:** 63.23 ± 7.98  CBCL-internalizing  **G1:** 59.08 ± 7.74  **G2:** 64.41 ± 8.45  CBCL-externalizing  **G1:** 54.33 ± 8.52  **G2:** 58.86 ± 6.26  PDD-MRS raw score  **G1:**10.25 ± 3.14  **G2:**11.27 ± 3.84  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Wong 2010[86](#_ENREF_86)  **Country:**  Hong Kong, China  **Intervention setting:** Clinic  **Enrollment period:** Jan – Dec 2007  **Funding:** NR  **Design:** RCT, cross-over | **Intervention:** A short 2-week Early intervention with ten 30-min sessions, with a target improving communication and  Social interaction.  Intervention given between baseline and Time 1 for the intervention group and between Time 1 and Time 2 for the control group**.**  The control Group undertook the  Intervention starting from Week 5 and received the same 10-session intervention. By Time 2, both groups had  completed the intervention, and they were combined\* to  give a larger sample size for detecting intervention effects  **Assessments:** ADOS, Ritvo-Freeman Real  Life Rating Scale, Symbolic Play Test, and Parenting Stress Index. Done at 3 time points (baseline, time 1, time 2).  **Groups:**  **G1:** Early intervention  **G2:** control  **Provider:** Trainer- autism therapist  **Treatment manual followed:** NR  **Defined protocol followed:** yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  None  **Concomitant therapies, n (%):** none  **N at enrollment:**  **G1:** 9  **G2:** 8  **N at follow-up:**  **G1:** 9  **G2:** 8 | **Inclusion criteria:**   * consecutive newly diagnosed children with autism * children with autism referred to DKCAC for developmental assessment   **Exclusion criteria:** NR  **Age, mean ± SD, mos: G1:** 25.33 ± 6 **G2:** 27.88 ± 5.57  **Mental age,** mean ± SD mos (SD): **G1:** 17.85 ± 4.16 **G2:** 17.91 ± 4.49  **Sex, n (%):**  M: 16 (94) F: 1 (6)  Male **G1:** 8  **G2:** 8  Female  **G1:** 1  **G2:** 0  **Race/ethnicity, n (%):**  % minority status: NR  **SES:** NR  Maternal education  NR  Household income, mean (range): NR  **Diagnostic approach:**  In Study  Diagnostic tool/method: DSM-IV, ADI-R, ADOS  **Diagnostic category, n (%):** Autism : 17 (100)  **Other characteristics:**  CARS, mean ± SD, (range)  **G1:** 35.67 ± 4.64 (29-41.5) **G2:** 36.88 ± 4.24 (30-40.5) | **Median (Range):**  **ADOS (Communication and language):**  **G1** (n = 9):  Total: 11.0 (7.0–13.0)  Vocalization: 2.0 (1.0–3.0)  Pointing: 3.0 (1.0–3.0)  Gestures: 2.0 (0.0–2.0)  **G2** (n = 8):  Total: 10.0 (7.0–14.0)  Vocalization: 2.0 (2.0–2.0)  Pointing: 3.0 (1.0–3.0)  Gestures: 1.0 (0.0–2.0)  **ADOS (Reciprocal social interaction)** :  **G1:**  Total: 22.0 (11.0–28.0)  Unusual eye contact: 2.0 (2.0–2.0)  Integration of gaze and other behaviors during social overtures: 2.0 (1.0–3.0)  Requesting: 2.0 (1.0–3.0)  **G2:**  Total: 18.5 (13.0–26.0)  Unusual eye contact: 2.0 (0.0–2.0)  Integration of gaze and other behaviors during social overtures: 1.5 (1.0–3.0)  Requesting: 2.0 (1.0–3.0)  **SPT (Symbolic play) :**  Standard score  **G1:**12.0 (12.0–21.9)  **G2:**13.7 (12.0–28.5) | **Median (Range):**  **ADOS (Communication and language) :**  No significant group difference in communication (Χ2 = 0.95, p = 0.331)  **G1:**  Total: 7.0 (4.0–9.0)  Vocalization: 1.0 (1.0–2.0)  Pointing: 2.0 (1.0–3.0)  Gestures: 1.0 (0.0–2.0)  **G2:**  Total: 7.50 (6.0–11.0)  Vocalization: 1.0 (1.0–3.0)  Pointing: 2.0 (0.0–3.0)  Gestures: 1.0 (0.0–1.0)  **ADOS (Reciprocal social interaction) :**  No between group differences observed (Χ2 = 0.46, p = 0.497)  **G1:**  Total: 15.0 (7.0–22.0)  Unusual eye contact: 2.0 (0.0–2.0)  Integration of gaze and other behaviors during social overtures: 1.0 (0.0–2.0)  Requesting: 0.0 (0.0–2.0)  **G2:**  Total: 16.0 (10.0–24.0)  Unusual eye contact: 2.0 (2.0–2.0)  Integration of gaze and other behaviors during social overtures: 1.0 (1.0–2.0)  Requesting: 1.0 (0.0–2.0)  **SPT (Symbolic play) :**  Standard score  **G1:** 12.7 (12.0–27.1)  **G2:** 13.7 (12.0–28.5)  **Commonly occurring co-morbidities:** No co-morbid neurological or psychiatric disorders  **Harms:** NR  **Modifiers:** NR |

**Table C-1. Evidence table, continued**

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| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures\*** | **Outcomes** |
| **Author:**  Aman et al.  2009[35-38](#_ENREF_35)  **Country:** US  **Intervention setting:** Clinic, home  **Enrollment period:** NR  **Funding:**  NIMH  **Design:** RCT  Note: See earlier study[87](#_ENREF_87) reporting on this population in 2011 AHRQ review[9](#_ENREF_9) | **Intervention:**  Risperidone (0.5 to 3.5 mg/day) or aripiprazole if risperidone was ineffective ((aripiprazole started at 2 mg and adjusted up to 15 mg)or a combination of medication plus parent training. Parents of children in combination group received an average of 11.4 parent training sessions.  **Assessments:** Home Situations Questionnaire (HSQ), Aberrant Behavior Checklist-Irritability (ABC-I), Vineland Adaptive Behavior Scales (VABS), Noncompliance index. Assessed weekly for 8 weeks then every 4 weeks until week 24. Follow-up study at 1 year  **Groups:**  **G1:** risperidone  **G2:** risperidone + parent training  **Co-interventions held stable during treatment:**  Yes  **Frequency of contact during study:** ~weekly across groups  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 49  **G2:** 75  **N at follow-up (1 year):**  **G1:** 36  **G2:** 51 | **Inclusion criteria:**   * age between 4 and 14 years * DSM-IV-TR diagnosis of autistic disorder, Asperger’s disorder, or PDD-NOS based on clinical assessment and corroborated by the ADI-R * serious behavioral problems (e.g tantrums, aggression and self-injury) evidenced by score ≥ 18 on ABC-Irritability subscale and CGI-severity score ≥ 4 * IQ ≥ 35 or mental age of 18 months from Stanford-Binet 5, Leiter International Performance Scale or Mullen Scales of Early Learning * anticonvulsant treatment permissible if medication was stable (≥ 4 wks) and subject was seizure free (≥ 18 mos)   **Exclusion criteria:**   * significant medical condition by history, exam or lab test * lifetime diagnosis of psychosis, bipolar disorder or current diagnosis of major depression, obsessive-compulsive disorder, substance abuse, or girls with positive Beta HCG pregnancy test   **Age, mean/yrs ± SD:**  **G1:** 7.5 ± 2.80  **G2:** 7.38 ± 2.21  **Mental age, mean/yrs (range):** NR  **Sex:** NRRace/ethnicity, n (%):  White/non Hispanic  **G1:** 34 (69.4)  **G2:** 59 (78.7)  Hispanic  **G1:** 7 (14.3)  **G2:** 4 (5.3)  African American  **G1:** 7 (14.3)  **G2:** 9 (12.1)  Asian American  **G1:** 0  **G2:** 3 (4.0)  Native American  **G1:** 1 (2.0)  **G2:** 0  **SES, mean ± SD:**  Income (US $)  <20,000  **G1:** 12 ± 25.0  **G2:** 14 ± 18.7  20,001-40,000  **G1:** 14 ± 29.2  **G2:** 21 ± 28.0  40,001-60,000  **G1:** 10 ± 20.8  **G2:** 11 ± 14.7  60,001-90,000  **G1:** 7 ± 14.6  **G2:** 16 ± 21.3  >90,000  **G1:** 5 ± 10.4  **G2:** 13 ± 17.3  Maternal education  <8th grade  **G1:** 1 ± 2.0  **G2:** 4 ± 5.3  Some high school  **G1:** 4 ± 8.2  **G2:** 3 ± 4.0  High school graduate/GED  **G1:** 15 ± 30.6  **G2:** 18 ± 24.0  Some collage  **G1:** 17 ± 34.7  **G2:** 28 ± 37.3  College graduate  **G1:** 10 ± 20.4  **G2:** 12 ± 16.0  Advanced degree  **G1:** 2 ± 4.1  **G2:** 10 ± 13.3  **Diagnostic approach:**  In Study  Diagnostic tool/method:  DSM-IV-TR diagnosis based on clinical assessment and corroborated by the ADI-R  **Diagnostic category, n (%):**  Autism  **G1:** 32 (65.3)  **G2:** 49 (65.3)  PDD-NOS  **G1:** 13 (26.5)  **G2:** 22 (29.3)  Aspergers  **G1:** 4 (8.2)  **G2:** 4 (5.3)  **Other characteristics:**  **Educational placement, n (%):**  F/T, regular education  **G1:** 10 (20.4)  **G2:** 18 (24.0)  F/T, regular education with aide  **G1:** 0  **G2:** 3 (4.0)  Regular education, some special  **G1:** 5 (10.2)  **G2:** 4 (5.3)  Special education classroom  **G1:** 8 (10.3)  **G2:** 14 (18.7)  Special elementary school  **G1:** 3 (6.1)  **G2:** 2 (2.7)  Home school  **G1:** 4 (8.2)  **G2:** 5 (6.7)  Special preschool  **G1:** 11 (22.4)  **G2:** 11 (14.7)  Regular preschool  **G1:** 6 (12.2)  **G2:** 8 (10.7)  No school  **G1:** 2 (24.1)  **G2:** 12 (16.0) | **HSQ, mean ± SD:** Average severity score  **G1:** 4.16 ± 1.47  **G2:** 4.31 ± 1.67  “Yes” count  **G1:** 18.9 ± 3.46  **G2:** 18.6 ± 4.65  **ABC, mean ± SD:** Irritabilty  **G1:** 29.7 ± 6.10  **G2:** 29.3 ± 6.97  Social withdrawal  **G1:** 17.1 ± 8.37  **G2:** 15.2 ± 9.01  Stereotypic behavior  **G1:** 10.6 ± 5.46  **G2:** 7.59 ± 5.20  Hyperactivity/non compliance  **G1:** 36.1 ± 6.86  **G2:** 35.3 ± 9.30  Inappropriate speech  **G1:** 6.37 ± 4.03  **G2:** 5.75 ± 3.43  **VABS, mean ± SD: Standard Score** Daily living skills  **G1:** 41.14 ± 19.81  **G2:** 50.79 ± 18.49  Socialization  **G1:** 53.48 ± 14.41  **G2:** 59.55 ± 15.01  Communication  **G1:** 53.18 ± 19.94  **G2:** 61.15 ± 20.95  Adaptive Composite  **G1:** 45.84 ± 15.5  **G2:** 53.15 ± 15.66  **Age Equivalent Score** Daily living skills  **G1:** 2.85 ± 1.52  **G2:** 3.63 ± 1.94  Socialization  **G1:** 2.09 ± 1.08  **G2:** 2.80 ± 1.84  Communication  **G1:** 3.12 ± 2.15  **G2:** 3.99 ± 2.65  Adaptive Composite  **G1:** 18.91 ± 14.18  **G2:** 16.59 ± 11.44 | **24 Week Follow-Up**  **VABS, mean ± SD: Standard Score**  Daily living skills  **G1:** 45.34 ± 20.48  **G2:** 55.65 ± 21.86  Socialization  **G1:** 56.59 ± 17.38  **G2:** 67.42 ± 18.48  Communication  **G1:** 53.57 ± 20.23  **G2:** 63.90 ± 22.65  Adaptive Composite  **G1:** 47.84 ± 15.81  **G2:** 57.87 ± 19.03  **Age Equivalent Score**  Daily living skills  **G1:** 3.49 ± 1.72  **G2:** 4.36 ± 2.25  Socialization  **G1:** 2.71 ± 1.51  **G2:** 3.99 ± 2.56  Communication  **G1:** 3.42 ± 2.18  **G2:** 4.58 ± 2.85  Adaptive Composite  **G1:** 12.88 ± 10.83  **G2:** 8.41 ± 8.69  **One Year Follow-up\*\***  **HSQ-mean**  **G1:**  2.12 ± 1.87  **G2:** 1.84 ± 1.46  **HSQ “yes”**  **G1:** 13.67± 7.04  **G2:** 12.69 ± 5.91  **ABC, mean ± SD**  Irritability  **G1:**15.25 ± 3.36  **G2:** 14.10 ± 3.60  Lethargy  **G1:** 7.39 ±6.83  **G2:** 4.65 ± 5.21  Stereotypy  **G1:** 5.61 ± 5.31  **G2:** 4.06 ± 3.67  Hyperactivity  **G1:** 18.94 ± 11.42  **G2:** 17.37 ± 11.78  Inappropriate speech  **G1:**  3.22 ± 3.36  **G2:**  3.27 ± 2.77  **Predictors, F**  **HSQ Total Score**  Income: 0.02  Maternal education: 0.40  Child age: 4.96  IQ: 3.18  ABC-Irritability: 1.13  ABC-Hyperactivity: 0.36  CGI-S: 0.08  CASI-ADHD/Combined: 0.02  CASI-ODD: 0.06  CASI-GAD: 0.77  CASI-Mood disorder: 0.84  CASI-PDD: 0.11  CYBOCS: 0.42  HSQ: 7.23 (p=0.007)  PSI-Parental distress: 0.20  PSI-Total stress: 0.78  VABS-daily living: 0.18  VABS-socialization: 0.34  VABS-communication: 0.58  VABS-composite: 0.60  **ABC-Hyperactivity/Non-compliance**  Income: 1.02  Maternal education:0.02  Child age: 3.23  IQ: 3.43  ABC-Irritability: 0,02  ABC-Hyperactivity: 0.31  CGI-S: 0.21  CASI-ADHD/Combined: 0.30  CASI-ODD: 0.00  CASI-GAD: 0.17  CASI-Mood disorder: 0.04  CASI-PDD: 2.47  CYBOCS: 0.38  HSQ: 0.29  PSI-Parental distress: 0.54  PSI-Total stress: 0.84  VABS-daily living: 3.62  VABS-socialization: 1.45  VABS-communication: 5.04  VABS-composite: 4.56  **Moderators, F**  **HSQ Total Score**  Income: 0.58  Maternal education:0.08  Child age: 0.43  IQ: 0.04  ABC-Irritability: 0.08  ABC-Hyperactivity: 0.15  CGI-S: 0.32  CASI-ADHD/Combined: 0.01  CASI-ODD: 3.38  CASI-GAD: 0.43  CASI-Mood disorder: 1.14  CASI-PDD: 0.39  CYBOCS: 1.96  HSQ: 2.27  PSI-Parental distress: 0.05  PSI-Total stress: 0.11  VABS-daily living: 0.12  VABS-socialization: 0.00  VABS-communication: 0.00  VABS-composite: 0.12  **ABC-Hyperactivity/Non-compliance**  Income: 0.07  Maternal education: 0.67  Child age: 0.65  IQ: 0.96  ABC-Irritability: 0.04  ABC-Hyperactivity: 0.46  CGI-S: 2.13  CASI-ADHD/Combined: 0.73  CASI-ODD: 5.70  CASI-GAD: 0.84  CASI-Mood disorder: 1.92  CASI-PDD: 0.08  CYBOCS: 1.60  HSQ: 1.02  PSI-Parental distress: 0.01  PSI-Total stress: 0.00  VABS-daily living: 0.09  VABS-socialization: 0.09  VABS-communication: 0.22  VABS-composite: 0.04  None of the predictors / moderators were significant at p<0.01 |

**Table C-1. Evidence table, continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Study**  **Description** | **Intervention** | **Inclusion/ Exclusion**  **Criteria/ Population** | **Baseline**  **Measures** | **Outcomes** |
| **Author:**  Kouijzer et al., 2009 [88](#_ENREF_88), [89](#_ENREF_89)    **Country:**  Netherlands,  France  **Intervention setting:** Private practice  **Enrollment period:** NR  **Funding:** NR  **Design**: Non-RCT | **Intervention:**  Twice a week for 40 sessions of seven 3-min intervals of EEG neurofeedback separated by 1-min rest intervals  **Assessments:** QEEG, executive functions skills, communicative abilities, social interaction and behaviors  **Groups:**  **G1:** neurofeedback  **G2:** control  **Provider:**  Psychotherapist  **Treatment manual followed:** NR  **Defined protocol followed:** Yes  **Measure of treatment fidelity reported:** NR  **Co-interventions held stable during treatment:**  NR  **Concomitant therapies, n (%):** NR  **N at enrollment:**  **G1:** 7  **G2:** 7  **N at follow-up:**  **G1:** 7  **G2:** 7 | **Inclusion criteria:**   * IQ-score of ≥70 * presence of ASD as diagnosed by a child psychiatrist or health care psychologist   **Exclusion criteria:**   * children using medication * children with a history of severe brain injury * children with co-morbidity such as ADHD and epilepsy   **Age, mean/yrs ± SD (range): G1:** 9.63 ± 1.53 (8-12) **G2:** 10.64 ± 1.41 (9-12)  p=0.220  **Mental age,:**  Total IQ, mean ± SD (range)  **G1**:92.50 ± 16.05 (73-111) **G2**:93.83 ± 13.67 (82-199)  p=0.891  Mean verbal IQ:  **G1:** 97.80 ± 18.38 (77-119) **G2**:95.40 ± 18.15 (78-125)  p=0.841  Mean performal IQ:  **G1:** 99.60 ± 25.77 (73-134) **G2**:93.40 ± 9.71 (81-108)  p=0.628  **Sex:**  M: 12 (86%)  F: 2 (14%)  **Race/ethnicity, n (%):** NR  **SES:** NR  Maternal education: NR  Household income, mean (range): NR  **Diagnostic approach:**  In Study  Diagnostic tool/method:  DSM-IV confirmed by  clinical psychologist and by results on the  CCC questionnaire  **Diagnostic category, n (%):**  PDD-NOS: 14 (100%)  **Other characteristics**, n (%)**:** NR | **mean ± SD:**  Attentional control  Visual selective attention **G1:** 4.33 ± 2.81  **G2:** 9.14 ± 14.44  Auditory selective attention **G1:** 47.87 ± 14.21 **G2:** 67.79 ± 25.61  Inhibition of verbal responses  **G1:** 68.17 ± 18.87 **G2:** 65.71 ± 31.53  Inhibition of motor responses  **G1:** 78.50 ± 13.16 **G2:** 89.84 ± 11.02  Cognitive ﬂexibility  -Verbal memory **G1:** 53.33 ± 3.62 **G2:** 51.29 ± 2.63  Visual memory **G1:** 46.00 ± 3.74 **G2:** 41.00 ± 5.57  Shifting **G1:** 30.00 ± 15.68 **G2:** 29.71 ± 10.50  Concept generation **G1:** 2.55 ± 1.48  **G2:** 3.50 ± 1.70  Goal setting **G1:** 55.45 ± 9.07 **G2:** 55.84 ± 18.17  Speed and efﬁciency **G1:** 34.33 ± 7.06 **G2:** 41.00 ±15.52  General communication **G1:** 115.14 ± 10.45  **G2:** 115.86 ± 9.42  Non-verbal communication **G1:** 15.86 (2.34  **G2:** 14.86 (2.85 | **mean ± SD:**  Attentional control  Visual selective attention  **G1:** 4.17 ± 4.26 **G2:** 7.29 ± 8.90  Auditory selective attention  **G1:** 62.40 ± 14.18 **G2:** 68.90 ± 27.30  p = .014  Inhibition of verbal responses  **G1:** 30.00 ± 12.12 **G2:** 50.14 ± 26.59  p = .049  Inhibition of motor responses  **G1:** 89.93 ± 9.20 **G2:** 91.47 ± 9.66  Cognitive ﬂexibility  Verbal memory  **G1:** 52.17 ± 4.07 **G2:** 50.57 ± 6.604  Visual memory  **G1:** 45.00 ± 4.34 **G2:** 40.29 ± 8.321  Shifting  **G1:** 47.00 ± 13.27 **G2:** 34.00 ± 13.29  p= .037  Concept generation  **G1:** 4.96 ±(.45) **G2:** 3.83 ±(1.42)  p= .046  Goal setting  **G1:** 75.85 ± 9.17 **G2:** 57.03 ± 11.89  p= .021  Speed and efﬁciency **G1:** 41.33 ± 5.13 **G2:** 43.86 ± 10.96  p= .542  No significant differences between post-treatment and 3-month follow-up measurements of children’s executive functioning at follow-up  General communication:  **G1:**101.29 ± 12.09  **G2:**114.29 ± 16.45  Non-verbal communication  **G1:** 13.71 ± 2.50  **G2:** 15.57 ± 2.76  p = .037  No group difference in any of the other subscales  Auti-R:  Social interaction  **G1:**36.50 ± 3.51  **G2:**30.71 ± 0.92  p = .001  Communication  **G1:**29.00 ± 1.79  **G2:** 24.14 ± 0.64  p = .000  Typical behavior  **G1:** 48.33 ± 3.44  **G2:** 44.14 ± 1.06  p = .018  Total  **G1:**113.83 ± 7.17  **G2:** 99.00 ± 1.95  **12 months:**  Only data for G1 reported  continuation of improvement of selective attention after 12 months p < .010  Non-significant improvement was found for inhibition of verbal responses, verbal memory, concept generation, and  speed and efficiency.  No significant decrease of performance was found between post-assessment and follow-up data on any  aspect of executive functioning  Significant improvement maintained for  general communication  **Harms:** NR  **Modifiers:** NR |

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