A Systematic Review of Naturalistic Developmental Interventions for Autism

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Abstract

- **Purpose:** To critically evaluate current research in naturalistic and developmental interventions for autism
- **Method:** Multiple keyword searches of databases and manual searches of article references were conducted to find relevant abstracts. These articles were reviewed more thoroughly, and a final body of 30 articles were selected for review in this study.
- **Results:** There has been a substantial shift from clinician-mediated to parent-mediated intervention. Identification of early ASD markers has facilitated a move toward earlier intervention.
- **Conclusion:** Intervention has shifted toward a naturalistic, developmentally-based model which is supported by research. However, study designs still require improvements such as larger n, more specific comparison groups, and follow-up data.

Introduction

- **Treatments in autism are shifting to a naturalistic and developmentally-based model.**
- These treatments have emerged out of very different schools of thought, but they have certain key elements in common:
  - They are designed to be implemented in the child's natural environment to increase generalization.
  - They do not target skills in isolation but are focused on achieving developmental milestones to help the child progress along a predictable trajectory.
- **Despite a growing body of research into this type of treatment, there has been very little done to consolidate and evaluate it.**

Purpose

- **The purpose of this study is to consolidate and analyze the research in the area of naturalistic developmental interventions for autism.**
- The following interventions were reviewed:
  - Play and Language for Autistic Youngers (PLAY)
  - DIR/Floortime
  - Pivotal Response Training (PRT)
  - The Early Start Denver Model (ESDM)
  - Relationship Development Intervention (RDI).

Methods & Analysis

- **The initial search consisted of keyword searches in the following databases through the University of Delaware's DELCAT Discovery system:**
  - Academic OneFile
  - General OneFile
  - WorldCat.org
- Search terms included "play based intervention autism," "relationship development intervention" "pivotal response treatment" and others.
- The initial search returned 2,196 titles.
- Titles were reviewed for apparent relevance and 52 abstracts were selected for further review.
- Studies with an n of 1 were excluded.
- A manual search of the references in these articles as well as websites associated with the interventions were reviewed for further relevant resources.
- **After completion of this process, 30 articles remained for review.**
- **These are listed in the table below.**

Results

- **Several trends were noted in the overall body of research**:
  - **A shift toward parent as primary interventionist**
    - **Benefits**
      - Parent can provide treatment within the child's daily routine to improve generalization
      - Child is more comfortable with parent
    - **Limitations**
      - Parents in studies were volunteers and may not represent the typical parent population
      - Difficult to monitor parent fidelity in real world scenario
  - **Move to begin intervention at an earlier age**
    - Several studies found positive and sustained benefits from intervention with toddlers (Dawson et al., 2010, Estes et al., 2015, Kasari et al., 2015, Steiner et al., 2013).
    - Early intervention is also supported by neurological research.
      - Young children who had received early intervention had brain activity which more closely resembled their peers in areas of attention, engagement, and social stimuli processing (Dawson et al., 2012).
      - More likely to associate social interaction with reward (Venkataraman et al., 2016).
  - **There are a few limitations common to the majority of studies reviewed:**
    - **Small sample size**
      - Average n of studies was 33 with all n=1 studies removed
      - A handful had between 60 and 70
      - Many in teens and 20s
      - Several less than 10
    - **Lack of defined control intervention**
      - Many studies listed control as "community services or "treatment as usual."
      - However, there was little done to control quality, dosage, or even intervention model used for the control group.
    - **Lack of follow-up**
      - The majority of studies only reported results immediately following the intervention period.
      - This makes it difficult to conclude anything about the long-term changes resulting from an intervention.

Table of Research

Name	Research Design	Number	Age Mean (SD)	Intervention	Primary Outcome Measure(s)	Intensity
Gengeoux et al., 2015	RCT	25	4.1yrs (1.2yrs)	PRT	Frequency of functional utterances	12 week program (8 90 minute parent trainings, 4 60 minute parent-child session)
Hardan et al., 2015	RCT	25	4.1yrs (1.2yrs)	PRT	Frequency of functional utterances Parent fidelity of treatment	12 week program (8 90 minute parent trainings, 4 60 minute parent-child session)
Mohammadzaheri et al., 2014	RCT	15	110.67mos (18.71mos)	PRT	MLU CCC	3 month program (2 60min sessions/week)
Steiner et al., 2013	Multiple Baseline	3	12mos	PRT	Child functional communication	10 week program (1hr parent education session/week)
Venkataraman et al., 2016	Quasi-experimental	19	5.87yrs (1.09yrs)	PRT	Changes in fMRI activity	16-week program (5hr direct intervention, 2hr parental guidance per week)
Ventola et al., 2016	Quasi-experimental	15	6.11yrs (1.13yrs)	PRT	RBS-R ABC SRS-2	16-week program (5hr direct intervention, 2hr parental guidance per week)
Liao et al., 2014	Quasi-experimental	11	55.9mos (8.9mos)	DIR/Floortime	FEAS VABS-II PSI/SF	10-week program (10hr parental play/week, 2hr 1:1 counseling/2 weeks)
Pajareya & Nopmaneejumruslers, 2011	RCT	16	56.6mos (10.1mos)	DIR/Floortime	FEAS	Mean 15.2hr/week (SD:12.4hr)
Sealy & Glovinsky, 2016	RCT	20	Range: 2:0-6:11	DIR/Floortime	PDI	24hr parent coaching over average of 12 weeks
Mahoney & Solomon, 2016	RCT	64	49.3mos (9.8mos)	PLAY	ADOS CSS MBRS CBRS FEAS	1 3hr home visit/month for 12 months (2hr parent intervention encouraged)
Solomon et al., 2007	Quasi-experimental	74	3.7yrs (0.2yrs)	PLAY	FEAS	14 month program (1 3-4hr consultation/month)
Solomon et al., 2014	RCT	64	49.85mos (10.43mos)	PLAY	ADOS MCDI FEAS	12 month program (1 3hr home visit/month; avg 51.825hr/week parent intervention)
Casenhiser et al., 2015	RCT	25	42.52mos (8.76mos)	MEHRIT	Functional use of language	12 month program (2 hr/week of therapy)
Chang et al., 2016	RCT	66	48.87mos (6.30mos)	JASPER and ABA	Joint Engagement, Joint Attention, Requesting, and Play	8 week program (maximum of 60 15 minute live coaching sessions)
Goods et al., 2013	RCT	5	48.73mos (11.68mos)	JASPER	Changes in play types, time unengaged, and requests	12 week program (2 30 minute sessions/week)
Harrop et al., 2017	RCT	43	30.7mos (3.5mos)	JASPER	Caregiver child play interaction Child RRBs Caregiver responses to RRBs	10 week program (1 hr/week)
Kasari et al., 2015	RCT	43	30.7mos (3.5mos)	JASPER	Joint engagement between parent and child	10 week program (2 30 minute sessions/week)
Lawton & Kasari, 2012	RCT	9	46.0mos (5mos)	JASPER	Frequency of initiating joint attention	6 week program (1hr/week)
Shire, Gulsrud, & Kasari, 2016	RCT	43	31mos (4mos)	JASPER	Correlation between parents' responsivity and child engagement	10 week program (1hr/week)
Green et al., 2010	RCT	77	45mos (range:26-60mos)	PACT	ADOS	6 month program (2hr biweekly clinic sessions)
Gutstein, Burgess, & Montfort, 2007	Quasi-experimental	16	60.50mos (20.43mos)	RDI	ADOS ADI-R	Chart review following at least 30 months of treatment
Hobson et al., 2015	Quasi-experimental	18	6yrs11mos (range: 2yrs6mos-12yrs10mos)	RDI	Correlation between ADOS severity index and DCS scores	Between 12 and 30 months of treatment
Colombi et al., 2016	Quasi-experimental	22	31.1mos (8.0mos)	ESDM	GABS VABS-II	6 month program (2hr clinic session/week)
Dawson et al., 2010	RCT	24	23.9mos (4.0mos)	ESDM	MSEL VABS	2 year program (2 2 hr sessions/day, 5 days a week)
Dawson et al., 2012	RCT	24	23.9mos (4.0mos)	ESDM	EEG results	2 year program (2 2 hr sessions/day, 5 days a week)
Eapen et al., 2013	Quasi-experimental	26	49.6mos (6.08mos)	ESDM	MSEL SCQ VABS-II	2 30 minute sessions/week
Estes et al., 2015	RCT	24	23.9mos (4.0mos)	ESDM	DAS VABS ADOS-WPS RBS-R ABC ADI-R	Follow-up to Dawson et al. 2012
Rogers et al., 2012	RCT	49	Range: 12-24mos	ESDM	ADOS Mullen DQ MCDI VABS-II Imitation Orienting to Social, Nonsocial, and Joint Attention Stimuli.	12 week program (1 1hr session/week)
Vinen et al. 2017	Cohort Study	31	39.16mos (9.91mos)	ESDM	ADOS MSEL WASI	Minimum of 15hr/week over 12 months
Vivanti et al., 2014	Quasi-experimental	27	40.30mos (9.55mos)	ESDM	MSEL VABS ADOS	Minimum of 15hr/week over 12 months
Vivanti et al., 2016	Quasi-experimental	60	Younger group: 33.25mos (7.26mos) Older Group: 49.54mos (5.36mos)	ESDM	Verbal DQ Nonverbal DQ VABS ADOS	12 month program (15-25h treatment/week)

Conclusions & Future Research

- **Interventions for autism have changed.**
- **The focus has shifted from isolated clinic-based treatments to intervention in the child's natural setting either within play or during the daily routine.**
- **The role of the clinician has also changed.**
  - In many cases, the clinician coaches the parents on the intervention.
  - The parents provide the direct intervention to the child.
- Skills are targeted to line up with developmental milestones. Activities follow along with these milestones to help the child progress.
- A growing number of studies have emerged in recent years which show promising results for these naturalistic developmental interventions.
- **Future studies should make the following changes:**
  - Increase sample size
  - Compare their interventions to specific alternatives
  - Conduct follow-up studies
- These changes would help to strengthen results and provide data on the true long-term impacts of these relatively new but promising interventions.