

Developmental outcomes in young children with autism and developmental delay

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Introduction

- Acquisition of spoken language and cognitive ability identified as a key predictors of positive long-term outcome (e.g. Kobayashi et al., 1992; Lotter, 1974; Nordin & Gillberg, 1998; Rutter et al., 1967)
- Therefore important to be able to understand what early developmental skills may be associated with the development of communication and cognitive skills
- In typically developing children
 - Imitation identified as a contributor to language development (Whitehurst, 1975)
 - Longitudinal studies have demonstrated the associations between early social-communicative abilities and later language development, e.g. between joint attention abilities and later language ability (Bates et al., 1979)

Introduction

- Mixed findings in children with autism:
 - Cognitive and language skills at age 2 related to outcomes at age 9 (Turner et al., 2006)
 - Nonverbal joint attention (45 months) significant predictor of language development 13 months later (Mundy et al., 1990)
 - Responding to joint attention at age 4 associated with expressive language gains at age 12 (Sigman & Ruskin, 1999)
 - Joint attention behaviours at age 4 associated with social behaviour at age 8 (Sigman & Ruskin, 1999)
 - Only predictors of language at age 4 motor imitation and number hours of intervention (Stone & Yoder, 2001)
 - Joint attention and imitation skills at 20 months related to receptive language gains (but not expressive) at 42 months (Charman et al., 2003)
 - Joint attention and nonverbal IQ associated with language outcomes at age 9 (Anderson et al., 2007)

Aim

This study therefore aimed to examine the associations between:

- early developmental skills
 - imitation, gesture, joint attention, imaginative play
- and language and cognitive development in early childhood

Method

Participants

- N = 187
- 20-55 month old children consecutively referred to a developmental assessment clinic
- Progress reviewed at 12 months (wave 2) and 24 months (wave 3) post initial assessment (wave 1)
- Based upon wave 3 diagnostic assessment, children allocated to one of two groups:
 - PDD (Autistic Disorder, PDD-NOS)
 - non-PDD (global developmental delay, language delay)

Method

Measures

- Wave 1 independent variables:
 - Developmental quotient (dev age / chron age X 100)
 - Autism symptomatology - ADI-R, ADOS (summed items for scores joint attention, imagination, gestures, imitation)
 - Receptive and expressive language, communication (Vineland)
 - Behaviour and emotional problems: Developmental Behaviour Checklist (DBC)
- Wave 3 outcome measures:
 - Development: PEP-R, WPPSI-III
 - Language: Reynell Developmental Language Scales (3rd ed), Vineland Communication
 - Adaptive behaviour: Vineland Adaptive Behavior Scale (parent interview)
- All measures repeated at all assessment and review time points

Sample characteristics

	Wave 1		Wave 3	
	PDD N=128	Non PDD N=59	PDD N=113	Non PDD N=55
Gender (% male)	89%	71%	87%	41%
Mean age (months)	39.3 (7.8)	37.9 (6.9)	62.1 (7.2)	63.3 (7.8)
Age range	22-55	20-55	46-79	44-80
Mean dev age	21.8 (9.0)	29.4 (8.5)**	25.3 (12.0)	25.5 (5.0)
Dev age range	4-48	14-44	8-72	22-29
Mean FSIQ	87.0 (4.2)	89.5 (12.8)	80.3 (17.6)	86.1 (14.6)*
FSIQ range	84-90	73-103	45-129	52-122

89.8% response rate at Wave 3 (19 families declined to participate in follow-up)
 *Wave 1 PDDNOS=24, Wave 3 PDDNOS=4
 ** p<.001, ***p<=.05
 †at Wave 1 PEP-R=185, WPPSI-III n=6; at Wave 3 PEP-R n=50, WPPSI-III n=120

Diagnostic change over time

DSM-IV diagnostic change Waves 1 - 3	N
Autistic Disorder to non PDD	1
PDD NOS to Autistic Disorder	15
PDD NOS to non PDD	4
Non PDD to PDD NOS	1
PDD NOS to Asperger's Disorder	1
Non PDD to Autistic Disorder	4

Of those children who received a diagnosis of Autistic Disorder at Wave 1, 97% had that diagnosis confirmed at Wave 3
 • 12 children with an autism diagnosis at Wave 1 did not participate at Wave 3

Change in overall level of functional language

ADI-R item 30	Wave 1		Wave 3	
	PDD	Non PDD	PDD	Non PDD
Code 0 – functional use of language, 3+ word phrases, daily	23%	44%	67%	100%
Code 1 – no 3 word phrases, daily speech, least 5 different words in last month	42%	41%	18%	0%
Code 2 – <5 words total or speech not used on a daily basis	35%	15%	15%	0%

- ### Analyses
- Correlations between Wave 1 independent variables and Wave 3 developmental outcomes, separately for PDD and developmental delay samples
 - Regression analyses to examine associations between Wave 1 and Wave 3 outcomes

- ### Results –correlations for Non PDD sample
- Wave 1 developmental quotient significantly correlated with all Wave 3 outcomes
 - Wave 1 receptive and expressive language and adaptive behaviour skills significantly correlated with Wave 3 developmental outcomes
 - Non significant correlations for all T1 joint attention, imagination, use of gestures for the developmentally delayed sample

- ### Results –correlations for PDD sample
- Wave 1 developmental quotient significantly correlated with all Wave 3 outcomes
 - Wave 1 receptive and expressive language and adaptive behaviour skills significantly correlated with all Wave 3 outcomes
 - Wave 1 response to joint attention significantly correlated with Wave 3 Communication (Vineland), receptive & expressive language, FSIQ, VIQ, and developmental age
 - Wave 1 initiation of joint attention significantly correlated with Wave 3 Communication (Vineland), receptive & expressive language, and VIQ

Results –correlations for PDD sample

- Wave 1 imaginative play significantly correlated with Wave 3 Communication (Vineland) and expressive language
- Wave 1 imitation significantly correlated with Wave 3 Communication (Vineland)
- Wave 1 use of gestures significantly correlated with Wave 3 Communication (Vineland), receptive language, expressive language, VIQ, and developmental age (PEP-R)

Regression analyses: Wave 3 developmental outcomes

- Wave 1 developmental quotient (dev age and chron age) consistently associated with language, cognitive and adaptive outcome at wave 3 for all children

Regression analyses: Wave 3 developmental outcomes non PDD sample

Non PDD sample	
Wave 3 outcomes	W1 variables significant associations
WPPSI VIQ	Communication (Vineland), expressive language
WPPSI PIQ	Developmental quotient only
Expressive language	Communication (Vineland)
Receptive language	Developmental quotient only
Vineland Communication	Developmental quotient only
Vineland Socialisation	Imitation, gestures, behaviour problems (W1 lower)
Vineland Daily Living Skills	Gestures
Adaptive Behavior Composite	Imitation, gestures, behaviour problems (W1 lower)

Regression analyses: Wave 3 developmental outcomes for PDD sample

PDD sample	
Wave 3 outcomes	W1 variables significant associations
WPPSI VIQ	Imitation, communication (Vineland), receptive language
WPPSI PIQ	Developmental quotient only
Developmental age	Initiation of joint attention, gestures
Expressive language	Initiation of joint attention
Receptive language	Developmental quotient only
Vineland Communication	Imitation, response to joint attention
Vineland Socialisation	Imitation, response to joint attention
Vineland Daily Living Skills	Imitation, response to joint attention
Adaptive Behavior Composite	Imitation, response to joint attention

Conclusions

- Diagnostic stability over time – majority of change within PDD NOS diagnoses
- Language improvements over time for both PDD and non PDD cases, although greater improvement for non PDD cases
- Significant associations between Wave 1 developmental quotient and all Wave 3 developmental outcomes
- Non PDD group
 - developmental outcomes predominantly associated with Wave 1 developmental level and communication skills
 - Wave 3 adaptive behaviour skills were also associated with Wave 1 imitation, use of gestures, and behaviour problems

Conclusions

PDD group

- Wave 3 developmental outcomes strongly associated with Wave 1 developmental quotient
- Wave 3 developmental age associated with Wave 1 initiation of joint attention and use of gestures
- Expressive language outcomes also associated with Wave 1 initiation of joint attention
- Wave 3 adaptive behaviour skills were consistently associated with Wave 1 imitation skills, response to joint attention

Conclusions

- Results highlight the importance of early developmental level, joint attention, and imitation skills in relation to later development in young children with PDD
- Implications for early intervention programmes in terms of skill development

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<http://www.med.monash.edu.au/spppm/research/devpsych/projects.html>