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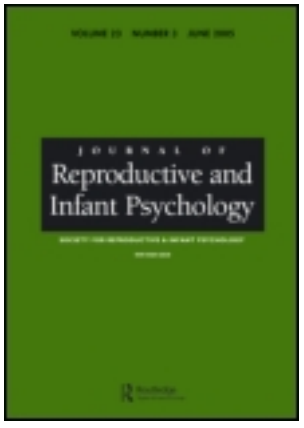

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Feasibility study of early intervention provider confidence following a neurobehavioural intervention for high-risk newborns

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Feasibility study of early intervention provider confidence following a neurobehavioural intervention for high-risk newborns

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Study purpose: Early intervention (EI) can ameliorate neurobehavioural difficulties and parental psychosocial distress. Often, EI service providers are not trained to address the unique needs of the high risk parent–infant dyad. The purpose of this study was to describe provider confidence and knowledge following delivery of a neurobehavioural intervention for high-risk newborns. **Methods:** This feasibility study was a multi-site, randomised controlled trial of newborns referred to EI. The intervention group received weekly home visits by a service provider certified in the Newborn Behavioural Observation (NBO) – a neurobehavioural intervention. The control group received usual care. Eighteen EI providers completed the Index of Practitioner Knowledge and Skills (IPKS). **Results:** EI providers did not differ on socio-demographic characteristics, discipline, or experience between the intervention and usual care groups. In mixed linear regression models, the NBO group demonstrated higher confidence scores (mean difference = 2.2, 95% CI: 0.54, 3.87). **Conclusion:** Integrating a neurobehavioural intervention into EI service delivery may be associated with higher perceived confidence among service providers in their ability to work with high-risk newborns.

Keywords: neurobehaviour; high-risk infants; state early intervention programme; service providers

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In the United States, the Individuals with Disabilities Education Act, Part C, mandates that states provide early intervention (EI) services for infants and toddlers with or at risk for developmental difficulties (PL 108–446, 2004). Newborns with developmental risk present unique opportunities and challenges for EI providers. Due, in part, to state variability in eligibility definition, infants in EI are a heterogeneous population (Spiker, Hebbeler, Wagner, Cameto, & McKenna, 2000) where biological and/or social risk confers developmental vulnerability that interferes with the central task of the newborn – self-regulation. Self-regulation (Als, 1982) can be described as the successful integration of four neurobehavioural subsystems: autonomic (e.g. heart rate, respiratory rate, colour and digestion), motor (e.g. muscle tone, movement patterns, suck, reflexes), state (e.g. deep sleep, active awake), and responsivity (Nugent, Keefer, Minear, Johnson, & Blanchard, 2007) or social interaction. Self-regulation is a dynamic developmental task, a complexity that requires

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specialised training and can undermine EI provider's confidence (Nugent, Blanchard & Stewart, 2007).

Developmental vulnerability is often associated with negative consequences for parents (Casey, Whiteside-Mansell, Barrett, Bradley, & Gagus, 2006; Hack et al., 2004; Mikkola et al., 2006; Osofsky & Thompson, 2000; Rutter, 1990; Stjernqvist, 2009). Parental psychosocial distress, initiated by a newborn intensive care unit (NICU) hospitalisation (Meyer & Bigsby, 2004) and further complicated by the complexity of self-regulation (Kleberg, Westrup, & Stjernqvist, 2000; Lyons-Ruth, Zeanah, & Benoit, 2003; Minde, 2000; Powell, 2006), requires supportive and well-trained EI providers (Blanchard, 2009; Nugent et al., 2007).

Self-regulatory skills lay the foundation for optimal social interaction skills and should be the cornerstone of developmental interventions in the newborn period (Blanchard & Mouradian, 2000; Nugent, Blanchard, & Stewart, 2007). Professional training in the NICU (e.g. Sweeney, Heriza, & Blanchard, 2009) integrates a neurobehavioural model, which previous research (Als, 2009; Als et al., 2003; Browne & Talmi, 2005; Kleberg et al., 2000; Koldewijn, Wolf, van Wassenaer, et al., 2005; Mahoney, & Perales, 2005; Ohgi et al. 2004; Ohgi & Akiyama 2009; Parker, Zahr, Cole, & and Brecht, 1992) suggests positively influences maternal psychosocial distress and infant neurobehaviour. Implementing a neurobehavioural model in EI presents a unique challenge. EI providers often have little professional training in assessment and intervention of high-risk infant neurodevelopment or in implementing a neurobehavioural model (Blanchard, 2009; Blanchard & Mouradian, 2000), which can contribute to limited clinical knowledge and undermine provider confidence in the context of high-risk newborns and their families.

The purpose of this article is to evaluate service providers' knowledge and skill confidence following an EI-based neurobehavioural intervention. We hypothesise that EI service providers who participate in the neurobehavioural model will demonstrate more favourable perceptions of their knowledge and confidence in their skills compared to similar EI service providers delivering usual care.

Methods

Participants

Infants were recruited from three EI programmes in one state between January and August 2004. All infants who were at risk for developmental delay and were referred to any of the three EI sites in this area, within the first two months of life, were eligible for the study. Criteria for eligibility were that the parent was the infant's primary caregiver and was fluent in English in order to be able complete the consent form and questionnaires.

Participants were then randomly assigned to either the NBO experimental group or the usual care group using simple randomisation procedures. The usual care group received weekly EI home visits throughout the study. At the final study visit, when the infant was 12 weeks of age (corrected), all study EI service coordinators filled out a measure of their perceived knowledge and confidence (described below). All parents provided written consent to participate. The Institutional Review Board at all participating institutions approved this study.

A sample size of 41 infants was chosen based upon power calculations to detect a meaningful difference between groups at an alpha of .05. Of the 41 infants recruited for this study, 3 were not followed due to inability to contact the family.

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The final sample (Table 1) included 38 infants (intervention group = 25 and control group = 13).

Eighteen EI providers (Table 2) participated in this study (experimental = 9 and control = 9). The professional disciplines of the participating EI providers included physical, occupational, and speech therapists, social workers, early childhood educators, and developmental specialists. The years of service for all EI service providers ranged from 2 to 20 and there was no discernible difference between the EI service providers in the intervention or usual care groups. There was no turnover within two years in the three programmes. Both usual care and intervention groups were served by the same interdisciplinary professionals, i.e. early educators, occupational service therapists, physical therapists, social workers and nurses.

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Design and procedures

Federal mandates (PL 108-446, 2004) governing EI services in the US require that receipt of EI begin with a referral to a local EI agency. Following the referral, a multidisciplinary evaluation occurs at the family's home. The purpose of the evaluation is to determine eligibility for EI. In the state where the study occurred, infants were deemed eligible for EI if they demonstrated (1) a substantial developmental delay on the state-approved evaluation tool, or (2) risk for developmental delay (e.g. < 32 weeks gestation, birthweight < 1200 g, a diagnosed developmental disability, or at least four social risk factors). Within 45 days of referral, eligible infants receive an individualised family service plan (IFSP) – a document describing the parents' priorities and concerns, the results of the developmental assessment,

Table 1. Socio-demographic and medical characteristics of study cohort of 38 families (25 intervention and 13 control) with a high-risk newborn.

Characteristic of infants	Whole sample *N* (%)
Race and ethnicity	
White, non-Hispanic	30 (73.9)
Non-white	8 (21.1)
Mother's education	
Less than high school (HS)	4 (10.5)
HS	9 (23.7)
Some college	9 (23.7)
College	16 (42.1)
Mother's employment status	
Full-time	6 (15.8)
Part-time	9 (23.7)
Unemployed	13 (34.2)
Stay at home mother / homemaker	10 (26.3)
Child's gender	
Male	23 (60.5)
Female	15 (39.5)
Low birth weight	20 (52.6)
Child in the NICU	27 (71.1)
Child has chronic feeding difficulties	8 (21.1)
Family lacks social supports	12 (31.6)

Table 2. Differences in characteristics between early intervention providers for the control and experimental groups.

Characteristic of providers	Control ($n=9$)	Experimental ($n=9$)
Professional discipline		
Physical, occupational, or speech therapist	5 (55.6)	5 (55.6)
Social worker	3 (33.3)	3 (33.3)
Early childhood educator / developmental specialist	1 (11.1)	1 (11.1)
Education		
Master's degree	7 (77.8)	7 (77.8)
Bachelor's degree	2 (22.2)	2 (22.2)
Years of experience	Mean, range 5.5, 2–20	Mean, range 5.5, 2–20

goals and strategies for intervention, and a service delivery page. Once the IFSP is written, EI services commence. EI services follow a transdisciplinary model whereby infants receive developmental services from one consistent provider who obtains consults from other disciplines as needed. EI services typically include home visits or a combination of home and centre-based developmental interventions. Infants are re-evaluated every 6 months to track progress and determine eligibility for EI services.

In accordance with the mandates described above, all study participants received (1) an initial developmental assessment (week 1), (2) an IFSP (week 2), and (3) home visits (weeks 3–8) by a consistent EI provider. The intensity of the intervention (i.e. weekly home visits for 8 weeks) was chosen to maximise opportunity for intervention within the newborn period (i.e. first 12 weeks postterm) while minimising the burden to families associated with multiple appointments. Moreover, weekly home visits were deemed an appropriate frequency, consistent with usual EI service delivery, for the control group participants.

Intervention group

Infants in the intervention group received home visits from an EI service provider certified in the NBO system (Nugent et al., 2007). The NBO is an 18-item measure that includes both observation and elicited manoeuvres with the purpose of (1) identifying infant neurobehaviours, and (2) interpreting these neurobehaviours in the context of the parent–infant interaction in order to promote positive parent–infant interaction to facilitate attachment and infant neurodevelopment. Specifically, the NBO was incorporated into all aspects of the procedural mandates listed above (i.e. initial assessment, IFSP, and home visits). A detailed description of the study protocol is available from the first author upon request. Briefly, the intervention group received 8 home visits from an NBO-certified service provider. The content of NBO intervention home visits were individualised to each family's needs and priorities (i.e. per federally mandated IFSP) and consisted of neurobehavioural intervention strategies guided by the initial NBO. Specifically, at each home visit the clinician administered the NBO with the parents and discussed (1) the infant's successes and vulnerabilities at self-regulation, and (2) successes and vulnerabilities of the regulation processes (i.e. interactional match or mismatches) between the parent

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and infant. Thus, the NBO became a shared observation of the infant between the parent and the EI provider. Consistent with previous neurobehavioural intervention research (e.g. Browne & Talmi, 2005; Koldewijn et al., 2005; Oghi et al., 2004), this shared experience served to (1) support parents and validate their concerns, (2) facilitate communication between the parent and EI provider, and (3) provide individualised, family-centred care to promote infant self-regulation and infant–caregiver attachment. Moreover, the NBO served as a supplement to the initial assessment, informed the writing of the IFSP goals and intervention strategies, and was an intervention tool during home visits.

Usual care group

The usual care group received the procedural mandates listed above (i.e. developmental assessment using a mandated standardised tool, IFSP, and home visits by a consistent EI provider). The usual care group received 8 home visits from an EI provider not certified in the NBO. The content of usual care group home visits included visual tracking, reaching and grasping toys of a variety of textures, and tolerance of developmental play.

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Measures

Index of Practitioner Knowledge and Skills

Following the final home visit, all EI providers completed the Index of Practitioner Knowledge and Skills (IPKS). The IPKS is a 17-item scale that asks service providers to rate their agreement, on a 4-point scale (1 = strongly agree and 4 = strongly disagree) with items related to their clinical practice of working with high risk infants (J. K. Nugent, 2003). The knowledge subscale includes 10 items such as, 'Helping parents understand their infant's cues is an important part of my practice', 'I can help parent's read their infant's subtle behaviours' and 'I have learned a great deal about newborn development from my assessments'. The skills confidence subscale includes seven items such as, 'I am confident in my ability to handle and calm newborns', I am confident in my assessment skills of newborn infants', 'I feel confident in providing guidance to parents specifically about behaviour during the first three months of life', 'I am confident that I can teach parents about their infant's newborn development' and 'I feel well-trained to work with infants and families'. The internal consistency overall (α = .87) and within each subscale – clinician's knowledge (α = .83) and skills confidence (α = .82) – was deemed acceptable. IPKS summary and subscale scores were summed and reverse coded so that higher scores indicate more favourable perceptions.

Analytic plan

We fit three mixed linear models to test the effect of the intervention on (1) IPKS summary score, (2) EI provider's knowledge score, and (3) EI provider's skills confidence score. For each model, we report the mean difference (and 95% confidence interval) in score the intervention versus the control group.

Results

Models 1 and 2 (Table 3) reveal that EI service providers trained in the NBO demonstrate more favourable perceptions of their skill confidence (mean difference = 2.2, 95% CI: [0.54, 5.83]).

Table 3. Mean difference and 95% confidence interval in index of practitioner knowledge and skills total and subscale scores from mixed linear regression models testing the effect of a neurobehavioural intervention among 38 families (25 intervention and 13 control) with a high-risk newborn.

	Intercept	Mean difference between groups	*p*
Model 1			
Knowledge subscale	7.27 (−2.05, 16.59)	.40 (−2.07, 2.88)	0.74
Model 2			
Confidence subscale	2.63 (−4.2, 9.47)	2.2 (0.54, 3.87)	0.01
Model 3			
Summary score	8.74 (−4.82, 22.30)	2.44 (−0.95, 5.83)	0.15

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Discussion

The results of this feasibility suggest that EI service providers who integrate an NBO-based neurobehavioural intervention report more favourable perceptions of their confidence in treating high-risk families than their counterparts delivering usual care. While these results suggest promise for improving EI service delivery for families of high-risk infants, this is a small-sample feasibility study where EI service providers were not randomised, so the results should be interpreted with appropriate caution.

Our finding suggesting feasible opportunities to bolster perceived clinical skill confidence and self-efficacy has been previously reported (Bailey, Palsha, & Simeonsson, 1991; Iversen, Shimmel, Ciacera, & Prabhakar, 2004), and self-efficacy (Lamorey & Wilcox, 2005).

We offer several hypotheses to explain the apparent association between a neurobehavioural model and provider confidence. The NBO results in a well-developed clinical picture of the infant, which has two advantages. First, it allows the parents and service providers to engage in a shared observation of the infant, which can affirm parents' perceptions by validating their concerns and reinforcing their successes. Second, it allows EI service providers to develop individually based intervention strategies that address the immediate needs of the infants (e.g. social interaction with caregivers, sleep/wake cycles, feeding) rather than longer-term developmental skills (e.g. 'next steps' on the developmental assessment) that have less relevance for parents. Finally, the NBO utilises a strength-based approach. The vulnerability of transitioning to parenthood is made more difficult with the birth of a high-risk infant. Highlighting infants' strengths can allow EI service providers to assist parents in looking beyond a diagnosis to the unique capabilities of their infant. In sum, bridging the gap between traditional EI service delivery and inclusion of a neurobehavioural model bolsters EI service providers' clinical assessment and intervention repertoire and appears to positively contribute to their perceptions of their confidence in their skills to work most effectively with high-risk infants.

We acknowledge several limitations to this study. Study service providers were not randomised. Thus, we cannot rule out the possibility that observed treatment effects were the result of characteristics of the service providers rather than the intervention per se. However, the service providers included in this study were a homogenous population – nearly all were white, non-Hispanic, had a Master's level

education, and on average 5 years of experience – and we found no differences in professional discipline or years of experience between intervention and control groups, which increases our confidence that limited bias was introduced. The IPKS has not been validated previously. The excellent internal consistency of the overall scale and subscales increases our confidence in the outcome measure. However, future research should replicate these results with larger, more diverse samples, which would allow for a more extensive assessment of the psychometric properties of the scale.

Conclusion

We find evidence that incorporating a neurobehavioural approach into service delivery for young infants referred to early intervention may positively influence service providers' perceptions about their confidence in working with high-risk families. These findings have promise for potentially improving the efficacy of early intervention service delivery for families of young infants – a vulnerable population – however, future research should replicate these results with a larger, more diverse sample where the service providers are randomised to the intervention or control groups.

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