

## Exploring the potential utility and impact of a universal, multi-component early parenting intervention through a community-based, controlled trial

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### ABSTRACT

**Background:** This paper describes the first phase of a community-based, controlled trial conducted to investigate the potential utility of a new, complex group-based early parenting intervention. In total, 106 parent-infant dyads were recruited to an interagency Parent and Infant (PIN) intervention which combines a range of supports, including the Incredible Years Parent and Baby Programme, baby massage, weaning workshops and paediatric first aid training. A 'services-as-usual' comparison group was also recruited (n = 84).

**Methods:** The primary outcome was parenting self-efficacy (Parenting Sense of Competence Scale). Parent well-being, child development and the home environment were also measured. Assessments were conducted at baseline (when infants were 6–20 weeks old) and at follow-up (when infants were aged approximately 8 months). Parent satisfaction with the intervention was examined, as well as uptake of community-based services and health service utilisation.

**Results:** An intention-to-treat analysis of covariance (ANCOVA) examined between-group post-intervention differences, whilst secondary analyses on a 'per protocol' sample of participants (who attended at least 50% of the intervention sessions) were also conducted. Satisfaction with the PIN intervention was very high. The intention-to-treat ANCOVA showed no post-intervention between-group differences on measures of parent competency or well-being. At baseline, children in the comparison group were older than those in the intervention group and, at follow-up, fared better than their intervention group counterparts on measures of child development. The per protocol analysis revealed a significant effect for the intervention group on the efficacy subscale of the primary outcome measure (effect size = 0.44,  $p < 0.05$ ). Intervention group infants attended GP and nursing services on significantly fewer occasions than their comparison group counterparts.

**Conclusion:** The findings provide tentative early support for the utility of the PIN intervention in terms of improving parenting efficacy and reducing reliance on primary health care services. Further follow-ups when infants are 16 and 24 months old are underway.

### 1. Introduction

The nature and quality of the caregiving environment experienced in the early years are central to influencing outcomes into later life (Metzler, Merrick, Klevens, Ports & Ford, 2017). A wealth of evidence indicates that sensitive, supportive and stimulating parenting is a central protective factor in child development and helps to foster positive physical and social, emotional and psychological well-being into adult life (Britto et al., 2017). Thus, the availability of universally effective programmes that promote parents' awareness of the importance of, and

their ability to provide, nurturing care is an increasing public health priority (Chan, Lake & Hassan, 2017).

Group-based behavioural parenting programmes have been identified as an effective means of intervening in the lives of at-risk families (Leijten et al., 2017) and, when implemented in community-based settings, have been found to enhance child social, emotional outcomes, as well as parenting skills (Furlong et al., 2013; Gardner et al., 2017). However, to date, these programmes have largely been tested with at-risk populations (e.g. teenage parents, mothers with postnatal depression, disadvantaged families) (Doyle, Delaney, Farrelly, Fitzpatrick &

Abbreviations: PIN programme, Parent and Infant Programme

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Daly, 2017; King, Priddis & Kane, 2015; O’Neill et al., 2018), toddlers (e.g. 15–18 months or older) and school-going children who are already showing signs of conduct disordered behaviour (Chislett & Kennett, 2007; Doyle, Hegarty & Owens, 2018; van Zeijl et al., 2006).

Tentative evidence suggests that group-based early parenting programmes implemented between the ages of 0 – 3 years may help to improve parental attitudes and competency, as well as parent–child relationships (Malmberg & Field, 2013; Niccols, 2008; O’Neill, Swigger & Kuhlmeier, 2018). A small number of studies have suggested that group-based, early parenting programmes may be universally effective with parents of young infants (Feinberg & Kan, 2008; Feinberg, Jones, Kan & Goslin, 2010; Lindsay & Totsika, 2017). A recent study of Incredible Years Parent and Baby programme (IYPBP) reported positive outcomes for parenting confidence and their interactions with their infants, but no effect on child outcomes (Jones et al., 2016), whilst another trial failed to find evidence of effectiveness of the same programme on parent or child outcomes (Pontoppidan, Klest and Sandoy, 2016). Moreover, a recent systematic review concluded that there is currently insufficient evidence on the development and effectiveness of preventative interventions and a need for further research is indicated (Hurt et al., 2018). These kinds of mixed findings indicate that further research in this area is needed to explore the development and effectiveness of early parenting programmes.

Recommendations for best practice in the delivery of early childhood development services involve integrated, multisectoral evidence-based interventions which promote holistic, child-focused approaches and multiple stakeholder partnerships (Machel, 2017; WHO, 2018). The transition to parenthood can be a period of heightened stress, anxiety and depression, and the multifaceted, evolving nature of infant care - which involves the provision of basic nurturance and safety, as well as psychological, emotional and cognitive support - can be taxing for all parents (Saxbe, Rossin-Slater, Goldenberg, 2018). However, standalone, standardised group-based parenting programmes may not always meet the varied needs of new parents, particularly those experiencing high levels of stress, depression and family conflict, or those who are most disadvantaged and vulnerable (Baydar, Reid & Webster-Stratton, 2003; Pontoppidan, Klest & Sandoy, 2016; Reyno & McGrath, 2006).

Moreover, drop-out rates of 20% to 80% for group-based parent-training programmes have also been reported (Heinrichs, 2006; Ingoldsby, 2010), and prevention-focused programmes, in particular, are characterised by low uptake and engagement (Cullen, Cullen & Lindsay, 2016). Barriers to engagement can include practical barriers (e.g. lack of access, transport), childcare needs, lack of perceived need, as well as stigma and/or discomfort attending group-based parenting programmes (Furlong & McGilloway, 2015). Thus, an approach to universal early parenting support provision, which aims to integrate

group-based parent training with a range of community-based parenting and services/supports, may help to create a holistic service model which can address multiple parent and infant needs, including those who are more at-risk. Coordinated and multiagency delivery of community-based supports may also help to promote engagement with preventative parent supports and help to address barriers to parent engagement.

Additionally, the small number of trials in this area to date have explored the impact of early parenting programme on parenting confidence, parent and infant relationships and child outcomes. Parent self-efficacy has been identified as a facilitative mechanism in successful early childhood interventions (Carneiro, Galasso, López García, Bedregal & Cordero, 2019); likewise, emotionally supportive parenting behaviours are important in supporting positive child outcomes and later developmental wellbeing (Belsky & Beaver, 2011; Peckins et al., 2020). However, there is little evidence to date which explores additional and potentially important variables, such as parenting routines and the level of cognitive stimulation in the home and how they are influenced by parenting interventions. Parents’ ability to cope with infant routines such as crying and sleeping, may help to promote better health outcomes, as well as positive parent-infant interactions and relationships (Zajicek-Farber, Mayer, Daughtery & Rodkey, 2014). A stimulating environment in the home (e.g. enhanced reading, presence of appropriate toys, messy play) may also help to promote positive developmental outcomes in children, putting in place the foundations for longer-run skill development (Heckman & Karapakula, 2019). Thus, the effects of group-based early parenting on such variables should be explored in more detail.

The principal aim of this study was to explore the acceptability and potential utility of a new programme called the Parent and Infant (PIN) intervention during its first phase of delivery; this is a complex, group-based programme which combines standardised behavioural parent training with a range of other supports delivered in sequential phases during the first two years of a child’s life. A logic model for the PIN programme is shown in Fig. 1. The services which are provided in combination with parent-training within the programme, represent supports which are available at a local level to parents, but are often not free of charge or are not delivered routinely through public health and community-based services (e.g. baby massage, paediatric first aid).

The PIN programme was designed to routinize and embed collaborative, multidisciplinary and cross-sectoral educational and social supports for parents in order to: (i) build organisational capacity for the delivery of collaborative, multi-agency and evidence-based prevention and early intervention support in services catering to parents and very young children; (ii) promote uptake of community-based parenting supports; and (iii) reduce gaps in service delivery and tackle barriers to

Inputs	Activities	Outputs	Proximal Outcomes	Distal Outcomes
<ul style="list-style-type: none"> <li>Investment from Irish Government</li> <li>Buy-in at a local level for implementation</li> <li>Support for implementation via programme staff (including preparation of materials for facilitators, providing background assistance for parent recruitment, gathering data, supporting implementation plan and protocol development)</li> </ul>	<p>Meet family need and enhance parent and child outcomes by:</p> <ul style="list-style-type: none"> <li>Delivering group-based parent training in-tandem with community-based supports available at a local level – supports informed by behavioural and social learning theory and attachment theory and involve peer-led, collaborative, experiential learning and problem-solving approaches</li> </ul> <p>Enhancing contact and reduce barriers to engagement by developing integrated, multidisciplinary services:</p> <ul style="list-style-type: none"> <li>through coordinated and streamlined delivery of PIN group-based supports</li> </ul> <p>Evaluating and monitoring programme activities and outcomes</p>	<p>Facilitators trained and delivering services to families</p> <p>PIN programme developed and integrated into public health and community-based services</p> <p>High quality programme administration by PIN programme staff</p>	<ul style="list-style-type: none"> <li>Improved parenting competency</li> <li>Greater parent confidence</li> <li>Increased parent support</li> <li>Increased positive interactions and positive parent-child relationships (e.g. nurturing, responsive care, stimulation and interaction)</li> <li>Reduced parent stress and improved wellbeing</li> <li>Enhanced early child development</li> </ul>	<ul style="list-style-type: none"> <li>Positive developmental trajectories for parents and children and lifespan health and wellbeing</li> <li>Reduced developmental inequality and disadvantage</li> <li>Enhanced community engagement with parenting supports</li> <li>Improved capacity and integration in parenting support at a local level</li> </ul>

Fig. 1. Overview of the Parent and Infant (PIN) Programme Logic Model.

engagement. The PIN programme combines standardised group-based parent-training, baby massage and a range of non-standardised community-based services to address multiple parent needs. The development of the programme and the selection of programme elements were informed by an extensive data gathering and piloting process which highlighted several barriers for families during early childhood, including poorer health outcomes (e.g. obesity), increased risk of accidents, child social, emotional and behavioural difficulties, mental health difficulties, parenting challenges (see (Hickey, McGilloway, Leckey, & Stokes, 2018; Twist, McDonnell, & Kennedy, 2012)). Programme delivery involves collaborative, peer-led educational approaches, problem solving and experiential learning to improve parental competency in addressing the challenges of early parenthood and to promote sensitive and responsive parenting. The programme also aims to improve well-being, strengthen parent-child relationships and enhance child developmental outcomes (Hickey et al., 2018).

The objectives of this exploratory community-based, controlled trial were to: (1) investigate parent uptake of/engagement with, the PIN intervention and their levels of satisfaction; (2) examine the early impact of the programme on parent and infant outcomes; and (3) assess any changes in the utilisation of primary care (e.g. General Practitioner [GP], public health nursing) and hospital services.

## 2. Method

### 2.1. Study design

A non-randomised, quasi-experimental controlled before-and-after study design was used to explore the utility of the PIN intervention when compared to services as usual. Usual services for parent-infant dyads involve: one home visit from a Public Health Nurse (PHN) in the first 6 weeks after birth and a 2-week and 6-week check-up with a GP/hospital service, regular developmental check-ups with a PHN (at 3, 7 and 24 months), and free vaccinations. GP care for children under the age of six is free in the Republic of Ireland. Parents in the intervention group also received usual services. A range of other services is available at a community-level. Breastfeeding supports and mother and baby/toddler groups are offered by public health or publicly funded community-based services (e.g. libraries, family resource centres) and are free to access. Other services such as baby massage, baby yoga, mother and baby swimming or music classes are also available, although these are typically offered by private businesses, and parents pay to access and use them. No participants were excluded or discouraged from seeking out, or accessing, any additional parent-and-child services and supports.

Parents who participated in the study were assessed at baseline when infants were aged 6 to 20 weeks old. The first follow-up assessment (Follow-up 1) took place when participating infants were aged approximately 8 months. Two further assessments were scheduled when infants were aged approximately 16 and 24 months. Parents in the intervention group began receiving the PIN intervention approximately 1 to 3 weeks after baseline assessments had been conducted.

### 2.2. Participants

Parents were recruited to an intervention group from sites where the PIN programme was available or to a comparison group from outside the cycle of programme delivery or from sites where the PIN programme was not available. The flow of participants through the trial is shown in Fig. 2. Participants were eligible to take part in the current research if they met the following criteria: a) were aged 16 years or older and had an infant aged 6–20 weeks old; b) were willing to participate in the study; and c) were able to communicate through good spoken English, had basic reading ability and/or could comprehend the meaning of words when read and/or explained by a researcher. Parents were not screened for risks (e.g. socioeconomic disadvantage, early

parenthood, lone parenthood) prior to inclusion in the study, although the study was conducted in areas which included neighbourhoods characterised by socioeconomic disadvantage. A total of 239 parents were initially informed of the research by a PHN, 79% of whom (N = 190) provided their written informed consent to participate in the research and subsequently completed baseline measures. Reasons for not participating included: lack of further interest in the research, illness and time constraints. At the 8-month follow-up one, a total of 12 participants were lost from the study (9 Intervention; 3 Comparison) (94% follow-up rate). All parents in the trial, regardless of intervention status, received services as usual.

### 2.3. Procedure

#### 2.3.1. Recruitment strategy

All participants were recruited from two areas in the Republic of Ireland: Clondalkin, West Dublin (Site 1) and Drogheda/Dundalk, Co. Louth in Northeast Ireland (Site 2). Both are large urban areas, which include neighbourhoods characterised by high levels of socioeconomic disadvantage (Haase & McKeown, 2003). The PIN intervention was only available to parents attending four specified health centres in Site 1 and three in Site 2. These health centres were selected by PIN intervention providers as they are located in predominantly socio-economically disadvantaged areas, although they do not cater solely to disadvantaged families. Intervention group participants were recruited over six cycles of programme delivery (three in each site) which were initiated in September, January and February in both sites. Baseline data were collected on a phased basis during September 2014 - January 2016.

Two health centres in each of the participating sites were identified for recruitment of the comparison group. These were deemed the 'best fit' for recruitment by PHN managers on the basis of available population data (e.g. Institute of Public Health Community Profiles, <http://www.thehealthwell.info/community-profiles>) indicating a comparable socioeconomic status in these areas, to those in the intervention group health centres. Parents were also recruited to the comparison group from health centres where the intervention was delivered, but only outside of programme delivery cycles (i.e. when the intervention was not available to parents as their baby was not born within the period of programme delivery). Comparison group parents were recruited on an ongoing basis (February 2015- July 2016).

#### 2.3.2. Obtaining consent and conducting assessments

New mothers attending developmental check-ups at the specified health clinics were informed of the research by PHNs both verbally and by means of a brief brochure describing the research, after which prospective participants were asked to provide their written informed consent (to the PHN) to be considered for inclusion in the research. Names and telephone numbers of consenting parents were confidentially forwarded to the research team. Information sheets were administered by a member of the research team to parents, who then provided their written informed consent to participate in the study prior to baseline assessment.

Follow-up one was completed when infants were approximately 8-months old, subsequent to the delivery of the first phase of the PIN intervention and prior to the delivery of phase two of the intervention (further detail on the phases of programme delivery are provided below). Assessments were conducted in the parents' homes; the collection of observational data took place when the infant was present and awake and parents were requested to interact with, and respond, to their infant as normal. Researchers could not be blind to group allocation due to the process of recruitment and the schedule of intervention delivery. At each time point, participants were provided with a shopping voucher (€20 for those in the intervention group and €25 for those in the comparison group) upon completion of assessments as a token of thanks for their participation in the research.

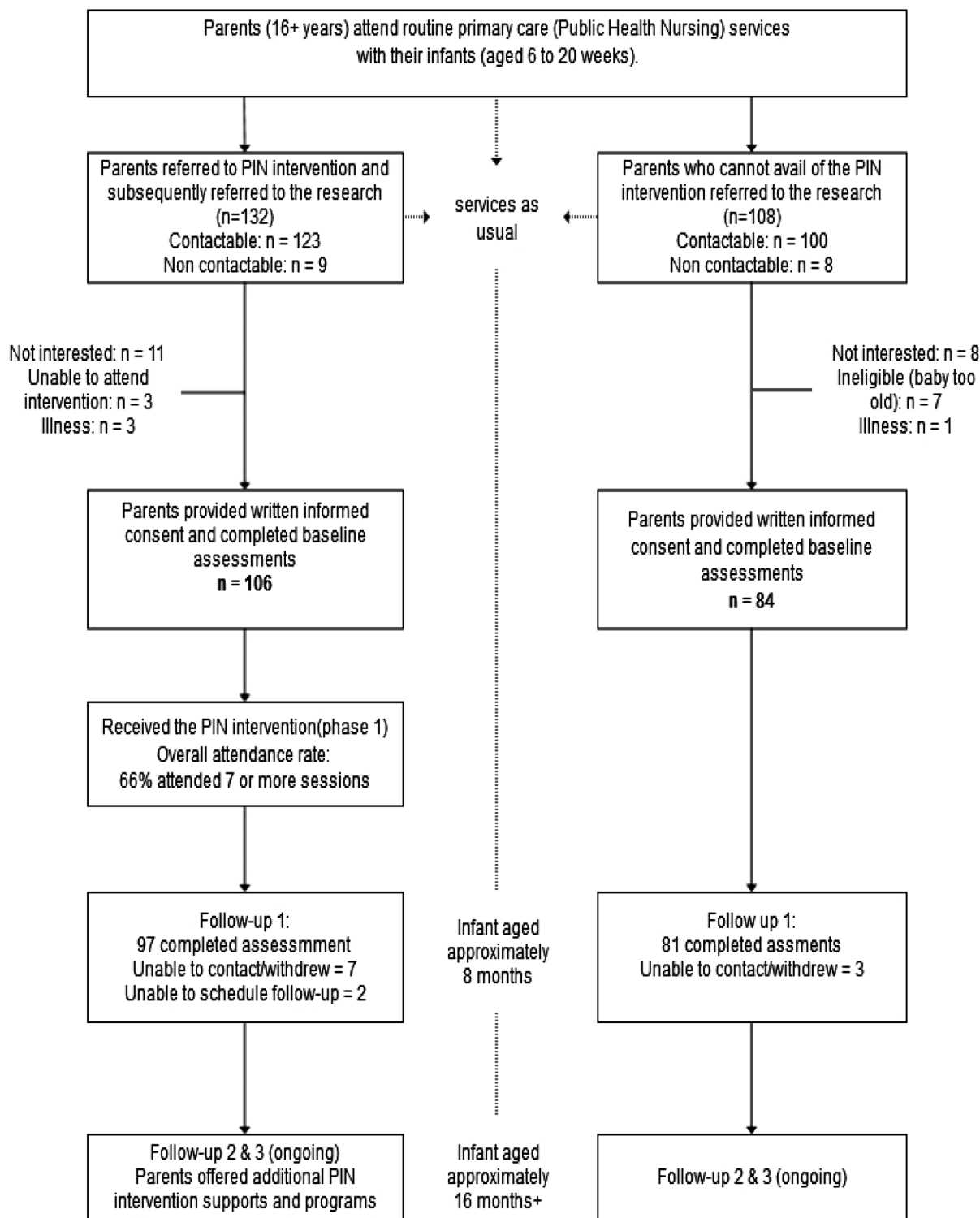


Fig. 2. Flow of Participants through Trial.

#### 2.4. Measures

Several purposefully-selected, robust measures were administered and accompanied by independent observations. The internal reliability of all scales was measured using Cronbach's alpha.

Demographic and background information on families was collected using a Personal and Demographic Information Form (PDFI). This was adapted from previous research (McGilloway et al., 2012) and elicited information on potential risk factors such as parental age, marital

status, living arrangements and employment status, as well as information on parent and infant health. Parent stress in response to parenting duties was assessed using one item on the PDFI. To reduce parent burden, a self-report measure of parenting skills was not included, however, parents were asked to rate the degree of stress they experienced looking after their child during the previous six weeks using an ordinal scale ('none at all', 'not much', 'some' or 'a great deal'). Parent difficulty with infant routines (e.g. crying, sleeping) was assessed using four items on which parents were asked to rate the

difficulty they experienced in coping with infant behaviour patterns and the extent to which infant routines posed a problem for them (e.g. when your baby cries, how often does he/she get on your nerves? 'never/almost never', 'rarely', 'sometimes', 'often', 'always/almost always').

#### 2.4.1. Measures of parenting and parent well-being.

The Parenting Sense of Competence (PSOC) Scale (Johnston & Mash, 1989) ( $\alpha = 0.77$ ) is a 16-item self-report measure widely used for measuring parent self-efficacy and, specifically, comprising two subscales that assess parents' satisfaction with, and their sense of competence in, the role of parent. This is the primary outcome in the study.

Maternal depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9; Spitzer, Kroenke & Williams, 1999), a validated 9-item measure designed to assess mood, anxiety, alcohol, eating and somatoform symptoms ( $\alpha = 0.79$ ). It is commonly used in primary care settings and has been found to have high convergent validity with measures of postnatal depression (Yawn et al., 2009).

Parent perceptions of the parent-infant bonding relationship were examined using the 9-item 'Quality of Attachment' subscale of the Maternal Postnatal Attachment Scale (MPAS; Condon & Corkindale, 1998) ( $\alpha = 0.71$ ), which has previously been used as a stand-alone measure (Thornton, Williams, McCrory, Murray, & Quail, 2013). The subscale captures parents' desire for proximity and interaction with the infant.

#### 2.4.2. Measures of child development

Child development was assessed using the 2-month and 8-month Ages and Stage Questionnaire 3 (ASQ 3; Bricker & Squires, 1999) ( $\alpha = 0.78$ ) at baseline and follow-up respectively. The ASQ 3 is a parent-report tool for screening child development during the first five years of life and was used here to provide a snapshot of the parent's understanding of their child's developmental progress. Each questionnaire contains 30 items covering several domains including communication, gross motor skills, fine motor skills, problem solving and personal-social development (6 items per scale).

Parent perceptions of child temperament were measured with the 9-item 'Fussy-difficult' subscale of the Infant Characteristics Questionnaire (ICQ; Bates, Bennett Freeland & Lounsbury, 1979) ( $\alpha = 0.83$ ). Child behaviours are scored on a 7-point Likert scale, indicating the perceived level of difficulty experienced by the parent in managing a range of infant behaviours.

#### 2.4.3. Observational measure

The short form of the Infant-Toddler version of the Home Observation for Measurement of the Environment (HOME-SF) was used as an observational measure of parenting behaviour and the home environment (Caldwell & Bradley, 2003). This comprises 16 items ( $\alpha = 0.63$ ) and two subscales: 'cognitive stimulation' and 'emotional support'. Due to ethical restrictions, two items relating to the use of physical punishment were omitted from the scale. The measure is completed by the researcher in approximately 20 min through interview (parent report) and observation. The HOME-SF correlates highly with the full HOME inventory and has good predictive validity (Totsika & Sylva, 2004).

#### 2.4.4. Intervention fidelity and parent engagement measures

Implementation fidelity for the IY component of the PIN programme was monitored by means of facilitator-completed checklists; however, treatment adherence or assessment of the quality of other aspects of programme delivery were not independently assessed.

Parental engagement with the PIN intervention was monitored and reported by programme facilitators using a weekly/programme component attendance list. Parent satisfaction with the PIN intervention was assessed by means of participant feedback questionnaires. For the

IYPBP, the *Parent Programme Satisfaction Questionnaire* (see [www.incredibleyears.com/](http://www.incredibleyears.com/);  $\alpha = 0.82$ ) was used to gather feedback from the parents on the teaching format/methods and facilitation approaches as well as specific parenting techniques taught in the programme. Parents also rated their satisfaction with other PIN intervention components by means of brief customised questionnaires. These assessed parental satisfaction with each component and its delivery, perceived usefulness and aspects of the module which they liked or disliked, as well as whether they would recommend the programme component to a family member or friend.

#### 2.4.5. Service utilisation measure

A *Service Utilisation Questionnaire (SUQ)*, based on the Client Service Receipt Inventory (CSRI; Beecham & Knap, 1992) was used to gather information on parents' use of routine primary care, social work and hospital-based services. Parents' utilisation of other parenting supports or programmes and/or mother-and-baby focused activities (e.g. breastfeeding groups, mother and baby groups, baby yoga, etc) was also assessed by customised questions included on the SUQ.

#### 2.5. Power analysis

A power calculation was conducted on the basis of comparing the mean score of an intervention group on the PSOC scale to that of a control group of the same size. This indicated that data were required from 132 parents (66 in the intervention group; 66 in the control group) to allow over 80% power to detect a difference of 3 units in mean scores, between the intervention and control arm, based upon a SD of 6; this corresponds to a Cohen's *d* of 0.5 (medium effect size). Therefore, a total sample size of 200 parents was recommended, assuming (based on previous research; (McGilloway et al., 2012) an attrition rate of 33%. The final sample size was 190 which meant that the power to detect differences between groups may have been a little low, in the instance of high attrition.

#### 2.6. Intervention

The PIN intervention was designed by a non-profit organisation called Archways ([www.archways.ie](http://www.archways.ie)) (who specialise in the provision of evidence-based programmes for children and young people in the Republic of Ireland) in collaboration with PHNs and several other community-based organisations. The PIN intervention comprises two phases of group-based supports. The first phase of intervention, which is offered to parents when infants are between 2 and 4 months old, involves the delivery of the standardised 8-week IYPBP, alongside free to access complementary, non-standardised programmes and workshops (including baby massage classes, Weaning workshops, First Aid). The second phase which is offered to parents once the child reaches approximately 18 months, involves the delivery of a play/oral language development programme, a healthy eating workshop and/or the Incredible Years Parent and Toddler Programme (IYPTP). The Incredible Years (IY) suite of interventions (Webster-Stratton & Reid, 2008), which are based on behavioural and social learning principles, offer model programmes for addressing conduct problems in childhood (National Institute for Health and Clinical Excellence, 2006) and numerous evaluations have demonstrated their effectiveness in improving parenting skills and child behaviour in a number of countries throughout the world (Hutchings et al., 2007; McGilloway et al., 2012; Leijten et al., 2018). In each site, the intervention has been slightly customised to meet community needs and local service delivery capacities (Table 1), but with only minor differences in the content and process of delivery across sites (further detail provided below).

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**Table 1**  
Parent and Infant Intervention Components, Core Topics and Objectives.

<i>PIN Intervention Phase 1</i>		<i>PIN Intervention Phase 2</i>	
Components	Core topics	Components	Core topics
<b>Incredible Years Parent and Baby programm<sup>a</sup></b>	Getting to know your baby Babies as intelligent learners Providing physical, tactile and visual stimulation Parents learning to read babies' minds Gaining support Babies' emerging sense of self	<b>Toddler Health Eating<sup>c</sup></b>	Food safety and hygiene Healthy eating principles Practical cookery demonstration and advice
<b>Baby Massage</b>	Relief – Colic and wind; Emotional stress Relaxation – Soothes and aids sleep Stimulation – Build immunity and help gain weight Interaction – Aid bonding and reduce postnatal depression	<b>'Play &amp; Talk' programme<sup>e</sup></b>	Play skills and strategies Language development milestones Practical play sessions and advice
<b>Weaning workshop</b>	Stages of weaning, timing, quantities, feeding techniques Food safety and hygiene Healthy eating principles Practical cookery demonstration and advice	<b>Incredible Years Parent and Toddler Programme</b>	Child directed play promotes positive relationships Promoting toddler's language with child directed coaching Social and Emotion coaching The art of praise and encouragement Spontaneous incentives for toddlers Handling separations and reunions Positive discipline – effective limit setting Positive discipline – handling misbehavior
<b>Paediatric First Aid / Child safety<sup>b</sup></b>	Child resuscitation Dealing with injury, poisoning, choking and medical emergencies Recovery position Threats to child safety and child proofing home environments		
<b>Dental health<sup>b</sup></b>	Principles of dental health		
<b>Active Play<sup>c</sup></b>	Play skills and strategies Language development milestones Practical play sessions and advice		
<b>Returning to work</b>	Information on childcare options Guidelines for choosing childcare		

<sup>a</sup> Standardised behavioural parent training (all other components are non-standardised).

<sup>b</sup> Delivered in Site 2 Drogheda/Dundalk only.

<sup>c</sup> Delivered in Site 1 Clondalkin West Dublin only.

number of countries throughout the world, including the Republic of Ireland (Department of Children and Youth Affairs [DCYA], 2013). The delivery of the PIN intervention is overseen in each site by a multi-disciplinary consortium of local stakeholders. These consortia employ a small number of staff whose role is to support the implementation of the PIN intervention.

### 2.6.1. PIN intervention phase 1 delivery

The PIN intervention was delivered using a peer-led, problem-solving framework. A combination of group-discussion, role-play, modelling practical demonstrations and video material were used throughout to strengthen parenting knowledge and skills across a range of domains (e.g. basic care routines, nutrition and child safety). Improvements in parent-infant relationships were targeted through the promotion of sensitive, responsive parenting, whilst parents are also encouraged to use play and communication techniques to promote positive infant well-being (see Table 1). The first phase of PIN intervention delivery was initiated when the infant was approximately 8 to 20 weeks old. At this time, the 8-week IYPBP was delivered in tandem with additional, complementary sessions including baby massage, paediatric first aid training, and weaning, child safety, dental health and 'returning to work' workshops and supports. Thus, IY sessions were delivered on a fortnightly basis, with additional supports delivered on alternate weeks. Normally, the 8-session IYPBP is delivered over consecutive weeks. Thus, the intervention investigated here is longer and more intensive.

Twelve intervention groups, each with approximately 10 participants, were delivered in community-based service settings (e.g.

Community Centres, Public Health Clinics and Schools) during the course of the study. Intervention implementation involved coordinated interagency working; thus, the IY components were delivered by community-based practitioners in collaboration with PHNs, whilst other components were delivered by community-based service providers (e.g. Health Officers and/or Family Support Workers).

### 2.6.2. Delivery of the IYPBP

The IYPBP involved 8 two-hour sessions, during which group leaders used group discussion, video vignettes and role plays to help parents learn about developmental milestones, brain maturation and the importance of good care for healthy infant development, as well as helping parents to read and respond to babies' cues in a sensitive manner and to provide appropriate stimulation to promote development and positive parent-infant relationships.

The IYPBP was facilitated by three persons, including PHNs and other community-based practitioners (e.g. Family Support Workers). All facilitators had received three-day training in the context and techniques of the IYPBP. One facilitator was fully accredited in the IYPBP at the start of research process, five achieved accreditation during the course of the study, whilst the remainder were working toward accreditation as implementation progressed. All IY group sessions were recorded and reviewed as part of the rigorous accreditation process and all facilitators received peer coaching from a certified IY peer coach, as well as attending fortnightly peer support sessions to address any issues that arose during group facilitation and to assess progress.

### 2.6.3. Delivery of baby massage

Baby massage was delivered to the intervention group by a fully-trained massage therapist who was certified by the International Association of Infant Massage. Baby massage sessions (approximately 1–1.5 h each) involved an initial introduction/ice breaker, followed by demonstration and teaching of infant massage strokes and gentle movements. Parents were instructed to request permission from infants to perform massage and to read and follow infant cues. At each session, time was allowed for group discussion, whilst facilitators used active and objective listening to support parents in problem solving and finding solutions to any parenting issues which are raised. In Site 1, during cycles 1 and 2, parents were offered four sessions in baby massage whereas in cycle 3 (Site 1) and in Site 2, all parents were offered five baby massage sessions.

### 2.6.4. Delivery of additional components

Other components which form part of the PIN intervention, include non-standardised content which were delivered by appropriately trained or qualified personnel. These workshops were delivered as 1 to 1.5 h sessions, although paediatric first aid training, which was delivered by a certified trainer, involved a full day session (delivered as two half day sessions in Site 2). The weaning, child safety, dental health, 'return to work' and active play workshops were delivered by a community-based health officer or PHN. The schedule of workshop delivery was developed to reflect the changing developmental needs of the parent and infant. Thus, the weaning workshop was scheduled for delivery before infants were 4 months old, whilst the 'return to work' workshop was delivered later in the intervention cycle when infants are older and when parents are making decisions regarding returning to work and childcare arrangements. In Site 1, due to a lack of uptake, the return to work workshop was not delivered during cycle 3, although these parents received an additional session of baby massage (5 sessions instead of 4). In Site 2, the additional components were combined into one two-hour session (e.g. baby massage would be delivered in combination with another workshop such as dental health or child safety). Thus, parents attending the PIN intervention were offered a total of 15 sessions across both sites and all cycles of delivery.

In Site 1, during cycles 1 and 2, the IY and additional components were delivered in different community-based venues and parents travelled to the different venues each week. However, for all cycles in Site 2 and also during cycle three in Site 1, all components of the intervention were delivered at the same community-based venue. At the time of data collection for follow-up 1, phase 2 of the intervention had not been delivered.

### 2.6.5. Role of PIN programme staff

PIN programme staff (made up of two part-time coordinators in Site 1 and one full-time programme coordinator in Site 2) had responsibility for: coordinating and deploying implementation resources (e.g. hiring venues, organising and sharing programme materials); liaising with PHN practitioners and/or other programme implementers for parent recruitment and programme delivery; coordinating the timing and delivery of programme components; organising implementation planning meetings; developing plans/protocols for programme delivery; liaising with practitioners on recruitment; gathering and maintaining contact details for recruited parents; and liaising with parents and promoting parent uptake of, and engagement with, the programme.

## 2.7. Analysis strategy

### 2.7.1. Baseline and attrition analyses

Differences at baseline between the intervention and comparison groups were assessed using independent samples t-tests and Chi Square. Attrition analyses were also conducted to identify potential differences between those retained in the study and those who were lost to follow-

up. Intervention fidelity, parent satisfaction and engagement were assessed using descriptive statistics.

### 2.7.2. Analysis of intervention outcomes

A complete-case, intention-to-treat (ITT) analysis was carried out whereby participants were included in the analysis regardless of programme attendance, excluding only those lost to follow up ( $n = 12$ ; 9 Intervention and 3 Comparison). Participants were not excluded from the ITT analysis on the basis of intervention attendance. Exploratory analyses were conducted on non-parametric variables to examine any potential changes over time in parenting behaviour or any differences between the groups (e.g. reading in the home, parenting stress, early weaning).

An analysis of covariance (ANCOVA) was carried out to examine differences between conditions at follow-up on parent-report and observational measures, controlling for baseline score, area of recruitment, treatment status, parity and infant age (at baseline and at follow-up). This approach was also used to examine between-group differences on measures of child development and temperament. The ASQ 3 2-month questionnaire was used for baseline data collection, and the 8-month questionnaire at follow-up one. Only infants within the recommended age range for these questionnaires were included in the analysis. Effect sizes were calculated using Cohen's guidelines whereby an effect size of 0.2 denotes a small effect, 0.5 a medium effect and 0.8 a large effect of the intervention (Cohen, 1988). Given the non-randomised nature of the study and to account for any impact of pre-test bias on the analysis of the treatment effect (Van Breukelen, 2006; Vickers & Altman, 2001), a sensitivity analysis was also conducted using multiple linear regression, with change as the outcome variable and treatment group, infant age, recruitment site and maternal parity as explanatory variables.

### 2.7.3. Secondary analyses

Subgroup analyses were also conducted on a 'per protocol' sample including only intervention group parents who had attended a minimum of 7 sessions of any of the intervention components. This cut-off represented approximately half of any intervention sessions and was deemed by programme providers to represent good attendance. The per protocol analyses also excluded comparison group participants who, between baseline and follow-up, had attended/received any aspects of the intervention (e.g. baby massage workshops), or another formal parenting programme which not typically delivered as part of services as usual. We did not exclude mothers who attended other services/programmes such as baby yoga or swimming, as these were not included in the PIN service model and parents in the intervention group may also have accessed these services. These secondary analyses were conducted using ANCOVA. Baseline score, treatment group, area of recruitment, parity and infant age were included as covariates in the per protocol analyses.

### 2.7.4. Parent engagement and service utilisation

Descriptive statistics were used to explore parent attendance and satisfaction with the PIN intervention. Summary variables were created for parents' and infants' engagement with GP, nursing, social work, accident and emergency and specialist hospital services in the previous 8-month period. Service utilisation differences between the intervention and comparison groups, were conducted using Chi Square and independent samples t-tests.

## 3. Results

### 3.1. Baseline findings

All participants were mothers, one-quarter of whom (25%) were lone parents (Table 2). The average age of mothers at baseline (i.e. at

**Table 2**  
Family Characteristics at Baseline. Figures are Numbers (%) Unless Otherwise Indicated.

	Intervention (n = 97)	Comparison (n = 81)	Between group comparison* p value	Lost to follow-up *		Average Irish Values
				Intervention (n = 9)	Comparison (n = 3)	
Lone parent	23 (24)	16 (20)	0.52	6 (67)	3 (100)	18% <sup>a</sup>
Ethnic minority	17 (18)	18 (22)	0.43	0 (0)	2 (75)	
First-time mother	67 (70)	31 (39)	0.00	7 (78)	0 (0)	
Mean age of mother (SD)	31.6 (6)	31.9 (5)	0.68	28.9 (5)	30 (5)	32.3 <sup>b</sup>
Mean age of infant in months (SD)	1.8 (0.8)	2.1 (0.7)	0.02	1.7 (0.5)	3 (0)	
No (%) of boys	53 (55)	39 (48)		5 (56)	2 (67)	
Unemployed	20 (21)	15 (19)	0.73	2 (22)	1 (33)	
Low income	33 (35)	24 (30)	0.54	4 (44)	1 (33)	16% <sup>c</sup>
Mean no of risk factors † (SD) <sup>b</sup>	1.04 (1.2)	0.9 (1.1)	0.35	1.0 (1.2)	0.33 (0.6)	
> 2/5	31 (32)	24 (30)		2 (22)	3 (100)	

\* Differences between intervention and comparison groups tested using Chi-Square tests and Independent Samples t-tests.

<sup>a</sup>Attrition analysis between those retained in the intervention group and those lost to follow-up conducted using Chi-Square tests and Independent Samples t-tests.

<sup>b</sup>Central Statistics Office [CSO], 2017

<sup>c</sup>CSO, 2015; Mean age of Irish mothers giving birth (Mean age of Irish mothers at birth of first child is 30.5)

<sup>d</sup>CSO, 2016; CSO categorises an equivalised disposable income per individual of 228.13/week as the threshold for at risk of poverty

<sup>e</sup>Risk factors = Lone parent, teen parent at birth of first child, Low income, maternal history of depression, parental history of drug abuse and/or criminality (min score = 0; max score = 5)

the birth of the index child) was 31.6 years (SD = 5.4); over half (55%) were first-time mothers. The infants included in the study were fairly equally divided by gender (48% boys; 52% girls) (average age = 1.91 months, SD = 0.79). Approximately one-third of the sample (32%) were socioeconomically disadvantaged (annual household income < €24,000 after taxation and deductions) when compared to average Irish norms (Central Statistics Office [CSO], 2016), whilst 19% were from an ethnic minority background. Risk factors for parenting difficulties include: single parenthood, teenage parenthood, family poverty, parental history of depression, substance abuse and criminality, whilst the number of risk factors experienced by a child has been shown to increase the likelihood of maladaptive outcomes (Trentacosta et al., 2008). A risk factor score (0 to 5) was calculated on the basis of the above factors to yield a mean score of 0.97 (SD = 1.11); 30% (57/106) of participants obtained a risk factor score of 2 or more, indicating that parents participating in the study were, on average, a low-risk group.

Statistical analysis (Independent samples t-tests and Chi-Square) revealed significant differences at baseline between the intervention and comparison groups with respect to parity and infant age. With regard to the former, there were significantly more first-time mothers in the intervention group, most likely due to the greater appeal of the programme for this group. In addition, infants in the comparison group were, on average, significantly older at baseline, mainly because it proved much more difficult than anticipated to recruit parents of very young infants to the comparison group within the timescale of the study. No differences were found between those retained in the study and those who were lost to follow-up.

At baseline, parents generally reported good health both for themselves and their infants. Minor illness was reported by 36% (n = 60) of parents and for 19% (n = 34) of infants. Low mean scores of 3.7 (SD = 3.9) on the PHQ-9 and high mean scores on the PSOC (M = 74.7; SD = 8.97) suggest that parents, on average, were coping well with the transition to parenthood. High participant scores on the MPAS Quality of Attachment subscale indicate that parents reported high levels of desire for proximity and interaction with their infants. These scores compare favourably with the mean score of a representative Irish sample (M = 42.5; N = 11,134; Nixon, Swords & Murray, 2013). High scores on the HOME-SF also indicated emotionally supportive and stimulating care environments.

### 3.2. Intervention delivery, parent response and uptake of parent-child supports

IYPBP facilitators completed self-evaluation checklists which indicated that 96% of intervention content was delivered. Feedback forms indicated that parent participant satisfaction with the PIN programme was very high and consistent across sites and cycles of programme delivery; 95% to 100% of parents reported that they were 'satisfied' or 'highly satisfied' with the various PIN programme components. Two-thirds of participants (66%) attended 7 or more PIN intervention sessions (out of a maximum of 15) during phase 1 of intervention delivery. The mean number of sessions attended was 4.9 (SD = 2.8). Mean attendance for other sessions (e.g. non-IY components) was 3.5 (SD = 2.6), whilst 63% attended 3 or more of these additional sessions (out of a total of 7). In total, 13% (14/106) of participants did not attend any part of the PIN intervention.

All parents in both the intervention and comparison groups were asked at follow-up, to report any community-based supports they had received since the baseline assessment. Of those in the comparison group, 16% (n = 13/81) had received 'Community Mothers' support, a home-visiting programme which involves community mothers visiting parents once a month in their own homes and providing information to promote positive parenting skills and parental self-esteem. Almost 15% (n = 12/81) of the comparison group had received/attended at least one support which is also offered as part of the PIN intervention (most typically baby massage). A very small number (n = 2) of those who received Community Mothers support also received/attended some aspect of the intervention; thus, 28% (n = 23/81) of the total comparison group received another formal parent support programme or some aspect of the intervention. Other parents attended other supports which were not part of the intervention, such as breastfeeding support groups, parent and baby yoga or baby music classes. Altogether, just over half (56%) of the comparison group had accessed some form of community-based parent-child support group or activity (which is not delivered as part of the PIN programme; 44% of the comparison group did not attend any community-based mother and baby services or supports (42/81).

When taking into account access to, and uptake of, the PIN intervention, almost all parents (96%) in the intervention group, attended some form of parenting support; only 4% of the intervention group



**Table 3**  
Summary of Parent Self-Report at Baseline and Follow-Up. Figures are no.s (%).

	Comparison (n = 81)			Intervention (n = 97)		
	Baseline	Follow-up	<i>p</i> -value *	Baseline	Follow-up	<i>p</i> -value*
Parent Stress †	25 (32)	23 (28)	0.67	29 (30)	36 (37)	0.18
Reading (≥ 3 X Wks)	30 (37)	41 (51)	0.07	28 (29)	63 (65)	0.00
Early Weaning (< 17 Wks)	–	24 (30)		–	23 (24)	

\* Within group differences examined using McNemar's Test

† Parenting stress: At any time during the past 6 weeks did you feel under any stress due to looking after your baby? None at all/Not much = 0; Some /A great deal = 1

reported no involvement with any locally-based service or support for mothers and babies. In addition to attending the PIN intervention, a total of 41% (n = 39) of intervention group parents reported attending other or additional group/parenting activities not included in the intervention (e.g. breastfeeding support groups, baby music classes, local mother and baby groups).

### 3.3. Intervention outcomes

At follow-up, most parents and infants reported good health (minor illnesses were reported for 24% (n = 44) of parents and 20% (n = 36) of infants). Treatment for depression, anxiety or 'nerves' at 8-month follow up was reported by 10% and 13% of the intervention and comparison group respectively, whilst, 25% of the intervention group and 21% of the comparison group reported major life events in the period between baseline and follow up, including: house move; bereavement; family illness; change in employment circumstances (partner/own); and separation and/or relationship difficulties. In total, 44% and 46% of the intervention and comparison group mothers respectively, had returned to work following maternity leave.

Self-reported parenting stress at baseline and follow-up is shown in Table 3. At follow-up, one third of all participating mothers (n = 59) reported stress relating to child care: 37% of the intervention group (n = 36) and 29% (n = 23) of the comparison group reported "some or a great deal" of stress due to looking after their child. Differences over time were not statistically significant. Parents were also asked to report the age at which their infants first received solid food and there were no between-group differences in this respect. Parents in the intervention group were significantly more likely to report reading regularly (i.e. 3 times or more per week) to the infant at follow-up when compared to baseline data (Table 3). Within the intervention group, the numbers who reported regularly reading to their infants (> 3 per week or more) grew from 29% at baseline to 65% at follow-up (representing an increase of 39%), compared to an increase of 14% in the comparison group (37% at baseline to 51% at follow-up). Parents in the intervention group were also significantly more likely to read three times a week or more to their infant, than those in the comparison group ( $\chi^2 = 3.73$  (1, n = 178),  $p < 0.05$ ,  $\phi = -0.15$ ).

The ITT ANCOVA did not reveal any statistically significant between-group differences on the primary outcome measure, the PSOC scale or on measures of parent outcomes (Table 4).

The ITT analysis for the ASQ subscales was conducted on a subsample of infants who were within the recommended age range for the 2-month and 8-month questionnaires (n = 129; 57 comparison, 72 intervention). ANCOVA revealed significant differences at follow-up in favour of the comparison group infants on the ASQ 3 subscales for communication, problem solving and fine-motor skills (Table 5).

#### 3.3.1. Secondary analyses

An ANCOVA for the per protocol group (n = 125; 58 comparison, 67 intervention) revealed significant differences in favour of the intervention group, indicating that parents who had attended 7 or more sessions of the PIN intervention, reported significantly better parenting

efficacy at follow-up than their comparison group counterparts (PSOC Efficacy subscale, effect size = 0.44). Significant differences between the intervention and comparison per protocol samples were also found on the HOME-SF total score (Table 6). Additionally, there was a downward trend amongst intervention group parents on perceived difficulty managing routine infant care; these post-intervention differences between the per protocol groups were borderline significant (Table 7).

### 3.4. Service utilisation

Parent and infant utilisation of primary health care, social care and hospital-based services are shown in Table 8. There were more mothers attending GP and nurse services in the comparison group, whilst more mothers in the intervention group attended casualty and outpatient consultant services; however, differences between the groups were not statistically significant. However, the mean number of infant visits to a GP was significantly lower amongst infants in the intervention group ( $t = 2.06$ ,  $p = 0.04$ ) as was their number of visits to a primary care nursing service ( $t = 2.4$ ,  $p = 0.02$ ).

## 4. Discussion

The findings reported here describe early outcomes from the first phase of an ongoing evaluation of a novel group-based, interagency, early parenting intervention. The principal aim of the study was to explore the potential utility of the PIN intervention as a primary prevention strategy for enhancing parent and infant outcomes in the earliest years. The PIN intervention is a new initiative designed to meet family need, promote engagement and enhance parent and child outcomes by combining group-based parent training in tandem with other community-based supports which are delivered in a collaborative and streamlined manner at a local level through primary care and community-based services. The availability of the PIN programme meant that parents and infants in the intervention group had greater contact with parenting and/or community-based parent-and-child focused supports, whilst those who attended the PIN supports also demonstrated significantly greater sense of efficacy in their parenting role. Parent satisfaction with the PIN intervention and its constituent components was also very high. Overall, these findings illustrate the acceptability, potential utility and relevance of a holistic, coordinated package of multidisciplinary parenting supports in the community which appears to promote the uptake of community-based services whilst also helping those who take part in the intervention, to improve their sense of competency in tackling the parenting challenges during the earliest stages of development.

Nevertheless, the ITT analysis did not identify any statistically significant differences between the groups on measures of parenting or parent wellbeing. Notably, the mothers in our study were, on average, functioning well at baseline, thereby limiting scope for change. It should also be noted that, although parents in the intervention group were more likely to have contact with community-based parent-child supports, almost 13% of the intervention group did not attend any

**Table 4**  
Summary of Parent Measures at Baseline and Follow-Up for 'Intention to Treat' Sample using Analysis of Covariance.

	M (SD) Raw scores				ANCOVA				Sensitivity analysis					
	Comparison		Intervention		M Diff (95% CI), p		Adj. M Diff (95% CI), p		M Diff (95% CI), p		Adj. M Diff (95% CI), p		Effect size	
	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up
<b>Intention to treat *</b>														
<b>PSOC Total</b>	76 (8.5)	75.5 (7.6)	73.7 (9.3)	75.4 (8.3)	1.2, (-0.6, 3.1), 0.2	75.4 (8.3)	75.4 (8.3)	0.8, (-1.3, 2.8), 0.47	0.8, (-1.3, 2.8), 0.47	2.2 (0, 4.4) 0.05	2.2 (0, 4.4) 0.05	1.4 (-1, 3.8) 0.24	1.4 (-1, 3.8) 0.24	0.20
<b>Efficacy</b>	33.8 (4.6)	33.8 (4)	32.8 (5)	33.7 (4.4)	0.5, (-0.5, 1.6), 0.32	33.7 (4.4)	33.7 (4.4)	0.5, (-0.6, 1.7), 0.36	0.5, (-0.6, 1.7), 0.36	1.1 (-0.2, 2.4) 0.09	1.1 (-0.2, 2.4) 0.09	0.8 (-0.6, 2.2) 0.25	0.8 (-0.6, 2.2) 0.25	0.19
<b>Satisfaction</b>	42.2 (5.7)	41.7 (4.9)	41 (6.5)	41.8 (5.5)	0.7, (-0.6, 2), 0.28	41.8 (5.5)	41.8 (5.5)	0.2, (-1.1, 1.6), 0.73	0.2, (-1.1, 1.6), 0.73	1.3 (-0.2, 2.9) 0.1	1.3 (-0.2, 2.9) 0.1	0.8 (-0.9, 2.4) 0.38	0.8 (-0.9, 2.4) 0.38	0.15
<b>PHQ-9</b>	3.3 (3.6)	3.7 (3.7)	4.1 (4.2)	3.9 (4.1)	-0.2, (-1.1, 0.7), 0.65	3.9 (4.1)	3.9 (4.1)	0.1, (-0.9, 1.1), 0.87	0.1, (-0.9, 1.1), 0.87	-0.5 (-1.5, 0.5) 0.338	-0.5 (-1.5, 0.5) 0.338	-0.4 (-1.5, 0.7) 0.49	-0.4 (-1.5, 0.7) 0.49	-0.11
<b>MPAS</b>	42 (3.5)	42.2 (2.8)	41.7 (3.4)	42.4 (2.9)	0.4, (-0.4, 1.2), 0.32	42.4 (2.9)	42.4 (2.9)	0.5, (-0.3, 1.4), 0.23	0.5, (-0.3, 1.4), 0.23	0.6 (-0.4, 1.6) 0.25	0.6 (-0.4, 1.6) 0.25	0.8 (-0.3, 1.9) 0.16	0.8 (-0.3, 1.9) 0.16	0.24
<b>HOMESF Total</b>	12.6 (2.2)	14 (1.4)	12.5 (2.3)	14.2 (1.9)	0.2, (-0.4, 0.7), 0.56	14.2 (1.9)	14.2 (1.9)	0, (-1, 1), 0.99	0, (-1, 1), 0.99	0.1 (-0.6, 0.9) 0.76	0.1 (-0.6, 0.9) 0.76	0 (-0.8, 0.8) 0.99	0 (-0.8, 0.8) 0.99	0.00
<b>Cognitive</b>	6.8 (1.6)	7.7 (1)	6.7 (1.3)	7.9 (1)	0.3, (-0.1, 0.6), 0.11	7.9 (1)	7.9 (1)	0.2, (-0.8, 1.2), 0.71	0.2, (-0.8, 1.2), 0.71	0.3 (-0.2, 0.7) 0.237	0.3 (-0.2, 0.7) 0.237	0.2 (-0.3, 0.7) 0.40	0.2 (-0.3, 0.7) 0.40	0.16
<b>Emotional</b>	5.9 (1.2)	6.3 (0.8)	5.8 (1.3)	6.3 (1.2)	-0.1, (-0.4, 0.2), 0.58	6.3 (1.2)	6.3 (1.2)	-0.1, (-1.1, 0.9), 0.81	-0.1, (-1.1, 0.9), 0.81	-0.1 (-0.6, 0.3) 0.64	-0.1 (-0.6, 0.3) 0.64	-0.2 (-0.7, 0.3) 0.39	-0.2 (-0.7, 0.3) 0.39	-0.17
<b>Parenting Difficulty †</b>	2.3 (2.1)	2.6 (2.1)	2.7 (2.6)	2.1 (2)	-0.6 (-1.2, 0) 0.03	2.1 (2)	2.1 (2)	-0.5 (1.1, 0.1), 0.11	-0.5 (1.1, 0.1), 0.11	-0.8 (-1.7, 0), 0.05	-0.8 (-1.7, 0), 0.05	-0.4 (-1.2, 0.3), 0.27	-0.4 (-1.2, 0.3), 0.27	-0.19

\* Intention to treat analysis = 81 Comparison, 97 Intervention; ANCOVA includes baseline score, area of recruitment, treatment status, parity and infant age (at baseline and at follow-up).  
 † Summary of 4 items on the PDJF: Is your baby ever difficult when put to bed? Never/Almost Never/Rarely/Sometimes/Often/Always/Almost Always; Is your baby's sleeping pattern a problem for you? No problem/Small/moderate/Large problem; Is your baby's crying a problem for you? No problem/Small/Moderate/Large problem = 1; When your baby cries how often does s/he get on your nerves? Never/Almost Never/Rarely/Sometimes/Often/Always/Almost Always (Min score = 0; Max score = 14; Lower scores indicate fewer difficulties).

**Table 5**  
Summary of Child Measures at Baseline and Follow-Up for 'Intention to Treat' Sample using Analysis of Covariance.

	M (SD) Raw scores				ANCOVA				Sensitivity analysis					
	Comparison		Intervention		M Diff (95% CI), p		Adj. M Diff (95% CI), p		M Diff (95% CI), p		Adj. M Diff (95% CI), p		Effect size	
	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up
<b>Intention to treat *</b>														
<b>ASQ 3</b>														
<b>Communication</b>	49.9 (11.8)	55.9 (5.3)	46 (13.6)	51.6 (8)	-4.1 (-6.6, -1.6) 0.00	51.6 (8)	51.6 (8)	-3.4 (-6.3, -0.5) 0.02	-3.4 (-6.3, -0.5) 0.02	-0.4 (-5.3, 4.5) 0.87	-0.4 (-5.3, 4.5) 0.87	-2.5 (-7.9, 2.8) 0.35	-2.5 (-7.9, 2.8) 0.35	-0.20
<b>Gross Motor</b>	54.8 (6.3)	50.2 (13.4)	53.1 (8.1)	46.3 (11.7)	-3.6 (-8, 0.8) 0.106	46.3 (11.7)	46.3 (11.7)	-3.1 (-8.3, 2.2) 0.25	-3.1 (-8.3, 2.2) 0.25	-2.1 (-7, 2.8) 0.40	-2.1 (-7, 2.8) 0.40	-3.1 (-9, 2.8) 0.30	-3.1 (-9, 2.8) 0.30	-0.22
<b>Fine Motor</b>	45.8 (10.5)	58.3 (3.8)	48 (10.1)	54.5 (7.7)	-3.7 (-5.9, -1.5) 0.001	54.5 (7.7)	54.5 (7.7)	-3.1 (-5.8, -0.5) 0.02	-3.1 (-5.8, -0.5) 0.02	-6.1 (-10.5, -1.7) 0.00	-6.1 (-10.5, -1.7) 0.00	-5.3 (-10.6, 0) 0.05	-5.3 (-10.6, 0) 0.05	-0.42
<b>Problem Solving</b>	49.9 (13.2)	58.2 (4.9)	46.8 (14.5)	54.4 (7.6)	-3.8 (-6.1, -1.4) 0.00	54.4 (7.6)	54.4 (7.6)	-3.9 (-6.7, -1.1) 0.00	-3.9 (-6.7, -1.1) 0.00	-0.9 (-6.3, 4.4) 0.73	-0.9 (-6.3, 4.4) 0.73	-0.5 (-6.5, 5.5) 0.86	-0.5 (-6.5, 5.5) 0.86	-0.04
<b>Personal Social</b>	51.2 (7.6)	57.2 (5.7)	48.6 (8.7)	55.1 (7)	-2.3 (-4.6, 0) 0.05	55.1 (7)	55.1 (7)	-2.5 (-5.3, 0.2) 0.07	-2.5 (-5.3, 0.2) 0.07	0.5 (-3.3, 4.4) 0.78	0.5 (-3.3, 4.4) 0.78	-1.6 (-6.2, 2.9) 0.48	-1.6 (-6.2, 2.9) 0.48	-0.15
<b>ICQ Fussy-difficult</b>	23.3 (8)	23.3 (7.5)	25.7 (8.2)	24.3 (7.2)	-0.2, (-2.1, 1.7), 0.84	24.3 (7.2)	24.3 (7.2)	-0.5, (-2.5, 1.5), 0.62	-0.5, (-2.5, 1.5), 0.62	-1.4 (-3.6, 0.9) 0.23	-1.4 (-3.6, 0.9) 0.23	-0.8 (-3.2, 1.7) 0.54	-0.8 (-3.2, 1.7) 0.54	-0.10

\* Intention to treat analysis for ASQ 3 data: n = 129; 57 comparison, 72 intervention; Intention to treat analysis for ICQ Fussy-Difficult: n = 178; 81 comparison, 97 intervention; ANCOVA includes baseline score, area of recruitment, treatment status, parity and infant age (at baseline and at follow-up).

ASQ 3 = Ages and Stages 3; ICQ = Infant Characteristics Questionnaire

**Table 6**  
Summary of Parent Measures at Baseline and Follow-Up for 'Per Protocol' Sample using Analysis of Covariance.

Per protocol *							
	<i>M (SD) raw scores</i>				ANCOVA		
	Comparison		Intervention		<i>M Diff, (98% CI), p</i>	<i>Adj. M diff, (98% CI), p</i>	<i>Effect size</i>
	<i>Baseline</i>	<i>Follow-up</i>	<i>Baseline</i>	<i>Follow-up</i>			
<b>PSOC</b>							
Total	75.7 (9)	75.4 (7.9)	74.7 (8.8)	76.7 (7.7)	1.9 (-0.3, 4.1) 0.095	1.2 (-1.4, 3.7) 0.37	0.19
Efficacy	34.1 (4.5)	33.7 (4)	32.6 (4.7)	34.2 (4)	1.3 (0.1, 2.5) 0.035	1.4 (0.1, 2.8) 0.04	0.44
Satisfaction	41.7 (6)	41.6 (5.1)	42.1 (6)	42.5 (5.4)	0.7 (-0.8, 2.3) 0.34	-0.1 (-1.8, 1.6) 0.92	-0.02
<b>PHQ-9</b>	3.4 (3.4)	3.8 (3.4)	3.9 (4.4)	3.5 (4)	-0.6 (-1.7, 0.4) 0.24	-0.4 (-1.6, 0.8) 0.46	-0.15
<b>MPAS</b>	42.3 (3.3)	42.4 (2.7)	41.8 (3.2)	42.7 (2.7)	0.4 (-0.4, 1.3) 0.32	0.5 (-0.4, 1.5) 0.28	0.22
<b>HOME-SF</b>							
Total	13.2 (1.8)	14 (1.4)	12.8 (2.1)	14.8 (1.4)	0.8 (0.3, 1.4) 0.004	0.6 (0, 1.1) 0.04	0.49
Cognitive	7.2 (1.4)	7.7 (1)	7 (1.2)	8.2 (0.9)	0.5 (0.1, 0.9) 0.007	0.3 (0, 0.7) 0.08	0.40
Emotional	6.1 (1)	6.2 (0.8)	5.9 (1.2)	6.6 (0.9)	0.3 (0, 0.7) 0.047	0.2 (-0.2, 0.5) 0.29	0.25
<b>Parenting Difficulty †</b>	2.4 (2.3)	2.6 (2.2)	2.5 (2.4)	1.9 (1.6)	-0.7, (-1.3, -0.1), 0.03	-0.7, (-1.4, 0), 0.06	-0.39

\* Per protocol analysis = 58 comparison, 67 intervention; ANCOVA includes baseline score, area of recruitment, treatment status, parity and infant age (at baseline and at follow-up).

PSOC = Parent Sense of Competence; PHQ-9 = Patient Health Questionnaire 9; MPAS = Maternal Post-Natal Attachment Scale; HOME-SF = Home Observation for Measurement of the Environment – Short Form

† Summary of 4 items on the PDI: Is your baby ever difficult when put to bed? Never/Almost Never/ Rarely/Sometimes/Often/Always/Almost Always; Is your baby's sleeping pattern a problem for you? No problem/Small/moderate/Large problem; Is your baby's crying a problem for you? No problem/Small/Moderate/Large problem = 1; When your baby cries how often does s/he get on your nerves? Never/Almost Never/ Rarely/Sometimes/Often/Always/Almost Always (Min score = 0; Max score = 14; Lower scores indicate fewer difficulties).

**Table 7**  
Summary of Child Measures at Baseline and Follow-Up for 'Per Protocol' Sample using Analysis of Covariance.

Per protocol *							
	<i>M (SD) raw scores</i>				ANCOVA		
	Comparison		Intervention		<i>M Diff, (98% CI), p</i>	<i>Adj. M diff, (98% CI), p</i>	<i>Effect size</i>
	<i>Baseline</i>	<i>Follow-up</i>	<i>Baseline</i>	<i>Follow-up</i>			
<b>ASQ 3 <sup>a</sup></b>							
Communication	50.8 (11)	56 (5.3)	46.1 (13.2)	50.9 (8.2)	-5.1 (-8.1, -2) 0.001	-3.7 (-7.6, 0.1) 0.06	-0.52
Gross Motor	56 (5.8)	49 (13.5)	52.4 (9)	48.8 (10)	0.8 (-4.2, 5.8) 0.75	2 (-4.2, 8.2) 0.52	0.17
Fine Motor	46.9 (10.3)	58.1 (3.9)	48.2 (10.3)	54.6 (8.1)	-3.5 (-6.3, -0.7) 0.02	-1.5 (-5, 2) 0.39	-0.23
Problem Solving	51.3 (11.8)	57.6 (5.7)	45.4 (15.9)	55.7 (7.4)	-1.8 (-4.6, 1.1) 0.23	-1.8 (-5.4, 1.9) 0.34	-0.26
Personal Social	51.9 (7.6)	57 (6)	48.5 (8)	56.8 (6)	-0.4 (-3, 2.2) 0.76	-0.5 (-3.8, 2.7) 0.75	-0.08
<b>ICQ Fussy-difficult <sup>b</sup></b>	23 (8.3)	23 (7.9)	26.2 (7.4)	23.9 (6.3)	-1.6 (-5.4, 2.3) 0.42	-1.5 (-6.3, 2.3) 0.54	-0.15

\* Per protocol analysis for ASQ 3 data: n = 90; 40 comparison, 50 intervention; Per protocol analysis for ICQ Fussy-Difficult: n = 125; 58 comparison, 67 intervention; ANCOVA includes baseline score, area of recruitment, treatment status, parity and infant age (at baseline and at follow-up).

ASQ 3 = Ages and Stages 3; ICQ = Infant Characteristics Questionnaire

aspect of the PIN intervention, whilst one-third demonstrated low engagement. We were unable to assess programme reach, as there is no available data on the rates of childbirth at a community level in Ireland; however, the average number of sessions attended for the IYPBP component of the PIN intervention (4.9) was lower than in previous research (6.8) conducted in Wales (Jones, Erjavec, Viktor & Hutchings, 2016). Cultural factors, such as parents' attitudes towards preventative parenting supports, may have influenced these differences.

Notably, at the time of the study, the implementation of the PIN programme was in a very early stage and awareness and understanding of the programme was still being established at a local level. The manner in which these programmes are advertised to new parents are likely to be an important factor in promoting engagement. Findings from an accompanying process evaluation reported elsewhere (Leckey, Hickey, Stokes, & McGilloway, 2019) highlighted feelings of stress, fear and isolation amongst participating parents' in the early stages of parenting. These qualitative reports also emphasised parents' enjoyment of the group process and the importance of collaborative learning in alleviating parenting concerns, promoting a sense of connectedness and

support and strengthening feelings of confidence. Thus, promotional efforts which communicate to parents the potential benefits of group-based supports in building a sense of social support and enhancing confidence, may help to promote parental engagement.

Furthermore, with regard to the IYPBP session, this was delivered in Wales, on a weekly basis and as a shorter intervention (Jones et al., 2016). Thus, the longer duration of the PIN intervention in the current study, may have acted as a barrier to regular attendance. The need for parents in Site 1, to travel to different venues to attend the various components across cycles one and two, may also have undermined attendance in these cycles. Furthermore, infants included in the current study were significantly younger than those recruited by Jones and colleagues (average age in weeks = 12.27) and it is possible that parents of younger infants found it more difficult to participate in the group-based intervention. Thus, early intervention and prevention-oriented supports delivered at the very earliest stages of parenthood, may require particular attention to ease of access. Additional supports for parents (e.g. travel supports) to promote engagement may be needed, whilst the quality of facilities available to parents upon attendance (e.g.

**Table 8**  
Proportion of Parents and Infants using Primary Care and Hospital Services at Follow-up.

	Intervention	Comparison
<b>Mothers</b>		
GP Mean (SD) no. of visits	49.5 1 (1.6)	53.1 1.3 (2.4)
Nurse Mean (SD) no. of visits	7.2 0.19 (0.9)	12.3 0.21 (0.7)
<b>Social work</b>		
Other (e.g. counselling) Mean (SD) no. of visits	1 4.1 0.2 (1.3)	1 3.7 0.2 (9)
Outpatient consultant apt Mean (SD) no of apts	13.4 0.35 (1.3)	8.6 0.2 (0.9)
Accident and Emergency Overnight stay at hospital	3.1 4.1	1.2 0
<b>Infants</b>		
GP Mean (SD) no. of visits	81.4 1.8 (1.4)	84 2.3 (2.8)
Nurse Mean (SD) no. of visits	83.5 1.5 (1.6)	86.4 2.3 (2.8)
<b>Social work</b>		
Other (e.g. physiotherapy) Mean (SD) no. of apts	2.1 7.2 0.16 (0.67)	0 2.5 0.19 (1.37)
Outpatient consultant apt Mean (SD) no. of apts	36.1 1.2 (2.4)	23.5 1.6 (4.2)
Accident and Emergency Overnight stay at hospital	18.6 5.2	22.2 12.3

accessibility of venue with pram, baby changing facilities), should also be considered. Overall, future and ongoing investment in universally available parenting supports requires further exploration of the factors that influence uptake of these kinds of supports amongst parents, in order to support the development of effective family engagement strategies (Gonzalez, Morawska & Haslam, 2018).

Secondary per protocol analyses were conducted to assess the impact of engaging in group-based parent-training in tandem with community-based parenting focused supports. These analyses demonstrated that those who attended the PIN intervention (7 or more session) reported significantly greater parenting self-efficacy than a comparison group who did not receive a parenting programme or PIN intervention supports; these findings, which are in line with previous research (Lindsay & Totsika, 2017; O'Neill et al., 2018), suggest that universally available, group-based supports have the potential to benefit parenting attitudes and sense of competency during early infancy. Self-report measures of parenting efficacy are considered appropriate as the concept is linked to the parents' own belief of their ability to successfully perform the parenting role (Wittkowski, Garrett, Calam & Weisberg, 2017). These kinds of measures have been found to have good predictive validity when – as in the case of the measure used here – they assess specific aspects of parenting. For example, a sense of parenting efficacy has been found to be a strong predictor of parent functioning, as well as a key mechanism for the effectiveness of parenting interventions (Carneiro et al., 2019). Moreover, parents with higher parenting self-efficacy have been found to experience positive mental health and to use more sensitive and responsive parenting behaviours (Gross & Marcussen, 2017). Greater parenting self-efficacy has also been associated with positive socioemotional well-being in children (Wittkowski, Dowling & Smith, 2016). In the absence of any significant changes in self-reported parenting stress, changes in parenting sense of competence may reflect positive changes in the ability of intervention group parents to better cope with parenting challenges and responsibilities when compared to their comparison group counterparts.

At follow-up, parents in the intervention group were also significantly more likely to read regularly to their infants when compared to the comparison group. Previous research has found that the presence of reading in the home when the infant is 8-months old is linked to enhanced later language development (Karrass & Braungart-Rieker,

2005). The findings of the comparative analysis for the per protocol sample also suggest potential benefits of the group-based early parenting intervention in terms of enriching the home environment. Overall, these findings are interesting, but should be interpreted with caution given the lack of any statistically significant differences in the ITT analysis, between parent-focused outcomes in the intervention and the comparison groups. It is possible that changes over time (e.g. increased reading in the home) reflect natural changes in maternal behaviour in response to infant growth and development, but it may also be the case that the larger proportion of first-time parents in the intervention group may have influenced these findings. Indeed, previous research has suggested that first-time parents may benefit more from these types of interventions (Stolk et al., 2008). Nevertheless, despite the higher proportion of first-time mothers in the intervention group, there were no baseline differences between the groups on any of the parent or child outcome measures.

The PIN intervention may also have had potentially beneficial effects on service utilisation patterns, with infants in the intervention group attending GP and nursing services less frequently than those in the comparison group. These findings reflect those of a small number of previous studies which demonstrate the effectiveness of parent-training in reducing child use of primary care services (Bywater et al., 2009; McGilloway et al., 2014). Reductions in service utilisation may be linked with improved parenting self-efficacy in the intervention group and could point to potential cost-savings. Thus, integrating early parenting supports within a coordinated and multidisciplinary system of services may be beneficial in terms of promoting more cost-efficient engagement with primary care health services and, at the same time, priming parents' engagement with community-based parenting supports. In a context of increasing public investment in universal parenting support services, it is vital that these kinds of services represent value for money. Thus, these findings can help to inform policy and practice decisions relating to preventative supports for families during the transition to parenthood. Nevertheless, there were no differences in respect of parents' own service utilisation and infant's use of hospital or casualty services. Further analysis of trends in service utilisation and parental engagement with community-based services and supports over time will be conducted at later follow-ups and will help to shed light on the cost-effectiveness of the PIN intervention.

Parent reports in the current study indicate that, on average, their infants appear to be developing on schedule. Parent-reported infant scores in the area of communication, fine-motor skills, problem solving and personal-social development show gains over time for both groups. However, in line with previous research (Bayer, Hiscock, Ukoumunne, Scalzo & Wake, 2010; Hurt et al., 2018), there was no impact of the intervention on child developmental outcomes. On average, infants in the comparison group fared significantly better than their counterparts in the intervention group on measures of cognitive development (communication and problem-solving domains), as well as on the ASQ 3 fine-motor development subscale. Although the ANCOVA analysis adjusted for child age, it is notable that infants in the comparison group were, on average, older than those in the intervention group. Infancy is a period of rapid behavioural change and development may occur in leaps; thus, small differences in age may make a considerable difference to developmental abilities and, therefore, influence infant outcomes at follow-up. Indeed, the sensitivity analysis conducted on change scores, showed no between group differences on measures of child development, suggesting that baseline differences may have influenced these findings. The per protocol analysis also did not demonstrate significant differences in child outcomes between the intervention and comparison groups. Importantly, the preventative impacts of early intervention on child development and behaviour may require a longer time period to emerge. Indeed, there is some evidence to suggest that preventative parenting interventions may have 'sleepier effects', whereby changes in child outcomes only appear after longer term exposure to positive changes in parenting behaviours (Deković et al., 2010; van Aar, Lejten,

de Castro, & Overbeek, 2017). Analyses of later follow-up data - when infants are 16 and 24 months old - should provide important further insights into the impact of the PIN intervention on child outcomes.

#### 4.1. Study strengths and comparison with other research

Previous research has reported high levels of satisfaction with group-based interventions amongst parents of young infants (Ferrari, Whittingham, Boyd, Sanders & Colditz, 2011). However, very few studies, to date, have explored the effectiveness of group-based early parenting interventions for parents and their very young infants. The current study is also one of a very small number to explore the effectiveness of the IYPBP, albeit within the context of an expanded intervention programme. Two previous studies to explore this IYPBP were conducted in Wales (Evans, Davies, Williams & Hutchings, 2015; Jones et al., 2016) and, as in the current study, indicated potential benefits of the programme for parent confidence and the home environment. However, the first of these studies was conducted without an intervention group (Evans et al., 2015), whilst the other involved a relatively small sample (N = 63; Jones et al., 2016).

A further randomised trial with a universal sample of parents (n = 112) of the IYPBP was conducted in Denmark (Pontoppidan et al., 2016). Notably, this study, which evaluated the IYPBP as a standalone intervention, did not find any benefits of intervention on parenting confidence or stress, whilst also reporting poorer outcomes for more 'at risk' parents in the sample. We have also reported detailed data on participants' engagement with primary care and hospital services. Thus, the current research makes an important contribution in terms of addressing a significant knowledge gap and provides insights into the potential utility, as well as highlighting the potential relevance and acceptability, of an adapted group-based intervention as a universal intervention for parents in the earliest stages of parenthood.

This study was conducted within naturalistic, community-based settings and matched health-centres were identified in order to recruit intervention and comparison groups which were equivalent in respect of socioeconomic status. In comparison to previous research examining the effectiveness of group-based parenting programmes (Hutchings et al., 2007; McGiloway et al., 2014), participants in this study were, on average, at low risk; the PIN intervention was offered to parents on a universal basis and parents who were included in the research were not screened for risks prior to inclusion in the research. This, in turn, contributed to the heterogeneity of the mothers who participated in the study, including a mix of lone and partnered parents, first-time and multiparous mothers and disadvantaged and non-disadvantaged families. Thus, this trial provides useful data on the real-world effectiveness of group-based parenting programmes as a primary prevention strategy in the earliest years for all new parents. Parent-reports were also supplemented with observational data, whilst a comprehensive data audit was conducted to ensure data quality. A power calculation was conducted to ensure adequate statistical power and study attrition was very low; those who were lost to follow up did not differ systematically from those who were retained in the study.

#### 4.2. Study limitations

The participants in this study were all self-referred and there were also differences between the intervention and comparison groups in respect of parity and infant age at baseline, despite the identification of matched health centres for the recruitment of the comparison group and vigorous efforts by the research team to the contrary. Service providers were actively encouraged during recruitment to try to ensure balanced groups in both respects, but this was not possible due to: (1) the requirement to deliver the programme to a tight schedule and to a specified number of mothers; and (2) difficulties in recruiting the required number of parent-infant dyads within the available time frame for inclusion in the comparison group. Informal feedback from service

providers further indicated that PHNs were more comfortable recruiting parents of younger infants to take part in the research when, at the same time, they were being offered the PIN intervention, as opposed to usual services in the comparison group. The between group differences may have biased outcomes and compromised to some extent, the generalisability of the findings. Other limitations include potential "contamination effects" caused by participants' use of other parent and infant focused services. A significant proportion of comparison group parents, in particular, accessed some aspect of the PIN intervention. However, per protocol analyses were conducted and these kinds of challenges are typical of this type of community-based research.

Practical constraints, including recruitment capacity and ethical concerns expressed by participating sites, precluded the possibility of conducting a randomised controlled trial. As a consequence of the study design and schedules of intervention delivery, researchers could not be blind to participant allocation. The ASQ 3 2-month was used at baseline and the ASQ 3 8-month questionnaire at the follow-up data collection time point; thus, analysis on measures of child development was limited to a subsample of infants who were within the respective age ranges for these questionnaires. We were also obliged to follow directions from our Ethics Committee regarding legislative changes in Ireland which were implemented during the study and which banned the use of slapping; this meant that items on the HOME-SF relating to the use of physical punishment had to be removed from the scale, thereby potentially impacting the measure's validity.

Only mothers participated in the study; paternity leave in Ireland is currently only two weeks and work commitments posed a significant barrier to fathers participating in the intervention. Data from fathers and/or other significant carers would be useful in gaining a more in-depth understanding of parenting in the early years, as well as infant well-being and development. To ensure minimal participant burden, we were unable to collect detailed information on, or control for, other factors which may also influence parenting and child development, such as parents' own childhood experiences of attachment styles or the social network / broader supports available to families included in the study.

Although a number of procedures were put in place to support the quality of intervention delivery, particularly for the IY component, the intervention also included non-standardised components (e.g. weaning workshops) which could not be monitored for fidelity. Facilitator self-reported fidelity to treatment for the IY component of the PIN programme was high; however, treatment adherence or assessment of the quality of other aspects of programme delivery were not independently assessed.

## 5. Conclusion

Early infancy is a critical period of development and both parenting competency and the quality of parent-infant interactions are crucial protective factors in the lives of young infants (Lorber & Egeland, 2011). Universally available parenting supports which aim to address parenting concerns and strengthen parenting competence, are a public health priority. The early findings reported here, point to the utility and potential benefits of a complex, group-based early parenting programme in terms of strengthening the environment and reading in the home, as well as building parenting self-efficacy. Satisfaction with the intervention was also very high while parents in the intervention group had greater contact with community-based parenting supports and their infants attended GP and PHN services on fewer occasions than their comparison group counterparts. Participants in the current trial were, on average, considered to be low risk; thus, this research is one of few studies exploring the potential utility of group-based parenting programmes as a universally available primary prevention strategy for parents of very young infants. These findings, however, represent only the first follow-up phase of an ongoing and longer-term intervention and evaluation. Detecting preventative outcomes may require a longer

time frame and further data analyses with parents and infants at 16- and 24-months of age is currently underway. Further analyses will also be conducted to explore the factors which impact parent engagement with the preventative intervention, as well as parent and child outcomes over time. In particular, the potential moderating effects of risk factors, such as baseline levels of parental depression and socio-economic disadvantage, and their impact on later outcomes, will be examined.

Perhaps unsurprisingly - and in line with previous research (e.g. Baydar et al. 2003) - the per protocol analyses suggest that those who engaged more effectively with the PIN intervention, derived the most benefit. This highlights the importance of addressing barriers to engagement in the provision of early parenting supports. Indeed, low rates of parental participation can negatively impact the effectiveness of preventative parenting interventions (Cullen et al., 2016). Thus, building an understanding of what works for parents during this important life stage, in terms of the processes or programme components which influence the implementation and effectiveness of early parenting, is vital to ensure that parents receive appropriate, effective and cost-effective supports (Finan, Swierzbiolek, Priest, Warren & Yap, 2018). These findings are playing an important role in informing further development of the PIN intervention, whilst additional research is also underway to explore the experiences of parents and service providers involved in programme delivery, as well as barriers to, and facilitators of, programme implementation. The costs of programme delivery and potential cost-benefits will also be investigated as part of a separate economic evaluation. This research provides vital information to practitioners and policy makers who seek to embed, and promote the use of, early parenting supports within usual care settings.

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#### Ethical approval

Ethical approval for this study was obtained from Maynooth University Social Research Ethics Sub-Committee and the Health Service Executive (HSE) North East Area Research Ethics Committee.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.childyouth.2020.105458>.

#### References

Bates, J. E., Bennett Freeland, C. A., & Lounsbury, M. L. (1979). Measurement of infant difficultness. *Child Development*, *50*, 794–803.

Baydar, N., Reid, M. J., & Webster-Stratton, C. (2003). The role of mental health factors

and programme engagement in the effectiveness of a preventive parenting programme for Head Start mothers. *Child Development*, *74*, 1433–1453.

Bayer, J. K., Hiscock, H., Ukoumunne, O. C., Scalzo, K., & Wake, M. (2010). Three-year-old outcomes of a brief universal parenting intervention to prevent behaviour problems: Randomised controlled trial. *Archives of Disease in Childhood*, *95*, 187–192.

Beecham, J., & Knap, M. (1992). Costing psychiatric interventions. In G. Thornicroft, C. Brewin, & J. Wing (Eds.). *Measuring mental health needs* (pp. 179–190). London: Gaskell.

Belsky, J., & Beaver, K. M. (2011). Cumulative-genetic plasticity, parenting and adolescent self-regulation. *Journal of Child Psychology and Psychiatry*, *52*, 619–626.

Bricker, D., & Squires, J. (1999). *Ages and Stages Questionnaires: A Parent-Completed, Child-Monitoring System*. Baltimore, MD: Paul H. Brookes Publishing Company.

Britto, P. R., Lyles, S., & Proulx, K. [...] & Early Childhood Development Interventions Review Group, for the Lancet Early Childhood Development Series Steering Committee (2017). Nurturing care: Promoting early childhood development. *The Lancet*, *31390*-3.

Bywater, T., Hutchings, J., Daley, D., Whitaker, C., Yeo, S. T., Jones, K., ... Edwards, R. T. (2009). Long-term effectiveness of a parenting intervention for children at risk of developing conduct disorder. *The British Journal of Psychiatry*, *195*, 318–324.

Caldwell, B. M., & Bradley, R. H. (2003). *Home Observation for Measurement of the Environment: Administration Manual*. Tempe, AZ: Family & Human Dynamics Research Institute, Arizona State University.

Carneiro, P. M., Galasso, E., Lopez Garcia, I. X., Bedregal, P., & Cordero, M. (2019). Parental beliefs, investments, and child development: Evidence from a large-scale experiment. World Bank Policy Research Working Paper, (8743).

Central Statistics Office [CSO] (2016). SIA12: Income and Poverty Rates by Sex, Year and Statistic. <http://www.cso.ie/px/pxeirestat/statire/SelectVarVal/saveselections.asp>.

Chan, M., Lake, A., & Hansen, K. (2017). The early years: Silent emergency or unique opportunity? *The Lancet*, *389*, 11–13.

Chislett, G., & Kennett, D. J. (2007). The effects of the Nobody's Perfect programme on parenting resourcefulness and competency. *Journal of Child and Family Studies*, *16*, 473–482.

Cohen, J. (1988). *Statistical Power for the Behavioural Sciences*. Hillsdale, NJ: Erlbaum.

Condon, J. T., & Corkindale, C. J. (1998). The assessment of parent-to-infant attachment: Development of a self-report questionnaire instrument. *Journal of Reproductive and Infant Psychology*, *16*, 57–76.

Cullen, S. M., Cullen, M. A., & Lindsay, G. (2016). Universal Parenting Programme Provision in England; Barriers to Parent Engagement in the CAN parent Trial, 2012–2014. *Children & Society*, *30*, 71–81.

Deković, M., Asscher, J. J., Hermanns, J., Reitz, E., Prinzie, P., & Van Den Akker, A. L. (2010). Tracing changes in families who participated in the home-start parenting programme: Parental sense of competence as mechanism of change. *Prevention Science*, *11*, 263–274.

Department of Children and Youth Affairs [DCYA] (2013). Area-based Childhood Programme 2013-2017. Retrieved from [https://www.dcy.gov.ie/viewdoc.asp?fn=%2Fdocuments%2FNational\\_Childrens\\_Advisory\\_Council\\_.htm&mn=betq&nID=3&mn=aree&nID=1](https://www.dcy.gov.ie/viewdoc.asp?fn=%2Fdocuments%2FNational_Childrens_Advisory_Council_.htm&mn=betq&nID=3&mn=aree&nID=1).

Doyle, O., Delaney, L., O'Farrelly, C., Fitzpatrick, N., & Daly, M. (2017). Can early intervention improve maternal well-being? Evidence from a randomized controlled trial. *PLoS One*, *12*, Article e0169829.

Doyle, O., Hegarty, M., & Owens, C. (2018). Population-based system of parenting support to reduce the prevalence of child social, emotional, and behavioural problems: Difference-in-differences study. *Prevention Science*, 1–10.

Evans, S., Davies, S., Williams, M., & Hutchings, J. (2015). Short-term benefits from the Incredible Years parents and babies programme in Powys. *Community Practitioner*, *88*, 46–48.

Ferrari, A. J., Whittingham, K., Boyd, R., Sanders, M., & Colditz, P. (2011). Prem Baby Triple P a new parenting intervention for parents of infants born very preterm: Acceptability and barriers. *Infant Behaviour and Development*, *34*, 602–609.

Feinberg, M. E., & Kan, M. L. (2008). Establishing family foundations: Intervention effects on coparenting, parent/infant well-being, and parent-child relations. *Journal of Family Psychology*, *22*, 253–263.

Feinberg, M. E., Jones, D. E., Kan, M. L., & Goslin, M. C. (2010). Effects of family foundations on parents and children: 3.5 years after baseline. *Journal of Family Psychology*, *24*, 532–542.

Finan, S. J., Swierzbiolek, B., Priest, N., Warren, N., & Yap, M. (2018). Parental engagement in preventive parenting programmes for child mental health: A systematic review of predictors and strategies to increase engagement. *PeerJ*, *6*, Article e4676.

Furlong, M., McGilloway, S., Bywater, T., Hutchings, J., Smith, S. M., & Donnelly, M. (2013). Cochrane review: Behavioural and cognitive-behavioural group-based parenting programmes for early-onset conduct problems in children aged 3 to 12 years. *Evidence-Based Child Health: A Cochrane Review Journal*, *8*, 318–692.

Furlong, M., & McGilloway, S. (2015). Barriers and facilitators to implementing evidence-based parenting programs in disadvantaged settings: A qualitative study. *Journal of Child and Family Studies*, *24*, 1809–1818.

Gardner, F., Leijten, P., Mann, J., Landau, S., Harris, V., Beecham, J., ... Scott, S. (2017). Could scale-up of parenting programmes improve child disruptive behaviour and reduce social inequalities? Using individual participant data meta-analysis to establish for whom programmes are effective and cost-effective. *Public Health Research*, *5*. <https://doi.org/10.3310/phr05100> ISSN 2050–4381.

Gonzalez, C., Morawska, A., & Haslam, D. M. (2018). Enhancing initial parental engagement in interventions for parents of young children: A systematic review of experimental studies. *Clinical Child and Family Psychology Review*, 1–18.

Gross, C. L., & Marcussen, K. (2017). Postpartum depression in mothers and fathers: The role of parenting efficacy expectations during the transition to parenthood. *Sex Roles*, *76*, 290–305.

- Haase, T., & McKeown, K. (2003). Developing Disadvantaged Areas through Area-based Initiatives: Reflections on over a Decade of Local Development Strategies. Dublin: Area Development Management. [www.lenus.ie/hse/bitstream/10147/287311/1/DevelDisadvantAreas.pdf](http://www.lenus.ie/hse/bitstream/10147/287311/1/DevelDisadvantAreas.pdf). Accessed 31 Jan 2017.
- Heckman, J. J., & Karapakula, G. (2019). Intergenerational and intragenerational externalities of the Perry Preschool Project (No. w25889). National Bureau of Economic Research.
- Heinrichs, N. (2006). The effects of two different incentives on recruitment rates of families into a prevention programme. *Journal of Primary Prevention*, 27, 345–365.
- Hickey, G., McGilloway, S., Leckey, Y., & Stokes, A. (2018). A Universal Early Parenting Education Intervention in Community-Based Primary Care Settings: Development and Installation Challenges. *Education Sciences*, 8. <https://doi.org/10.3390/educsci8040178>.
- Hurt, L., Paranjothy, S., Lucas, P. J., Watson, D., Mann, M., Griffiths, L. J., ... Lingam, R. (2018). Interventions that enhance health services for parents and infants to improve child development and social and emotional well-being in high income countries: A systematic review. *British Medical Journal Open*, 8, Article e014899. <https://doi.org/10.1136/bmjopen-2016-014899>.
- Hutchings, J., Bywater, T., Daley, D., Gardner, F., Whitaker, C., Jones, K., ... Edwards, R. T. (2007). Parenting intervention in Sure Start services for children at risk of developing conduct disorder: Pragmatic randomised controlled trial. *British Medical Journal*, 334, 678.
- Ingoldsby, E. M. (2010). Review of interventions to improve family engagement and retention in parent and child mental health programmes. *Journal of Child and Family Studies*, 19, 629–645.
- Johnston, C., & Mash, E. J. (1989). A measure of parenting satisfaction and efficacy. *Journal of Clinical Child Psychology*, 18, 167–175.
- Jones, C. H., Erjavec, M., Viktor, S., & Hutchings, J. (2016). Outcomes of a comparison study into a group-based infant parenting programme. *Journal of Child and Family Studies*, 25, 3309–3321.
- Karrass, J., & Braungart-Rieker, J. M. (2005). Effects of shared parent–infant book reading on early language acquisition. *Journal of Applied Developmental Psychology*, 26, 133–148.
- King, K. L., Priddis, L. E., & Kane, R. T. (2015). Enhancing maternal sensitivity and emotional wellbeing through a preventative parent-child relationship intervention in a community-setting. *Journal of Child and Family Studies*, 24, 1582–1592.
- Leijten, P., Raaijmakers, M. A., Orobio de Castro, B., van den Ban, E., & Matthys, W. (2017). Effectiveness of the Incredible Years parenting program for families with socioeconomically disadvantaged and ethnic minority backgrounds. *Journal of Clinical Child & Adolescent Psychology*, 46, 59–73.
- Leckey, Y., Hickey, G., Stokes, A., & McGilloway, S. (2019). Parent and facilitator experiences of an intensive parent and infant programme delivered in routine community settings. *Primary Health Care Research and Development*, 19, 20–27.
- Leijten, P., Gardner, F., Landau, S., Harris, V., Mann, J., Hutchings, J., ... Scott, S. (2018). Research Review: Harnessing the power of individual participant data in a meta-analysis of the benefits and harms of the Incredible Years parenting programme. *Journal of Child Psychology and Psychiatry*, 59, 99–109.
- Lindsay, G., & Totsika, V. (2017). The effectiveness of universal parenting programmes: The CANparent trial. *BMC Psychology*, 5, 35.
- Lorber, M. F., & Egeland, B. (2011). Parenting and infant difficulty. *Child Development*, 82, 2006–2020.
- Machel, G. (2017). Good early development—the right of every child. *The Lancet*, 389, 13–14.
- Malmberg, J. L., & Field, C. E. (2013). Preventative behavioural parent training: A preliminary investigation of strategies for preventing at-risk children from developing later conduct problems. *Child & Family Behaviour Therapy*, 35, 212–227.
- McGilloway, S., Ni Mhaille, G., Bywater, T., Furlong, M., Leckey, Y., Kelly, P., Comiskey, C., & Donnelly, M. (2012). A parenting intervention for childhood behavioural problems: A randomized controlled trial in disadvantaged community-based settings. *Journal of Consulting & Clinical Psychology*, 80, 116–127.
- McGilloway, S., Ni Mhaille, G., Bywater, T., Leckey, Y., Kelly, P., Furlong, M., ... Donnelly, M. (2014). Reducing child conduct disordered behaviour and improving parent mental health in disadvantaged families: A 12-month follow-up and cost analysis of a parenting intervention. *European child & adolescent psychiatry*, 23, 783–794.
- McGilloway, S., NiMhaille, G., Bywater, T., Furlong, M., Leckey, Y., Kelly, P., ... Donnelly, M. (2012). A parenting intervention for childhood behavioral problems: a randomized controlled trial in disadvantaged community-based settings. *Journal of Consulting and Clinical Psychology*, 80, 116–127.
- McGilloway, S., NiMhaille, G., Bywater, T., Leckey, Y., Kelly, P., Furlong, M., & Donnelly, M. (2014). Reducing child conduct disordered behaviour and improving parent mental health in disadvantaged families: a 12-month follow-up and cost analysis of a parenting intervention. *European Child & Adolescent Psychiatry*, 23, 783–794.
- Metzler, M., Merrick, M. T., Klevens, J., Ports, K. A., & Ford, D. C. (2017). Adverse childhood experiences and life opportunities: Shifting the narrative. *Children and Youth Services Review*, 72, 141–149.
- National Institute for Clinical Excellence. (2006). Parent training/education programmes in the management of children with conduct disorders. A health technology appraisal. <https://www.nice.org.uk/guidance/ta102>.
- Niccols, A. (2008). 'Right from the Start': Randomized trial comparing an attachment group intervention to supportive home visiting. *Journal of Child Psychology and Psychiatry*, 49, 754–764.
- Nixon, E., Swords, L., & Murray, A. (2013). *Growing up in Ireland*. National Longitudinal Study of Children: Parenting and Infant Development <http://www.esri.ie/pubs/BKMNEXT244.pdf>.
- O'Neill, A., Swigger, K., & Kuhlmeier, V. (2018). 'Make the Connection' parenting skills programme: A controlled trial of associated improvement in maternal attitudes. *Journal of Reproductive and Infant Psychology*, 36, 536–547.
- Peckins, M. K., Roberts, A. G., Hein, T. C., Hyde, L. W., Mitchell, C., Brooks-Gunn, J., ... Lopez-Duran, N. L. (2020). Violence exposure and social deprivation is associated with cortisol reactivity in urban adolescents. *Psychoneuroendocrinology*, 111, 104426.
- Pontoppidan, M., Klest, S. K., & Sandoy, T. M. (2016). The Incredible Years Parents and Babies Programme: A pilot randomized controlled trial. *PLoS one*, 11, Article e0167592.
- Reyno, S. M., & McGrath, P. J. (2006). Predictors of parent training efficacy for child externalizing behaviour problems – A meta-analytic review. *Journal of Child Psychology and Psychiatry*, 47, 99–111.
- Saxbe, D., Rossin-Slater, M., & Goldenberg, D. (2018). The transition to parenthood as a critical window for adult health. *American Psychologist*, 73, 1190.
- Spitzer, R. L., Kroenke, K., & Williams, J. B. W. (1999). Patient Health Questionnaire Study Group. Validity and utility of a self-report version of PRIME-MD: The PHQ Primary Care Study. *Journal of the American Medical Association*, 282, 1737–1744.
- Stolk, M. N., Mesman, J., van Zeijl, J., Alink, L. R., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., ... Koot, H. M. (2008). Early parenting intervention: Family risk and first-time parenting related to intervention effectiveness. *Journal of Child and Family Studies*, 17, 55.
- Thornton, M., Williams, J., McCrory, C., Murray, A., & Quail, A. (2013). Growing up in Ireland. National Longitudinal Study of Children: Design, Instrumentation and Procedures for the Infant Cohort at Wave 1. <https://www.esri.ie/pubs/BKMNEXT252.pdf>.
- Totsika, V., & Sylva, K. (2004). The Home Observation for Measurement of the Environment revisited. *Child & Adolescent Mental Health Journal*, 9, 25–35.
- Trentacosta, C. J., Hyde, L. W., Shaw, D. S., Dishion, T. J., Gardner, F., & Wilson, M. (2008). The relations among cumulative risk, parenting, and behaviour problems during early childhood. *Journal of Child Psychology and Psychiatry*, 49, 1211–1219. <https://doi.org/10.1111/j.1469-7610.2008.01941.x>.
- Twist, E., McDonnell, S., & Kennedy, L. (2012). The Incredible Years Parent and Babies Programme: A pilot study in west Dublin. Considerations for future implementation & social policy. *Irish Review of Community Economic Development Law & Policy*, 1, 43–62.
- van Aar, J., Leijten, P., de Castro, B. O., & Overbeek, G. (2017). Sustained, fade-out or sleeper effects? A systematic review and meta-analysis of parenting interventions for disruptive child behavior. *Clinical Psychology Review*, 51, 153–163.
- Van Breukelen, G. J. (2006). ANCOVA versus change from baseline had more power in randomized studies and more bias in nonrandomized studies. *Journal of Clinical Epidemiology*, 59, 920–925.
- van Zeijl, J., Mesman, J., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Juffer, F., Stolk, M. N., Koot, H. M., & Alink, L. R. A. (2006). Attachment-based intervention for enhancing sensitive discipline in mothers of 1- to 3-year-old children at risk for externalizing behaviour problems: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 74, 994–1005.
- Vickers, A. J., & Altman, D. G. (2001). Analysing controlled trials with baseline and follow up measurements. *British Medical Journal*, 323, 1123–1124.
- Webster-Stratton, C., & Reid, M. J. (2008). *The Incredible Years Parents, Teachers and Children training series: A multifaceted treatment approach for young children with conduct problems*. In J. Weisz, & A. Kazdin (Eds.). *Evidence-based psychotherapies for children and adolescents* (pp. 194–210). (2nd edition). New York: Guilford Publications.
- WHO (2018). *Nurturing Care for Early Childhood Development: A Framework for Helping Children Survive and Thrive to Transform Health and Human Potential*. Geneva: World Health Organization. <http://apps.who.int/iris/bitstream/handle/10665/272603/9789241514064-eng.pdf?ua=1>.
- Wittkowski, A., Dowling, H., & Smith, D. M. (2016). Does engaging in a group-based intervention increase parental self-efficacy in parents of preschool children? A systematic review of the current literature. *Journal of child and family studies*, 25, 3173–3191.
- Wittkowski, A., Garrett, C., Calam, R., & Weisberg, D. (2017). Self-report measures of parental self-efficacy: A systematic review of the current literature. *Journal of Child and Family Studies*, 26, 2960–2978.
- Yawn, B. P., Pace, W., Wollan, P. C., Bertram, S., Kurland, M., Graham, D., & Dietrich, A. (2009). Concordance of Edinburgh Postnatal Depression Scale (EPDS) and Patient Health Questionnaire (PHQ-9) to assess increased risk of depression among postpartum women. *Journal of the American Board of Family Medicine*, 22, 483–484.
- Zajicek-Farber, M. L., Mayer, L. M., Daugherty, L. G., & Rodkey, E. (2014). The buffering effect of childhood routines: Longitudinal connections between early parenting and prekindergarten learning readiness of children in low-income families. *Journal of Social Service Research*, 40, 699–720.