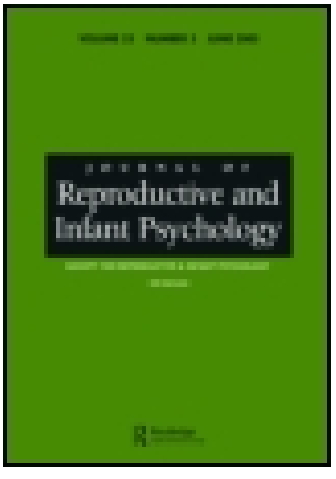

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The Parent Infant Play Observation code (PIPOc): development and testing of a new positive parenting measure

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The Parent Infant Play Observation code (PIPOc): development and testing of a new positive parenting measure

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Objective: To develop a new observational code of parents playing with their infant in the first 18 months. **Background:** There is a lack of observational codes to analyse early interactions between parents and infants. We developed and tested this measure – the Parent Infant Play Observation code (PIPOc) – to be developmentally appropriate for infants, brief and easy to code after training, reliable and potentially suitable for clinical and research use. **Method:** The PIPOc was developed for use in a repeated measures trial of a new parenting programme. Mothers were filmed at home playing with their infant for 10 minutes with a six-month follow-up visit. The author also collected IT-HOME inventory data at the homes. A coding manual was developed to train an independent coder. **Results:** Six positive parenting behaviours were coded (Talk, Play, Touch, Move, Mind and Respond) with excellent to very good inter-rater reliability between the author and independent coder. Principal component analysis of the coded behaviours resulted in a three-component model termed -positive physical encouragement, sensitive parenting and verbal engegement components. A further analysis for the scores at follow-up resulted in the same component solution. Concurrent validity of the three components with subscale scores from the IT-HOME inventory subscales is reported. **Conclusions:** The PIPOc shows promising psychometric properties which are robust and reliable over six months. More extensive use of the PIPOc observation scores comparing intervention and control parents' scores on the observation components will further test the code's sensitivity to change over time.

Keywords: positive parenting; infant; development; observation; measure

Introduction

The role of early parenting

Parents are the primary source of influence on their child's development and the quality of parental interaction with infants in their first months of life can affect the development of secure attachments and future relationships (Ainsworth, 1985; Bowlby, 1969/1997; Meins, Fernyhough, Russell, & Clark-Carter, 1998; Rutter, Giller, & Hagell, 1998). Longitudinal studies have shown that parents observed demonstrating positive parenting with their toddler reported lower levels of externalising behaviours when their children were older (Boeldt et al., 2011). Targeted support for parents in the first two years can have significant long-term benefits for both the parent and child (Kitzman et al., 2001). A study in Jamaica comparing the

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benefits for stunted children (aged 9 to 24 months) of nutritional supplementation with psychosocial stimulation showed that those who received stimulation had less self-reported violence, fewer incidents of depression and social inhibition and improved IQ and educational achievement at 22 years of age, whereas nutritional supplementation had no long-term effect (Walker, Chang, Vera-Hernández, & Grantham-McGregor, 2011).

A recent UK government-commissioned report on early intervention stated that 'what parents do is more important than who they are' (Allen, 2011, p. xiv). The report emphasised the importance of support for families at disadvantage at an early age before behavioural and social problems become entrenched and more expensive to tackle. Children classified as securely attached in the first 12 to 18 months develop better peer relationships at pre-school (Sroufre, Fox, & Pankake, 1983) and achieve better academic outcomes (Pearson et al., 2011).

The increased emphasis on investing support for families before children enter school has increased the need for assessment tools that support and encourage positive parenting. Identifying the positive parental behaviours that promote healthy child development is challenging as many of the current observational codes have been designed for parents' interactions with older children. This article describes the development of a new observational code to analyse the behaviour of mothers playing with their baby in the first 18 months. The six predetermined positive parenting behaviours are analysed using video recordings from the home. Practitioners can be trained to use the code and a manual facilitates future researchers and clinicians to evaluate parent behaviour with their infant in a natural environment and with minimal disturbance to the family.

Parenting measures

Observations

Observational methods that evaluate parent–child interactions are considered to be the 'gold standard' for analysing the behaviours between parent and child (Cummings, Davies, & Campbell, 2000) and are especially useful in tracking changes of targeted behaviours over time (Kazdin, Esvelot-Dawson, & Loar, 1983). However, many of the existing codes are targeted at analysing parental interactions with older children and include many categories related to child deviance that are not appropriate for the assessment of early parent–child interactions (DPICS, see Robinson & Eyberg, 1981; P-CERA, see Clark, 1985; Mellow Parenting coding system, see Mills & Puckering, 2001). Other established codes involve extensive training of new coders to achieve reliability (e.g., CARE Index, Crittenden, 2001).

Wahler and Leske (1973) showed that, even with relatively highly qualified raters, rating scales to assess behaviour were more reliable when accompanied by frequency coding of behaviours. However, despite this finding, a recent review of 46 measures used to evaluate caregiver–child interactions with children less than three years of age reported that the majority of the measures required coders to allocate macro-analytic global ratings after a period of observation (Halle, Anderson, Blasberg, Chrisier, & Simkin, 2011).

The new code reported in this article requires the researcher to analyse parenting behaviour within each 10-second interval using partial time sampling methodology. This reduces the risk of bias by selecting the most recent behaviour after a long period of observation. Research comparing partial time with momentary time sampling

concluded that partial time sampling was more sensitive to detecting change in behaviour (Harrop & Daniels, 1986) and gave the best estimate of the frequency of responses (Meany-Daboul, Roscoe, Bourret, & Ahearn, 2007). Further information on selecting observation measurement systems are available in Fiske and Delmilino (2012). The new code will enable researchers to detect subtle changes in parenting behaviour by analysing videos taken in the home environment.

Video analysis of behaviour

Some observational codes require parents and infants to attend a laboratory to be filmed. This method may lack ecological validity as parents and infants are filmed in unfamiliar environments and the parents may not exhibit behaviours that are relevant to the infants' daily experiences. Recording interactions in the home environment involves less travel and time commitment from busy mothers caring for a young family. Coders using recordings can also focus on the target behaviours when observations are analysed away from the home and inter-rater reliability can be monitored using video data.

The period of filming in the home is an important consideration. One study compared the results of observational data collected using five-minute recordings and live observations collected every week for a year; the study concluded that five-minute recordings were sufficient to account for the mothers' interaction style with their infants (Kemppinen et al., 2005). This article reports analysis based on 10-minute recordings of mothers playing with their babies.

The Parent Infant Play Observation code (PIPOc)

We wanted to develop an observational measure that could be adapted for clinical and research observations. The observations were recorded in the participants' homes with minimal equipment (a timer and tripod-mounted video camera); this enabled the parents to be observed in a naturalistic environment.

The PIPOc is not intended to be an exhaustive list of maternal behaviours; therefore, caretaking behaviours such as nappy changing, bathing or feeding that are unlikely to occur during play observations were not coded. A brief behaviour description and reasons for adopting or rejecting target behaviours from the final version of the PIPOc are listed in Appendices A and B. Our main aim in developing the code was to evaluate whether parents' positive behaviour changed after attending an eight-week group-based Incredible Years Parent and Baby programme (Jones, 2013; Jones, Hutchings, Erjavec, & Hughes, 2012; Webster-Stratton, 2008). The parenting programme encourages positive parenting behaviour such as sensitive engagement and stimulation of their babies.

The behaviours of interest were informed by the existing developmental literature, the parenting programme contents and positive parenting behaviours such as parental warmth, engagement and stimulation of their babies' early development and were coded according to a pre-populated list within a manual developed for the code (Jones, 2013). Affectionate *touch* is the most basic form of interaction and a study with premature babies videotaped with their mothers for 10 minutes showed a negative association between maternal touch and maternal depression (Keren, Feldman, Eidelmean, Sirota, & Lester, 2003). Schore (2001) also emphasised the importance of positive affect on the development of the postnatal brain

maturation. Infants who are encouraged to *move* and explore their environment show increased rates of language acquisition with potential benefits for encouraging communication skills (Iverson, 2010).

Parents who *talk* more with their 9-month-old babies had children who showed better language skills when assessed at 12 and 18 months of age (Rollins, 2003). Mothers who produced more *mind*-related comments about their 6-month old infants' internal mental states at play tended to have infants who were classified as securely attached at 12 months using the Ainsworth Strange Situation Procedure (Meins, Fernyhough, Fradley, & Tuckey, 2001), encouraged their child's social and emotional development (Meins et al., 1998) and enhanced theory of mind acquisition in pre-school years (Symons & Clark, 2000).

Parental *response* to their infant encourages the infant to develop an appreciation of their autonomy and ability to have an impact within their immediate environment. Infants as young as two and three months of age will attempt to attract the attention of an unresponsive mother (Tronick & Cohn, 1989). Receiving acknowledgement for actions is rewarding and facilitates cohesive family systems (MacDonald, 1992).

Play encourages parents to interact in close proximity with their infants and can help the infants to learn about their environment. Play has also been linked to better infant language acquisition (Newland, Roggman, & Boyce, 2001) and development of social regulation skills. Poor social regulation skills have been shown to increase levels of conduct disorders later in life (Panskepp, 2007).

Method

Participants

The PIPOc was developed for use in a repeated measures trial of a new parenting programme (Webster-Stratton, 2008), which received ethical approval from the School of Psychology at Bangor University and the Ethics Committee North Wales Health Trust (10/WNo01/40). All of the home visits were arranged and completed by the first author (the researcher).

This article reports on data from 79 mothers filmed for 10 minutes playing with their infants (mean chronological age [weeks] = 12.50, range = 3 to 29 weeks) at baseline and 63 who agreed to a six-month follow-up data collection visit. Just over half of the infants were male (52%). Health visitors invited primary carers to take part in the study. In all cases the participants were the biological mothers of the infants with a mean age at baseline of 26.9 years (range = 17 to 44 years).

Materials and procedure

Parents were asked to minimise any distraction by switching off the television as it can affect infants' ability to focus during play (Setiff & Courage, 2011). If the infants were tired or hungry, the researcher arranged to return at a convenient time later on the same day.

A video camera was placed on a tripod to record both mother and infant and to be as unobtrusive as possible; the researcher remained in the room to ensure the dyads were within camera shot. Each mother was instructed to play with their infants for five minutes with no toys and this was immediately followed by the researcher introducing the same age-appropriate toy to each mother for the final

Table 1. Distribution data on baseline PIPOc target behaviours and IT-HOME subscales (N = 79).

Target Behaviour	Mean	SD	Range
Touch	25.8	9.9	6–46
Move	15.3	8.7	1–39
Play	23.6	9.0	3–48
Talk	18.0	10.5	1–52
Mind	5.6	4.9	0–18
Respond	12.4	6.7	1–33
IT-HOME			
Warmth	5.5	2.0	1–9
Learning/Literacy	8.1	2.1	4–12

five minutes of the observation. A rattle with a mirror and face was used for the first observations and a set of nine soft blocks, with pictures and numbers, was used in the second home visit six months later. This ensured that the recordings contained an equal amount of time without and with toys, introducing a greater range of play behaviour and reducing potential bias related to the availability and selection of toys within the homes.

Short-term test-retest data were not collected for the PIPOc due to time restrictions. Interested parents (N = 80) received home visits from the researcher over a period of 64 days. As participants lived across a large geographical area, repeat visits were not feasible within this time period.

Following identification of observable target behaviours a coding manual was developed by the researcher to train a psychology graduate as the independent coder for the target behaviours. The manual is available by request from the first author.

The independent coder observed in a quiet office environment using the DVDs with an electronic countdown signal prompting after each 10-second interval. Each observed category was recorded only once within the 10-second time frame. The final scores for each category are the number of intervals within which the target behaviour was seen to occur (see Table 1). Thus, for each target behaviour a dyad could score a minimum of 0 and a maximum of 60 (over 10 minutes).

Validation measure

HOME Inventory (Bradley & Caldwell, 1976; Caldwell & Bradley, 2003)

The ecological model of development (Bronfenbrenner & Morris, 1998) describes the importance that children's immediate or proximal environment can have on their development and wellbeing. Responsive parents encourage their infant's early skill development through positive social interactions.

The Infant-Toddler Home Observation for Measurement of the Environment (IT-HOME, Caldwell & Bradley, 2003) is based on the ecological model of development and is used to evaluate the provision of resources and nurturing activities within the home. A review of the measure by Totskia and Sylva (2004) reported that the HOME discriminates between children at low and high risk of cognitive delay and substantial correlations were reported for HOME scores with other cognitive measures when the children were two years old. Mothers who scored highly on the HOME measure were also more likely to have securely attached children. This measure has been used extensively in research to evaluate the effectiveness of

family interventions on the provision of age-appropriate stimulation in the home and can be used as a screening tool.

Immediately after the play session was video recorded the researcher administered a shortened version of the IT-HOME, completing a binary score for each item observed in the home visit. The items selected were grouped into two conceptually derived subscales – Parental Warmth and Learning/Literacy – based on the findings of Linver, Martin, and Brooks-Gunn (2004). Lists of the items ($N = 21$) that contribute to the subscales used in this article can be found in Appendix C. These subscales were selected as they include items that complement the behavioural categories selected in the PIPOc and were significantly associated with child cognitive outcomes (Linver et al., 2004). The subscale scores have been employed as an evaluation tool in the present research to assess the concurrent validity of the PIPOc codes.

Results

PIPOc behaviours: category refinement

The code initially included 13 behaviour categories. After the researcher reviewed the observations, it became apparent that some categories could not be reliably coded and they were rejected for this reason (see Appendix A). These included: no stimulation; inappropriate developmental task; positive visual affect; and asynchrony with the infant.

Parents in the present study were only instructed to play with their baby during the recording process and the protocol implemented procedures that minimised unnecessary stressors for the participants. Consequently, parents were unlikely to demonstrate behaviours related to their babies' distress. The frequency of Empathy ($M = 2.2$; SD = 3.8, range = 0–19) and Ignore behaviours ($M = 1.2$; SD = 1.5; range = 0–3 per 60 intervals) observed in the initial recordings were deemed too low to be included in the final code.

Manual development, training and data coding

Intra- and inter-rater reliability

The researcher conducted code-recode tests with at least two weeks between first and second coding of each recording ($N = 15$ observations, median interval 17 days, range = 14–95 days). Intra-class Correlation Coefficient (ICC) calculations were used to assess the agreement based on the total score for each category. Intra-observer reliability was strong to excellent across all categories (ICC range = .7 to .9; see Table 2).

Table 2. ICC results of the intra- and inter-rater reliability checks on a (20%) random sample of recordings.

Category	Code–Recode ($N = 15$)	Training ($N = 15$)	Random ($N = 37$)
Touch	.9	.9	.7
Move	.9	.8	.7
Play	.9	.9	.8
Talk	.9	.9	.8
Mind	.9	.8	.9
Respond	.7	.9	.7

Note: ICC single measures: moderate = .5 to .6; strong = .7 to .8; excellent = 0.8+.

Observer training was delivered over a period of seven days and took a total of 27 hours to complete. Inter-rater reliability between the trainer and independent coder was excellent (N = 15, ICC range = .8 to .9). Discrepancies were checked by the first author and discussed with the primary coder to ensure consistency in coding according to the manual and further clarification was included in the manual to minimise any further discrepancies.

Negative parenting behaviour was observed at very low frequency (baseline data N = 79, mean score = 0.2; range = 0–7 per 60 intervals) and had low inter-rater agreement calculated using ICC calculations (ICC= .2) and this category was removed from the PIPOc. The remaining six codes all targeted positive parenting behaviour and are summarised in Appendix B.

Having established the final six target behaviours, the independent coder coded all the interaction videos within four months of the training; these data have been used for all reported analyses. Inter-observer agreement between the researcher and primary coder was checked throughout this process to minimise observer drift using a sub-sample of randomly chosen videos (N = 37; 20%) taken from baseline and follow-up visits and the reliability rates were strong to excellent (ICC range = .7 to .9).

Mean, standard deviation and range scores of the six PIPOc target behaviours and IT-HOME scores at baseline are presented in Table 1. The ICC scores obtained during and after training are presented in Table 2.

To achieve significant correlations in this study, upper and lower limits for post hoc effect size were set in line with Cohen's (1988) criteria. Values > .30 were deemed to have a medium effect size and > .50 a large effect size. All but two inter-correlations in this study were found to have at least a medium effect size. Within this study, the critical value for Rho was set between .2 and .3 to maintain power at .8 and alpha at .05. Spearman's rho correlational analysis was used to examine the relations between the scores for the target behaviour categories at baseline. This resulted in the identification of small but significant inter-correlations between the scores for one or more of the target behaviour categories (see Table 3).

We assessed the suitability of the correlation matrix for a factorial model by examining the results of the Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy and Bartlett's Test of Sphericity. The KMO value of .5 was found to be within the acceptable range specified by Field (2009; .5 to .7). Even though our sample size was small (N = 79), the significant result for the Bartlett's test ($p < .01$) suggested that the relationship between the variables was strong enough to proceed with Exploratory Factor Analysis (EFA).

Table 3. Spearman's rho correlations between six PIPOc target categories at baseline.

	2	3	4	5	6
1. Touch	.3*	.1	-.0	-.1	.1
2. Move		.2*	.0	.0	.3**
3. Play			.1	-.2*	-.1
4. Talk				.2	.3*
5. Mind				-	.4**
6. Respond					

Note: N = 79; * $p < .05$; ** $p < .01$ (two-tailed).

To reflect the small sample size, we increased the minimum acceptable absolute value for the factor loading from the usual .3 (or .4) to .6 for inclusion in the factor structure. This was done by applying Stevens' (2002, p. 394) formula, which states that the critical value of the correlation coefficient (.286) at $\alpha = .01$ for a two-tailed test with an approximate N of 80 should be doubled to ensure that the absolute loading values are statistically significant with a small N.

To identify how many components should be extracted and retained in the Principal Components Analysis (PCA), both the K1 method (Kaiser's eigenvalue greater than one rule; Kaiser, 1960) and Cattell's Scree Plot Test (Cattell, 1966) were employed and both approaches identified that three components should be extracted and retained and in subsequent PCAs. Following the failure to extract a simple factor solution using Maximum Likelihood and Principal Axis Factoring with and without rotation, PCA with Varimax rotation was employed. This resulted in a three-component model being extracted from the data that accounted for 69.48% of the variance. Component 1, which we termed sensitive parenting (Sensitive for short), had an eigenvalue of 1.62 and accounted for 27.03% of the variance. Component 2, which we termed physical encouragement (Physical for short), had an eigenvalue of 1.46 and accounted for an additional 24.41% of the variance. Lastly, Component 3, which we termed verbal engagement (Verbal for short), had an eigenvalue of 1.08 and accounted for 18.03% of the variance. The successful extraction of a simple variable-specific solution enabled the researcher to reduce the original list of six target behaviour codes to three new behaviour components based on the absolute loadings within the rotated solution.

A further PCA with Varimax rotation of the scores for the six target behaviours at six-month follow-up ($N = 63$) was conducted to evaluate the reliability and stability of the three new behaviour components. The model was fixed in accordance with the procedures used to extract the baseline component solution. The follow-up analysis delivered the same component solution as baseline and accounted for 76.68% of the variance. Table 4 shows factor loadings of the six original PIPOc categories at baseline and follow-up. This result shows that the component solution was robust and reliable.

The composite scores derived from the PCA for the new three behaviour components were tested for concurrent validity using two IT-HOME subscale scores collected at baseline and six-month follow-up: Parental Warmth and Learning/Literacy. The means, standard deviations and ranges of the IT-HOME subscales are listed in Table 1. The Spearman's rho inter-correlation matrix of PIPOc component scores and IT-HOME subscale scores at baseline and follow-up is

Table 4. PCA with Varimax rotation.

Target Behaviour	Component	Baseline N = 79		Six months later N = 63	
Touch	Physical	.8		.9	
Move		.8		.6	
Play	Verbal		.6		.9
Talk			.8		.9
Mind	Sensitive	.8		.8	
Respond		.8		.8	

Table 5. Spearman's rho correlational analysis between the PIPOc components and the IT-HOME subscales at baseline (N = 79) and follow-up (N = 63).

Measure	2	3	4	5	6	7	8	9	10
1. Sensitive PIPOc	.1	.1	.1	.3*	.2	.1	.3*	.4**	.3**
2. Physical PIPOc		.1	.3*	.2	.1	.1	.2	.0	.1
3. Verbal PIPOc			.4**	.1	.2	.1	.4**	.3*	.1
4. Warmth IT-HOME				.3*	.3*	.0	.2	.4**	.1
5. Learning/Literacy IT-HOME					-.3*	.3**	.2	.2	.3*
Six months post baseline									
6. Sensitive PIPOc						-.2	.1	.1	-.1
7. Physical PIPOc							.2	-.1	-.0
8. Verbal PIPOc								.4**	.3**
9. Warmth IT-HOME									.4**
10. Learning/Literacy IT-HOME									

Note: * $p < .05$; ** $p < .01$ (two-tailed).

presented in Table 5. The results show that parents' scores on these two IT-HOME subscales correlated with each other at baseline (rho = .3, $p < .05$) and at follow-up (rho = .4, $p < .01$).

Theoretically, we would expect that verbal PIPOc component scores should correlate well with Warmth IT-HOME scores as all nine items on the IT-HOME subscale were verbal interactions between the parent and child (see Appendix C). Indeed, the two sets of scores were highly correlated in both baseline (rho = .4, $p < .01$) and in follow-up (rho = .4, $p < .01$) measures; and sensitive PIPOc scores at baseline were correlated to Warmth IT-HOME scores at follow-up (rho = .3, $p < .05$) and to Learning/Literacy IT-HOME scores at follow-up (rho = .3, $p < .01$). In addition, we found that PIPOc verbal encouragement behaviour scores were correlated across the two time points (rho = .4, $p < .01$) and that Warmth IT-HOME scores also correlated well between baseline and follow-up (rho = .3, $p < .01$). Mothers who scored highly on the PIPOc physical engagement component in the observation were also rated as high on the Warmth IT-HOME subscale at baseline (rho = .3, $p < .05$) but this relationship was not found in follow-up.

Theoretically, we expected that PIPOc maternal sensitivity scores, which rated the mother's capacity to respond to her infant's physical actions and internal mental states, should correlate with Learning/Literacy IT-HOME scores, which contained measures of parental provision of opportunities for physical and mental development. This relationship was found at baseline (rho = .2, $p < .05$) and at follow-up (rho = .3, $p < .01$). In addition, PIPOc Sensitive component scores at baseline were positively correlated with Warmth IT-HOME scores at follow-up (rho = .4, $p < .01$) and with PIPOc verbal scores at follow-up (rho = .3, $p < .05$).

In summary, the overall pattern of correlations shows concurrent validity of our new PIPOc component scores against two subscales of a well-established measurement instrument, IT-HOME. They also point to interrelatedness of positive parental behaviours, verbal and non-verbal, in the first six months of an infant's life.

Discussion and conclusion

This article describes the development and testing of a simple observational code that was devised to evaluate positive parental play behaviour that supports infant development during the first 18 months.

Initial investigations and trial coding of recorded interactions resulted in target behaviours that were not observable in the naturalistic play setting being systematically eliminated from the final measure. With the aim of creating a parsimonious behaviour code, the statistical analysis resulted in three main positive behaviour components, each containing the scores from two defined target behaviours. The final components of sensitive parenting, physical and verbal encouragement accounted for over 69% of the total variance at baseline. The components remained stable over the six-month period and accounted for 77% of the total variance at follow-up.

The positive parenting components identified in this study add to the current literature on mental attunement between parents and their child (Meins et al., 2001; Symons & Clark, 2000). The PCA enabled us to construct a theoretical combination of the target behaviours of responding to the baby's actions and verbalisations and mind-related commentary, which reflects the parents' interpretation of how the infant was feeling at the time.

Limitations of the study include lack of short-term test-retest data and a small sample size. Further tests with larger samples would benefit the PIPOc development to establish norms, and confirmatory factor analysis would be useful to evaluate whether the component factor solutions identified in the present study remain stable within a larger sample. Another limitation is the use of revised IT-HOME subscales which currently lack data on norms; the use of another validated observation tool in future evaluations would be worthy of further development.

Our new measure is practical and easy to use. It enables researchers and clinicians to evaluate parent behaviour with their infant in a natural environment and with minimal disturbance to the family. By video-recording the interactions, the accuracy of coding can be checked by two people coding the same recording independently. A possible further use for the code may be in Video Interactive Guidance with families (Fukknik, 2008; Li, 2011). Parenting programmes such as the Circle of Security (Hoffman, Marvin, Cooper, & Powell, 2006), VIPP (Bakermans-Kranenburg, Juffer, & Van Ijzendoorn, 1998) and Mellow Parenting (Mills & Puckering, 2001) use recordings of parents with their children as a tool during intervention where parents are shown selected video recordings of themselves with their babies to highlight areas of improvement. The use of PIPOc across the different programme evaluations would simplify comparison of programme effectiveness and this would help commissioners and mangers in selecting the most effective method of supporting parents in the early years of parenting.

The PIPOc component scores showed promising correlations with IT-HOME subscale scores at both the first and second data collection points. Further use of the PIPOc comparing parents who attended an intervention with controls will increase our understanding of the value of the PIPOc in evaluating the effectiveness of early parent support programmes and is the subject of a paper currently in preparation.

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Appendix A. Description of the parental behaviour categories rejected during in the development of PIPOc.

Behaviour Category	Definition	Trial Results
No stimulation	No visual or verbal stimulation within 10 seconds.	Rejected: Parent may be allowing infant to explore.
Inappropriate developmental level	Coded when parent is insensitive to the infant's developing abilities and makes demands that may exceed the child's development stage.	Rejected: Difficult for a researcher to judge what may be beyond the infant's current ability.
Ignore	Parent ignores or responds negatively to her child's verbal or physical protest. This category may include persisting with a stimulating activity when the baby is falling asleep.	Rejected: This is situation-dependent behaviour.
Empathy	Parent responds verbally and/or physically in a positive manner suggesting an awareness and empathy with the child's upset state.	Rejected: This is situation-dependent behaviour.
Positive visual affect	Parent shows positive encouragement that is visible to the infant.	Rejected: It is difficult to code when parent's face is out of full view.
Asynchrony with infant	Parent continues with an activity despite significant protest, crying or withdrawal from the infant. The parent may also restrict infant from exploration.	Rejected: Parents may be using distraction techniques to engage their infant's interest.
Negative	Child's neutral or positive action leads to a negative verbal/action response from parent; this includes grimaces or critical remarks, finding fault in the activities, actions, products or attributes of the child.	Rejected: This category had low frequency and poor reliability scores.

Appendix B. Description of the parental behaviour categories included in the PIPOc.

Behaviour Category	Definition
Talk	Any neutral or positive vocal cues from the parent that encourage their infant to recognise sounds and label objects in their environment.
Play	Parent proactively initiates and sustains games with their infant with obvious positive affect as the parent attempts to engage their infant's interest.
Touch	The parent physically touches or holds the infant in a warm affectionate manner.
Move	The parent encourages their infant's fine and gross motor movement, promoting the infant's physical development.
Mind	Parent verbalises the child's wants or emotions and helps them to label, identify and understand their emotions.
Respond	Parent responds in a neutral or positive manner to their child's neutral or positive vocal or physical actions. This implies that the adult recognises the infant as a separate individual with agency on their environment.

Appendix C. Items scored during the home visit: revised IT-HOME inventory.

Parental warmth items (originally in the IT-HOME responsivity subscale)
Parent spontaneously vocalises to child 2+
Parent responds verbally to child's vocalisations/verbalisations
Spontaneous praise of child at 2+
Parent voice conveys positive feelings towards child
Parent responds positively to praise of child by visitor
Parent tells child name of person/object
Parent speech is clear and uses parentese
Parent converses freely
Parent initiates verbal exchange
Learning/literacy items(combined Learning Materials and Involvement subscales)
Muscle activity toys
Cuddly/role play toys
Music toys and books available
Mobile/high chair/play pen
Simple hand–eye coordination toys
Toys provided for child during visit Parent keeps child in vision/looks at child often
Talks to child while doing housework
Consciously encourages developmental advancement
Invests maturing toys with value via personal attention
Structures play periods
Provides toys that challenge child to develop skills