Citation: Curtin, M., Morgan, G., Cruice, M. & Herman, R. (2023). Assessing parent interaction with deaf infants: A quantitative survey of UK professional practice. International Journal of Language and Communication Disorders, 58(4), pp. 1148-1167. doi: 10.1111/1460-6984.12849

This is the published version of the paper.

This version of the publication may differ from the final published version.

Received: 1 April 2022 | Accepted: 19 December 2022

DOI: 10.1111/1460-6984.12849

International Journal of Language & Communication Disorders

RESEARCH REPORT

Assessing parent interaction with deaf infants: A quantitative survey of UK professional practice

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Funding information
Research Trainees Coordinating Centre, Grant/Award Number: NIHR300558

Abstract

Background: Between 90% and 95% of deaf children are born to hearing parents who often need support with how to adapt their communication. Parent–child interaction (PCI) is an important predictor of deaf children's future language development. It is therefore necessary for professionals to assess parents' strengths and needs to identify areas for intervention. Qualified teachers of the deaf (QToDs), speech and language therapists (SLTs), psychologists, and national deaf child and adolescent mental health (NDCAMHS) professionals regularly support families with deaf children. With no current evidence-based tool available to assist with the assessment of PCI in deafness, it is important to gather information on current professional practice as this may differ from known practices within research.

Aims: To survey the practices of UK-based professionals in the assessment of PCI where the deaf infant is aged 0–3 years. Professionals were QToDs, SLTs, psychologists or psychiatrists and professionals working at NDCAMHS services.

Methods & Procedures: After a pilot phase, an 85-item survey was distributed electronically through a range of professional and social media networks. Survey items were based on a systematic review of PCI with deaf infants. Survey questions were focused on parent behaviours that were assessed, methods of assessment, goal planning and service provision. Analysis was conducted using descriptive and inferential statistics.

Outcomes & Results: A total of 190 professionals from across the UK completed part 1 of the survey; this decreased to 148 in part 4. Respondents were primarily female, hearing, used spoken English and had 16 years or more experience. Results indicate that PCI is routinely assessed by a large proportion of professionals and there is a substantial overlap in which parent behaviours are assessed. Some parent behaviours are assessed that do not feature in the research. Methods of assessment are informal and predominantly consist of observation and note making, with professionals using their own skills and experience to analyse interaction. Goal setting practices were largely similar between professionals, with many jointly deciding goals with parents.

Conclusions & Implications: This survey highlights the range of parent behaviours assessed by UK professionals in PCI with deaf children aged 0–3. This survey provides valuable information about and for professionals who assess PCI and set intervention goals with parents. Information from research and professional practice is important to consider in the design of a future PCI assessment. Implications are included for future research in this area.

KEYWORDS
assessment, deaf, infant, parent–child interaction, practice, survey

What This Paper Adds

What is already known on this subject

Parental involvement is one of the greatest predictors of deaf children's language outcomes. With many deaf children born to hearing parents, parents often need guidance with how to facilitate effective communication. A recent systematic review identified the range of parent behaviours and methods used to analyse PCI in international research studies, but little evidence or guidance exists on how professionals assess this phenomenon in practice.

What this study adds

This is the first survey to generate large, valuable practice-based evidence for the assessment of parents' communication behaviours as they interact with their deaf infants aged 0–3. The survey recruited a range of multidisciplinary professionals working on interaction within this field: SLTs, qualified teachers of the deaf, psychologists or psychiatrists, and professionals working within deaf child and adolescent mental health services. The study reports on which behaviours these professionals assess and how, and includes information on the goal setting behaviours of practitioners. Most respondents were highly experienced; the survey, therefore, reveals expert practice within the field.

What are the potential or actual clinical implications of this work?

We recommend the following practice: (1) incorporate a range of parent-based behaviours in PCI assessments, including establishing joint engagement and parental sensitivity, as well as communication-focused behaviours; (2) video record PCI assessments where possible to enable professionals and parents to watch and reflect together; (3) following assessment, set parent-focused goals in collaboration with families, ensuring parents' skills, particularly their strengths, are considered. All primary caregivers should be included in the process where possible; and (4) reassess PCI regularly (at least termly) to monitor and encourage families' progress. The timing of reviews should be discussed between parent and professional.

INTRODUCTION

Parent–child interaction (PCI) is an umbrella term that focuses on the reciprocal, face-to-face, dyadic relationship between caregiver and child during communicative exchanges. Good PCI is defined as contingent, responsive and expanded input, and is positively associated with language learning in hearing children (Roberts & Kaiser, 2011). Children build the foundations of language through the 'serve and return' of interactions with their parent. Responses can be visual (eye contact, facial expressions, gestures) and/or language based (Tomasello, 2010). Parents are seen as the main provider of the social and linguistic stimulation required for successful communication development (Peacock-Chambers et al., 2017). Parents provide scaffolds to this development through prompts and contingent reactions to their child's behaviour (Bornstein et al., 2008). This in turn encourages and reinforces a child's communicative intentions (Tomasello & Todd, 1983).

Although in the wider population there is considerable variability in the quality of PCI any one child experiences (Bergelson et al., 2019; McGillion et al., 2017), parents' engagement, responsiveness and linguistic input may be particularly important for deaf children for whom language and socio-emotional development are more at risk than their hearing peers (Stevenson et al., 2015). This may be due to differences in hearing status between parent and child, difficulties in gaining and maintaining the deaf child's visual and/or aural attention and the deaf child's reduced access to incidental language learning. In this paper, we use the term 'deaf' to refer to all levels of deafness, from mild to profound. We follow the recommendation from the British Association of Teachers of the Deaf and use the positive terms 'deafness' and 'deaf' rather than 'hearing loss' and 'hearing impairment' (BATOD, 2020).

A total of 90–95% of deaf children are born to hearing families (Mitchell & Karchmer, 2004) who often have little experience of deafness and the impact it can have on the child's ability to access spoken language. Hearing parents who have not yet developed effective skills in communicating with their deaf children may provide PCI that has fewer contingent responses and reduced language input (Barker et al., 2009; Meadow-Orlans & Spencer, 1996; Vaccari & Marschark, 1997). This in turn affects how a child develops their own understanding and use of language (Levine et al., 2016). Most hearing parents of deaf children need to be supported to adapt their communication to attain successful interactions with their deaf child (Dirks & Rieffe, 2019; Moeller et al., 2013). In the early years, this may include greater focus on gaining and/or establishing joint attention between parent and child, to ensure parental interaction and language is accessible/perceivable by the deaf child. It may also include the introduction of a signed language.

According to the most recent UK-wide summary from the Consortium for Research in Deaf Education (2021), there are 51,612 deaf children (i.e., children and young people up to the age of 19 years 11 months) in the UK: 22% of these are unilaterally deaf, 26% are mildly deaf, 31% are moderately deaf, 9% are severely deaf and 12% are profoundly deaf. CRIDE reports on languages used by deaf children and young people in educational settings: 88% of children use spoken language, 7% use a spoken language (English or Welsh) with signed support, 2% use British or Irish Sign Language, and 3% use an alternative combination (CRIDE, 2021). Cochlear implantation is provided to families for free in the UK after thorough assessment as part of the country's free national healthcare provision. The proportion of eligible deaf children in the UK with at least one cochlear implant is approximately 44% (CRIDE, 2021) and approximately 74% of eligible deaf children receive CIs by the age of 3 years (Raine, 2013).

Upon identification, generally following new born hearing screening shortly after birth, every deaf child regardless of their level of deafness is allocated a qualified teacher of the deaf (QToD).[1] Other professionals may include a speech and language therapist (SLT),[2] a deaf instructor, professionals from national deaf child and adolescent mental health services (NDCAMHS), and/or other professionals from cochlear implant teams (additional QToDs, SLTs, audiologists and psychologists). It is these professionals who deliver PCI interventions to deaf children and their families (Rees et al., 2015). Dependent on local provisions and pathways, PCI interventions can begin at any time from referral to these services, that is, from 3 months of age following deafness identification onwards.

Much research has documented that the quality of PCI offered is linked to better language development in deaf children (Curtin et al., 2021; Ambrose et al., 2014; Desjardin, 2003; Yoshinaga-Itano, 2003). In a recent systematic review and meta-analysis, parents' linguistic input was found to be a substantive predictor of deaf children's expressive language and explained 31.7% of the variance in deaf children's language scores (Holzinger et al., 2020). Another recent systematic review of 26 studies from six countries uncovered the strategies used by hearing and deaf parents to gain their deaf children's attention, as well as the strong positive associations between the length of joint engagement between parent and child and child language scores (Lammertink et al., 2021). Other international studies have uncovered additional parental features in PCI associated with higher language scores for deaf children, such as higher skills in maternal responsiveness and non-intrusiveness (Niparko et al., 2010), a higher number of conversational turns between the parent and child (Ambrose et al., 2014), a wider range of word types and language structures used by the parent (DesJardin & Eisenberg, 2007), as well as parents' recasts and the use of open-ended questions (Cruz et al., 2013).

There is some evidence that providing parents with the knowledge, skills and practice they need to adapt their communication leads to improved child communication, for example, improvements in pre-linguistic skills (an American RCT from Roberts, 2019) and in receptive and expressive language (an Italian between-groups intervention study from Nicastri et al., 2021). An important stage prior to providing support or intervention is assessment. However, a validated assessment tool to appraise a parent's strengths and needs, and assist with targeted goal planning or with continued monitoring via reassessment does not yet exist within PCI work with deaf infants. A systematic review of 61 papers by Curtin et al. (2021) found the most assessed parent behaviours when communicating with a deaf child aged 0–3 to be: how a parent gains a child's attention; the maintenance of joint engagement; the emotional availability and responsivity of a parent during the interaction and strategies in providing accessible and stimulating linguistic input.

Regarding methods of assessment, Curtin et al. (2021) found researchers predominately used frame-by-frame coding of videos, scales or both. Dyads (predominately mother–child) were filmed in either a lab, at home or in a clinic. While Curtin et al. (2021) described how PCI is evaluated in research, it is also important to investigate PCI assessment within professional practice, to explore the extent to which practice and research are aligned. The focus of the current paper was therefore to investigate how parent behaviours within interactions are assessed in current UK professional practice.

Assessment and goal setting are well-established activities in health and education. There are some validated tools available to professionals to track a deaf child's early expressive and receptive language development, such as the Ski-Hi Language Development Scale (Watkins, 2004). However, there are no published, parent-focused PCI assessments in the English language for practitioners to use. This has implications for how goals are set and reviewed. In a UK-based survey (Rees et al., 2015) investigating early interventions used by professionals working in deafness (SLTs, QToDs and auditory–verbal therapists), participants reported that they frequently selected and combined principles from approaches developed for hearing children (e.g., Hanen: Manolson, 1992, and parent–child interaction therapy: Eyberg, 1988). Many participants also reported relying on guidance from the Early Monitoring Protocol (Early Support, 2004), now relaunched as ‘Success from the Start’ (National Deaf Children's Society, 2020). This is a developmental tracker that allows parents and professionals to monitor a deaf child's language, cognition, play, social and physical development. However, none of the aforementioned are (or include) validated assessments of PCI.

Methods to assess interaction in research are less appropriate for practitioners to use in the family home as they have a narrow focus on a single or a few specific behaviours and take considerable time to complete. Some PCI research studies do use validated scales, which could be deemed as quicker to use, such as the Emotional Availability Scales (Biringen, 2008) as used by Dirks and Rieffe (2019) and Pressman et al. (1999), but these scales are not yet recommended in any SLT or QToD professional guidance in the UK. In addition, practice-based PCI assessments will be influenced by the real-life circumstances of each family and their individual social, emotional and environmental factors. For example, assessments may be administered more informally to be sensitive to parents' emotional well-being, they may be administered at home, with/without siblings, with/without additional caregivers or with interpreters; these factors are rarely discussed in research.

In their detailed clinical guidelines on deafness, the Royal College of Speech and Language Therapists (RCSLT) (2021) recommends that practitioners make informal observations of how the deaf child communicates with their key communication partners but does not provide any specific information on how to observe parents supporting or facilitating communication. The RCSLT also suggests careful monitoring and outcome measurement but does not suggest any tools to use for this. While the National Deaf Children's Society (2019) resource ‘Assessments of Deaf Children and Young People’ is comprehensive, there are no assessments included that can be used to monitor parents and their interactions in the early years. The absence of a reliable, evidence-based assessment tool may mean that professionals are not in agreement on which parent behaviours are important to appraise in the home. It also increases the likelihood of disparity between professionals on how to identify parents' strengths, needs and targets for intervention, which could impinge on the child's development if therapy goals are not appropriate. It is therefore important to consult with practitioners working in the field to ascertain current practices of PCI assessment. Further, by involving and gathering insights from professionals, we propose to fuse practice-based clinical findings with the research evidence from Curtin et al. (2021) to develop the content of a future assessment tool for PCI for young deaf infants.

PATIENT AND PUBLIC INVOLVEMENT (PPI)

Patient and public involvement is well-established in UK-based health research and is an area of growing interest in Europe (Biddle et al., 2021). Involving patients, caregivers and the public in the entire research process can lead to higher quality, relatable work that meets the needs of the target population (Cook et al., 2019). This project has 10 hearing parents of deaf children and eight hearing and deaf professionals involved, working with the first author as research partners. In preparation for this project, parents were asked about their key lines of enquiry and what they might want to ask a wider group of professionals in relation to PCI practice. Parents shared many negative experiences of appointments where they were told their child was deaf, reporting that the language used, and the flippancy of some professionals had caused great upset and distress in the first few months of their child's life. Parents also collectively shared a severe lack of counselling support at this time. When planning this survey, parents were keen to ask whether other professionals involved in the child's journey after identification were alert to parental well-being and checked whether parents felt supported, as this may affect when a parent is ready for a PCI assessment and should influence the approach taken by the assessing professional.

While we wanted to acknowledge the research drives of our parent partners, a clear evidence based for considering the well-being of parents also exists. The range of negative emotions felt by parents after learning of their child's deafness is well documented internationally. Henderson et al.'s (2014) review uncovered a list of emotional concerns found by authors ascribed to parents: 'emotional distress, low self-esteem, grief, unpredictability, loneliness, incompetence, vulnerability, lack of fulfilment, and perceived stigma. Many of these negative emotions arose after the child's diagnosis with hearing loss and/or at periods of transition' (p. 442). Parents who feel supported in the period after identification report significantly lower negative feelings of well-being and stress, which in turn has a positive effect on the socioemotional development of the deaf child (Hintermair, 2006). We have included a research objective below that refers to parent well-being by professionals assessing PCI.

This paper reports the results of a quantitative survey which focused on UK-based professionals' practice in assessing PCI where the child is deaf, aged 0–3 years, and the parent is hearing. To our knowledge, this is the first paper of its kind within the international research field of deafness. The research question addressed by the study is: What is the reported practice of UK professionals assessing PCI with deaf infants aged 0–3? The specific research objectives were:

1. To understand whether assessing early PCI is routine practice for professionals working with deaf infants aged 0–3.

For professionals who do routinely assess PCI:

2.1 to identify which parent behaviours are and are not assessed

2.2 to distinguish which parent behaviours are considered the most important to assess in PCI

2to determine how assessments are conducted in practice

2.4 to ascertain how assessment results influence goal setting and intervention planning

2.5 to determine whether parental well-being is considered

3. To examine any differences in PCI assessment that exist in the UK dependent on professional background, hearing status of assessor, languages used at work and/or years of experience.

METHODS

Ethical approval was granted from City, University of London's Health Sciences Research committee (ETH2021-0335). The study is funded by National Institute for Health Research, as part of a fellowship (NIHR300558). The Checklist for Reporting Results of Internet E-Surveys (CHERRIES, Eysenbach, 2004) has been used for this paper.

Development and testing

The data reported in this paper was collected via an online, open quantitative survey. As mentioned, some questions were co-designed by a group of hearing and deaf professionals and parents of deaf children, but most were based on the findings from a systematic review of PCI research (Curtin et al., 2021). Narrative synthesis of the 61 papers included in this review (Curtin et al., 2021) generated definitions of each PCI concept, as well as skills measured for each concept, for example, a definition of joint engagement was provided along with ways to assess the skill, that is, by the number of connected turns within an episode of joint engagement, total length of time engaged, and whether engagement was mutual or more supported by the parent. The first author compiled all co-produced and evidence-based questions for the authorship team and PPI group's final review and agreement.

Questions were then refined through five, individual, 'think-aloud' cognitive interviews with professionals (SLTs and QTODs) working in the field, using the methods outlined by Willis (2005). Cognitive interviewing is 'a qualitative method specifically designed to investigate whether a survey question satisfies its intended purpose' (Willis & Artino, 2013, p. 354). The interviews involved pilot testers reading the survey questions aloud and then vocalizing their thoughts to the first author while answering the question. Probing questions were also used by the first author such as 'What does [concept] mean to you?' or 'Can you put that question into your own words?' to ensure the questions were comprehended as intended. This pilot work also considered the usability and technical functionality of the survey. The adaptation of wording from second-person questions (e.g., 'Do you assess …?') to first person statements (e.g., 'I assess …') is an example of a change made from the cognitive interview process. Another addition included frequent reminders that the term 'assessment' could also mean 'observe', 'evaluate' or 'look at,' and that the activity could be formal or informal. This was because those involved in the pilot cognitive interviews commented that 'assessment' suggested a formal, standardized tool and that other terms may be preferred by professionals.

Recruitment and inclusion criteria

The survey was open for 15 weeks to all hearing and deaf, currently registered UK QToDs, SLTs, psychologists or psychiatrists and professionals working in NDCAMHS. The latter two groups were included in the recruitment strategy as psychologists (working in NDCAMHS or in cochlear implant centres) are often involved in appraising PCI as part of a larger assessment. Any professional working in NDCAMHS was welcome to participate as there is often a range of professionals responsible for carrying out PCI assessments when referrals are received. All these professional groups are highly skilled, highly trained and acknowledge the important role parents play in a deaf child's language acquisition.

Professionals had to have experience of working with deaf infants aged 0–3. Professionals of any age, gender, hearing status, ethnicity and years of experience were eligible. The survey link was anonymous and shared through professional network mailing lists, social media, and professionally relevant magazines and newsletters (see Appendix A in the additional supporting information). Completion was voluntary, and no incentives were offered.

Consent process

An information sheet (downloadable from the first page of the survey) explained the study's purpose, the name and contact details of the investigator, the approximated completion time of the survey, where data were stored and for how long. On the second page, participants gave their consent. The survey was presented through Qualtrics, and responses were anonymous and GDPR compliant.

Survey administration

Questions were not randomized or alternated, but were adaptive (i.e., certain items were conditionally displayed based on responses to previous questions) to reduce the number of items. There were 85 questions with a range of 1–19 questions per page (see Appendix B in the additional supporting information). The questionnaire was distributed over 11 pages but again this depended on the responses given. Each item required a mandatory response, except the four optional open text boxes provided for participants who wanted to share their opinions on the COVID-19 pandemic's impact on PCI, add their own suggestions of the parent behaviours they observe (beyond those presented), or provide more detail to some of the questions. Participants were able to change their answers using a 'back' button. Most questions were designed for respondents to select a single response or multiple responses from the range offered.

Survey content

Following consent, the survey began with a screening question to check participant eligibility. The remaining 81 questions were split into four sections to collect information on the following: anonymous participant demographics; parent behaviours assessed in PCI; methods used to assess PCI; and goal setting and service provision (see Appendix B in the additional supporting information). Definitions of parent behaviours described in a review from Curtin et al. (2021) were displayed to ensure shared understanding of the concepts explored.

Response and participation rates

Qualtrics identified each participant as a unique visitor through their IP address. There were 228 unique visitors to the survey's first information page. A total of 228 people agreed to participate by clicking the consent box; the recruitment rate was therefore 100% (consent ticked/first page). Ten participants left after giving their consent, 20 participants left after ticking 'I meet the criteria' and eight participants selected 'I do not meet the criteria'. In total, there were 153 complete and 37 partially complete responses (completion rate ranged from 28% to 81%). This study reports on all complete and partially complete responses, as the partially complete responses also contained much useful information. Duplicate entries were avoided by preventing users with the same IP address access to the survey twice, that is, the survey was not displayed a second time if the user had completed it.

Data analysis

Data were exported from Qualtrics into Microsoft Excel and reviewed by the lead author. Both partial and fully complete questionnaire responses were analysed, with the sample size noted for each main research question. Descriptive statistics summarized the data, further analysis used *t*-tests via SPSS to compare groups.

RESULTS

Participant demographics

Most participants were SLTs and QToDs (Table 1). Participants were mostly female, hearing, aged between 50 and 59 and used spoken English as their preferred language. Most professionals' highest qualification was a master's-level degree, followed by an undergraduate degree. The majority of professionals (55%, $n = 104$) had over 16 years of experience in their profession. Participants mainly worked in England, with London and the south-east of England featuring prominently. A total of 97% (n = 184) reported they had specialist knowledge and skill in the field of deafness and almost half (48%, $n = 91$) reported they used both English and British Sign Language (BSL) at work.

Participant responses according to research objectives

1. ***Where the deaf child is aged 0–3, is the assessment of PCI routine practice? Respondents (n) = 185***

The term 'assess' refers to all formal and informal observations and evaluations. Most professionals (92%, n = 171) assessed PCI as part of their routine practice. Split by profession, this was 95% (n = 82) of SLTs, 89% (n = 76) of QToDs, 100% (n = 6) of psychologists or psychiatrists and 88% (n = 7) of NDCAMHS professionals. Those who did not routinely assess PCI (8%, n = 14) explained another professional was responsible for doing this. These professionals were taken directly to the end of the survey.

2.1. ***Which parent behaviours are assessed by practitioners? Respondents (n) = 155***

A breakdown of all responses to this question, per profession is provided in Appendix C in the additional supporting information.

Attention getting behaviours (Q22–26; see Appendix B in the additional supporting information)

The most frequently assessed attention getting behaviours selected were parents making eye contact with their child (97%, $n = 150$); parents using gesture (95%, n = 147), parents using words such as 'look' (94%, n = 146), parents using pointing (93%, n = 144), and parents using their voice to call their child's name (92%, n = 153). Waiting was also considered an attention getting strategy, as a paused action, voice, sign or gesture can initiate a look from the child. Most professionals (97%, n = 151) assessed whether the parent actively waits for their child to look before communicating and most (96%, n = 149) reported they watched to see if parents used combinations of visual, auditory and tactile strategies, that is, multimodal strategies, to gain their child's attention. Parents grabbing onto their child's clothing (27%, n = 41) and using humming to gain their child's attention (27%, n = 41) were the least assessed.

All professional groups assessed parents' visual-based attention-getting strategies the most (each professional group selected between nine and 12 of the 12 visual strategies). SLTs and QToDs then assessed auditory-based attention getting strategies (a range of five to six of the seven listed strategies were selected), whereas psychologists or psychiatrists and NDCAMHS professionals selected more tactile-based strategies (eight of the 10 skills selected). Fewer tactile-based strategies to gain a child's attention were selected by QToDs and SLTs (six of the 10 skills). Some caution is required here as only three psychologists or psychiatrists and six NDCAMHS professionals completed this section.

Joint engagement (Q27–31)

Many professionals noted the length of joint engagement (71%, n = 110), counted the number of connected turns between the parent and the child live, as they observed (68%, n = 105), and noted whether joint engagement was 'supported by the parent' or 'coordinated between parent and child' (79%, $n = 123$). By this, we mean the difference between a parent working hard to support joint engagement by waiting, watching and responding to the child, versus coordinated, mutual, joint engagement where parent and child focus on each other.

Parental sensitivity (Q32)

Many professionals assessed all six features, with 'availability' (92%, n = 143) and 'contingent and responsive' (92%, n = 142) being the most frequent. 'Availability' refers to a parent who is genuinely interested and actively involved in participating in accessible interactions with their child. 'Contingent and responsive' refers to a parent that follows their child's lead and pace and responds with on-topic behaviour or language. Fewer professionals assessed a parent's consistency of interaction (70%, n = 108), that is, a parent who can absorb and regulate a range of their child's emotions and behaviours, while remaining mostly constant and positive in their own behaviours.

Assisting the child's access to language (Q33)

Most professionals assessed to see if the parent and child were face to face (96%, n = 149) and whether the parent

TABLE 1 Survey participants ($n = 190$)

Professions	**SLT** **46% ($n = 88$)**	**QToD** **46% ($n = 87$)**	**NDCAMHS** **5% ($n = 9$)**	**Psych** **3% ($n = 6$)**	**Total** **100% ($n = 190$)**
Female % (n)	98% (86)	94% (82)	100% (9)	67% (4)	95% (181)
Hearing status % (n)					
Deaf or hard of hearing	4% (3)	16% (14)	67% (6)	0	12% (23)
Hearing	95% (84)	82% (71)	33% (3)	100% (6)	86% (164)
Other/prefer not to say	1% (1)	2% (2)	0	0	2% (3)
Age (years) % (n)					
20–29	7% (6)	2% (2)	11% (1)	0	5% (9)
30–39	31% (26)	10% (9)	45% (4)	17% (1)	21% (40)
40–49	28% (25)	30% (26)	11% (1)	33% (2)	28% (54)
50–59	33% (29)	51% (44)	11% (1)	50% (3)	41% (77)
60–69	1% (2)	7% (6)	22% (2)	0	5% (10)
70+	0	0%	0	0	0
Preferred language % (n)					
Spoken English	98% (86)	85% (75)	33% (3)	83% (5)	89% (169)
BSL	0	2% (2)	56% (5)	0	4% (7)
Spoken English and/or BSL	2% (2)	9% (8)	11% (1)	17% (1)	6% (12)
Other	0	4% (2; 1 BSL with voice, 1 no detail)	0	0	1% (2)
Languages used at work % (n)					
Spoken English only	43% (38)	39% (34)	11% (1)	67% (4)	41% (77)
BSL only	0	2% (2)	33% (3)	0	3% (5)
Spoken English and BSL	51% (45)	47% (41)	45% (4)	16% (1)	48% (91)
Other	3% (3) (sign supported English—SSE); 2% (2) AAC/Makaton	7% (6) SSE; 1% (1) Welsh and English; 1% (1) Welsh and BSL	11% (1) BSL and written English	16% (1) SSE	8% (15)
Highest qualification % (n)					
Undergraduate degree	58% (51)	9% (8)	56% (5)	0	34% (64)
Postgraduate diploma, e.g., PGCE	1% (1)	16% (14)	0	0	8% (15)
Master's	32% (28)	46% (40)	33% (3)	16% (1)	38% (72)
Doctorate	1% (1)	0	0	84% (5)	3% (6)
Other	8% (7)	29% (25)	11% (1)	0	17% (33)

(Continues)

TABLE 1 (Continued)

Professions	SLT 46% ($n = 88$)	QToD 46% ($n = 87$)	NDCAMHS 5% ($n = 9$)	Psych 3% ($n = 6$)	Total 100% ($n = 190$)
Years working in profession % (n)					
< 3	3% (3)	5% (4)	34% (3)	0	5% (10)
4–10	22% (19)	21% (18)	11% (1)	17% (1)	21% (39)
11–15	21% (18)	20% (17)	11% (1)	17% (1)	19% (37)
16–20	23% (20)	16% (15)	22% (2)	49% (3)	21% (40)
+21	31% (28)	38% (33)	22% (2)	17% (1)	34% (64)
Geographical location % (n)					
Wales	6% (5)	8% (7)	0	0	6% (12)
Scotland	3% (3)	6% (5)	0	0	4% (8)
Northern Ireland	2% (2)	2% (2)	0	0	2% (4)
England					
North West	7% (6)	15% (12)	11% (1)	17% (1)	11% (20)
North East	2% (2)	5% (4)	11% (1)	0	4% (7)
Yorkshire and Humber	2% (2)	7% (6)	11% (1)	17% (1)	5% (10)
West Midlands	3% (3)	3% (3)	0	0	3% (6)
East Midlands	3% (3)	3% (3)	0	17% (1)	4% (7)
East of England	3% (3)	8% (7)	11% (1)	0	6% (11)
London	33% (28)	17% (15)	22.5% (2)	17% (1)	24% (46)
South East	31% (26)	20% (17)	11% (1)	32% (2)	34% (46)
South West	3% (3)	3% (3)	22.5% (2)	0	4% (8)
Prefer not to say	2% (2)	3% (3)	0	0	3% (5)

used child-directed speech or 'parentese' (95%, n = 147), where a parent modifies their speech to be more child orientated, for example, exaggerated pitch/acoustic highlighting or stress. Fewer professionals assessed whether parents used child-directed sign (64%, n = 99), where a parent modifies their signing to be more child orientated, for example, palm orientation so the child can see more, exaggerated non-manual features, larger sign space and range of motion.

Enriching the child's language (Q34–36)

The most assessed behaviours were parents labelling items or feelings (96%, n = 148), commenting on the child's actions (96%, n = 148), adding one to two words or signs to a child's utterance (96%, n = 148), use of praise (95%, n = 147) and modelling play (95%, n = 147). Fewer professionals assessed parents' recasting of their child's utterance into a question (65%, n = 100) and whether a parent reprimanded or disciplined their child (60%, n = 92).

Most professionals often (44%, n = 68) or always (31%, n = 48) noted the number of signs/words used by parents in interactions with their children. When asked about assessing parents' signing proficiency, some professionals said they either always do this (31%, n = 48) and the other large group said they did not have the skills (29%, n = 45).

Use of touch (Q37–38)

For the frequency of parental touch, 30% (n = 46) of professionals said they 'sometimes' assessed this and 28% (n = 44) said they 'rarely' assessed this. For the purpose of touch, an equal proportion of professionals said they 'often', 'sometimes' or 'rarely' assess this phenomenon (all 27%, n = 41).

Behaviours assessed by professionals that were not mentioned in the survey (Q39)

Professionals could report any parent-focused behaviours in a free text box, that they felt were missing from the survey. After qualitative analysis, there were 18 additional behaviours listed by 72 different professionals. Some of these focused on the listening environment or environmental sounds; others considered parental awareness of their skills, or specific techniques adopted while speaking. These are listed in full in Appendix C in the additional supporting information. Respondents also suggested observing how parents include siblings within the interaction, use books, use language in everyday routines, and use music, singing and rhymes.

2.2. *Which parent behaviours are considered most important to assess in PCI?*

Professionals selected the 10 most important behaviours they assess (Table 2). The behaviour most frequently selected by the 155 participants was 'waiting', that is, a parent actively waiting or pausing until their child looks at them. This was selected as a 'top 10 skill' by three of the four professional groups (QToDs, SLTs and NDCAMHS professionals). All four professional groups agreed that the second most frequently selected parent behaviour to assess was 'contingency/ responsivity'.

There were four parent behaviours selected by all four professional groups: being contingent/responsive (see Parental Sensitivity above); being face to face; being emotionally available and genuinely interested and providing appropriate stimulation and pace in play and language. QToDs and SLTs selected eight of the same behaviours in their respective top 10, with the first two parent behaviours in the same position. The three least selected for assessment were: parents prohibiting their child (3.9%, n = 6), parents recasting their child's utterance into a question (3.2%, n = 5) and parent correcting their child's communication (2.6%, n = 4). Appendices D and E in the additional supporting information provide details on all behaviours and each professional group's top 10.

2.3. *How are PCI assessments conducted in practice? Respondents (n) = 145–148*

Findings were combined due to all professionals answering Q42–56 similarly (Table 3). Just over half of professionals (55%) let parents know that they are observing their interactions with their deaf child and 37% assessed PCI covertly. The remaining 8% selected 'other' and using open text responses, explained it was family and context dependent, that is, they would not explicitly say 'I am observing you' but would offer some positive feedback if they noticed behaviours that were supportive of the child's development.

Professionals usually observed PCI during play in the family home. A total of 17% selected 'other' for the activity they observe, adding that they often asked parents to choose whatever they are most comfortable with or whatever the family most enjoys. Mostly, professionals conducted these assessments alone with the family rather than with other colleagues. As well as those professionals listed in Table 3 (Q50), respondents used the 'Other' option to report that PCI assessments were also conducted with teaching assistants, audiologists, multisensory impairment colleagues and cochlear implant team members, for example, listening therapists.

Professionals usually assessed PCI live and made either mental or written notes of their observations. Most commonly, the mother was assessed, followed by the father and then older siblings and grandparents. The most popular method used to form judgments on the interaction was by professionals using their own skills, knowledge and expertise, followed by intervention checklists such as those from Hanen (Manolson, 1992), Palin PCI (Kelman & Nicholas, 2008), VERVE Child Interaction (Cummins, 2021) and the Early Monitoring Protocol (Early Support, 2004). A total of 14% reported using formal, scientifically validated checklists for PCI and named the Autism Diagnostic Observation

TABLE 2 Top 10 parent behaviours assessed in PCI ($n = 155$)

Parent behaviour assessed	%	(n)
Parent waits for the child to look	82.6%	128
Parent is contingent and responsive, follows their child's lead and responds with on-topic behaviours or language	69.0%	107
Parent uses multimodal strategies to gain the child's attention	59.4%	92
Parent ensures they are face to face with their child	58.1%	90
Parent is stimulating and can provide appropriate pace, play, and language structures	54.2%	84
Parent is available to the child, genuinely interested and involved	53.5%	83
Parent expands their child's language by adding 1 or 2 new words/signs	50.3%	78
Parent uses child-directed language (spoken or signed) to raise child's interest	49.7%	77
Parent interprets their child's behaviour with language (spoken or signed)	45.2%	70
Parent comments on, or describes the child's action	41.9%	65

Schedule (ADOS) (Lord et al., 2012), the Nottingham Auditory Milestones (Datta et al., 2011), the Rossetti Infant Toddler Language Scale (Rossetti, 2006), the Infant Monitor of Vocal Production (Cantle-Moore & Colyvas, 2018) and the Pre-school Language Scales (Zimmerman et al., 2011).

Many professionals reassess PCI once every few months (38%, $n = 44$) which would suggest a termly review. The next largest interval selected was 'other' (35%, $n = 40$) with many professionals using the open-text box to say reassessment would be dependent on the family's progress, or the frequency of visits. For those professionals who used filmed recordings of PCI (22%, $n = 33$), film recording length was generally between 3 and 5 min with the same length of time watched in analysis. Professionals generally watched back the videos in the same appointment, with the parent. Finally, on a sliding scale from 0 to 100 where '100' signified 'extremely confident', professionals averaged at '80' for their confidence in assessing children in PCI and slightly lower at '75' for their confidence in assessing parents' skills.

2.4. What is the goal-setting practice of professionals? Respondents (*n*) = 145–148

Most professionals (76%; $n = 111$) stated that their assessments always lead to goal planning. As well as setting child-focused goals, professionals reported setting parent-focused goals either all the time (42%, $n = 61$), often (33%, $n = 48$) or sometimes (25%, $n = 36$). Many professionals discussed and jointly set goals with parents (61%, $n = 89$) but others chose the target themselves (22%, $n = 32$), or asked the parent to choose (15%, $n = 22$). Just over half of professionals (52%, $n = 76$) had a timeframe in mind for when the goal might be expected to be achieved, whereas 43% ($n = 62$) reported this was sometimes the case. The majority (71%, $n = 98$) shared this time frame with parents, with a high proportion (77%, $n = 111$) reporting that they revisited and reviewed goals.

The two most frequently selected time frame categories to review PCI goals were 'once a term', that is, every 10–12 weeks (23%, $n = 34$) and 'every 6–8 weeks' (23%, $n = 33$). For this question, the category of 'other' was also frequently selected (24%, $n = 35$). Within the free text box, many professionals reported that reviewing goals depended on two things: the individual family's progress with their goals and the visit schedule to that family, with many reporting they may review the goals at the start of every visit (which could be weekly, bi-weekly, monthly or termly). Finally, 61% ($n = 88$) of professionals shared their goals with other members of the families' multidisciplinary team and 37% ($n = 54$) reported they 'sometimes' shared their goals.

Only 24% of professionals ($n = 35$) said their assessments sometimes lead to goal planning. This group contained a similar number of SLTs ($n = 17$) and QToDs ($n = 15$), as well as two psychologists, and one NDCAMHS professional. Most professionals in this group (68%, $n = 24$) had a small proportion of their work (0–25%) allocated to working with deaf 0–3-year-olds. Only one professional from this group received supervision every six weeks from a more knowledgeable colleague, whereas others either had access to peer-to-peer support (31%, $n = 11$), never received supervision (20%, $n = 7$) or received supervision one to two times a year (20%, $n = 7$).

2.5. Do professionals consider parental well-being during assessment sessions and visits? Respondents (n) = 141

A relatively even number of professionals 'sometimes' (34%, $n = 48$), 'often' (28%, $n = 40$) or regularly asked (26%, $n = 37$) about parents' feelings towards their child's

TABLE 3 Survey responses for methods of PCI assessment

Q 42 When I assess PCI, I:	**100% ($n = 148$)**
let parents know	55% (81)
do not let parents know I am observing them	37% (55)
other	8% (12)
Q 43 When I assess PCI, I:	100% ($n = 148$)
observe play	78% (116)
observe book reading	3% (5)
meal time	1% (2)
other	17% (25)
Q 44 When I assess PCI, I:	100% ($n = 148$)
observe live and make written notes	38% (56)
observe live and make a mental note	26% (38)
make a video recording	22% (33)
ask parents to send me a video	5% (8)
other	9% (13)
Q 49 When I assess PCI, I:	100% ($n = 145$)
carry out the assessment alone	74% (108)
with another professional	16% (24)
other	10% (15)
Q 50 When I assess PCI, I:	100% ($n = 145$)
Joint-PCI assessments have been with QToDs	64% (99)
with SLTs	48% (75)
with spoken language interpreters	16% (25)
with portage workers	15% (23)
with deaf instructors	8% (13)
with BSL interpreters	6% (9)
with psychology colleagues	5% (8)
Other	18% (28)
Q51 When I assess PCI, I:	100% ($n = 148$)
assess the family at home	72% (107)
assess the family in a community clinic	10% (15)
assess at a specialist centre	7% (11)
assess at a hospital appointment	5% (8)
assess a nursery	5% (7)
Q52 When I assess PCI, I:	100% ($n = 148$)
assess mum and child	76%
assess dad and child	16%
assess older siblings and child	3%
assess grandparents and child	3%
assess nanny/au pair and child	1%
assess others interacting with the child	<1%
Q48 When I assess PCI, I:	100% ($n = 146$)
observe and make judgements using my own skills, expertise, training and knowledge	88% (128)
use a formal checklist from a therapy	21% (31)
carry out a descriptive analysis / written transcript	18% (27)
use a service-developed tool	17% (25)
use a formal, validated assessment	14% (21)
make a tally of behaviours observed	7% (10)
other	9% (13)
Q55 When I assess PCI, I:	100% ($n = 148$)
reassess PCI	79% (117)
do not reassess PCI	21% (31)
Q56 When I assess PCI, I:	100% ($n = 115$)
reassess PCI once a week	10% (11)
reassess PCI once a month	16% (18)
reassess PCI every few months	38% (44)
reassess PCI yearly	2% (2)
other	35% (40)

Note: See Appendix B for the survey questions.

deafness. Similarly, professionals reported ‘regularly’ (32%, $n = 45$), ‘sometimes’ (32%, $n = 45$) and ‘often’ (28%, $n = 39$) asking about parental stress. Finally, 43% ($n = 60$) of professionals regularly ask parents about access to external sources of support, such as friends and family or members of the local community. A proportion of professionals often (31%, $n = 44$) or sometimes ask (21%, $n = 29$). Significantly more QToDs (36%, $n = 23$) regularly ask about external pressures, compared with SLTs (23%, $n = 17$, $t(7.25) = -1.99$, $p = 0.008$). No other significant differences were found.

3. What are the differences in PCI assessment practices between practitioners who differ in profession, hearing status, languages used at work and years of experience?

Differences in PCI assessment practice between professional groups

Psychologists ($n = 3$) and NDCAMHS professionals ($n = 6$) were removed from these *t*-test analyses due to small numbers. To explore differences in skills selected, a ‘1’ was given for each of the 52 parent-focused behaviours that respondents selected throughout the survey and a ‘0’ was given where the professional had not selected that behaviour. Behaviours were categorized as in section 2.1 above, that is, 12 visual, seven auditory and 10 tactile attention-getting strategies; six parental sensitivity behaviours; five behaviours focused on access to communication and 12 on language enrichment. When QToDs and SLTs were compared across the six categories above, there were no significant differences in the number of behaviours selected, except for the five parent behaviours around providing good access to language. On average, SLTs assessed four of these five skills and QToDs assessed all five ($t(144) = 4.06$, $p < 0.001$). Looking back to the descriptive data within this category, we can see fewer SLTs (52%) assessed whether the parent checks the child can hear all six Ling sounds compared with QToDs (86%) and fewer SLTs (56%) assessed child-directed sign, compared with 73% of QToDs.

The methods used in PCI assessment were very similar and no significant differences were found between groups, except for the location of assessments. Mostly, QToDs assessed mothers in the home (92%) with less assessed in community clinics (2%), nurseries (3%) and specialist centres (3%). The distribution for SLTs was more spread: 59% of assessments happened at home, but some took place in community clinics (16%), specialist centres (11%), hospitals (9%) and nurseries (5%), $t(128) = -4.36$, $p > 0.001$. There were no significant differences in the goal setting practices of both professions, nor were there any differences in their confidence ratings in assessing parents' skills during interaction.

Differences in PCI assessment practices between professionals with differing hearing status

The survey recruited 23 deaf professionals and 164 hearing professionals. Inferential statistics were not run due to an imbalance in sample size. However, some subtle differences in behaviours valued as most important to assess were noted. When professionals selected the most important behaviours to assess, six parent behaviours were the same across deaf and hearing professionals but were ranked differently. These were being face to face, waiting/pausing, structure and stimulation, child-directed language, emotional availability and expanding on the child's language. For the other four skills, deaf practitioners assessed visual-based attention getting strategies, joint attention, positive regard, and the parent using praise; whereas hearing practitioners assessed multimodal attention-getting strategies, contingency/responsiveness, commenting/describing and interpreting the child's action with language.

There were no differences in the PCI assessment methods or goal setting behaviours. Both hearing and deaf practitioners ranked themselves highly in terms of their confidence with assessing deaf children in PCI, but in terms of assessing parents' skills in PCI, deaf practitioners rated their confidence lower (64/100) compared with hearing practitioners (75/100). Again, caution is required with this finding due to stark differences in group sizes.

Differences in PCI assessment practices between professionals who use English only at work and those who use English and BSL

These two groups of professionals were compared on how many of the 52 parent-focus behaviours they assessed across the six categories. There were no significant differences found between the two groups. The top 10 parent behaviours to assess were also very similar, with eight of the 10 being the same. Professionals who only use English at work (referred to here as monolingual-focused professionals) prioritized assessing whether the parent uses child-directed language and whether they interpret the child's behaviour with language. Professionals who can use English and BSL at work (bilingual bimodal-focused professionals) prioritized assessing the parents' use of comment/describing the play and whether the parent is within 1–2 m of their child's amplification device(s). There was a significant difference in how professionals assess joint engagement. Significantly fewer monolingual-focused professionals count the number of connected turns (57%, $n = 38$) compared with bilingual bimodal-focused professionals (73%, $n = 53$, $t(133) = 1.97$, $p = 0.5$). Similarly, significantly fewer monolingual-focused professionals note the length of time a parent and child remain engaged (64%, $n = 43$) compared with bilingual bimodal-focused professionals (75%, $n = 55$, $t(138) = 1.44$, $p = 0.01$). Both groups rated their confidence in assessing parent's skills the same (76/100).

Differences in PCI assessment practices between professionals with different levels of experience

Professionals with under and over 10 years' experience were compared on how many of the 52 parent-focus behaviours they assessed across the six categories. Significant but marginal differences were observed in the number of auditory-based attention getting strategies assessed; those with less experience assessed five of the six skills on average, whereas those with more experience assessed all six skills on average ($t(51) = -1.994$, $p = 0.05$). Similarly those with less experience assessed fewer language-based parent behaviours (nine out of 12) compared with more experienced professionals, who assessed 10 of the 12 behaviours ($t(153) = -1.929$, $p = 0.05$). Regarding their most selected parent behaviours to assess, eight of the 10 chosen were the same. Less experienced professionals prioritized joint attention and positive regard, whereas more experienced professionals prioritized stimulation and structure, and interpreting the child's behaviour with language. Methods of assessment and goal setting behaviours were very similar. Finally, less experienced practitioners rated their confidence in assessing parents' skills significantly lower (66/100) when compared with those with more experience (78/100), $t(144) = 3.75$, $p < 0.001$.

DISCUSSION

This is the first study of its kind to report on professionals' practice of PCI assessments of hearing parents and deaf infants. The total sample size was 190 for part 1 of the survey, reducing to 148 in the final section, part 4. This exceeded the sample size reported by Rees et al.'s (2015) intervention-focused survey of professionals working in pre-school deafness ($n = 158$ for part 1 and $n = 117$ for part 2). We were successful in recruiting widely across England and within Northern Ireland, Scotland and Wales.

Almost all our sample self-reported specialist skills in working with deaf children and over half had more than 16 years of experience. These professionals are well established, well-practised experts in the field of PCI assessment in deafness, therefore enhancing the validity of our findings. As described, the survey's content was based on a systematic review of 61 papers that assessed PCI between parents and their deaf children aged 0–3 (Curtin et al., 2021). The value of consulting this group of professionals has uncovered the differences in clinical and research PCI assessment practice, including which parent behaviours are prioritized in practice, how assessments are conducted, and how goals are made. The survey also extends the knowledge base on clinical PCI assessment in this field by uncovering 18 more parent-focused behaviours.

Parent behaviours

PCI assessment is routine practice for almost all professionals in our survey. By far the most frequently assessed parent behaviour was 'waiting', that is, observing whether the parent waits for the child to look before they communicate. The next most frequently assessed parent behaviour (agreed upon by all four professional groups) was responsivity and contingency, that is, ascertaining whether the parent follows the child's lead and responds with on-topic cues or language. Within the top 10 of most assessed skills, there were three more language-focused behaviours: adding one or two new words/signs to the child's utterance; interpreting the child's behaviour with language; and commenting or describing the child's action. These language skills echo the parent behaviour of responsivity and contingency, as they are all based on the parent observing, receiving and then responding to the child's language or behaviour. These findings align with the parent behaviours taught in PCI intervention studies carried out by Glanemann et al. (2013), Roberts (2019) and Nicastri et al. (2021). Each of these intervention studies involved parents of deaf children aged 0–3 learning these behaviours. With all three studies highlighting the value of these particular parent behaviours in promoting good language development, it is encouraging to see that professionals observe whether they are present in PCI.

Almost two thirds of participants prioritize assessing parents' methods of gaining their child's attention and whether the parent is face to face with their child. Almost half of professionals assess whether the parent used child-directed language, that is, adapting their speech or sign to raise the child's interest. Despite not being within the top 10 in Table 2, high numbers of professionals measure joint attention in some way. Assessing these skills within interaction is important as gaining and maintaining joint attention is positively associated with deaf children's language development (Barker et al., 2009; Cejas et al, 2014; Chen et al., 2020; Dirks & Rieffe, 2019). There is also evidence to suggest deaf children will attend to, and their language learning benefits from, child-directed speech (Dilley et al., 2020; Wang et al., 2017) and/or child-directed sign (Koester & Lahti-Harper, 2010; Perniss et al., 2018).

The majority of professionals assess two more features of parental sensitivity; whether the parent is stimulating and can provide appropriate pace and structure in play and language, and whether the parent shows genuine interest, involvement, and availability to the child. These features link to the parents' willingness to engage with, attune to, and enhance interaction with their deaf child. They are important to observe within PCI, as higher rates of parental sensitivity correlate with greater language scores in deaf children (Dirks & Rieffe, 2019; Pressman et al., 1999; Pressman et al., 1998; Quittner et al., 2016; Quittner et al., 2013).

Most professionals noted the number of words or signs used by the parent to the child within their PCI assessments. As discussed above, professionals also assess parents on their abilities to gain their deaf child's attention, remain face to face and provide language that is child directed. We could infer professionals noting the number of words used by a parent are also assessing whether the number of words used is appropriate for the child's age and stage of language development, whether the number of words used (and the way they are used) are perceptually and cognitively accessible by the child. This aligns directly to the research work of Hall (2020), where parental input (signed or spoken) matters: 'it is not enough to simply consider what kinds of linguistic signals are being sent to a child. Instead, it is necessary to think about the linguistic signals that that child is receiving' (p. 3).

Differences, though small, did exist between some professional groups. For example, psychologists and NDCAMHS professionals assessed visual and tactile based attention-getting strategies the most, whereas QToDs and SLTs assessed primarily visual and auditory strategies. Furthermore, psychologists and NDCAMHS professionals prioritized far more parental sensitivity skills within their top 10s than SLTs and QToDs. This is likely due to their professional focus on positive mental health and well-being for the families, parents, and deaf children they see within their service. However, caution must be taken with this finding, due to a large contrast in sample size between groups.

A similar difference was also seen between SLTs and QToDs. In comparison to SLTs, QToDs were more likely to assess parents using the Ling sound checks and child-directed sign, as many QToDs have advanced audiology training as part of their master's-level degrees and are also expected to know/learn BSL. Finally, more QToDs check in on parental wellbeing than SLTs. This may be because generally in the UK, QToDs are the first professionals in the home with families following a child's identified deafness and may therefore have a closer connection to parents.

One behaviour that does not align between research and practice is 'restating the child's utterance into a question format'. This was one of the least selected parent behaviours to assess in practice but was highlighted by DesJardin and Eisenberg (2007) as a higher level facilitation language technique and positively associated with deaf children's language skills. DesJardin and Eisenberg's paper has since been cited many times, with other established authors using their coding system to analyse PCI (Ambrose et al., 2014; Chen et al., 2019; Dirks & Rieffe, 2019). Based on our survey, professionals seem wary of parents asking or relaying questions, whereas research suggest this may be supportive in developing language.

Methods

Our study uncovers the routine practice of UK professionals assessing PCI. Assessments were reported to take place mainly with mothers in the family home. Professionals mostly watched play-based interactions live and made mental or written notes, with only a fifth of professionals using video recordings. Professionals made sense of their observations through using their own skills, knowledge and expertise.

When compared with the Curtin et al. (2021) review, similarities and differences were found between researchers and practice-based professionals. For example, both researchers and professionals tend to assess mothers most. The importance of the mother–child bond has long been the focus of research and practice, but fathers are known to have positive impact on the deaf child's academic, language and social–emotional development too (Calderon & Low, 1998; Hintermair, 2006). Gender differences have been found between hearing parents use of spoken language with deaf children (Löfkvist et al., 2022), and there are also differences between hearing and deaf fathers in the amount of visual–tactile interaction strategies and wait-time they use to gain their child's attention (Loots & Devisé, 2003) and between the number of turns taken by deaf mothers and deaf fathers when interacting with their deaf children (Wille et al., 2019). As recommended by Szarkowski and Dirks (2021), future work should focus on both parents, the mother–father–child triad, or indeed other parent–parent–child dynamics.

We identified that over three quarters of professionals assess parents in free play with their deaf infants (free play was also an inclusion criterion for Curtin et al.'s, 2021, review). Play involves the integration of cognitive, social and emotional processes (Cohen, 2018). It has been called 'the child's work' by Montessori (2004), more than just fun, but the driving force behind the development of a child's ability to think, plan, sequence, develop motor pathways, take turns, share enjoyment, express emotion, communicate, imagine and pretend. It, therefore, seems apt that UK professionals focus on this concept within interaction. Play opportunities certainly exist in a wide range of cultures but vary in frequency, mode and partner (Roopnarine, 2010).

While researchers mainly preferred a more controllable context (i.e., clinics and labs), assessing PCI in homes only 26% of the time (Curtin et al., 2021), families in our survey were mostly assessed at home by professionals (72% of the time). Home is seen as an advantageous place in terms of the 'ecological validity' of the observation (Smith, 2010, p. 6), is more representative of real life, and remains key to providing family-centred care, as the families' toys and favourite interactive activities are in easy reach.

Another difference between practice-based professionals and researchers is in the methods used to analyse PCI. For example, the majority of researchers use video recordings and either detailed frame by frame coding, validated scales, or a mixture of coding and validated scales. Conversely, professionals mainly observe PCI live and make mental or written notes, with 88% relying on their own skills and knowledge to decipher the PCI. Video recording was used by less than a quarter of professionals. When observing play and play-based interactions, video recording is recommended by Smith (2010) as it does not lose any information, increases accuracy in interpretation, can be played over and over, moments can be observed that were not apparent at first viewing, videos can be freeze-framed, precise measurements can be made, and the practice is less intrusive for infants if cameras are inconspicuous. There is a risk that professionals are missing information or making errors in interpretation if they are not using video at least some of the time.

Lastly, the formal, validated assessments reported to be used by 14% of professionals (the ADOS, the Nottingham Auditory Milestones, the Rossetti Infant Toddler Language Scale, the Infant Monitor of Vocal Production, and Pre-school Language Scales) are not in fact designed for the assessment of PCI in deafness but mainly assess skills *within the child*. Most professionals who completed the survey were very experienced and in the absence of a deaf-specific, evidence-based tool, it could be considered that relying on one's skills, knowledge, qualifications and experience is a legitimate way to observe and analyse PCI. Many disciplines, including health, depend on expert judgement where time, resource and adequate data are limited (Burgman et al., 2011; Morgan & Henrion, 1990). However, for less experienced professionals, very little guidance exists on how to observe a parent's skills in interactions with their deaf child. Our survey found that less experienced professionals assessed PCI less regularly and felt significantly less confident in assessing parents' skills compared with those with more experience. The development of an assessment for PCI in deafness is likely to benefit all practitioners (with goal setting, measuring progress) but perhaps provide particular support to early career practitioners with which skills to look for.

Goals

For most professionals, assessments of PCI lead to the development of family-orientated goals and these are targeted in subsequent visits. This conduct is aligned with Moeller et al.'s (2013) 'best principles' paper, where family-centred assessments are recommended within play and everyday routines to determine the need for change or enhancement to communication, and parents are encouraged to reflect on outcomes and evaluate successes (Moeller et al., 2013). Our findings suggest that many UK professionals are doing this, either jointly setting targets with parents or asking parents to choose a target themselves. Goals drive progress and change and help to steer the course of intervention. Goals that incorporate the parent as the expert and align with parental priorities and preferences as well as the acknowledgement of family routines have been found to lead to progress in a range of parent-implemented programmes with children with additional needs (Lucyshyn et al., 2002; Rodger et al., 2004). Our survey also highlighted that nearly a quarter of respondents only set goals 'sometimes'. This may be explained by two overlapping characteristics among individuals within this group: a smaller proportion of their work was spent with children with this age group and the lack of regular supervision from a more knowledgeable colleague.

Limitations

The structure and topics in the quantitative survey were driven by a systematic review from Curtin et al.'s (2021) review of PCI assessments in research. Researchers often choose topics in order to test theory, not to support intervention in practice. Therefore, the closed question, tick-box style of the e-survey may have narrowed responses for practitioners. To address this, open text boxes were provided enabling participants to add further parent behaviours that were not drawn from research.

Professional bodies such as BATOD and RCSLT do not have detailed figures for the number of professionals working with deaf infants 0–3, therefore the representativeness and generalizability of these findings are unclear. It was also unfortunate that we were unable to recruit more psychologists, more NDCAMHS professionals, more male professionals, more deaf professionals, and more with under 3 years of work experience. With respect to deaf professionals, efforts were made to subtitle recruitment videos, create videos explicitly for BSL users, and share within professional deaf networks such as the UK Deaf QToD group. Providing professionals with a longer window to respond and more reminders to complete the survey may have increased participation. Similarly, UK-based higher education institutes that offered SLTs and QToD courses were asked to share the survey with their alumni to recruit recent graduates and early career professionals. Low numbers of early career professionals may be explained because few work with the 0–3 age group; the recruitment strategy was not robust enough; potential recruits were not confident enough to complete the survey, and/or were too busy with settling into their roles.

As is a risk for all questionnaires, participants may not have been completely truthful in reporting practices (aligning with social desirability bias). The anonymity of the survey will have assisted with this as well as the reassurance provided at the start of the survey that guidelines in PCI assessment in deafness do not currently exist, and wrong answers are therefore not possible.

IMPLICATIONS FOR PRACTICE

Based on our survey of well-established experts working in the field of PCI with young deaf children aged 0–3, we recommend the following in future practice:

- Assessments of PCI incorporate a range of parent-based behaviours, including the 10 listed in Table 3.
- Despite survey findings, assessments of PCI should be video recorded where possible. Professionals could suggest using parents' own devices to record the PCI. Professionals and parents can then replay and reflect on the video together during the session and leave the recording with parents to share with other family members.
- Following assessment, parent-focused goals should be set in collaboration with families, ensuring parents'

skills, particularly their strengths, are considered. Mothers, fathers and other primary care givers are to be included in the process where possible.

- Reassessment should take place regularly (at least termly) to monitor and encourage families' progress. The timing of reviews should be discussed between parent and professional.

FUTURE RESEARCH

Though this survey paper describes routine PCI assessment practice with deaf infants in the UK, it does not provide information on the professional reasoning behind the decisions they make. For instance, we do not know how a PCI assessment may change where the child has additional needs, where the child is implanted, or where the family use a language other than English. In addition, though we know professionals check in on parental well-being, we do not know how this is done and how a parent's well-being might influence the approach a professional takes for a PCI assessment. We explore these aspects of professional practice in a follow-up study using explanatory focus groups.

Further, the outcomes of our systematic review, this survey data and the follow-up focus groups will provide the basis for an international e-Delphi, where a range of expert skill, knowledge and experience will be consolidated towards the development of an assessment tool. The tool will be for experienced and novice professionals to use, with the aim of standardizing and formalizing the assessment, identification of targets, and monitoring of progress in parent–deaf child interaction.

CONCLUSION

This study has demonstrated that experienced professionals in the UK report routinely assessing parent-focused behaviours when observing PCI. Many of the parent behaviours reported to be included in practitioner assessments have also been associated with, or found to be drivers of, improvements in deaf children's language development. Survey respondents also included 18 skills that were not initially suggested in our survey or uncovered by our preceding large-scale systematic review.

Professionals typically observe mothers, in the home environment, during play. Professionals typically use their own skills and experience to decipher observations made in the home, and rarely use video recordings or a deaf-specific, evidence-based framework to support either their PCI analysis or goal setting processes. As mentioned above, it is our aim to address these gaps in practice through the development of a new tool in PCI for deaf infants.

ACKNOWLEDGEMENTS

The authors sincerely thank all the professionals who took part in the study, as well as the organizations and networks that aided the recruitment of participants. Special thanks also to our group of hearing and deaf parents and professionals for their ongoing involvement throughout the project.

CONFLICT OF INTEREST

The authors declare no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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ENDNOTES

[1] QTODs are trained teachers with an additional 2-year master's-level qualification that covers topics in deaf education, communication and audiology. QToDs are also expected to have a basic level (minimum level 1, from the Council for the Advancement of Communication with Deaf People—CACDP) in British Sign Language (BSL). A QToD may refer a deaf child to an SLT automatically, or only if there is a concern about a child's communication development. This referral pathway varies across the UK as local trusts within the UK health service and education departments operate differently. The RCSLTs and the British Association of ToDs recommend approaches for working collaboratively (2019).

[2] SLTs gain either undergraduate or master's-level qualifications in speech, language and communication development and disorders. They then develop a specialism in deafness post-qualification through working in deaf settings and attending post-qualification courses in deafness. They must also receive regular supervision with a more knowledgeable clinician in deafness, in order to work through clinical cases and develop competency with the client group.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Curtin, M., Morgan, G., Cruice, M. & Herman, R. (2023) Assessing parent interaction with deaf infants: A quantitative survey of UK professional practice. *International Journal of Language & Communication Disorders*, 1–20. https://doi.org/10.1111/1460-6984.12849