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ORIGINAL ARTICLE

A tool to profile neural, sensory and motor development in children at school entry, identifying possible barriers to learning and emotional well-being in early childhood

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Abstract

The objective of the study was to develop a prototype for an accessible, high quality, cost and time-effective 'Development Profiling Tool' for use in reception classes. This would build a unique picture of every individual child's developmental at the beginning of their educational journey, meaning that interventions for any comparable areas of difficulty could be started early in the child's schooling. In this study, a prototype of the tool was developed and tested for reliability, validity and usability. Through content analysis of a range of screeners and the merging of targeted expertise, a single 54 question observational questionnaire was constructed that incorporated the five developmental domains considered to impact on learning and emotional well-being: auditory skills; internal senses (proprioception and vestibular input); external senses (auditory, visual and tactile responsivity); fine motor skills and gross motor skills. Thus, the Development Profiling Tool was created.

KEYWORDS

development, early intervention, learning, profiling, well-being

Key points

- For a child to learn successfully a number of developmental building blocks need to be present.
- These include effective sensory responsivity and motor coordination.
- This study develops a Developmental Profiling Tool to map every child's development at the start of their schooling.
- The study also tests the prototype for reliability, validity and usability.

INTRODUCTION

Development during infancy and early childhood is intrinsically driven, and both dynamic and rapid. However, the development and physical growth that occurs through this post-natal period is usually predictable and follows well recognised patterns that are demarcated by specific skill attainments called 'milestones'. These milestones are categorised into five groups: social/emotional, fine motor, gross motor, language and cognition, and examples include smiling, grasping, walking and talking. Identifying these markers of development is essential to determining atypical development and as such, parents/carers are encouraged to record when these observable milestones have been achieved as 'baby's firsts'. In addition to this, infants are reviewed at regular (9–12 months and 24–30 months) health

visitor checks where any deviations from the anticipated model are flagged and referred on for extra help to specialists such as paediatricians, speech and language therapists and physiotherapists.

The tangible nature of milestones lends itself well to checklists that can be simply ticked and dated when observed. However, behind these developmental goals are a culmination of highly nuanced and complex sensory and motor interactions that are incomparably refined and evolved, invisibly designating any milestone as subtly unique. Ultimately, it is the uniqueness of these sensorimotor interactions that provide the innate foundations to every child's development, from daily living skills to social communication and academic learning. Thus, the detail as to how each observable milestone is acquired synchronously provides the variance and subtleties of development. This correlative relationship can be seen in Taylor and Trott's Pyramid of Learning (1991) (as cited in William's & Shellenberger, 1996) where the acquisition of each new skill is underpinned by the prior development of the necessary sensorimotor skills (See Figure 1).

Past and present theories of development reinforce the importance of sensorimotor skills, with pioneering developmental psychologist Piaget's four-stage theory of development (1971) beginning with the sensorimotor stage, in which the infant learns about the world through their own senses and action; and the more recent theory of embodied cognition emphasising the role of sensory and motor functions in cognition itself (Foglia & Wilson, 2013). In addition to theory, an array of studies make links between sensorimotor skills and academic achievement (Ivanović et al., 2019; Lopes et al., 2013; Taanila et al., 2005), while variances and deviations in sensorimotor development are widely implicated in neurodiversities ranging from autism to dyscalculia (Babu & Sasikumar, 2019; Banaschewski et al., 2001; Dewey et al., 2002; Hannant et al., 2016; Torres & Whyatt, 2017; Yochman et al., 2006).

With multiple facets of development intrinsically associated with the infinite and unparalleled sensory and motor connections that occur during early childhood, mapping sensory and motor skills in the early years, above and beyond the developmental milestones, appears to be pivotal to identifying any subtle deviances and delays that might impact socioemotional development and academic achievement. Indeed, existing developmental surveillance screeners that have been created in the United States and Canada include some of these observations (Dosman et al., 2012; Sheldrick & Perrin, 2013). With assessments in the United Kingdom assessing for variances in coordination and reflexes (Goddard Blythe et al., 2022; Squires & Bricker, 2009). However, with the foundations of the pyramid of learning (Figure 1) and development being so complex it is imperative that a developmental profile includes the assessment and observation of all modalities; internal and external sensory responsivity, fine and gross motor skills, auditory processing and visual perception, which, and as far as the author is aware, existing 'surveillance screeners' do not.

Furthermore, a fundamental consideration when identifying important markers of development is the observer. As noted previously 'baby firsts' are reliant on parent observations, and the tangible nature of these developmental milestones lends itself well to such assessment. Nonetheless, research has shown repeatedly that parents' beliefs in their child's cognitive, social and motor functioning is often overestimated, and at times underestimated (Callan Stoiber, 1992; Dizon-Ross, 2019; Kitamura et al., 2015; Miller et al., 1991; Moens et al., 2018). In addition to this, the complexities of the sensorimotor and nervous system and the subtleties of any deviations from the expected trajectories requires specialist knowledge and attention; justly developmental checks are completed by Health Visitors. However,

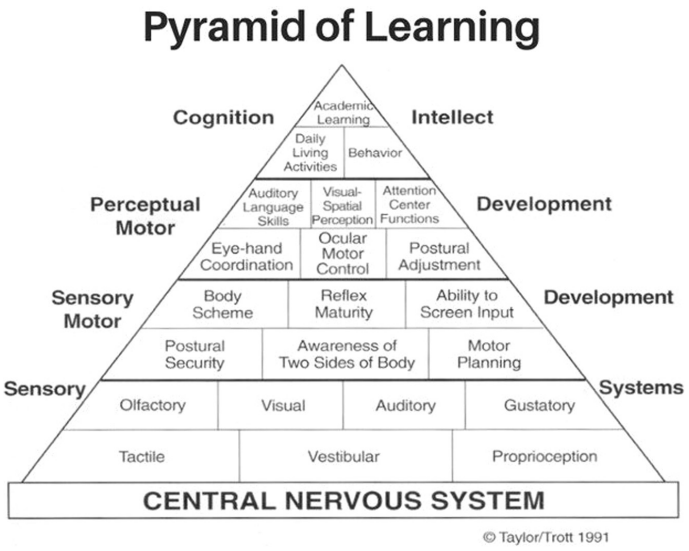

FIGURE 1 Taylor and Trott's Pyramid of Learning (1991).

pre-COVID-19 pandemic, 2018/19, there was a large variation (ranging from 35% to 100%) across local authorities (LA) in England, of eligible children receiving their 2–2 ½ year health checks, with 31% of LAs not completing health checks on more than a quarter of the children. Furthermore, during this time two thirds of the reviews completed were not done so by Health Visitors but by other healthcare professionals and members of the Healthy Child Programme (Hancock, 2020). This was pre-pandemic. Since the COVID-19 pandemic development checks have been postponed, carried out virtually or by phone call, with a considerable number of children missing development checks altogether (Moreton, 2021). Additionally, a survey of 663 Health Visitors, completed by the University College London, found that 38% of the Health Visitor respondents (253) had their caseloads increased to 50% or more due to Health Visitor team member redeployment (Morton & Adams, 2022). Such challenges to the Health Visitor sector, the COVID-19 pandemic, in addition to the methods used to collate information on children have culminated in fewer developmental checks occurring and the quality of the checks deteriorating. Nonetheless, as school baseline assessments for reception children provide only an 'on-entry assessment of pupil prior attainment in maths, literacy and communication' (Reception Baseline Assessment, 2020) in addition to optional language screeners such as the Nuffield Early Language Intervention (NELI, 2021), parents and educators are reliant on the healthcare sector to identify developmental differences in areas such as hearing, vision, coordination and speech.

The Reception Baseline Assessment (2020) mentioned above, in addition to the Early Years Foundation Stage syllabus relies heavily on the 'expert professional judgment' of the Early Years Teacher, noting that knowledge of a child is built from their observation of development during day-to-day activities (Early Years Foundation Stage Handbook, 2021, p. 8). With the Teaching Standards for Early Years (2013) including the ability to 'observe and assess children's development and learning' embedded throughout, the early years teacher intrinsically develops the mindset to observe every facet and detail of a child's growth and development to make a summative assessment within the Early Learning Goals at the end of the reception year. Thus, with approximately 1% of children being home educated in the Early years (Long & Danechi, 2022), 99% of 4–5-year-olds are educated by teachers whose work encompasses and hinges on the powers of observation.

Utilising this powerful skillset, inherently acquired by early years teachers, the aim of this study is to design an accessible, high quality, cost and time-effective 'Development Profiling Tool' for use in reception classes to build a unique picture of every individual child's developmental 'sensorimotor building blocks'. The Development Profiling Tool, hereinafter referred to as the 'Tool', will measure and profile areas of development that are considered barriers to learning and emotional well-being. In doing so, this study will help identify both atypical and uneven development in children at the start of their educational journey, in order to signpost interventions for these areas of comparable difficulty early in the child's schooling. This will ensure the pyramid of learning (Figure 1) and communication is reinforced at the foundations; prioritising a child's readiness to learn, rather than what they have learnt, on school entry. Such timely recognition and therapy will impact immeasurably on a child's long-term academic achievement, confidence and life goals.

METHOD

This methodology is three tiered: the development of the tool; the prototype trial of the tool; the testing of the tool's reliability, validity and usability. Stages 1 and 2 were part of a practitioner study that was designed to help target early intervention effectively within a group of schools. Stage 3 was necessary to validate the study to develop further. Ethical approval was obtained by the local research Ethics Committee.

Stage 1—The development of the tool

In order to create a Development Profiling Tool that was both robust and comprehensive, it was important to approach its creation utilising both secondary and primary resources, in the form of recognised screening tools and professionals trained in related and specialist disciplines. A multi-disciplinary team consisting of a developmental psychologist, paediatrician, speech and language therapist and occupational therapist were engaged to document important aspects of development, within their own area of expertise, that needed to be established to promote a child's capacity to learn and be emotionally and socially secure. These constructs were based on Taylor and Trott's Pyramid of Learning (1991) (as cited in William's & Shellenberger, 1996) and included sensory responsivity, neural responses, coordination and auditory skills. It is important to note here the difference between auditory skills and phonological awareness. Auditory skills detect sound onsets and offsets, including the discrimination of sound and recognising sound irregularities (Huotilainen et al., 2008), while phonological awareness refers to an individual's awareness of the sound structure of a spoken word (Gillon, 2017). Auditory skills are critical to the

development of phonological awareness and speech. The determinants contributed by each professional were then cross referenced with the following screening tools: Ages and Stages questionnaires 48 months (Squires & Bricker, 2009), The Sensory Profile Checklist—Revised (Bogdashina, 2016), the Little Developmental Coordination Disorder Questionnaire DCDQ (Wilson et al., 2015), the Movement ABC checklist (Henderson, et al., 2007) and the Leicestershire Sensory Screener (Thorpe & Crispin, 2017). Accordingly, several points consistently emerged spanning both primary and secondary resources. The multi-disciplinary team then devised a series of tasks and observations that would provide 'true' or 'false' determinants for these measures, coupled with attributes each discipline felt were requisite to profiling the sensory and motor development of children. It was then important to ascertain the ease of administering the tasks within the early years foundation stage (EYFS) and so guidance was sought and offered from two experienced EYFS teachers. Consequently, the tasks were adapted and modified as necessary, categorised into modalities (auditory skills, internal (proprioception and vestibular input) and external (auditory, visual and tactile) sensory responses and fine and gross motor skills) and uploaded onto an Excel spreadsheet, thus creating a very simple and accessible 'Developmental Profiling Tool' (Figure 2). Fundamental and minimal information to be understood by EYFS teachers with regards to child development were cascaded by the SENCos (Special Educational Needs Coordinators) in seven primary schools after training by the developmental psychologist, to ensure proficient administration of the 'Developmental Profiling Tool', in addition to the insertion of videos within the tool to ensure accurate observations.

Stage 2—Prototype trial of the Development Profiling Tool

During the autumn term of 2021, 172 reception children based in seven primary schools within a multi-academy trust (MAT) in South Leicestershire (overall deprivation decile 8; with 1 being the lowest), and a large primary school in Northamptonshire (overall deprivation decile 7) were assessed using the Tool. After cascaded training from the SENCo, EYFS teachers commenced observations of the children during complementary activities and collected Boolean data (Yes/No) based on each child's skillset across the Tool's modalities. The Boolean data was then added to the pre-populated Excel spreadsheet and positive (YES) scores were calculated as percentages of the total number of observations made per modality. Percentages were then utilised to create radial charts of each child's profile across the tool, thus determining comparable areas of strengths and weakness for each child's sensory and motor development, see Figure 3.

With each child's developmental profile mapped, EYFS teachers were then able to assign pre-signposted and evidence-based targeted interventions to each child within their class over the spring term, thus supporting all children quickly and effectively in any comparably weaker areas of development.

Stage 3—Reliability, validity and usability

To demonstrate validity of the Tool, between 10% and 15% of the children assessed were chosen from each school using simple random sampling; this equated to 20 children across the seven participating schools. Each child then had two of the initial cross-referenced screeners from Stage 1 sent home to parents/carers to measure each child's sensory

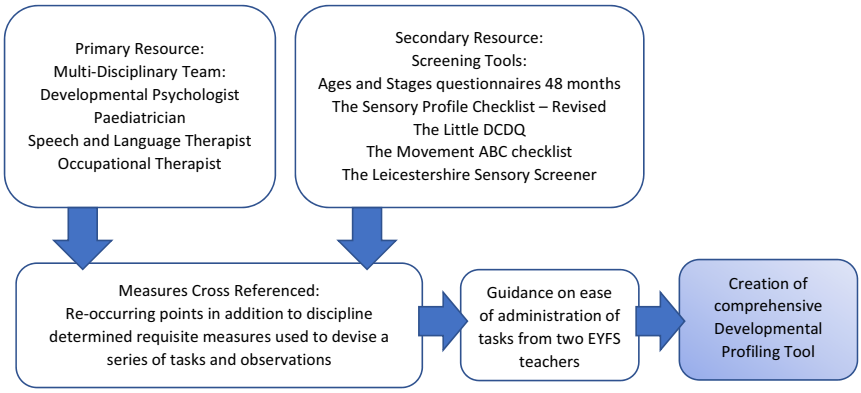

FIGURE 2 Flow diagram to show the stages of 'Developmental Profiling Tool' creation.

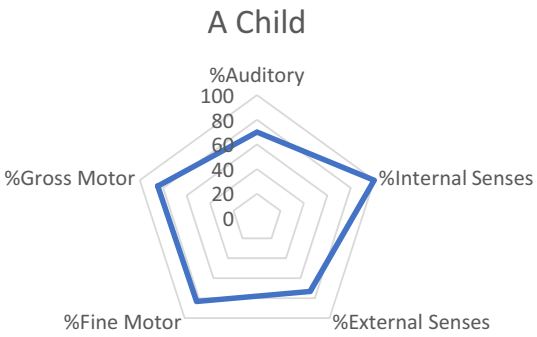

FIGURE 3 Radial chart showing an anonymous child's profile, accentuating areas of strength and weakness.

responsivity and coordination according to parent observation. The sensory responsivity was measured using the Sensory Profile-2 (Dunn, 2014): standardisation sample 1791 children aged birth to 14 years 11 months; internal consistency 0.60–0.90; inter-rater reliability 0.49–0.89; test–retest reliability at 0.87–0.97; good content and construct validity when applying the Quality Criteria for Health Status Questionnaires (QCHSQ) (Licciardi & Brown, 2021). The coordination screener was the Little DCDQ (Rihtman et al., 2011): standardisation sample 353 three- to four-year-olds, with a subgroup of 119 children used to determine motor impairment; test–retest reliability 0.96; internal consistency 0.94; construct and concurrent validity showed significantly different scores between children thought to be typically developing and those at risk (Wilson et al., 2015). Additionally, SENCos within the schools administered sound discrimination assessments on the same children using the 'Speech discrimination in noise' and 'Mimicry' subtests from the Auditory Skills Assessment (Geffner & Goldman, 2010): standardisation sample 225 3;6-year-olds to 4;11-year-olds; internal consistency reliability 0.60; test–retest reliability 0.64; construct validity no comparisons available for age range and assessment.

Upon receipt of the parental questionnaires, results were correlated with the original Tool outcomes using a Pearson's correlation in IBM SPSS Statistics (Version 27) (IBM Corp, 2020) per sampled child. Inter-rater reliability was assessed indirectly by analysing the descriptive data for normality and outliers.

To assess usability and impact, 10 EYFS teachers partook in a focus group semi-structured interview, 5 of which were also SENCos in their respective schools. Consent was sought describing the purpose of the study and confidentiality of interview. After welcoming the interviewees ground rules were discussed followed by interview questions based around three topics: overall impression of the tool, simplicity of use and impact in addition to prompts to support discussion.

Strengths and limitations were recorded from discussions in conjunction with a vote as to whether they would be recommending the tool to all EYFS teachers.

RESULTS

Stage 1: The development of the 'Development Profiling Tool'

With the synergism of the multi-disciplinary team in addition to the cross-referenced screeners, a 54-question observational questionnaire was constructed, divided into five areas of development and consisted: 11 auditory skills questions, 7 internal senses questions (proprioception and vestibular input); 15 external senses questions (auditory, visual and tactile); 7 fine motor control questions; 14 gross motor control questions.

Content analysis

Each existing screener was cross referenced against the other screeners and the professionals' requisites, according to the area of development. For example, 'fine motor skills' questions from the Ages and Stages questionnaire 48 months (Squires & Bricker, 2009), Little DCDQ (Rihtman et al., 2011), Movement ABC checklist (Henderson, et al., 2007) and occupational therapist's stipulations were culled and seven observations were consistently apparent: *copying, colouring within boundaries, drawing body parts, fastening medium buttons, threading small beads, cutting paper in straight line and can cross midline*. See Table 1 for example.

For each observation required, a simple Boolean task was generated by the associated professional, in this case the occupational therapist, and included in the questionnaire, providing an even representation of the screeners' and professional's requirements. For example, '*Is able to copy* - | O', '*Is able to fasten medium buttons*', '*Is able to colour within boundary lines*', '*Is able to thread small beads (1 cm)*'.

This process was repeated for the other four areas of development, auditory skills, internal senses, external senses and gross motor skills.

Stage 2—Prototype trial of the development profiling tool

Radial charts produced from the Tool's questionnaire responses were created for each of the 172 children taking part in the study. Any group analysis of these data was considered outside the purposes of this study as data was collated to create single radial charts that were personal and unique to each child's profile. These were created to ascertain comparable areas of strengths and weaknesses within each child's sensory and motor development, serving only to indicate possible areas of concern that would benefit from targeted support; noted as results at or below 80% (See Figure 4). Pre-existing and evidence-based interventions were signposted but not endorsed to help facilitate this process.

Stage 3—Reliability, validity and usability

Table 2 shows correlations between the teacher-assessed Development Profiling Tool (The Tool) and the parental screeners utilised to ascertain construct validity. Across each of the modalities the Tool shows moderate to large correlations between the screeners sent home to parents and the teacher-based tool. Specifically, correlations were apparent between the auditory skills section of the Tool and the sound discrimination subtask on the Auditory Skills Assessment (Geffner & Goldman, 2010) with moderate effect. Auditory skills were also significantly correlated with gross motor coordination on the Little DCDQ (Rihtman et al., 2011) with moderate effect. Internal senses on the Tool (proprioception and vestibular input) were significantly correlated with both fine and gross motor skills on

TABLE 1 Example of repeated outcomes from screeners and professional stipulations.

Example observation	Responses from screeners and associated professional
Copying	• Holds a pencil/crayon and can copy simple lines or shapes with it (Little DCDQ) • Ask your child to copy three of the four shapes below using a pencil/crayon, without tracing (Ages and Stages 48 months) L | O + • Can copy - | O + (Occupational therapist)
Fastening medium buttons	• Can fasten buttons (Movement ABC checklist) • Does your child unbutton one or more buttons (Ages and Stages 48 months) • Can button and unbutton medium-sized buttons (Occupational therapist)
Colouring within the boundary lines	• Does your child colour mostly within the lines in a colouring book with lines (Ages and Stages 48 months) • Can stay within the boundary lines when colouring (Occupational therapist)
Threading	• Can manipulate small objects such as beads (Movement ABC checklist) • Can thread small beads onto a string (Little DCDQ)

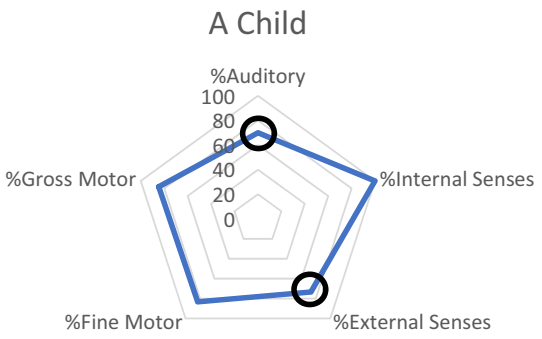

FIGURE 4 Radial chart with areas of comparable concern indicated by circles.

TABLE 2 Correlations between the 'tool' and screeners.

Development profiling tool area	Auditory skills assessment (ASA)—Sound discrimination	Sensory Profile-2 internal senses	Sensory Profile-2 external senses	Little DCDQ fine motor	Little DCDQ gross motor
Auditory skills	**$r(18) = 0.40$ $p = <0.05$***				**$r(14) = 0.43$ $p = <0.05$***
Internal senses		$r(15) = -0.40$ $p = <0.06$		**$r(14) = 0.50$ $p = <0.05$***	**$r(14) = 0.61$ $p = <0.01$****
External senses	No Correlations				
Fine motor skills		**$r(15) = -0.54$ $p = <0.05$***		**$r(14) = 0.60$ $p = <0.01$****	**$r(14) = 0.80$ $p = <0.001$****
Gross motor skills		**$r(15) = 0.50$ $p = <0.05$***		**$r(14) = 0.65$ $p = <0.01$****	**$r(14) = 0.74$ $p = 0.001$****

Note: Internal senses: Proprioception and vestibular input; External senses: Auditory, visual and touch. Correlations in bold show statistical significance.

*Correlation significant at 0.05; **Correlation significant at 0.01.

the Little DCDQ (Rihtman et al., 2011) with large effect but were not significantly correlated to the internal senses section of the Sensory Profile-2 (Dunn, 2014). Fine motor skills on the Tool were significantly correlated with the internal senses section of the Sensory Profile-2 (Dunn, 2014) and the fine and gross motor sections on the Little DCDQ (Rihtman et al., 2011) all with large effect. Gross Motor Skills were also significantly correlated with the internal senses section of the Sensory Profile-2 (Dunn, 2014) and the fine and gross motor sections on the Little DCDQ (Rihtman et al., 2011) all with large effect. No outliers were identified that extended across all areas of the Tool in the descriptive data (z-scores) and in all cases identified, specific areas of weakness were noted in both school and parent/carer observations, suggesting the outliers indicated true areas of specific weakness across a child's profile.

Stage 3—Usability

Usability and impact were measured by identifying strengths and limitations from EYFS teacher focus groups and semi-structured interviews (transcript available on request). Reviewing the transcripts identified seven areas that were deemed as beneficial. These were as follows:

1. All of the interviewees stated that the Tool was able to pick up children who would not have 'come under their radar' normally and was particularly important after COVID-19 due to so many children having missed assessments and health appointments
2. 8 out of the 10 teachers present stated at various points throughout the discussion that they were 'more aware of the whole child' with examples given such as how children sat on the carpet, whether children could cross the midline, whether they were able to stand up without leaning walls
3. 4 of the 10 teachers noted that the Tool helped to reinforce their concerns if present
4. All schools noted that they made clear adaptations to the whole curriculum to support the development of the children holistically in addition to knowing what to target for groups of children, stating that they knew which areas needed targeting that would otherwise have been missed
5. The SENCos within the focus group noted that the Tool supported the beginnings of a graduated approach where needed and was useful when applying for additional support for children with SEND
6. SENCos also noted that the Tool was particularly useful at identifying children that may go on to develop difficulties further on down the school, and so early and fast intervention was put into place to help lessen the impact and in turn the possibility of being placed on the SEND register. Examples given included proprioceptive weaknesses impacting on inattention and midline difficulties impacting on handwriting
7. All EYFS teachers present stated that the positives far outweighed the negatives and endorsed the Tool fully

Limitations/Suggestions for Improvement were as follows:

All teachers requested additional training on how to use the tool correctly and accurately. Bar charts were requested to illustrate individual profiles as opposed to radar charts to enable easier identification of deviations within the children's personal profiles. Teachers felt that it would be helpful to have a resource list available in addition to sectioning the observations needed into the areas of learning and development across the Foundation Stage curriculum. As time was also a crucial factor, the teachers present requested training in the summer term prior to the observations taking place in the autumn term to allow them the whole term to assess accurately rather than condensing the assessments alongside other mandatory assessments on school entry. Finally, it was felt that visual perception needed profiling more accurately.

DISCUSSION

This study aimed to create an accessible, high quality, cost and time effective 'Development Profiling Tool' for use in reception classes to build a unique picture of every individual child's developmental 'sensorimotor building blocks', thus assessing their readiness to learn on school entry.

Development of the tool

Through content analysis and the merging of targeted expertise and a range of screeners, a single 54-question observational questionnaire was constructed that incorporated the five developmental domains considered to impact on learning and emotional well-being: auditory skills; internal senses (proprioception and vestibular input); external

senses (auditory, visual and tactile responsivity); fine motor skills and gross motor skills. Thus, the Development Profiling Tool was created.

Application

The tool was then trialled in a small group of schools within Leicestershire and Northamptonshire. After training EYFS teachers, 172 children had individual profiles created based upon the observations made within their foundation stage setting while performing associated activities. Where children's profiles fell below the 80% marker interventions were assigned and early support was given. This support varied from increased awareness of children's physical movement by EYFS teachers, to changing the whole curriculum to incorporate universal interventions where a cohort exhibited specific areas of weakness.

Reliability and validity

Construct validity within this Prototype study was achieved by correlating parent/carer observations using screeners and teacher observations completed by using the Tool, on 10%–15% of the children in each school. Significant correlations were found between the Tool's auditory skills domain and the sound discrimination subtask on the Auditory Skills Assessment (Geffner & Goldman, 2010) with moderate effect. Interestingly, the Tool's auditory skills domain also correlated significantly with the Little DCDQ gross motor screener (Rihtman et al., 2011) which included balance. As motor proficiency and balance appear to be associated with hearing loss in children (Apeksha et al., 2021; Melo et al., 2018) this result accentuates the need for a holistic developmental profile. The Tool's internal senses domain (proprioception and vestibular input) correlated significantly with both the fine and gross motor sections of the Little DCDQ (Rihtman et al., 2011), with large effect, while the Tool's fine and gross motor skills assessments correlated significantly with the internal senses section of the Sensory Profile-2 (Dunn, 2014) with moderate effect; results that further cement the link between sensory and motor performance. However, it is noteworthy that the Tool's internal senses did not correlate with the internal senses of the Sensory Profile-2 (Dunn, 2014). Likewise, the external senses domain of the Tool did not correlate with any of the screeners, including the Sensory Profile-2 (Dunn, 2014). This could be due to differences in observer rather than questionnaire, as research notes situational specificity regarding observations of behaviour at school and home, where the nature of the different environments is likely to influence sensory responsivity (Palmer et al., 2022). For this reason, it was felt that such an important domain should be kept within the Tool as specific differences in the external senses are known to impact learning, for example inattentive children may have deficits in the auditory modality (Schmidt et al., 2019) and children with motor deficits may also have visual difficulties (Miller et al., 2014). Finally, the tool's fine and gross motor skills domain correlated significantly with the Little DCDQ (Rihtman et al., 2011) with large effect. While these results show correlations between the tool and the respective screeners, it is important to note that there was no distinction between the fine and gross motor skills, with the fine motor domain also correlating with gross motor skills and vice versa, potentially indicating the need for only one domain on the tool itself. However, despite fine and gross motor difficulties often occurring in tandem, this is not always the case. With 6% of children not meeting expectations for fine motor skills at their 2 ½ year check in 2019 (Public Health England, 2019), in addition to fine motor difficulties being associated with neurodiversities such as autism (Lidstone et al., 2020) and working memory (Ziereis & Jansen, 2016), it was felt that fine and gross motor skills should be retained. Significant correlations between the parent questionnaires and the tool show construct validity, nonetheless the small sample size should be acknowledged and so needs further investigation.

Usability and impact

Despite the time pressures that the EYFS teachers in this study were under, with the government baseline, school baseline assessments and, in this case, double language assessments (due to trialling a new language screener), the semi-structured interviews generated extremely positive feedback on the tool with participating teachers stating that they: were more aware of children that might otherwise have not come under their radar; were more aware of the whole child; had used the tool to reinforce their own concerns about a child's readiness to learn; that the Tool had helped guide professional judgements and planning in reference to adaptations and enhancements of the class curriculum in the form of the signposted targeted interventions and, in some instances, universal intervention. EYFS teachers who were also SENCos also found the Tool highly effective for implementing the Graduated Approach and in identifying children who might go on to require SEND support as they progress through the school.

Development points from teachers included: additional training for EYFS teachers within the summer term prior to implementation; changes to how the graphs were presented within the profile (radial to bar); the inclusion of a resource list within the Tool; sectioning the observations into areas of development within the EYFS curriculum to supporting time allocation. Development points from the multi-disciplinary team included a more accurate visual perception task in addition to the visual observations included. Differences in chronological age for school entry were also considered with some children chronologically being 12 months older than others, however with the tool being aimed at 'readiness to learn' on school entry with expected development at 48 months, this was deemed as all inclusive.

To conclude, the development and prototype trial of the tool has been successful with all EYFS teachers endorsing the tool to assess readiness for learning rather than prior attainment. With the limitations taken into account, it is hoped that this study will be the foundation of a larger and timely study that will further validate the tool and measure the need and impact of the tool at school entry nationally, and perhaps in time internationally. Thus, helping to ensure that when all children begin their educational journey deviations or delays in child development, that may have impacted on learning and mental health, are identified, targeted and supported with early intervention; ultimately helping to bridge the attainment gap, as well as reducing anxiety and potential mental health issues.

CONFLICT OF INTEREST STATEMENT

The authors certify that there are no affiliations with or involvement in any organisation or entity with any financial interest or non-financial interest.

DATA AVAILABILITY STATEMENT

Data sharing is not available due to confidentiality and sensitivity of the data.

ETHICS STATEMENT

The study was approved by the Humanities and Social Sciences Ethics Committee of the University of Birmingham.

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