Predicting Achievement in the Early Years: How Influential is Personal, Social and Emotional Development?

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Abstract

The personal, social and emotional development (PSED) of young children is perceived to be an important aspect of child development. Although widely valued, how strong is the relationship between PSED and cognitive development and does it predict later outcomes? This paper explores the relationship between PSED and attainment using a large data set collected from children aged 4, 5 and 7 years in English primary schools. The results from the multi-level models suggest that PSED is a significant factor in reading and mathematics up to age 7 after controlling for earlier attainment.

Introduction

In recent years there has been an increased interest in the personal, social and emotional development of children within an educational context. Those children who have good inter-personal skills and can self-regulate their behavior and emotions are more likely to associate well with their peers and their teachers, and to reap the benefits of their education. The Early Years Foundation Stage (EYFS), launched in March 2007 (Department of Children, Schools and Families, 2008) for use in England from September 2008 onwards, emphasised the importance of personal, social and emotional development (PSED) in the education and care of the 'whole child' from birth through to the end of the first (Reception) year at school age 5. The Early Years Foundation Stage Profile (EYFSP), which is the accompanying statutory assessment, aimed to measure progress in areas including disposition and attitudes, social development and emotional development. The rationale behind this was to promote a positive sense of self, a positive disposition to learn and emotional well-being for children to know themselves and what they can do. The review of the EYFS by Dame Clare Tickell recommended focusing on three prime areas which are the foundations for children's ability to learn and develop healthily of which personal, social and emotional development came top of the list (Tickell, 2011). In Wales, the Framework for Children's Learning for 3 to 7-year-olds in Wales (Department for Children, Education, Lifelong Learning and Skills (2008) stated that "Personal and Social Development, Well-Being and Cultural Diversity is at the heart of the Foundation Phase and should be developed across the curriculum."

The development of socio-emotional skills is clearly essential for children, but to what extent is this related to cognitive development? If there is a relationship, does this change with age? If a relationship is found, this will add weight to the importance of assessing PSED within schools and also provide a basis for further research into causality and possible remediation or intervention.

There is well-established evidence of a link between children's early attention and their ability to self-regulate with later outcomes. One example is a study of young children with a long-term follow-up that was conducted in 1990 by Shoda, Mischel and Peake.

They demonstrated how pre-school children who were able to delay immediate gratification developed into successful adolescents. The first part of the study was conducted when the participants were in pre-school at which time they were offered the choice of accepting an immediate reward or waiting a short time (15 – 20 minutes) for a larger reward. Ten years later, those children who had waited for a larger reward had more positive outcomes. There is a growing body of evidence to support a relationship between socio-emotional skill and cognitive function. Kohn & Rosman (1973) used instruments of social-emotional function to predict cognitive functioning using a two factor model: Interest-Participation versus Apathy-Withdrawal and Cooperation-Compliance versus Anger-Defiance. They found an association between high ratings on Apathy-Withdrawal and poor cognitive functioning in pre-school children. In a later study, (1974) they found that the same socio-emotional factors measured in pre-school explained 16%-22% of the variance in achievement in word-knowledge, reading and arithmetic at the age of 7. Miles and Stipek (2006) found significant associations between social skills (aggression and prosocial behaviour) and literacy in children from low-income backgrounds at particular risk of negative outcomes. This association was consistent with children aged 6, 8 and 10 years. Although they point out that their study was limited to a particular set of social skills and only related to literacy, it suggests the importance of schools in developing the social aspects of the child alongside academic achievement.

Not all recent studies have produced consistent findings. Lemelin et al. (2006) conducted a study that investigated the contribution of socio-emotional factors (level of activity, pleasure, social fearfulness, anger proneness and interest/persistence) to individual differences in cognitive development. They found only activity level to be related to performance on a mental development scale.

In a comprehensive review, Blair (2002) addressed the functional role of social and emotional skills in cognition from a neurobiological perspective. His work converged on there being a significant contribution from emotion in organising and directing cognition.

For example deficits in strategic thinking have been associated with poor attributions of the self as a learner.

With studies from child development, educational psychology and neurobiology providing some interesting results exploring the relationship between personal, social and emotional development and cognition, further research from a different angle has the potential to add to the existing body of knowledge.

As already noted, the Early Years Foundation Stage Profile in England places importance on PSED and includes a rating scale against which to measure children's development over time. Other assessments also incorporate similar measures. The PIPS (Performance Indicators in Primary Schools) Baseline Assessment is part of a monitoring system developed for primary schools by CEM (Centre for Evaluation and Monitoring), Durham University, UK (for more information see www.cem.org). This is a large-scale project, which several thousand primary schools currently choose to subscribe to. CEM provides assessments for every year group throughout the primary school, collects and analyses pupil-level data, and provides standardised feedback for schools. The PIPS Baseline Assessment (PIPS BLA) measures early reading, early maths, phonological awareness, and personal, social and emotional development (PSED) within the first six weeks of children starting primary school. The PIPS PSED scale uses a teacher's knowledge of each child gained through general day-to-day interaction and observation. The assessment involves determining the stage for each child on each of eleven items which are arranged into three sections. Each of the eleven items is assessed using a five point scale. A descriptor is provided for each point on the scale. The teacher makes a judgement as to which descriptor provides the closest match for each child. The items in the assessment are summarized in the table below.

Item	**Description**
Adjusting to the school environment	
Comfortable	This item seeks to measure the extent to which a child is comfortable with their separation from their main carer, their ability to cope with transitions between locations and activities and generally how settled they are during the day.

Independence	Dependency on adults or other children for guidance and support is measured. Also the extent to which a child needs help with dressing and going to the toilet.
Personal development	
Confidence	A child's willingness to talk and ability to join in with group activities are measured.
Concentration (teacher-directed activities)	This item addresses concentration on tasks directed by the teacher. Is the child able to maintain concentration and not be disturbed in the face of competing activities?
Concentration (self-directed activities)	This scale is similar to the item above but focuses on activities chosen by the child rather than determined by the teacher.
Actions	A child' impulsivity to act is measured with this item. Do they act without consideration for themselves or others? Do they demonstrate appropriate behaviour and interact well with others?
Social	
Relationship to peers	This item measures the child's ability to communicate, make friends and take notice of the feelings of others.
Relationship to adults	The child's ability to approach and communicate with adults and to interact appropriately and confidently are measured.
Rules	To what extent can the child obey rules and not distract their peers.
Cultural awareness	This item seeks to measure the extent to which the child understands that others may have a different way of life to them and that this should be respected.
Communication	Is the child able to communicate fluently and coherently, listen to views of others, respond appropriately and take turns in conversation?

Each of these items can be seen to measure an element of a child's personal social or emotional skill which is likely to affect their experience of education and their relationships with their peers, teachers and others. It is likely that the classroom teacher is aware of the lack of these skills in individuals without the need for assessment but by measuring these skills and then repeating the assessment at a later time, teachers can judge whether appropriate progress and development is made. If progress is less than expected, it could indicate a deficit which is likely to affect them in their future years in school. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association,1994) classifies and describes mental illnesses for clinicians and researchers using evidence from empirical studies. Certain items from the PIPS PSED scale can be mapped onto the diagnostic criteria for certain developmental disorders. This

does not suggest that the assessment has diagnostic capabilities, but rather that children scoring consistently poorly on certain areas of the scale might benefit from further investigation. Behaviours that are found at the lower end of the scale for concentration and action, if they persist, are covered in the diagnostic criteria for attention deficit hyperactivity disorder (DSM-IV, 1994). Concentration, action, rules and independence map onto the critera for autistic spectrum disorders including autism and Asperger's, and hyperactivity. Conduct disorder and oppositional defiant disorder have symptoms found at the lower end of the range for relationship to peers, actions and rules. Separation/anxiety disorder is characterized by behaviours associated with the comfortable and concentration scales and social phobia with confidence. Deficits in the confidence and concentration scales may be indicative of general anxiety disorder. In addition to being a useful assessment for teachers, the data are returned to CEM and analyses such as the relationship between cognitive development and PSED of interest in this paper can be carried out. The inter-rater reliability between class teachers and classroom assistants has been assessed with a sample of 769 children. The correlation between the two sets of results was 0.75 (significant at the 0.01 level). The internal reliability (Cronbach's alpha) = 0.92.

As well as being a valuable tool for monitoring the personal, social and emotional development of pupils, the PIPS PSED assessment is conducted alongside the PIPS assessment of early reading and mathematics. The test/re-test of the total reading and maths score is 0.98 and the internal reliability (Cronbach's alpha) is 0.94 (Merrell and Tymms, 2011). This provides the potential for the correlational analysis that is the focus of this paper. The study investigated the relationship between PSED at the start of primary school with early reading and mathematics attainment on a large school-based cohort of children. The participants were then followed up to age 7 to explore longer-term relationships.

Measures and Procedures

Data for this study came from schools that participated in the PIPS (Performance Indicators in Primary Schools) monitoring system run by CEM, Durham University, UK, described earlier.

Assessments from three time-points were analysed. The first assessment was administered at the start of the first year of primary school (known as the Reception year in England, when the children are aged 4 years), the end of the first year at school (age 5 years in England) and in the January of the third year at school (age 7 years in England).

Children were assessed in the first few weeks of the first year of primary school with the PIPS On-Entry Baseline Assessment. This individually-administered, computer-adaptive assessment included the following measures:

1. Handwriting – the child is asked to write his/her own name.
2. Vocabulary – the child is asked to identify objects embedded within a series of pictures.
3. Ideas about reading – assesses concepts about print.
4. Repeats – child hears and repeats words in this measure of phonological awareness.
5. Rhyme detection – child hears a words and selects one that rhymes with it from a choice of three.
6. Letter identification – a fixed order of mixed upper and lower case letters.
7. Word recognition and reading (sentences and then comprehension).
8. Ideas about mathematics – assessment of understanding of mathematical concepts.
9. Counting and numerosity.
10. Sums – addition and subtraction problems presented without symbols.
11. Shape identification.
12. Digit identification.
13. Maths problems – including sums with symbols.

An ‘Early Reading’ scale was constructed from sections 1, 2, 3, 6 and 7. A ‘Phonological Awareness’ scale was constructed from sections 4 and 5. An ‘Early Mathematics’ scale was constructed from sections 8 – 13. The ‘Total’ score was constructed from the three scales with a maximum raw score of 255. To construct these scales, a pupil was assigned 1 mark for each item answered correctly in each section. The internal (Cronbach’s Alpha) and test/re-test reliabilities of the PIPS On-Entry Baseline Assessment Total score were 0.94 and 0.98 respectively (Merrell and Tymms, 2011). The teacher works with individual pupils and the whole assessment takes approximately 20 minutes per child. The computer program presents the child with questions (orally) and, depending on the type of question, the child responds either by pointing to the answer from the choice of options on the screen or by saying the answer. The teacher records the child’s response on-screen and the program selects the next question.

In addition to the measures of early reading and mathematics, the PIPS On-Entry Baseline Assessment includes an optional assessment of personal, social and emotional development (PSED) described earlier. This was also carried out within the first six weeks of children starting school after teachers had had an opportunity to observe the children in different situations to be able to make judgements about their behavior. The reliability of this assessment was estimated using the data from the participants in the sample for this study (described below) using Rasch measurement. The person reliability was 0.91 and the item reliability was 1.00, suggesting that it was a reliable scale.

The reading, phonological awareness and mathematics sections of the PIPS BLA were repeated at the end of the first year of school when the children were aged 5 years.

Half way through the third year of school, when the children were aged 7, group assessments of reading and mathematics were administered. These assessments were developed exclusively for the PIPS system and the reading and mathematics sections were based on the English national curriculum. Each section had high internal reliabilities (Cronbach’s alpha was 0.98 for reading and 0.90 for mathematics).

Participants

Participation in the PIPS assessment systems is voluntary and several thousand schools pay to be involved each year. Schools subscribe to the system which allows them to assess pupils in any year group from ages 4 to 11. The PIPS scores are normalized and T scores with a mean of 50 and standard deviation of 10 are fed back to participating schools. The number of participating schools varies from one year to the next and so the full sample is regularly checked for national representativeness.

From the whole sample, pupils who started in Reception in English primary schools in September 2005 were selected for this study. The requirement for inclusion was that the schools had assessed their full cohort of pupils with the PIPS BLA, including the optional PSED section. The sample consisted of 16,023 pupils in 758 schools at the start of the Reception year. The sample of schools which chose to re-assess their pupils at the end of that year was smaller: 14,782 pupils in 704 schools. By the time the pupils had reached the third year of schooling in the 2007/08 academic year, aged 7 years, the sample had declined further to 3,561 pupils in 216 schools. Attrition in a system which relies on voluntary participation is a potential problem and so to investigate whether the characteristics of the sample changed over time (i.e. particular types of school chose not to use the assessments for the sever year-olds), the PIPS T scores of the schools in the study sample were compared with the full sample of schools using PIPS assessments each year. The means and standard deviations for reading and mathematics for each time-point are shown in Table 1.

Table 1: Means and standard deviations (T scores) for sample in reading and mathematics at each time point

	Reading		**Mathematics**	
	Mean	**SD**	**Mean**	**SD**
On-entry to school, aged 4 years	50.31	10.55	49.87	9.71
End of first year, aged 5 years	49.72	9.94	49.41	9.84
Third year, aged 7 years	49.89	9.87	50.43	9.81

The means and standard deviations of the study sample were very close to those of the full sample and there was no evidence to suggest bias in the characteristics of participants each year towards, for example, children from more higher or lower attaining schools.

Results

The correlations between PSED, reading and mathematics at each time-point are shown in Table 2.

Table 2: Correlations between PSED and reading and mathematics at each time point

	PSED
Reading age 4	0.50
Mathematics age 4	0.49
Reading age 5	0.40
Mathematics age 5	0.39
Reading age 7	0.37
Mathematics age 7	0.41

All of the correlations were statistically significant ($p < 0.01$). The strongest correlations were between PSED and reading and mathematics at the start of school when the children were aged 4 years.

Were some aspects of the PSED assessment more strongly related to reading and mathematics than others? Table 3 shows the correlations between each area of the PSED assessment and reading and mathematics at age 4.

Table 3 Correlations between areas of PSED, reading and mathematics at age 4

	Reading	Mathematics
Comfortable	0.25	0.23
Independence	0.36	0.36
Confidence	0.40	0.39
Concentration (Teacher-directed)	0.44	0.45
Concentration (Self-directed)	0.43	0.44
Actions	0.36	0.35
Relationship to peers	0.39	0.38
Relationship to adults	0.40	0.39
Rules	0.30	0.31
Cultural awareness	0.38	0.37
Communication	0.50	0.47

All of the correlations were statistically significant ($p < 0.01$).

How important was PSED at the start of school for children's reading and mathematics at the later ages? This was explored using multilevel models (using MLWin version 2.11 software) in which pupils were nested in schools. The outcomes were reading and mathematics at ages 4, 5 and 7. At age 4, the start of school in England, the explanatory variables were sex and PSED. At the end of the first year at school in England, age 5, the explanatory variables were reading and mathematics at age 4, sex, PSED at the start of school. At age 7, the explanatory variables included in the full model were reading and mathematics at age 5, sex and PSED at the start of school. The Null models, before explanatory variables were included, and the full model which included all of the explanatory variables are shown for each outcome.

The coefficients for the reading models are shown in Table 4 with standard errors in parentheses.

Table 4 Multi-level models for Reading Outcomes

	Outcome: Reading Age 4		Outcome: Reading Age 5		Outcome: Reading Age 7	
	Null	Full	Null	Full	Null	Full
Cons	50.678 (0.223)	21.916 (0.425)	49.979 (0.213)	6.141 (0.342)	49.600 (0.360)	5.392 (0.769)
Sex		0.587 (0.127)		0.611 (0.091)		1.243 (0.208)
PSED		0.564 (0.007)		0.067 (0.006)		0.042 (0.014)
Reading Age 4				0.434 (0.007)		
Maths Age 4				0.351 (0.008)		
Reading Age 5						0.583 (0.019)
Maths Age 5						0.199 (0.018)
Variance						
School	27.616 (1.837)	29.681 (1.862)	23.259 (1.618)	15.656 (1.001)	19.016 (2.557)	11.319 (1.430)

Pupil	83.873 (0.958)	58.342 (0.667)	76.049 (0.904)	27.015 (0.322)	77.721 (1.894)	32.789 (0.804)

For reading at age 4, the null model indicates proportion of unexplained variance at the school and pupil levels before any explanatory variables were included. The full model shows how at this age, sex and PSED were both statistically significant. The coefficient and standard error for the 'sex' explanatory variable indicates that the girls' reading at the age of four was significantly higher than the boys'. Including these variables in the model reduced the unexplained variance between pupils but not schools. At the end of the first year of school at age 5, and at age 7, the girls' reading scores were significantly higher than the boys'. PSED continued to be a still significant explanatory variable even when earlier reading and mathematics attainment were included as controls. As the children got older, the proportion of unexplained variance steadily declined at the school level in both the null and full models. Including earlier attainment made a substantial difference to the unexplained variance at ages 5 and 7.

The results for mathematics are shown in Table 5. The controls were the same as for the reading outcomes.

Table 5 Multi-level models for Mathematics Outcomes

	Outcome: Mathematics Age 4		Outcome: Mathematics Age 5		Outcome: Mathematics Age 7	
	Null	Full	Null	Full	Null	Full
Cons	50.091 (0.176)	24.296 (0.398)	49.710 (0.199)	7.873 (0.358)	50.36 (0.355)	7.032 (0.765)
Sex		-0.964 (0.124)		-0.817 (0.094)		-1.449 (0.207)
PSED		0.549 (0.007)		0.112 (0.007)		0.100 (0.014)
Reading Age 4				0.173 (0.008)		
Maths Age 4				0.584 (0.008)		
Reading Age 5						0.155 (0.021)
Maths Age 5						0.399 (0.020)
Variance						

School	15.475 (1.123)	18.596 (1.233)	19.562 (1.405)	17.660 (1.121)	18.296 (2.484)	9.787 (1.262)
Pupil	79.039 (0.902)	55.882 (0.639)	78.172 (0.929)	29.464 (0.351)	78.228 (1.906)	32.42 (0.795)

Once again, the Null model shows the proportion of unexplained variance associated with the school and pupil before any explanatory variables are included. All explanatory variables were statistically significant and, as with reading, PSED at the start of school remained a significant factor for mathematics at age 7. Sex was a significant explanatory variable, this time indicating that boys were attaining higher scores than girls.

Discussion

This study found that an assessment of PSED was statistically significant in the prediction of achievement in reading and maths when the children in the sample were aged 4 years. The particular assessment of PSED that was used was a teacher rating scale that included measures of comfort and confidence, independence, concentration, actions, relationships with peers and adults, adherence to rules, cultural awareness and communication. This relationship was found to continue for both reading and mathematics until children reached the age of 7. These trends were similar to findings of the study by Miles and Stipek which reported that children with better social skills had better literacy achievement in the early years however it differed by remaining significant at age 7 whereas Miles and Stipek found that when the children were tested in third-grade (aged 7), PSED was no longer significant. The sample of children in the Miles and Stipek study was limited to 400 children and the range of social skills covered was limited to teacher rating on only two subscales: aggression and prosocial behaviour. The assessment of PSED used in this study covered a wider range of behaviours and dispositions. It includes a measure of concentration and there is a well-established link between concentration (attention) and cognitive outcomes. Much of this evidence comes from clinical samples of children diagnosed with ADHD (Frazier et al., 2007; Taylor et al. 2009) but the same link has been found to apply with school-based populations (McGee et al., 2002; Merrell & Tymms, 2001).

The findings of this study indicate a relationship between PSED and cognitive function which has clear implications for practitioners. However, further work is needed to investigate the direction of causality. Using data from the US National Institute of Child Health and Human Development Study, Mann et al. (2007) found a significant relationship between lower prosocial scores and referral to remedial or special educational programmes. Direction of causality is not addressed, but it provides further evidence to suggest more work be done in this area with the potential for an intervention study. Miles and Stipek also addressed the issue of causation. Overall, some studies have previously found that poor academic skills predict later anti-social behaviour and others have found the reverse pattern.

Further potential research might take the form of an intervention study to improve certain aspects of PSED with the aim of investigating the benefit on attainment outcomes. Classroom interventions to help children improve in some of the PSED areas assessed have already been evaluated. For example, there are techniques available to help inattentive and hyperactive children (as assessed in the areas of concentration and actions in the PSED assessment) but whilst these can improve their behavioural problems, they don't necessarily lead to a significant increase in their academic attainment (Taylor et al., 2009). Some of the areas of PSED most strongly correlated with reading and mathematics attainment do not have strong evidence-based interventions to remediate them and subsequently improve attainment.

In conclusion, a significant relationship was found between the areas of PSED measured in this study and attainment in reading and mathematics up to the age of 7. A longer-term follow-up study would be interesting to see for how long the association persists and we suggest that more randomized controlled trials are necessary to identify causal links between promising early interventions and academic outcomes.

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