Parental Demand for Precision in Their Preschool Children's Letter Writing

by

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Abstract

Although there is a wealth of research on parent-child interaction during story book reading, much less is known about parent-child interaction during writing activities. In this study, we specifically looked at demand for precision, or the degree to which parents corrected mistakes in their children's writing. Parents and their preschoolers (n=121) were videotaped during a joint writing activity in which they filled out pretend birthday party invitations. The interactions were coded based on the degree to which the parents insisted that the child write conventionally. We found that parents who insisted that their children write more precisely were more invested in their child's learning of pre-literacy and early math skills. We also found that demand for precision predicted the child's fine motor skills, so parents were sensitive to their child's abilities.

Parental Demand for Precision in Their Preschool Children's Letter Writing

Learning to read at an early age is fundamental for being an adept reader later in life. Children who begin to read at a younger age are stronger readers in high school, are more interested in reading and read more often than their peers (Cunningham &Stanovich, 1997; Hanson & Farrel, 1995). Being a poor reader at a young age can also be detrimental to future reading success. Juel (1988) found that students who were poor readers in first grade were also at the bottom of their class in fourth grade, and vice versa.

Although children are taught to read in school, parents also play a strong role in early literacy development. Children are often exposed to written text at home long before formal education begins, and even the mere frequency of this exposure is a predicting factor of children's reading ability (Echols, West, Stanovich, & Zehr, 1996). The home literacy environment, which broadly includes how often parents read to their child, parental reading habits, library membership, and newspaper subscriptions, has been positively correlated with children's pre-literacy skills, above and beyond parental education (Christian, Morrison, & Bryant, 1998). The link between parenting behaviors and children's reading success may be partially genetic, but an adoption study by Petrill, Deater-Deckard, Schatschneider, and Davis (2005) showed that parenting behaviors were correlated with children's literacy outcomes without a genetic link.

Most research regarding the role of parenting in early literacy development has focused on storybook reading, which has been found to explain about 8% of the variance in early reading skills (Evans & Shaw, 2008). However, Senechal, LeFevre, Thomas, and Daley (1998) found that the frequency of storybook reading only predicted oral language skills, such as vocabulary, while the frequency of direct instruction predicted written language skills, such as phonological

awareness and alphabet knowledge. Nevertheless, the nature and effectiveness of different parenting teaching styles have not been studied in depth.

There has been some research on the nature of parent-child joint writing interactions. Burns and Casbergue (1992) videotaped 26 preschoolers writing a letter with their parents. The task was completely open ended: they were allowed to write to whomever they chose, parents or children could choose to write, and they were allowed to use drawings, invented spelling, or conventional writing. They found that parents who exerted more control had children who produced more conventional text characterized by proper spelling, correct-looking letters, and conventional openings and salutations. Parents who allowed the child to direct the activity had children who produced letter products characterized by emergent writing, such as invented spellings, scribbling, and drawing pictures. While the authors provide a rich description of the parent-child writing interaction, they do not make a comparison of this interaction to the children's independent ability, nor can they assert which type of parental writing support is better for child outcomes.

DeBaryshe, Buell, and Binder (1996) used the same writing task as Burns and Casbergue (1992) to analyze the difference between parent-child writing and independent child writing. Five and six year old children wrote a letter by themselves and then repeated the same task with the assistance of their parent. All of the children produced longer, more conventional letters when writing with their mothers than when writing alone. They found that mothers did not comment on the legibility of their children's writing or ask their children to correct errors. In fact, the children were more concerned about their mistakes than their parents were. This study also did not compare the richness of the parent-child interaction to achievement.

More recently, research has examined parent-child interactions and the child's pre-literacy skills. Aram and Levin (2001) studied how Israeli parents help their kindergarteners write by observing 40 families doing a joint mother-child writing activity in their home. They observed a structured writing task (parents and children were asked to write the names of pictures on a card) and an unstructured writing task (parents and children were asked to write a guest list for a pretend birthday party). They found that mothers who assisted their children in sounding out letters, rather than dictating or writing themselves, had children who had better early literacy skills, such as phonological awareness, word recognition, and word writing. The effects were still observed after controlling for factors such as parental education, socioeconomic status, and the home literacy environment. A follow up study (Aram, 2005) two and a half years later showed that the mediation scores from kindergarten predicted achievement measures in second grade, even when accounting for socioeconomic status and kindergarten literacy skills.

A large focus in the study of maternal writing mediation has been to see if mothers are sensitive to the developmental level of their children. In a 2007 study, Aram and Levin studied twin preschoolers because they could observe whether the mothers differentiated their instruction for the twins' differing skill levels. Along with the mediation variables they used in past studies, Aram and Levin included a parental variable called "demand for precision," which measured the degree to which parents demanded that their children correct mistakes in their writing, ranging from allowing the child to write unconventionally with no intervention to insisting that the child correct their mistakes. Parents who demanded more precision had children with higher word writing, letter naming, and phonological awareness scores. While their results were interesting and demand for precision was significant, they included demand for precision in a group of other

parental mediation factors and did not analyze its importance or meaning beyond the other parenting behaviors that they observed.

In this study, we took a more in-depth look at demand for precision. We are interested in how often the children produce unconventional letters, how often parents correct these errors, and if this correction is predictive of the child's achievement. Using a modified version of Aram and Levin's demand for precision variable, this study explores 4 questions:

1. What percentage of the parents intervenes? Do these parents differ from parents who ignore their children's unconventional writing, and in what ways? We hypothesize that more educated parents will demand that their children's writing be more precise. We also predict that demand for precision will be related to the home learning environment, indicating that it is an attribute of parents who are more involved with their child's literacy development.
2. Do children who make many errors differ from children who make few or none? We hypothesize that children with more precise writing will have higher achievement scores than children who make more mistakes. Children who make fewer mistakes should also have better fine motor skills and self regulation scores.
3. Do parental correcting behaviors relate to our achievement measures? Can demand for precision scores in year 1 predict growth in year 2? We hypothesize that highly achieving children will have parents who demand more precision of them. Parents should also be sensitive to their own children's abilities and demand more precision of children with high self regulation and fine motor control.
4. Does parental demand for precision in year 1 predict the child's precision in year 2? In other words, do parents with high demand for precision scores in year 1 have children who

write more conventionally in year 2? We hypothesize that demand for precision will be related to precision.

Method

Participants

The present study was conducted as part of the larger Pathways to Literacy longitudinal study, a study of literacy development conducted in two middle-class suburbs of a large Midwestern city. Of the 180 families enrolled in the study, 30 did not have home visits due to scheduling conflicts. Technical difficulties made the video footage of another 29 families unusable, leading to a final sample of 121 participants (63 female). Analyses showed that these families did not differ from those not included in the sample. The mean age of the children at their first spring evaluation was 4.47 years (*SD*=0.56, range=3.46-6.41 years). The mean age of the parents was 38.65 years (*SD*=5.50) with an average of 16.12 years of education (*SD*=1.77), the equivalent of a bachelor's degree. All families reported having two-parent households. Annual income ranged from poverty level to several hundred thousand dollars, with the majority of the sample identifying as middle class. Approximately 80% of the families were Caucasian, 10% were Asian American, 5% were African American, and 5% were of middle-eastern heritage. All but one family spoke English at home and none were English language learners.

Procedure

Participants were recruited as part of the Pathways to Literacy project in the fall of their preschool year. Investigators attended a district Back to School event for parents and invited them to participate in the study, explaining the objectives and logistics of the program, including that there would be a one-hour videotaped home visit each year, and an additional battery of questionnaires that would take another hour to complete. Families received a $20 gift certificate

to a local bookstore for each year of their participation in the study. For completing the study, they received an additional $100. Parents were given consent forms and business reply envelopes and were asked to mail the forms to the project office if they wished to participate.

Researchers observed and videotaped parent-child interactions in the participants' homes at two different times during the summer months, spaced a year apart. The camera was clearly visible and both parents and children were aware that the interaction was being recorded. At both visits, the parents and their children were asked to have a pretend birthday party. They were given a box of supplies that included two invitations, two markers, four goodie bags, and various "goodie bag" toys. The parent and child were left alone to do the activity while the researcher entertained siblings in another room. Although no explicit instructions were given (they were simply told to use the items in the box to get ready for the party), all families chose to at least partially fill out the invitations. The lack of instructions was intentional so that parents would interact with their children as they normally do. This methodology led to writing being performed by both parents and children, and some incomplete invitations.

While at the home, parents were given an array of questionnaires on their parenting styles, perceptions of the children, and demographic information. The parents completed these questionnaires on their own and mailed them back to the study office in a business reply envelope. The children were also given a battery of academic achievement assessments in the fall and spring of each school year. They were tested individually at their school. The assessments took place on two days, and took approximately twenty minutes to complete each session.

Measures

Demand for precision. Demand for precision is the degree to which parents insist that their children correct errors in their writing. The researchers coded the interactions by watching the videotapes after all of the data had been collected. It was coded on a 3-point scale (low, medium, and high). Parents who exhibited low demand for precision ignored mistakes in their child's writing and allowed them to write however they chose. Parents with medium demand for precision pointed out errors, but did not insist that the child correct them. High demand for precision was characterized by insisting that the child correct the mistake. For a more detailed list of characteristics of these levels and for our criteria for conventional writing, see Appendix A.

The birthday party invitations are divided into five sections (to, from, date, time, and place; see Appendix B for example invitations). For each section of the invitation, up to three instances of demand for precision were recorded. Only the highest instance of demand for precision per section of the invitation was included in the analyses.

First, the coder watched the video and noted any instances in which the parent either pointed out an error or asked for correction. Afterwards, coders looked at the invitation to see if the child wrote conventionally. Medium and high demand for precision were scored regardless of the coder's analysis of the writing, although reminders to write correctly before the child produced an unconventional letter were not scored. In other words, medium and high demand for precision depended on the parent's interpretation of whether the child's writing was acceptable rather than the coder's. Low demand for precision was recorded by assessing unconventional writing that the parent did not mention. A demand for precision score was calculated by averaging the highest score per section of the invitations.

Three researchers coded the same interactions until 95% reliability was achieved. Disputes were resolved by discussion and rewatching of the interactions. After that, reliability was calculated every tenth video to account for drift. Inter rater reliability was 81.2%.

Precision. A precision score was calculated for each child as the percentage of words that the child wrote correctly. Because different families wrote different numbers of sections, and some parents wrote as well, the denominator for this calculation was individualized based on how many sections that particular child wrote.

Achievement scores. Children were tested on their basic alphabet knowledge by using flashcards. They were shown the lower case letters of the alphabet and asked to name each one. Their score was the number of letters that they correctly identified. The children's abilities in various pre-literacy skills were assessed by using several sections of the Woodcock Johnson III Tests of Achievement (Woodcock, McGrew, & Mather, 2001). Letter Word Identification measures the subject's word identification skills. The initial items ask the subject to identify individual letters, as it increases in difficulty, subjects must pronounce full words. Passage Comprehension tests the child's ability to understand written texts. The initial, easier items ask the child to identify pictures described in a phrase. As the test continues, the child must fill in the blank in a paragraph without the help of illustrations. Applied Problems requires the subject to analyze and solve mathematical problems. Picture Vocabulary measures oral language development and word knowledge. The task requires the subject to identify objects presented to them as pictures. The items become increasingly difficult as the words become less frequently found in the environment. Academic knowledge includes three subtests: science, social studies, and humanities. It samples the subject's knowledge in the sciences, history, geography,

government, economics, art, music, and literature. Lastly, Sound Awareness is a measure of phonological awareness.

Dimensions of Parenting. Parents were given a 50 item questionnaire (Morrison & Cooney, 2002) on their parenting beliefs and practices. A factor analysis revealed that 17 of the items from this questionnaire fall into three dimensions of parenting: home learning environment, responsivity and warmth, and control and discipline (Hindman & Morrison, in progress). The 17 questions used in this analysis were all Likert-type scales ranging from 1 (not like me, not important) to 5 (very much like me, very important). The scores for each dimension were calculated by totaling the responses for each question.

The home learning environment items dealt with reading and math instruction in the home. For example, questions included "I try to provide my child with math workbooks" and "How frequently do you teach your child the names of letters?" Responsivity was reflective of parents' emphasis on children's autonomy, pro-social skills, and independence. Items included were "I respect my child's opinion" and "It is important to me for my child to be considerate of others." On the control and discipline dimension, parents were assessed on their regular enforcement of rules. For example, "I have little or no difficulty sticking with rules for my child" and "Once I decide how to deal with a misbehavior, I follow through on it" were questions included in this factor.

Motor Skills. The children's visual motor (e.g. fine motor) and gross motor skills were assessed using The Early Screening Inventory – Revised (ESI-R) (Meisels, Marsden, Wiske, & Henderson, 1997). Although this assessment is primarily used as a screening measure for children with problems in motor control, it contains items that are similar to assessments of motor control used in other longitudinal studies. The visual motor assessment tests children's

eye-hand coordination, short-term memory, and ability to reproduce two- and three-dimensional forms and structures. Items involve drawing figures such as a circle, a person, and a square with a pencil and remembering and rebuilding structures with blocks. The gross motor assessment included tasks such as skipping and hopping on one foot. Each item was either rated as 0 or 1 or as 0, 1, or 2. If the child refused to complete an item, no score was given and it was treated as missing data.

Self Regulation. Self regulation was tested using the Heads to Toes task (Ponitz, McClelland, Jewkes, Connor, Farris, & Morrison, 2008). This task is a direct measure that requires the child to use three aspects of behavioral regulation (inhibitory control, attention, and working memory). The children were told they were going to play a game where they had to do the opposite of what the researcher told them to do, and touch their head when the researcher said "touch your toes" and vice versa. After a training session in which the instructions were repeated up to three times, there were ten test trials presented in a random order. For each correct response, the child received 2 points, and for each self correction, the child received 1 point. For an incorrect response, the child received 0 points. Some children received a more difficult version of the assessment, in which a knees to shoulders task was added to the head to toes task. Because of this difference in difficulty, the scores were standardized. Standardized scores range from 0 to 40.

Results

Because this is an aspect of parent-child interaction that has not been studied in the past, we were firstly interested in how much variability there was among the parents. Demand for precision scores for 21 families could not be calculated. For four of these families, the children wrote perfectly, and therefore the parent didn't have any opportunities to demand precision of

them. In the other 17 families, the parents wrote all sections of the invitations, and since the child was not writing, we could not analyze how they would have reacted to the child's mistakes. There were no statistically significant differences between the families who allowed their child to write and those that did not.

Of the remaining 100 families, we found that almost half (n=45) received scores of one. Although their child made at least one error in their writing, the parent did not make any comments about the mistake. However, 55 families had mean demand for precision scores between 1.1 and 3, so many parents did demand at least some precision of their children, and parents displayed the full range of behaviors. Because the distribution was skewed, we collapsed scores into a categorical variable where one group was parents who demanded no precision and the other was parents who demanded at least some precision. Since this was a simplification of a variable that had previously been more complex, we recombined the "some precision" group into a second set of groups: medium precision and high precision. However, no differences were found between the medium and high precision groups, so they have been treated as a combined "some precision" group for the remainder of the paper.

Demand for Precision and Parental Factors

We hypothesized that parental demand for precision would be related to other parental factors that have previously been associated with child achievement, such as the home learning environment, parental responsivity and warmth, and parental management and discipline. A t-test showed that parents who demanded precision (M=28.07, SD=5.15) had significantly higher home learning environment scores than parents who did not (M=24.90, SD=5.53). Parents who exhibited demand for precision scored slightly higher on responsivity and warmth and management and discipline, but these differences were not significant at the .05 level (see table

2). Maternal years of education (an indicator of socioeconomic level) was also not significantly related to demand for precision.

Child Precision

Our second research question was if the children who wrote more precisely were different from their peers. Because the children are so young and our criteria for precision were very strict, about half (n=50) of the children had a precision score of 0%. For this reason, precision was also recoded into a categorical variable, where one group was zero precision, and the second group was at least one precise section (precision>0.0). T-tests revealed that precision scores were significantly related to all of our achievement measures except for passage comprehension (Table 3). In addition, children who wrote precisely (M=12.16, SD=2.78) had better fine motor control than children who wrote imprecisely (M=10.04, SD=1.71). However, self regulation and gross motor control were not related to precision.

Parental factors were also associated with children's precision scores. Home learning environment scores were higher for children with some precision (M=27.64, SD=4.99) than no precision (M=25.06, SD=5.82). In addition, parental responsivity $t(95)$=-1.981, p=.051 and maternal years of education $t(94)$=-3.302, p=.001 were significantly associated with precision.

Demand for Precision and Child Outcomes

We also hypothesized that parental demand for precision would be related to child achievement outcomes. As shown in Table 3, the children whose parents demanded precision scored higher on all of our achievement tests. However, the differences in score were very small and not statistically significant on any of the measures. Parents did demand more precision of children who had better fine motor control (t=-2.214, p<.05), but not gross motor control. They also did not demand differing amounts of precision based on the child's self regulation skills.

Demand for Precision and Child Precision

Our last research question dealt with the relationship between the parent's demand for precision and the future precision in their child's writing. We hypothesized that children whose parents demanded that their writing be precise would have more precise writing a year later. However, we found no mean difference in precision scores between children of parents who demanded precision and those who did not.

Discussion

We found that demand for precision was a behavior that was displayed by about half of the parents in the sample. This differs from DeBaryshe, Buell, and Binder's (1996) finding that parents were relatively unconcerned about mistakes that the children made. They observed that the children were more preoccupied by their mistakes than the parents. While we did observe child self-correction, we did not quantify or analyze it for this study.

We also found that the parents who did demand precision did so to varying degrees. Some parents simply pointed out mistakes in their children's writing, while others insisted that the child correct the mistake. Parents were also not consistent in their demand for precision. Although some parents demanded a correction for every mistake the child made, most parents only asked for correction in some mistakes. Since we did not analyze different types of child errors, we do not know if the parents were consistent in correcting only specific types of errors.

We first hypothesized that demand for precision would be related to socioeconomic status and other parental factors. We found that parents who demanded more precision also scored higher on our home learning environment dimension. This shows that demand for precision is linked to the home learning environment, and parents who are invested in their children's learning in other ways, such as explicitly teaching the child letters and playing math games, are

also the parents who are more likely to demand precision. The fact that demand for precision was not related to other parenting factors, such as years of maternal education, responsivity and warmth, and control and management is further evidence that it is part of the home learning environment, and that these aspects of parenting are distinct.

Our second research question dealt with the relationship between the child's writing precision and other parental and child factors. We found that child writing precision was related to almost all of our achievement measures (letter-word recognition, applied problems, picture vocabulary, academic knowledge, alphabet knowledge, and sound awareness). It is logical that children who have better pre-literacy skills would also have better handwriting skills. In the same sense, children who wrote more precisely had better fine motor control. The ability to write with precision requires more sophisticated motor control skills.

More interesting than the factors that were related to the child's precision are those that were not. Although all of our other pre-literacy skills were related to precision, passage comprehension was not. Of the Woodcock Johnson assessments that were used, passage comprehension was the only test that required the subject to read. Self regulation was also not related to precision, which means that children don't need high executive function to produce conventional text.

Thirdly, we hypothesized that parental demand for precision would influence children's achievement outcomes. We did not find that demand for precision was related to any of the child achievement measures. This does not replicate Aram's (2007) findings that demand for precision was correlated with word writing, letter naming, and phonological awareness. While this difference could be attributed to cultural and linguistic differences between the Hebrew-speaking Israeli sample and the English-speaking American sample, it also could be attributed to

the types of tasks used in the two studies. Aram used a more structured task, which may have influenced parental behavior. Aram's sample was also more varied in terms of socioeconomic status, which also probably caused more variability in parenting behaviors and child outcome measures.

However, since demand for precision was related to the home learning environment, which has been associated with child achievement in the past (and even within the Pathways to Literacy dataset; see Hindman & Morrison, in progress), demand for precision is probably just too small of a behavior to have a significant difference on its own. Since the parents who demand precision also emphasize child learning in the home, they are likely influencing their children's achievement outcomes in other ways.

The only child outcome measure that was correlated to demand for precision was fine motor control. This shows that parents were sensitive to their child's motor skills and did not demand precision if they knew that their child was incapable of correcting the mistake.

Contrary to our expectations, parental demand for precision did not influence child precision in the future. We had expected that children would become more precise due to their parents correcting behaviors, internalizing their corrections and beginning to make them on their own. However, we did not find this result. Again, demand for precision was probably simply too small of a behavior, or our sample size was too small to see any clear differences.

Implications

Although it remains unclear whether parental demand for precision has any influence on children's outcome factors, this is a behavior that parents are producing in varied ways. It is also related to other home learning behaviors. The parents who demand precision are the same parents who are more invested in their child's reading and mathematical development. While

demanding precision, parents are also sensitive to their child's abilities. They do not demand as much precision of children with lower fine motor skills because they know that they are incapable of completing the task precisely.

Limitations

There are several limitations to this study. Firstly, our definition of precise writing was very strict considering the young age of our sample. While it is reasonable for parents to insist that a preschooler write a J facing the correct direction, or write the correct letter, they may be less concerned about the spacing between letters or the sizing, all of which were criteria for precise writing, and were given equal weight in the analyses. The effects of precision on child achievement may be partially due to the strictness of our criteria. However, we may have also seen very different outcomes for demand for precision if it was based on looser precision criteria.

Secondly, our sample is not representative of the population at large. It is mostly Caucasian, middle class, and highly educated. With a broader sample, we may have observed different behaviors and effects than the ones that we found in our middle class sample.

Directions for Future Research

In this study, we only analyzed the degree to which parents insisted on the correction of their child's errors. Since we did not find any differences between parents who demanded a lot of precision and parents who demanded a little precision, other distinctions among parents who demand precision could be important predictors. Future research could look at the differences in what types of errors parents feel the need to correct, and if parents who correct one type of error differ from parents who correct other types of errors.

This study also could be replicated with a broader range of socioeconomic status. Since the present sample was largely middle class and highly educated, we may not have seen the full

range of parenting behaviors that exist in the full population. Observing this larger sample could give us insight into the impact of these parental behaviors.

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Table 1

Descriptive Statistics

Variable	N	Mean (SD)	Min.	Max.
Demand for Precision	101	1.44(0.58)	1	3
Precision	104	0.26(0.30)	0	1
Letter-Word Recognition	118	357.47(31.07)	264	464
Passage Comprehension	109	405.06(19.26)	358	463
Applied Problems	119	418.26(16.07)	366	458
Picture Vocabulary	119	474.22(10.12)	447	498
Academic Knowledge	119	455.87(13.43)	423	484
Sound Awareness	119	452.04(18.79)	420	496
Child Age	119	4.47(0.56)	3.46	6.41
Maternal Education (years)	108	16.12(1.76)	10	18

Table 2

Demand for Precision and Parent Factors

	No Demand		Some Demand		
	Mean	SD	Mean	SD	t
Home Learning Environment	24.90	5.53	28.07	5.15	-2.667**
Responsivity	27.95	1.90	28.34	2.33	-0.850
Management	14.60	1.75	14.47	2.63	0.266
Maternal Education (years)	16.24	1.322	16.00	2.01	0.655

* denotes significant difference in means at the .05 level
** denotes significant difference in means at the .01 level

Table 3

Precision t-tests

	No Precision		Some Precision		
	Mean	SD	Mean	SD	t
Letter Word Recognition	347.63	30.31	369.62	30.84	-3.613**
Passage Comprehension	402.86	19.41	409.20	20.63	-1.525
Applied Problems	413.45	17.17	423.25	14.71	-3.148**
Picture Vocabulary	471.24	11.31	477.51	8.14	-3.229**
Academic Knowledge	452.08	13.26	460.45	12.51	-3.272**
Sound Awareness	444.98	18.547	458.53	17.37	-3.800**
Alphabet Knowledge	12.83	7.83	17.53	7.61	-3.020**
Self Regulation	12.96	8.20	14.19	8.15	-0.750
Fine Motor Skills	10.04	2.78	12.16	1.71	-4.599**
Gross Motor Skills	6.78	2.26	7.40	2.50	-1.308
Child Age	4.90	0.56	5.04	0.54	-1.317
Home Learning Environment	25.06	5.81	27.46	5.00	-2130*
Responsivity	27.60	2.41	28.51	1.80	-1.981*
Management	14.55	1.81	14.49	2.59	0.124
Maternal Education (years)	15.57	1.89	16.68	1.32	-3.302**

* denotes significant difference in means at the .05 level
** denotes significant difference in means at the .01 level

Table 4

Demand for Precision and Child Outcomes

	No Demand		Some Demand		
	Mean	SD	Mean	SD	t
Letter Word Recognition	354.40	24.46	362.04	37.72	-1.211
Passage Comprehension	403.50	15.57	407.74	23.51	-0.981
Applied Problems	417.89	17.536	418.87	15.72	-0.291
Picture Vocabulary	473.27	11.28	475.33	9.54	-0.963
Academic Knowledge	454.82	14.43	457.24	12.74	-0.872
Sound Awareness	448.64	18.05	453.80	19.85	-1.353
Alphabet Knowledge	14.14	8.14	16.00	7.96	-1.124
Self Regulation	13.21	8.24	13.60	8.27	-0.233
Fine Motor Skills	10.47	2.92	11.59	2.09	-2.214*
Gross Motor Skills	6.95	2.65	7.30	2.02	-0.699
Age at Evaluation	4.91	0.56	5.00	0.56	-0.848

* denotes significant difference in means at the .05 level
** denotes significant difference in means at the .01 level

Appendix A

Demand for Precision Coding Criteria

Parental Demand for Precision scale

What is this?

The level to which the parent requires the child to be precise in **writing** both **words and numbers.** We will focus on situations in which the child's writing is not conventional.

Consider the following criteria when using this scale:

- Is each letter recognizable when it is presented on its own? Can you, as a coder, recognize it? Be picky! [Note: check each letter for appropriate orientation and recognizability at the same time – only mark one error if either or both problems are present]
- Is a letter written 3/4 above the line or the other letters? It is acceptable for a letter to extend past the end of the line as long as the child started writing somewhere near the beginning of the line.
- Are two words spaced far enough apart to be recognized as separate words?
- Are the letters in a word close enough to each other to clearly represent one word?
- Is any letter larger more than 150% the size of another letter?
- Is the orientation of the letter correct? By correct, we mean not rotated more than 45 degrees from a conventional orientation.
- Does the child write on the correct line?
- Is the word spelled correctly?

Score up to three comments made by the parent for each segment.

How do we score this?

1. Low - The parent allows the child to write in whatever way he/she wants. The parent does not tell the child to fix the product though it does not look like a conventional product according to the above criteria.

2. Medium – The parent draws the child's attention to an unconventional written outcome but, critically, does not suggest that the child should correct it at that moment. The parent may suggest that the child should pay attention to that product or be more precise in the future. She/he may only remark rather than insist on a correction. She/he also may make a remark and then correct the outcome herself. It doesn't matter if the child consequently corrects the product, as long as the parent doesn't demand it.

3. High- The parent asks the child for correction. Specifically, the parent suggests that the child should correct the outcome at that moment. There may be a situation in which the parent asks the child to make a correction, the child fixes it to the level that he can, and then the parent accepts the product even if it is not perfect in her/his eyes (or to the coder's eye!). However, even so, because the parent explicitly asked the child to fix the

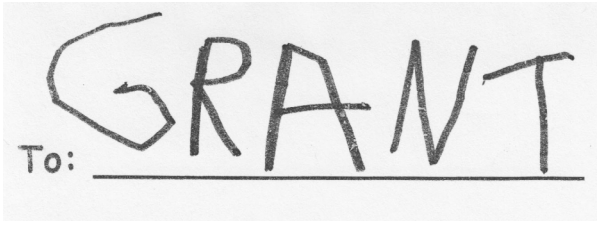
product, we will give the family a score of 3 (even if the parent accepted a non-perfect product in the end). Even if the child fails to make the correction, the mother's request for a correction is coded as "3"

- **9.** Demand for precision may be irrelevant for some families. This could happen in two situations:
    - The child has no difficulty producing the letters. His/her writing is good enough that there is no need for the parent to demand any changes. In this case, we cannot know what the parent's attitude towards precision is because the child does not give the parent a chance to exhibit it.
    - The parent writes for the child or together with the child so she/she does not demand anything from him in terms of writing.

Appendix B

Sample Invitations

1. This is an invitation with high precision. All of the letters are recognizable on their own, are the same orientation, and are the same size.



2. This is an invitation with low precision. The letters are not all recognizable (ex the E in Dave), the middle O in October is a different height than the other letters, and the 1 is backwards