The present study examined if having an older sibling was significantly related to stronger self-regulation and achievement, in a sample of 74 preschool children participating in a self-regulation intervention. It was hypothesized that children with an older sibling in the fall would have higher self-regulation and achievement scores than children with no older siblings, and that children with an older sibling in the intervention would improve more across the year in self-regulation and achievement than children with an older sibling in the control group. Results showed that having an older sibling significantly predicted higher vocabulary and math scores in the fall of preschool. In addition, children with an older sibling in the intervention group had significantly higher vocabulary scores than children with an older sibling in the control group in the spring. Findings indicate that older siblings have an important influence on the early development of vocabulary skills in preschool children.

Key Words: Siblings, School readiness, Self-regulation, Development

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Play with your older sister:

Relations between having an older sibling and school readiness.

by

Sara A. Tafuri

A PROJECT

submitted to

Oregon State University

University Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Arts in Psychology (Honors Associate)

Presented May 14, 2009
Commencement June 2009
Honors Baccalaureate of Arts in Psychology project of Sara A. Tafuri presented on May 14, 2009.

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I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

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Acknowledgements

I would like to acknowledge:

My mentor Dr. Megan McClelland for all of her hard work and dedication in helping me through this project.

Shauna Tominey for helping me with the statistics, it is much appreciated.
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### Introduction

Preschool is an important time in a child’s life and helps prepare children for formal schooling. Compared to preschool, kindergarten is a more structured learning environment and children must possess certain self-regulation skills in order to make a successful transition. Self-regulation skills, such as inhibitory control, paying attention, and remembering and following instructions are important for success in kindergarten and elementary school (McClelland, Acock, & Morrison, 2006; McClelland, Morrison, & Holmes, 2000). However, many children enter school with low levels of self-regulation. These children are more likely to do worse on academic achievement and are at risk for school failure. In fact, more children are being expelled from kindergarten than children from higher grades such as middle and high school (Louge, 2007).

### The Importance of Self-regulation for School Readiness and Achievement

Research has found that self-regulation (specifically attention, working memory, and inhibitory control) is important for early school success (McClelland, Cameron, Connor, Farris, Jewkes, & Morrison, 2007). Children utilize attention so that they can focus on a task, and complete behavioral tasks while accessing working memory (Barkley, 1997). Working memory helps children to remember directions to follow and also plan solutions to a problem (Gathercole & Pickering, 2000). Inhibitory control plays a huge role by helping children to stop incorrect solutions and carry out better or correct responses (Dowsett & Livesey, 2000). These factors are
all part of school readiness, where teachers regularly ask children to inhibit inappropriate behaviors, remember directions, and focus on specific schoolwork related tasks. Examples are, raising a hand to be called on, sitting still and completing a task quietly, or waiting one’s turn for playing at a specific station.

Self-regulation is also related to higher academic performance (Rueda & Rothbart, 2005). In one study, prekindergarten children with better self-regulation skills had higher levels of emergent literacy, vocabulary, and math. In addition, children who showed gains in self-regulation showed significant gains in emergent literacy, vocabulary, and math as compared to children who showed little or no gains in self-regulation (McClelland et al., 2007). Thus, focusing on improving children’s self-regulation may be an effective way to help children enter school ready to learn.

*Measuring Self-Regulation and the HTKS task*

Recently, there has been increased interest in developing direct measures of self-regulation. These direct measures have the ability to predict social and academic achievements without the bias that comes with observational methods or teacher ratings (Hongwanishkul et al., 2005; Manly et al., 2001; Pickering & Gathercole, 2004). Originally, caregiver and teacher reports were the most commonly used measures (McClelland et al., 2000). Although these reports are an important part of measuring a child’s self-regulation, they can be biased because reports could be based on perception rather than measurements recorded from interactions with children. Direct measures allow children to perform tasks while a researcher records scores, insuring that the children have a chance to show skills acquired rather than relying on ratings for information.
Unfortunately, many of these direct measures still have limitations. Some are performed in a lab setting where results may not generalize to a classroom setting (Hongwanishkul et al., 2005). Also, much of the research has focused on children with special educational needs or children with learning disabilities such as ADHD (Manly et al., 2001; Pickering & Gathercole, 2004). Thus, new measures are needed for typically developing children that apply to classroom settings.

The Head-Toes-Knees-Shoulders (HTKS) task is designed to directly measure self-regulation skills in preschool children. This task can be administered as a simple game in a classroom setting, takes about five minutes, and does not require any specialized equipment or materials. The HTKS is set up so that children respond with gross motor movements and are asked to do the opposite of what the administrator says. Assessments that require fine motor movements can miss skills that children may have, but are unable to show because they lack fine motor abilities and not necessarily self-regulation (Cameron et al., 2008).

The HTKS task taps self-regulation skills such as inhibitory control, attention and working memory. These aspects of self-regulation are important skills required to be successful in a classroom. Children are asked to perform a simple task (“touch your toes” then “touch your head”) followed by being asked to perform a more complex opposite task (touch toes when asked to touch head and vice versa). A child needs to be able to pay attention (listen to directions), use working memory to remember directions, and use inhibitory control to perform the opposite of what is asked, which feels unnatural. The HTKS directly measures the combined effect of these three aspects of self-regulation and is also strongly correlated to school achievement scores (McClelland et al., 2007).
Interventions for school readiness

Although self-regulation is important for early achievement, not all children have strong levels of these skills. Children who do not have the ability to work cooperatively during group activities, ‘use their words’ instead of showing aggression when frustrated, or control impulses, are more likely to experience difficulty as they get to kindergarten. A number of studies have shown that interventions can be effective in strengthening children’s self-regulation. For example, a recent study examined an intervention to help increase self-regulation skills in foster children (Pears, Fisher & Bronz, 2007). In this study, foster children entering kindergarten were randomly assigned to participate in either the intervention group (meeting twice a week) or a control group (which included usual services for local foster children). Children practiced self-regulation and social skills in groups of unfamiliar peers. The intervention group focused on two main aspects of social emotional readiness: social competence, and emotional and behavioral self-regulation. Children were taught techniques to help control self-regulation through modeling and participation in circle time, had multiple opportunities to practice newly learned skills, and were consistently reinforced for appropriate self-regulation. The foster parents of intervention children reported increased social competence in children, and the intervention helped to stabilize children’s behavior whereas the control children’s behavior deteriorated. Results suggested that the intervention had positive effects of emotional competence and self-regulation skills, helping foster children in the transition to kindergarten (Pears, Fisher & Bronz, 2007).

Another recent study evaluated the Incredible Years Teacher Classroom Management and Child Social and Emotion Curriculum (called Dinosaur school) as a potential intervention program for children in Head Start and poverty stricken areas (Webster-Stratton, Reid &
Stoolmiller, 2008). Classrooms were randomly chosen as intervention or control classrooms. Teachers were trained in the curriculum and to use classroom management skills to improve emotional and behavioral regulation and social competence. Homework was also sent home to involve parents. Results showed that teachers in the intervention classrooms showed more positive teaching and management strategies and students showed improved social, emotional, and self-regulational competence. Parents also showed more involvement in the intervention classrooms (Webster-Stratton, Reid & Stoolmiller, 2008). Together these results suggest that interventions that are set up for classroom settings and promote the skills necessary for successful school participation could be extremely helpful in transitioning children to the kindergarten environment.

The Influence of Siblings on Children’s Self-Regulation

In addition to the benefits of interventions, some studies suggest that siblings can also support children’s self-regulation. One such study found a connection between having an older sibling and inhibitory control. This study found that children with older siblings had an advantage in inhibitory control over children with no older siblings. Children with siblings performed better when told to resist instructions from a certain instructor but follow instructions from a different instructor (Cole & Mitchell, 2000). This suggests that children with older siblings may be better at remembering directions. It also suggests that they can stop the incorrect behavior of following one instructor and instead choose a correct response by following the direction of the other instructor.

Siblings can also indirectly help teach self-regulation skills. Children with siblings have additional opportunities during play to interact with their siblings and learn that others have
unique thoughts of their own (called theory of mind). Therefore, having an older sibling who may already understand theory of mind can enhance the development of theory of mind in younger siblings (Perner, Ruffman & Leekam, 1994). In addition, aspects of self-regulation such as inhibitory control are associated with the development of theory of mind, suggesting that children with a developed TOM might have better developed self-regulation skills. (Rueda & Rothbart, 2005).

Other research suggests that older siblings may be more effective teachers than older peers. This is important because younger siblings spend more time around older siblings than older peers (Azmitia & Hesser, 1993). In one study, older siblings gave explanations, positive feedback, and spontaneous guidance more often than peers. Older siblings were also more effective teachers, and children taught by siblings outperformed the children taught by peers. (Azmitia & Hesser, 1993) Another study by Klein, Zarur, and Feldman (2003) found that older siblings’ teaching was focused on the regulation of behavior, and increased cognitive performance in younger siblings was related to the amount of teaching behaviors of older siblings. This may be because sibling pairs have established patterns of communication with each other. Young children might learn more when taught by an older sibling because of these well established patterns (Cicirelli, 1972). Sibling interactions involve two different components: equal partner sibling pairs (playing where both partners teach and learn) and younger siblings imitating the older siblings. These two components complimenting each other are important for a teaching and learning environment. (Klein et. al, 2003) These complex interactions are not found among peers.

Together, this research suggests that older siblings have a unique influence on modeling and teaching self-regulation to their younger sisters or brothers. In early childhood, younger
siblings spend more time with older siblings than peers and have more opportunities for an older sibling to teach and model skills. By middle childhood, children and parents are more likely to share responsibility for regulating a child’s behavior (Azmitia & Hesser, 1993). Thus, these children would have more opportunities to learn from every family member. Children without an older sibling would not have this opportunity. Younger siblings would benefit from both the parents and the older sibling teaching them. In fact, research has found that children under age 12 with an older sibling tend to get higher scores on I.Q. tests than the older child (Carey, 2007).

The Extra Affect of Having a Sibling and an Intervention

School readiness is incredibly important and children who do not possess the appropriate self-regulation skills are starting kindergarten at-risk for school difficulty. Intervention research has suggested that self-regulation skills can be improved to help children prepare for the structured environment of kindergarten. Because self-regulation is associated with achievement, interventions may also help children improve on literacy, vocabulary, and math skills. However, siblings also play a role in the development of school readiness in prekindergarten children. The above research suggests that older siblings help younger siblings develop self-regulation through teaching and modeling regulatory behavior. Thus, it seems likely that children with at least one older sibling should have more practice in self-regulation than children with no siblings. Therefore, it may be that children with at least one older sibling in an intervention group will have the combined positive effects of learning self-regulation skills from an older sibling and strengthening self-regulation skills from an intervention group. This suggests that children in an intervention group with at least one older sibling should have higher levels of self-regulation and achievement than children with at least one older sibling in a control group.
Goals of the Current Study

Based on the research literature, the present study asked two questions:

1.) Does having an older sibling relate to significantly stronger self-regulation skills and achievement for children in the fall of preschool? It was expected that preschool children with an older sibling would have stronger self-regulation and perform better on vocabulary, math, and reading than preschool children without an older sibling in the fall.

2.) Do preschool children with an older sibling who are in the intervention group improve more in self-regulation and achievement from fall to spring than preschool children in the control group with an older sibling? It was hypothesized that preschool children in the intervention group who have an older sibling would have greater improvement in self-regulation and achievement from fall to spring than preschool children in the control group who have an older sibling.
Methodology

Participants

The Kindergarten Readiness Study used a longitudinal design to follow 74 English- and Spanish-speaking children over the preschool year when children were 4 years old. Half the children (n=37) were randomly assigned to the control group and half (n=37) to the intervention group. Thirty-four of the children in the study were enrolled in Head Start and 40 of the children were not enrolled in Head Start. The average age at the beginning of the study was 54.5 months. Forty-three of the children were female and 31 were male. Children, parents and teachers were involved in the study.

Procedure: Intervention

Children in the intervention group participated in structured playgroups twice a week for eight weeks (for a total of 16 playgroups) where they practiced self-regulation and social competence. The 30 minute playgroups were conducted during free-play time in the preschool. The same researcher was the group leader for every playgroup. Groups were set up as a circle with everyone sitting on mats. A hello song helped the children transition to the playgroup setting and a goodbye song ended each session.

Group Games:

The group games were intended to help children improve self-regulation skills such as working memory, attention and inhibitory control. Rules were added to each game as the children learned them to add difficulty and practice the skills. For example, an opposite rule was
added to many of the games such as dancing slow to fast songs and dancing fast to slow songs in the Freeze Game. A description of the games used in the intervention included:

1.) *Sleeping, Sleeping, all the children are sleeping.* The sleeping game was used to help children remember and follow directions (attention and working memory). Children were instructed to lie on the floor along with the teachers, while the teachers sang, *sleeping, sleeping, all the children were sleeping... and when they woke up, they were______!* An animal was chosen and teachers and children pretended to be this animal until the group leader sang the sleeping song again. Children were given the chance to choose the animal.

2.) *The Freeze Game.* The freeze game helped children pay attention (attention), remember instructions (working memory), and learn to do the opposite (inhibitory control). The children were instructed to dance when music was playing and freeze when music stopped playing. Then the group leader introduced a fast and a slow song, and the children were instructed to dance slow during the slow song and fast during the fast song and freeze whenever the music stopped. In the next session children were instructed to do the opposite and dance fast for slow songs and slow for fast songs.

3.) *Color-Matching Freeze Game.* The Color Matching Freeze Game helped children practice attention and working memory (multi-step instructions) and inhibitory control (freezing, dancing, finding proper color to freeze on). This game was related to the Freeze Game in that children danced when music was playing and froze when the music stopped (also had fast-slow song component). However, paper circles of different colors were taped to the bottom of each mat. When the music stopped the instructor held up a colored circle and children had to freeze on the correct colored circle on the floor mats. Children got to take turns holding up a colored circle.
4.) Red Light, Purple Light. Red Light Purple Light helped children practice paying attention to an “instructor” (attention), taking turns and starting and stopping (inhibitory control). Children were instructed to go stand with their backs against a wall. A piece of instruction paper was held up to indicate ‘go’ or ‘stop’. The group leader decided which colors were ‘go’ and ‘stop’. Children were instructed to walk instead of run so that was practice for inhibitory control. Later children got to choose which color was which, choose from among more colors, and be the leader (holding up construction paper). The opposite was also added later (‘go’ color means stop and ‘stop’ color means go).

5.) Conducting an Orchestra. The Conductor Game helped children with learning to take turns with different roles (inhibitory control), and listening to and remembering instructions (attention and working memory). Musical instruments were brought in and each child got to choose a musical instrument. Children were instructed to play their instruments when the leader moved the baton and stop when the leader set the baton down on the floor. Each child got a chance to be the conductor. Later an opposite element was added for children to play when the baton was on the floor and stop playing when the baton was moving.

6.) Drum Beats. The drum game helped children practice remembering instructions and focusing on who was drumming (attention and working memory); and also helped children practice inhibitory control. A drum was introduced. The leader either beat fast or slow. The children were instructed to perform an activity (clapping, stomping, marching) to the beat of the drum and to freeze when the drumming stopped. Children each got a turn on the drum. Later an opposite component was added where the activities were performed slowly to a fast beat or fast to a slow beat.
7.) *Funny Faces Song.* After a few sessions, instructors realized that children had trouble switching attention from the main instructor (adult) to a child when children got to take turns being the instructor. This song was introduced to assist children in following a peer leader in the circle instead of only the adult group leader or teacher. This song was intended to help children switch tasks and switch attention to changing leaders (attention and working memory). Each child got to be the person making the funny face while others copied. This way a child has to look at the leader to know what to copy as opposed to looking at other cues from the group.

(To the tune of Mary Had a Little Lamb)

“I can make a funny face, funny face, funny face.
I can make a funny face, watch and copy me!”

*Measures*

*Parent Demographic Questionnaire*

In the fall of the preschool year, parents completed a background questionnaire with questions about children’s age, gender, sibling status, childcare experience, ethnicity, and parent education level.

*Self-Regulation*

In the fall and spring of the school year, children were given the Head-Toes-Knees-Shoulders task (HTKS), which focused on working memory, attention, and inhibitory control. Children were instructed to do the opposite of what the researcher told them to do. Validity was determined by comparing scores to other teacher ratings (SSRS; Gresham & Elliott, 1990; CBRS;
Bronson et al., 1995). There were no significant differences across examiners in children’s scores and inter-rater reliability was strong (McClelland et al., 2007; Pointz et al., 2008).

In the HTKS, when the researcher said, “touch your toes” children were supposed to touch their heads and when the researcher said, “touch your head” children were supposed to touch their toes (same with knees/shoulders). Before the actual test portion, a practice portion took place in which the researcher could re-explain the instructions up to 3 times. The test portion was a total of 10 random items. The score was 0, 1, or 2 for each item. If the child did not follow the directions (did not do opposite) a 0 was recorded. If the child self-corrected (moved towards the wrong answer, but then switched to the correct answer) a 1 was recorded. If the child did the opposite correctly a 2 was recorded.

**Early Vocabulary Skills**

The Picture Vocabulary portion of the Woodcock-Johnson Psycho-Educational Battery-III Tests of Achievement (The Batería III Woodcock- Muñoz for Spanish speaking children) was used to assess receptive and expressive vocabulary skills. Previous research has shown the picture-vocabulary test to have strong reliability for preschool aged children (Woodcock & Mather, 2000; Muñoz-Sandoval et al., 2005). This task was also introduced by the researcher as a book game. Children were asked to identify pictures, such as pictures of cars, houses, grasshoppers, etc.

**Early Math Skills**

The Applied Problems portion of the Woodcock-Johnson Psycho-Educational Battery-III Tests of Achievement (The Batería III Woodcock- Muñoz for Spanish speaking children) was used to assess early math skills. The Applied Problems portion of the test also has strong
reliability for preschool aged children (Woodcock & Mather, 2000; Muñoz-Sandoval et al., 2005). This task was introduced by the researcher as a book game, and measured children’s ability to answer questions about time and money, and to complete word problems.

**Emergent Literacy Skills**

The letter-word identification portion of the Woodcock Johnson Psycho-Educational Battery-III Tests of Achievement (The Batería III Woodcock- Muñoz for Spanish speaking children) was used to assess emergent literacy skills including letters and word identification. The letter-word identification test is standardized and has strong reliability and validity (Woodcock & Mather, 2000; Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005). This task was introduced by the researcher as a book game in order to make the task fun. Children were asked to verbalize letters/words pointed to by the researcher, or to point to letters/words verbalized by the researcher.

**Analysis**

In order to answer the research questions, sibling data were analyzed. For the first research question, a regression was run to control for the possible confounds of maternal education and child age, and to see if having an older sibling predicted higher HTKS and higher achievement in the fall than children with no older siblings.

For the second question, a one-way ANOVA was performed to look at the differences in achievement in the spring in the Intervention and Control group. This was used to see if children with at least one older sibling in the Intervention group had higher achievement scores in the spring than children with at least one older sibling in the Control group. A one-way ANOVA was also run to look at differences in HTKS and achievement across the year in the Intervention
and Control group. Change scores were used to examine the improvement of children with an older sibling in the intervention and control group from fall to spring. This was used to see if children with at least one older sibling who were in the Intervention group improved more in self-regulation and achievement scores than children with at least one older sibling in the Control group.
Results

The present study examined sibling data from the Kindergarten Readiness Study to see if having an older sibling influenced self-regulation skills and achievement in preschool children. It was predicted that preschool children with an older sibling would have stronger self-regulation skills and perform better on reading, math, and vocabulary than children without an older sibling in the fall, and that preschool children in the intervention group with an older sibling would have greater improvement in self-regulation and achievement from fall to spring than preschool children in the control group with an older sibling.

The sample for the present analyses contained 35 children with no older siblings and 29 children with at least one older sibling. The average age for children at the start of the study was 54.53 months (about 4.5 years), and the average parent education (for both mothers and fathers) was 15 years.

*Does having an older sibling relate to significantly stronger self-regulation skills and achievement for children in the fall of preschool?*

For the first question it was predicted that preschool children with an older sibling would have stronger self-regulation skills and perform better on vocabulary, math and reading than preschool children without an older sibling in the fall. A regression was run to control for the effects of child age, maternal education and older siblings, to see if having an older sibling predicted higher achievement in the fall than children with no older siblings. Only maternal education was controlled for, because the average education levels for mothers and fathers were the same. A regression was not run for HTKS scores in the fall, because the scores were not normally distributed. There were many zero scores suggesting that many children had difficulty
with the task possibly due to children being young at the beginning of the year; therefore a regression was not appropriate.

After controlling for maternal education, having an older sibling was related to higher vocabulary and math scores (see Table 1). Specifically, both maternal education and having at least one older sibling were significant predictors of children’s vocabulary skills, ($\beta = .42, p < .001$; $\beta = .51, p < .001$ respectively). For math, maternal education ($\beta = .55, p < .001$), and having at least one older sibling ($\beta = .26, p < .05$) significantly predicted higher math scores for children in the fall. The regression for reading scores in the fall showed that maternal education predicted significantly higher reading scores ($\beta = .40, p < .01$), but having at least one older sibling was not significantly related to higher reading scores, ($\beta = .13, p > .05$) (see Table 1).

Do preschool children with an older sibling who are in the intervention group improve more in self-regulation and achievement from fall to spring than preschool children in the control group with an older sibling?

For the second question it was predicted that children in the intervention group who had an older sibling would have greater improvement in self-regulation and achievement from fall to spring than preschool children in the control group who had an older sibling. First, a one-way ANOVA was run to see if scores for achievement were significantly higher in the spring for children with at least one older sibling in the intervention group than children with at least one older sibling in the control group.

There was a significant difference between children with at least one older sibling in the intervention group than children with at least one older sibling in the control group for spring vocabulary, $F (3, 65) = 5.01, p < 0.01$. For math scores in the spring, there were no significant differences between intervention and control groups for children with at least one older sibling, $F$
(3, 65) = 1.28, \( p > 0.05 \). For reading scores in the spring, children with at least one older sibling in the intervention group did score the highest (363.73 vs. 352.86), but this was not statistically significant, \( F (3, 65) = 1.72, p > 0.05 \).

The next question used change scores to examine if children with at least one older sibling in the intervention group showed more improvement from fall to spring than children with an older sibling in the control group. For self-regulation, children in the intervention group with at least one older sibling had the second highest score (11.45 vs. 12.63), but there were no significant differences between intervention and control groups for children with at least one older sibling, \( F (3, 65) = .73, p > 0.05 \).

There were also no significant differences in improvement of the achievement outcomes for children with at least one older sibling in the intervention or control groups across the year. Specifically, an ANOVA showed that there were no significant differences in vocabulary and math scores between intervention and control groups for children with at least one older sibling across the year, \( F (3, 65) = 1.55, p > 0.05 \); \( F (3, 65) = 1.85, p > 0.05 \). An ANOVA also showed that children with at least one older sibling in the intervention group had the highest scores in reading for across the year (24.64 vs. 9.5), but the scores were not significant \( F (3, 65) = 2.11, p > 0.05 \).

In general, children with at least one older sibling started out ahead of children without an older sibling on vocabulary and math achievement in the fall. In addition, children with an older sibling in the intervention group had significantly higher spring vocabulary scores than children with an older sibling in the control group. It cannot be known if children with older siblings in the intervention group stayed ahead in vocabulary because of having an older sibling or because of participating in the intervention. Also, there were no significant differences in self-regulation
or achievement across the year for children with an older sibling in the intervention or control groups.
Discussion

The present study examined the influence that an older sibling might have on the development of self-regulation and achievement in preschool children. Specifically this study looked at self-regulation and early vocabulary, math and reading skills as they related to a child having an older sibling or not in a self-regulation intervention. It was predicted that children with at least one older sibling would have better self-regulation and achievement than children without siblings. It was also predicted that children with at least one older sibling would improve more in self-regulation and achievement in an intervention group than children with an older sibling in a control group.

Does having an older sibling relate to significantly stronger self-regulation skills and achievement for children in the fall of preschool?

Results indicated that children with an older sibling had significantly higher vocabulary and math scores in the fall of preschool. This finding supports other research showing that older siblings tend to be better teachers, give more feedback, and interact with younger siblings more often than peers (Azmitia & Hesser, 1993; Shlomit, and Feldman, 2003). Therefore, older siblings who have more developed language skills, and math skills may talk to their younger siblings more often and help children with early math concepts. For example, older siblings might be influencing math skills because they would be able to help teach a younger sibling skills such as how to count. Past research supports this showing that sibling pairs develop patterns of communication and interactions not found among peers that complement each other and foster the teaching, learning environment (Cicirelli, 1972; Klein et. al, 2003). Together, this
suggests that siblings play an important role in teaching and scaffolding younger children’s early vocabulary and math skills (Klein et al., 2003).

Maternal education was another factor that predicted early vocabulary, math, and reading scores. Mothers with more education may have larger vocabularies and use a wider range of vocabulary with their children. This is supported in past research that found that 86%-98% of the words in a child’s vocabulary are the same as in the parents’ vocabulary. In addition, these mothers may also promote math and reading skills by encouraging early learning and having more learning materials in the home (Hart & Risley, 1995).

Do preschool children with an older sibling who are in the intervention group improve more in self-regulation and achievement from fall to spring than preschool children in the control group with an older sibling?

Results from the present study showed that children with at least one older sibling in the intervention group did have significantly higher vocabulary scores in the spring than children with at least one older sibling in the control group. However, for math and reading scores in the spring, there were no significant differences between children in the intervention group with at least one older sibling and children in the control group with at least one older sibling. Although children with an older sibling did have higher math scores in the fall than children without an older sibling, this result was not found in the spring of the school year. It is uncertain why children in with an older sibling in the intervention group did not remain higher on math scores in the spring (like vocabulary) than children with an older sibling in the control group. It could be that siblings have a stronger influence on vocabulary development because of the social interaction, whereas less focus between siblings involves math development. In addition, there were no significant differences in rates of improvement over the year between children with at
least one older sibling in the intervention and control groups for self-regulation or the achievement outcomes. As noted above, older siblings talk to younger siblings and teach them more often than peers and are therefore more likely to help in the development of early vocabulary.

This indicates that older siblings may give children an initial boost in vocabulary skills, but having an older sibling does not necessarily influence improvement. However, these children did start ahead and stay ahead. Participation in the intervention could have helped to keep vocabulary scores for children with an older sibling higher than children with an older sibling in the control group.

**Practical Implications, Limitations, and Further Research**

The present study points to some practical implications, although it does not mean that parents should all have more than one child. Overall, results support the importance of having an older sibling or mentor especially for children’s early vocabulary and math skills. For example, big brother, big sister programs might potentially be programs that can provide mentoring to younger children to promote early achievement. These programs would be better than simply increasing interactions with peers because they serve as mentors. Mentors take the time to get to know a child, build a rapport, and can utilize opportunities to help teach important skills. These types of programs might help a child get ahead so that he/she could stay ahead.

Although the results of this study are interesting, they must be looked at carefully. There were many limitations and therefore it is inappropriate to make strong assumptions based on the findings. First, the sample size was somewhat small. The sample was taken from a study that already had children randomly split up into Intervention and Control groups. Groups were not
formed based on whether children had an older sibling or not and were not split evenly by having an older sibling or not. Also, the study did not originally look at sibling influences and was not set up specifically for it. Thus, there is not more specific information about siblings in the study (such as the age of older siblings). In addition, maternal education was an important variable that significantly predicted reading, math, and vocabulary achievement. However, there may have been other variables that were not considered, such as the age or gender of the older siblings or even having a younger sibling.

Future studies should have larger sample sizes, look at the age and gender of the older sibling, and include younger siblings or collect more specific information about siblings. These studies would provide a better picture of how siblings affect early self-regulation and achievement. Looking at older children in grade school would also examine how siblings affect these skills later in childhood. Considering the influence of maternal education level, future studies could look at how parental level of education has an impact of these skills as well. Also, future studies should look at mentoring programs such as big brother, big sister to see if children involved in these programs have stronger self-regulation and achievement. Big brother, big sister programs could potentially have a larger effect on early vocabulary and math development, because the mentors could explicitly focus on promoting academic and self-regulation skills.

Conclusion

The present study found that having an older sibling significantly predicted better vocabulary and math skills in the fall of the preschool year. Furthermore, children with an older sibling in an intervention had significantly stronger spring vocabulary scores than children with an older sibling in a control group. Because children were participating in an intervention, it is
unclear if results in the spring of the school year for vocabulary were due to the presence of an older sibling or due to participation in the intervention. Future research should examine this issue more closely. In general, results from the present study indicated that interactions among older and younger siblings may help to strengthen early development of the younger child’s vocabulary skills, and give preschool children an extra advantage.
References


Table 1. *Regression testing the relationship between having at least one older sibling and Reading, Math and Vocabulary scores in the fall of preschool (N = 62)*

<table>
<thead>
<tr>
<th>Reading</th>
<th>Coef.</th>
<th>St. Err</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Age</td>
<td>-.99</td>
<td>.86</td>
<td>-.14</td>
</tr>
<tr>
<td>Mom Ed.</td>
<td>2.93</td>
<td>.89</td>
<td>.40**</td>
</tr>
<tr>
<td>Older Sib.</td>
<td>6.39</td>
<td>6.10</td>
<td>.13</td>
</tr>
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<table>
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<th>Math</th>
<th>Coef.</th>
<th>St. Err</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Age</td>
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<td>.63</td>
<td>.12</td>
</tr>
<tr>
<td>Mom Ed.</td>
<td>3.14</td>
<td>.65</td>
<td>.55***</td>
</tr>
<tr>
<td>Older Sib.</td>
<td>10.50</td>
<td>4.47</td>
<td>.26*</td>
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<table>
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<th>Coef.</th>
<th>St. Err</th>
<th>β</th>
</tr>
</thead>
<tbody>
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<td>.39</td>
<td>.13</td>
</tr>
<tr>
<td>Mom Ed.</td>
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<tr>
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<td>2.70</td>
<td>.51***</td>
</tr>
</tbody>
</table>

Note: * p < .05, ** p < .01, *** p < .001