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Prevalence of family history of speech-language impairment in an African American sample

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PREVALENCE OF FAMILY HISTORY OF SPEECH-LANGUAGE IMPAIRMENT IN AN AFRICAN AMERICAN SAMPLE

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ABSTRACT

The purpose of this study was to examine the prevalence of a positive family history of speech and/or language impairments in an African American sample. The first phase of the study used questionnaires from the primary caregivers of 161 children. The questionnaires allowed for an examination of family history as a function of a child's socioeconomic level (+/- high school level of maternal education), educational placement (+/- receipt of services by a speech language clinician), and clinical status (+/- profile consistent with a diagnosis of SLI). The second phase of the study included interviews that were collected from 17 families who completed the questionnaires. All families who indicated a willingness to be interviewed were called, but only 17 were accessible by phone. Through the interviews, the family histories of the children were further documented.

Results were that families from low socioeconomic backgrounds reported greater rates of a positive speech and/or language family history than those from middle socioeconomic backgrounds. Families of children classified as SLI also reported higher rates of a positive family history than the families of children who were not classified as SLI, and this comparison controlled for differences in the families' socioeconomic levels. Significant differences in positive family history rates were not found to be related to the children's educational placements.

Results from the phone interviews revealed that of those children whose families reported a positive speech and/or language history, the number of members within each family who reported a positive history ranged from one to five (mean = 1.8 family members; SD = 1.3). Half of these members were in the children's immediate families, while the other half were in their extended families. Given the limited number of families who participated in the interviews, an

examination of these data as a function of the children's socioeconomic status, educational placement, and clinical status was not completed.

Together, these findings support the claim that the clinical diagnosis of SLI has a familial component, but future studies that seek to explore this familial component need to measure, and rigorously control for, the socioeconomic levels of children and their families.

CHAPTER 1
INTRODUCTION

As humans, a unique characteristic we possess is the ability to rapidly acquire speech and language at a very young age, with relatively little effort and intentional instruction. However, some children do not acquire language and develop effective communication skills as quickly, or within the expected time frame, as other children. Obvious causes of such developmental impairments may be attributable to mental retardation, hearing loss, cleft palate, autism, or cerebral palsy (Fisher, Lai, & Monaco, 2003). There also exists another group of children who do not possess the developmental impairments listed above, but still show a prolonged period of language development. In the field of Communication Disorders, this condition is known as specific language impairment. According to Rice (1997) the "specific" implies an impairment that is specific to language, without evidence of other clinical conditions. The aforementioned definition of SLI, along with many others that have been created to describe groups of individuals, is vague and glosses over the heterogeneity of those classified as having SLI (Conti-Ramsden, Crutchley, & Botting, 1997). Nevertheless, the use of this term helps researchers identify children who fit this category so that the nature of the language impairment and the nature of the heterogeneity within the group can be examined.

Much research has been done to identify the risk factors associated with the clinical condition of language impairment. Some of this research has been conducted on children who meet the definition of SLI, while others have been performed on children who meet a broader definition of language impairment. Regardless of whether children have been classified as having SLI or a general language impairment, aggregation of weak language skills within these children's families has been documented. In fact, research has shown that family history of language impairment and autoimmune diseases, gender, and prenatal/perinatal factors contribute

to childhood language impairments, with family history of language disorders as the strongest indicator of compromised language development within children (Benasich, 2002; Bishop, 1997a; Tallal, Ross, & Curtiss 1989b; Tomblin, 1989, 1996; Tomblin, Records, Buckwalter, Zhang, Smith, & O'Brien, 1997; Van Hulle, Goldsmith, & Lemery, 2004).

The purpose of the current study is to use a sample of African American (AA) families to further explore family history of speech-language impairment as a variable that has been shown to be related to the presence of language impairment and/or a diagnosis of SLI. Another variable of interest is socioeconomic level, because very little research has been done in this area with respect to its effect on the prevalence of SLI and on the prevalence of a positive family history of language impairment and/or a clinical diagnosis of SLI. The literature review for this study includes studies that focus on the clinical diagnosis of SLI and those that focus on children with more broadly-defined language impairments. In the first section, phenotype and heritability will be described as two terms that are used in studies to examine the relation between family history and childhood language disorders. In the second section, research will be presented regarding family history and its impact on language disorders as well as socioeconomic level as a risk factor that needs to be explored within the family history literature. As will be shown, very little research has examined the impact of these risk factors in AA families.

Heritability and Phenotype

In recent years, people have researched heritability and phenotypes to help focus on a more preceise definition of SLI. Encyclopedia Americana defines phenotype as "any physical or behavioral trait or traits [e.g., eye color, size, or behavior] of an organism…that results from the interaction between the organism's genetic makeup, or *genotype*, and the environment in which the organism develops" (p. 859). In terms of SLI, defining the phenotype is important when

determining prevalence of family history involvement with respect to language impairment. A more precise definition of the phenotype related to SLI will lead to less errors in detecting probands (affected indivduals) and will lead to more accurate determinations of genetic influence (Rice, Haney, & Wexler, 1998). As noted earlier, the clinical condition of SLI refers to a heterogenious group of individuals; therefore, methods of measuring SLI are problematic (Stark & Tallal, 1981), and "unraveling the phenotypic complexity of speech and language impairment represents a major challenge for those seeking to ascertain the underlying causes" (Fisher et al., 2003, p. 58). However, recent studies have honed in on more stable and consistent identification of those affected with SLI by identifying certain linguistic aspects of the condition (Leonard, Miller, & Gerber, 1999; Rice & Warren, 2004).

Sesardic (2005) describes heritability as a measure of strength of genetic influence on phenotypic variations. The variations may be due to genetic and/or environmental factors. Heritability analyses approximate the relative involvement of genetic and non-genetic factors in observed behaviors (i.e., specific language impairment). Twin studies, family aggregation studies, and familial environment studies are some examples of heritability studies that have been conducted. Family aggregation studies, in particular, help to determine the degree to which observed behaviors, such as SLI, run in families.

Family History

Evidence has been collected concerning familial aggregation of language impairment and SLI despite the absence of a solid phenotypic definition of either of these conditions. Rice et al. (1998) indicated that as early as the 1940s studies were done that supported the hypothesis that general language disabilities appeared to run in families. More recent studies have been conducted that continue to support the hypothesis of familial concentration of language

impairment, which lends to the possibility of a genetic link (Lahey & Edwards, 1995; Lewis & Thompson, 1992; Neils & Aram, 1986; Rice et al., 1998; Spitz, Tallal, Flax, & Benasich, 1997; Tallal, Hirsch, Realpe-Bonilla, Miller, Brzustowicz, Bartlett, et al., 2001; Tallal, Ross, & Curtiss, 1989a; Tomblin, 1989). Six of these studies will be reviewed in further detail. In addition, one study that does not support a genetic link will be examined.

Neils and Aram (1986) sought to ascertain if children with general language disorders had significantly more family members who reported speech, stuttering, reading, and language disorders than children who did not present with language disorders. Seventy-four children with language impairments (probands) and 36 control children participated. All children were between 4;0 and 5;11 years of age. Parents of all participants completed a questionnaire regarding any family members that presented an impairment and the nature of the impairment. To ensure validity, all completed questionnaires were discussed with the parents. In the proband group, the average percentage of immediate family members with language-related disorders was 20.3. The average percentage of affected immediate family members in the control group was 3. These average percentages for the two groups were statistically different.

Tallal, Ross, and Curtiss (1989a) conducted a study to assess familial aggregation of SLI. Data were reported by families of children that participated in a larger longitudinal study. The study comprised of 62 4-year-old children with SLI and 50 matched controls. To be classified as SLI, the child needed a nonverbal performance IQ of 85 or higher on the *Leiter International Performance Scale* (Leiter, 1940), a mean language age at least 1 year below both performance mental age and chronological age, normal hearing, no motor handicaps, and no oral, structural, or motor impairments affecting non-speech movement of articulators. The children could also not present with autism or any known neurological disorders, and they had to be monolingual

English speakers. Children with speech deficits alone were also not included in the study. Both the biological mother and father were requested to fill out a separate questionnaire relating to family history of language, reading, writing, and academic achievement. Parents were classified as "affected" if any of the following were reported: history of language problems, history of below average school achievement to the eighth grade, and history of being held back in grade school through eighth grade. Siblings were "affected" if parents reported them to have a positive history of difficulties in reading, writing, language, or other learning disability. Chi-square tests revealed that the children with SLI were significantly more likely than controls to have a positive family history, defined as at least one first-degree relative, (77% vs. 46%). Additionally, t-tests revealed that the children with SLI reported a higher average frequency of impairment in first-degree relatives than did the controls, (42% ± 3% vs. 19% ± 2%). Although a rate was not reported, it was also stated that isolated impaired cases in families were rare, suggesting that SLI aggregates in families.

As an extension of the Tallal, Ross, and Curtiss (1989a) study, Tallal, Townsend, Curtiss, and Wulfeck (1991) used the same data to determine whether children with or without positive family histories of SLI showed different phenotypic profiles. The first analysis included 65 of the children with SLI who had sufficient family history data collected for the full five years of the longitudinal study. Forty-two of the participants met the criteria for a positive history, while 23 met the criteria for negative history. The children's socioeconomic level was the only phenotypic difference between the groups that was identified. Specifically, more children with a negative family history in the group were classified as presenting a higher socioeconomic level as compared to the children with a positive family history. Tallal et al. (1991) did not deem this

finding surprising, as they reasoned that language problems are often linked to poor academic achievement, and thus lower levels of parental education in affected families may be expected.

The second analysis of the study further examined a subset of the subjects in the first analysis, which included those who were the most severely language impaired. The data came from a more detailed family history questionnaire that was administered at the end of the study. These questionnaires were collected from 23 participants with language impairment. Sixteen of these children met the criteria for a positive family history. The trend for more children with a negative family history to be found in families of higher socioeconomic status continued; however, the results were not statistically significant.

In another study, Tomblin (1989) completed research on familial aggregation of general language impairment using the questionnaire method. His participants were 187 second-grade children, ages 7 to 9 years, with and without a language impairment or learning disability. Fifty-one family history questionnaires from the impaired group were returned, while 136 questionnaires from the control group were received. This study found that only 3% of first degree relatives of the control group reported a positive family history, while roughly 23% of the immediate relatives of children with impairments reported a positive family history. A chi-square test showed that these differences were statistically significant.

In a fourth study, Lahey and Edwards (1995) conducted a study to investigate the proportion of children with SLI who have a positive family history of speech and language impairments. The data reported in this study was part of a larger project that explored lexical processing in children. The children were recruited through speech-language pathologists. This study included 53 children with SLI, ranging in age from 4 to 9 ½ years, and included 33 males

and 20 females. The ethnic distribution of the participants was as follows: 75% European American, 19% African American, 6% Mixed, but not European American.

Information gathered was based on direct observation, primarily via standardized tests, and a questionnaire completed by the parent. Chi-square tests were performed in order to determine if family history was independent of three different subgroups of children with language impairments: expressive only deficits, mixed deficits in expressive and receptive skills, and mild. The following proportions were found with children who had expressive language deficits versus children with mixed and mild deficits: family members ($.47 \leq .22$), affected mothers ($.57 \leq .17$), and affected siblings ($.53 \leq .27$). Thus, in all cases, children who had expressive deficits represented higher proportions of affected family members than did the children with mixed or mild deficits.

As part of the Lahey and Edwards (1995) study, they also examined maternal education and its relation to positive family history of SLI. Lahey and Edwards utilized parental education to determine socioeconomic level and they were grouped according to whether or not they had education beyond high school. The proportion of mothers with post high school education was .65, while it was .60 for fathers. Results indicated that neither maternal nor paternal educational level was related to family history of SLI. These findings are different from those reported by Tallal et al. (1991).

In a fifth study, Rice, Haney, and Wexler (1998) examined the family histories of children with SLI who showed pronounced difficulties with grammatical morphology. A total of 98 families (31 proband families and 67 control families) participated in the study. Both immediate and extended family members were included in the study, which led to 555 proband family members (110 immediate and 445 extended) and 1283 control family members (197

immediate and 1086 extended). The children with language impairments were between the ages of 4 ½ and 5 ½ years of age. Probands were recruited from the caseloads of area speech-language pathologists, while controls were recruited from preschools and daycare centers. Whole (both nuclear and extended together), nuclear, and extended families were examined. Results can be seen in Table 1. As can be seen, there were significantly higher rates of speech and language impairments in proband families than in control families. It was also found that there were significantly more affected nuclear family members than extended family members in proband families (26% vs. 16%).

Table 1. Results of Rice, Haney, and Wexler (1998) Family History Study

	Group			
	Proband famililies	Control families	X^2	p
Nuclear	26%	13%	9.10	< .01
Extended	16%	9%	20.7	< .001
Whole	18%	9%	31.6	< .001

Finally, Tallal et al. (2001) conducted a study to further examine the significance of family history with respect to language impairment. This study used a case-control design, in which they assessed the current language-related abilities of all biological, primary relatives (mother, father, siblings) of children with SLI, as well as the families of matched controls. The SLI group consisted of 22 participants, while the control group had 26 participants. The age range of the children in each was 4 to 14 years old, with a mean age of 7.6 years. The results found that children with SLI were significantly more likely than the control group to have a positive family history (59% vs. 19%). Additionally, the overall impairment rate of family members was found to be significantly higher for the children with SLI than the control group

(31% vs. 7%). The results of this study indicate that there is some level of concentration of language impairment when a positive family history is present.

These six studies, among others, combine to establish the possibility of a genetic link between family history and language impairment in children. However, a study conducted by Whitehurst, Arnold, Smith, Fischel, Lonigan, and Valdez-Menchaca (1991) does not show strong family concentration of language deficits in children who present expressive language problems without receptive language problems. Their study used questionnaire data gathered from the families of 117 children from middle- to upper-socioeconomic level (SEL) families from Long Island, New York. Sixty-two children classified as having expressive only language impairments were compared to 55 normally developing age-, gender-, and SEL-matched children. The expressive language delayed children were tested and performed at least 2.33 standard deviations below the mean on the *Expressive One-Word Picture Vocabulary Test* (Gardner, 1991). In contrast, they received standard scores of at least 85 on the *Peabody Picture Vocabulary Test-Revised* (Dunn & Dunn, 1983) and the *Leiter International Performance Scales* (Leiter, 1976). The authors did not assess articulation due to their extremely depressed expressive language abilities. This means that the children included in the study could have presented articulation and language deficits. The results revealed that there were no significant differences in positive family history rates between immediate families of children with expressive only language impairments and the immediate family members of children who were typically developing.

The findings of this study were surprising, given the findings of the other six studies. Artifact bias from maternal report data may be one reason for the findings, but the authors argued that this was not the case since parents of the children with language impairments have a

heightened awareness of language delay and are more likely to report problems. Additionally, the method of collecting the family history data was similar to the methods used in other studies, which implies that this methodology is capable of finding significant results. Since the methodology is similar across studies, the conflicting results may be due to the differences in the type and severity of the language impairments of the affected children in the studies. Interestingly, even though significant differences were not found, rates of family involvement were higher in the children with delays than in the controls (24% vs. 16%). The children in this study were also younger than those that have typically been studied. According to Lahey and Edwards (1995), the children in the affected group may not have been as homogenous as the children who have been included in previous familial aggregation studies.

In summary, in seven studies that have examined family history of language impairment, all but one showed evidence toward a genetic link. Of those seven studies, most participants included were Caucasian and from families that were described as middle to upper socioeconomic level. Two studies examined family history as it related to socioeconomic level (Tallal et al, 1991; Lahey & Edwards, 1995). While one of these studies suggested a link between family history and social class, the other did not.

Purpose of Research

The purpose of the current study was to examine the prevalence of a positive family history of speech and/or language impairments in an African American (AA) sample. The study had two phases. The first phase of the study used data from questionnaires that were collected from 161 families. In addition to learning more about the rate at which AA families report a family history of speech and/or language impairments, this component of the study examined rates of prevalence as a function of a child's socioeconomic level, their educational placement

(whether or not they received services by a school-based speech language clinician), and their clinical diagnosis (whether or not they met the eligibility criteria to be classified as SLI). The data used for this component of the study used questionnaires that were collected as part of two dissertations, one by Pruitt (2006) and one by Garrity (2007). The research questions guiding the first component of the study were:

1. Is there a difference in prevalence of a positive family history in AA children as a function of a child's socioeconomic level?
2. Is there a difference in prevalence of a positive family history in AA children who receive SLP services and those who do not receive such services?
3. Is there a difference in prevalence of a positive family history in AA children who were determined to meet the SLI criteria versus those who do not receive SLP services?

The second goal of the study was exploratory in nature. Specifically, phone interviews were completed with families of children who indicated on their questionnaire a willingness to be called. The phone interviews allowed us to learn more about the family histories of the participants. The research questions guiding the second component of the study were:

1. What is the number of family members who report a history of speech-language difficulties and their relation to the affected child (i.e., the proband)?
2. What is the nature of each family member's speech and language impairment?

CHAPTER 2
METHODS

Participants

The participants in this study were recruited as part of two dissertations completed at LSU, one by Pruitt (2006) and the other by Garrity (2007). They were residents of East Baton Rouge Parish, St. Tammany Parish, or Ascension Parish. All three parishes are located in the southeastern region of Louisiana. East Baton Rouge Parish and St. Tammany Parish are urban communities with 415,000 and 220,000 residents, respectively. Ascension Parish is a rural community, with approximately 87,000 residents. A total of 175 consent forms (Appendix A) were returned by African American (AA) children, ages 2 to 8 years, for these studies. Of the 175 returned consent forms, thirteen were omitted from the study due to incomplete information regarding either date of birth and/or status of speech therapy services (if any). An additional consent form was thrown out because two consent forms came from the same family (i.e., consent forms came from siblings). Thus, the resulting number of interpretable consent forms and number of participants in the study was 161. With this pool of participants, there were two phases of the study. As mentioned earlier, the first phase of the study examined all of the participants together ($N = 161$) and the second examined a subset of participants who were called to learn more about their family histories ($N = 17$). The participants and materials used for Phases 1 and 2 are discussed in the following two sections.

Phase 1: Participants and Materials

As shown in Table 2, age in months for the entire sample ranged from 25 to 100 months with a mean age of 78.5 (SD = 11.8). Gender was evenly split, with 49% males and 51% females. Maternal education ranged from 6 to 16 years with a mean of 13.3 years (SD = 2.2). In this study (and in the original studies by Pruitt and Garrity), socioeconomic status (SES) was

based on the highest level of education completed by each participant's mother. Based on the research by Campbell et al. (2003), maternal education below 12 years was classified as low SES (LSES), while mothers who had at least graduated from high school were classified as middle SES (MSES). The mean maternal education level of the LSES group was 10.2 years with a standard deviation of 1.1. The mean maternal education level of the MSES group was 14.2 years with a standard deviation of 1.7. Eighteen percent of the group received speech therapy services. The Louisiana Department of Education (2006) sites that 48.2% of the state's children, ages 3 to 5 years, have speech-language impairment. It should be noted that consent forms were not solicited from all classrooms in the parishes previously mentioned.

Table 2. Participant Characteristics

	Total *N* = 161, (%)
Age (in months)	
Mean	78.5
Standard Deviation	11.8
Gender	
Male	79 (49)
Female	82 (51)
Maternal Education	
LSES (< High School Graduate)	32 (20)
MSES (≥ High School Graduate +)	128 (80)
Receives SLP Services	29 (18)
Positive Family History of Speech, Language, Reading, or Writing Difficulties	39 (24)

Of the 161 participants, ten were classified as having SLI. Age in months for the SLI sample ranged from 71 to 106 with a mean of 84.9 (SD = 8.8). The sample consisted of 4 males and 6 females. Maternal education in years ranged from 11 to 16 with a mean of 12.2 (SD =

1.9). The children who were classified as having SLI were required to be receiving speech-language services. They also presented normal nonverbal cognitive levels as documented by the Figure Ground and Form Completion subtests of the *Leiter International Performance Scale-Revised* (*Leiter-R;* Roid & Miller, 1998). Additionally, these children were required to score more than one standard deviation or more below the mean on the Syntax Quotient of the *Test of Language Development-Primary: Third Edition (TOLD-P:3*; Newcomer & Hammill, 1997). An overview of the SLI participant characteristics can be seen in Table 3.

Table 3. SLI Participant Characteristics

	SLI Total *N* = 10, (%)
Age (in months)	
Mean	84.9
Standard Deviation	8.8
Gender	
Male	4 (40)
Female	6 (60)
Maternal Education[a]	
LSES (< High School Graduate)	5 (55)
MSES (≥ High School Graduate +)	4 (45)
Scores	Mean (SD)
Leiter-R	20.6 (3.0)
PPVT-3	78.0 (4.9)
TOLD	66.1 (8.5)

[a]One participant did not report maternal education

The data for the first phase of the study came from questions that were included within the consent forms (Appendix A). The consent forms were completed when the participants consented to their children's participation in the Pruitt (2006) and Garrity (2007) studies. Questions requested information about each child's: gender, age, race, maternal education,

receipt of speech language therapy services (if any), and information about any family members who presented difficulties with speech, language, reading, or writing. The family history inquiry on the questionnaire was a simple question involving a yes/no answer.

Phase 2: Participants and Materials

For the second phase of this study, participants were contacted to determine the number of family members who reported a history of speech-language difficulties and their relation to the affected child (proband), as well as the nature of the family member's impairment. Of the 161 consent forms available for the study, 69 caregivers gave permission on the consent form to be contacted via telephone. Nine to twelve months after these consent forms were returned phone calls were made to all 69 of these caregivers. Thirty-four phone numbers were either disconnected, not in service, incorrect, or unanswered and without a workable voice mail system. Maternal education for these children ranged from 6 to 16 years with a mean of 12.2 years (SD = 2.2). Eighteen did not answer or return a message. Maternal education for these children ranged from 10 to 16 years with a mean of 13.4 years (SD = 2.0). This left 17 (25%) caregivers who willingly completed the phone interviews. Maternal education for these children ranged from 9 to 16 years with a mean of 12.8 years (SD = 2.3). Table 4 shows the breakdown of participants who were reached versus the number of those who were called as well as the maternal education of each group.

Table 4. Telephone Responses

	Total N = 69, (%)	Maternal Education Mean (SD)
Disconnected, not in service, or incorrect phone numbers	34 (49)	12.2 (2.2)
Participants who did not answer or return message	18 (26)	13.4 (2.0)
Participants who were contacted and willing to participate	17 (25)	12.8 (2.3)

Age in months for the children of the families who completed the telephone interviews ranged from 48 to 94 months with a mean age of 75.1 (SD = 12.8). The child sample consisted of 11 males and 6 females. Maternal education for these children ranged from 9 to 16 years with a mean of 12.8 years (SD = 2.3). Table 5 shows the demographic information of the 17 participants who completed the phone interviews.

Table 5. Child Characteristics of Families Who Completed the Telephone Interviews

	Total *N* = 17, (%)
Age (in months)	
Mean	75.1
Standard Deviation	12.8
Gender	
Male	11 (65)
Female	6 (35)
Maternal Education	
LSEL (< High School Graduate)	5 (29)
MSEL (≥ High School Graduate +)	12 (71)
Receives SLP Services	4 (22)

Of the 17 participants contacted, six received SLP services. One of the six was classified as having SLI. Table 6 shows the nature of each participant's impairment as described by the caregivers who completed the phone interviews.

The phone interviews were guided by a questionnaire that was adapted from the one used by Lewis and Freebairn (1993). If the child was reported to attended speech therapy services, information about the type of services was gathered. Information was gathered for the immediate family first, including relation to the child, birth date, handedness, age, and whether or not there was a history of speech/language difficulties, reading difficulties, spelling

difficulties, learning disabilities (i.e., special education classes), stuttering, and hearing loss. Then, the same information was collected for extended family members. Only blood-related family members were included. Clarification and examples were provided to the caregivers in cases where they are unsure of the nature of the impairment. Appendix B is a sample of the form that was utilized to help gather this family history information.

Table 6. Nature of Proband's Communication Impairment

Number of Probands	Nature of Impairment
2	Expressive Language Delay
2	Articulation
1	Articulation and Language Delay
1	Stuttering

Procedure

Initial recruitment for the Pruitt (2006) and Garrity (2007) studies included sending informational packets home with children enrolled in local day cares, preschools, and kindergartens and disseminating information through contacts at local churches. The informational packet included a flyer describing the study and a consent form. Those interested in participating were asked to complete the documents and either return them to their child's school, where they were kept in an envelope until the investigator collected them, or mail them to the investigator. In an effort to protect the confidentiality of the information disclosed by the participants, these materials were assigned a random identification number that was used for all documents associated with the participants.

For the exploratory portion of the study, phone interviews were conducted with the primary caregivers of the children. For each consent form that included a phone number (N=69),

three phone calls were attempted. Each attempt was made one to three days apart. The first attempt was made in the evening, the second attempt was in the morning, and the third attempt was in the afternoon.

Reliability

To test the reliability of the data collected from the consent forms, a graduate student not affiliated with the study independently identified family history and maternal education from each consent form. The student was trained on consent forms not used in the current study prior to retrieving information from the actual forms. She classified the family history status of 161 consent forms and there were two disagreements with the original analysis. This reflected a 99% rate of agreement. The data were corrected and resolved when the disagreements were found. A measure of reliability was not collected for the phone interviews.

Validity

There were four participants whose information from the phone interview and consent form was not consistent. In two cases, the caregivers reported on the consent form that the child did not receive speech-language services. However, upon speaking with the caregivers on the phone, it was determined that the children did receive SLP services. In the third case, the caregiver did not report a positive family history of language impairment, but the phone interview revealed that there was a positive history. The final case involved a caregiver who reported a positive family history of speech-language impairment on the consent form, but upon speaking with the caregiver, the family had a history of psychological problems rather than speech and language impairments. A summary of this information can be seen in Table 7. The consistency rate for both pieces (educational placement of child and family's history) of information was 88% (15/17). The remaining 13 caregivers contacted reported consistent

information regarding educational placement and family history. Given the 88% agreement between the consent forms and phone interviews, the validity of the consent form data was considered adequate for the dependent measures of interest.

Table 7. Consistency Rate of Consent Forms and Phone Interviews

	Consistency Rate (%)
Educational Placement	88
Prevalence of History in Family	88

CHAPTER 3
RESULTS

Prevalence of Family History

Of the 161 children for whom there were consent forms, 39 indicated that someone in the participant's immediate family had difficulties with speech, language, reading, or writing. This reflected an overall positive family history prevalence rate of 24%. Table 8 summarizes the results pertaining to the prevalence of positive family history as a function of the participants' socioeconomic level and educational placement. The results indicated that there were significant differences between LSES and MSES for rates of positive family history. Forty-four percent of children in the LSES population reported a positive family history of speech-language impairment, while 20% of the MSES population reported such data. In other words, those from low socioeconomic backgrounds were slightly over two times more likely to have a positive family history of speech-language impairment than those from middle socioeconomic backgrounds. However, the results indicated that children who received services by a school-based speech language clinician were not significantly more likely than children who did not receive services to have a positive family history of impairment. Of the children receiving services, 38% reported a positive family history of language impairment, while those not receiving services reported a rate of 21%.

Table 8. Prevalence of Positive Family History as a Function of Socioeconomic Level and Educational Placement

	Hx + (%)	Hx – (%)	X^2	Significance Level
LSES	14 (44)	18 (56)	8.1	$p \leq .01$
MSES	25 (20)	103 (80)		
SLP +	11 (38)	18 (62)	3.6	$p > .05$
SLP -	28 (21)	104 (79)		

In the first two chi-square analyses, interactions between socioeconomic level and educational placement could not be examined. Therefore, a third analysis was done to look at a potential interaction of these variables. For this analysis, the participants were divided into two groups: 1) those that received services and 2) those that did not, and then they were further classified by the two SES levels (low vs. middle). Half of the LSES group who received services reported having a positive family history of speech-language impairment, while only 33% of MSES group who received services reported such findings. Of those who did not receive services, 41% of the LSES group reported a positive family history of speech-language impairment while only 17% of the MSES group reported such data. A summary of these data can be seen in Table 9.

Table 9. Interaction Between Educational Placement and Socioeconomic Level

	Hx + (%)	Hx – (%)	X^2	Significance Level
SLP +				
LSES	5 (50)	5 (50)	0.7	$p > .05$
MSES	6 (33)	12 (67)		
SLP -				
LSES	9 (41)	13 (59)	6.1	$p \leq .025$
MSES	19 (17)	91 (83)		

As can be seen, for those that received services, the LSES and MSES samples were not significantly different with respect to prevalence of a positive family history. It was found, however, that of those who did not receive services, the LSES and MSES samples significantly differed in their prevalence of a positive family history. In fact, the LSES sample was again two times more likely to have a positive family history of speech-language impairment than the MSES sample.

The final analysis compared family history rates of the children with SLI to those who did not present this clinical diagnosis. Recall that there were ten children who met the criteria of SLI and 133 who did not (the 133 reflected all of the children who were not receiving any services by a speech-language clinician). As shown in Table 10, the results indicated that the children with SLI were significantly more likely to have a positive history of speech-language impairment than the typically developing comparison group. In fact, the children with SLI were over two times more likely to present with a family history of speech-language impairment than the others. This finding is particularly interesting given that family socioeconomic level was controlled across this comparison. Recall that the SLI group had a mean maternal education of 12.2 years (SD = 1.9), and their mothers' levels of education ranged from 11 to 16 years. The typically developing comparison group presented with a mean maternal education of 13.5 years (SD = 2.2), and their mothers' levels of education ranged from 6 to 16 years.

Table 10. Prevalence of Positive Family History as a Function of Clinical Status

	Hx + (%)	Hx – (%)	X^2	Significance Level
10 SLI	5 (50)	5 (50)	4.3	$p \leq .05$
All SLP -	28 (21)	104 (79)		

Phone Interviews

Of the 17 families reached during the phone interviews, 11 reported a positive history, and a total of 20 family members within these 11 families presented with a positive history of speech-language impairment. Of the 11 families, one came from a child classified as SLI, four came from children who received services by an SLP but the classification of the children's clinical status was unknown, and six came from children who did not receive services by an SLP. The number of members per family with a history of speech-language impairment ranged from

one to five, with a mean of 1.8 (SD = 1.3) family members. Table 11 shows a breakdown of this information. Half of the family members with a history of speech-language impairment were in the children's immediate families, while the other half were in the children's extended families. Table 12 provides information on the relationship of each family member to the proband, as well as the nature of each family member's impairment.

Table 11. Number of Family Members with Positive History Per Proband

Number of Family Members Per Proband Family with Hx+	Number of Probands who Reported a Positive History
1	7
2	1
3	2
4	0
5	1

Table 12. Family Members Reporting a Positive History and Nature of Impairment

	N	Nature of Impairment
Total Family Members	20	
Mother	3	Reading, Articulation
Father	1	Stuttering
Brother	5	Articulation, Reading, Stuttering
Sister	0	
Uncle	3	Reading, Stuttering
Aunt	5	Reading, Articulation
Male cousin	1	Unknown
Female cousin	2	Deaf, Unknown

CHAPTER 4
DISCUSSION

Results

The purpose of this study was to examine the prevalence of a positive family history of speech-language impairments in an African American (AA) sample. The first phase of the study used questionnaires from the primary caregivers of 161 children. The questionnaires allowed for an examination of family history as a function of a child's socioeconomic level (+/- high school level of maternal education), educational placement (+/- receipt of services by a school-based speech language clinician), and clinical status (+/- language profile consistent with a clinical diagnosis of SLI). The second phase of the study included interviews that were collected from 17 families who completed the questionnaires. All families (n = 69) who indicated a willingness to be interviewed were called, but only 17 were accessible by phone. Through the interviews, the speech and language histories of the families were further documented.

Results of the study indicated that socioeconomic level appeared to co-exist with a positive family history. The study revealed that those from the low socio-economic group were over two times more likely (44% vs. 20%) than those from the middle socioeconomic group to report a positive family history of speech-language impairment (44% vs. 20%). Interestingly, families of children who received services by a school-based speech-language clinician were not significantly more likely to report a history of impairment than were families of children who did not receive these services (38% vs. 21%). However, families of children with the clinical status of SLI were significantly more likely to have a positive family history of speech-language impairment than those children who were not deemed as having SLI (50% vs. 21%).

Of the eleven families with a positive family history reached by phone, a total of 20 family members were reported to have a history of speech-language impairment, which equals an

average of 1.8 family members per affected child. The number of affected nuclear and extended family members was evenly split. The nature of the impairments included reading, articulation, stuttering, deaf, and unknown.

Comparison of Results

Results of this study that related to family history are inconsistent with the Lahey and Edwards' (1995) study. However, they are similar to the findings of Tallal et al. (1991), who found that more children with a negative family history were significantly more likely to be classified as presenting a higher socioeconomic level as compared to the children with a positive family history. Follwing Tallal et al. (1991), one possible explanation for these findings is that language problems may be linked to poor academic achievement, and thus lower levels of parental education in affected families.

Results of family history as a function of the children's clinical diagnosis of SLI coincided with the findings of Lahey and Edwards (1995), Rice et al. (1998), Tallal et al. (2001), and Tallal et al. (1989a). Recall that all three of these studies reported higher rates of a positive family history in children with SLI as compared to children who did not present with SLI. Each of these studies also reported children with SLI to be approximately two times more likely to have a positive history of speech-language impairment than those who did not present with SLI. A summary of these data can be seen in Table 13. The results of this study, along with these other studies, indicate that SLI appears to run in families.

Results of this study that related family history and the children's educational placement could not be compared to previous studies in the literature, because as far as this author knows, this type of work has not been completed. Findings related to the phone interviews could also not be directly compared to previous studies because the 17 children for whom these interviews

were completed did not match those that have been studied by others. Recall that the Rice et al., (1998) study reported more nuclear family members of children with SLI to be affected than extended family members. In the current work, only 50% of the family members were in the children's immediate families. However, only one of the 17 children for whom family interviews were completed met the definition of SLI. Given this, it is possible that current findings differed from those of Rice et al. because the children in the two studies presented different types of language learning profiles.

Table 13. Percentage of Probands with a Positive Family History of Language Impairment

Researchers/Study	Children with SLI	Controls
Lahey and Edwards (1995)	47	22
Rice et al. (1998)	18	9
Tallal et al. (2001)	59	19
Tallal, Ross, and Curtiss (1989a)	42	19
Present Study	50	21

Future Directions/Implications

More research needs to be done to determine the exact nature of the speech and language impairments of children and their families. The questionnaire method alone does not always accurately reveal the presence of a family history of language impairment or capture all the different nuances of a child's impairment. The questionnaire simply relies on information given by the parent, who may not be a trained professional or have background knowledge about speech and language impairments. Pairing the questionnaire method with direct testing, observations, or discussion may help to accurately gather information about the child and family. Direct testing, observations, and discussion could potentially be held on-site at a speech-

language pathology clinic, doctors' clinic, or Head Start center. This could facilitate any questions the researchers may have for the family members and allow them to observe each participant in the study. Future research could also focus on specific genetic or environmental factors that may lead to familial aggregation of language impairment. One way this could be done is by determining if there are certain trends, such as inheritance patterns, that contribute to familial aggregation. Additionally, sibling studies could be done to determine phenotypic differences that are present in those with the same familial background. This may be done by studying twins, specifically, one with language impairment and the other with typically-developing language. In the distant future, genetic testing may also be considered to determine if some children are genetically predetermined or at-risk to develop different types of speech and/or language impairments.

The results of this study, while preliminary, are relevant to clinical practice. However, it may be too early to begin using family history information to determine a child's eligibility for services. With more data and convergence of findings across additional studies, however, there may come a time when this type of information could be used by clinicians to build a case for a child to receive services at an earlier age than is typically recommended. In the future, knowing a child's family history may also help a clinician build a case for some children to receive a more intense schedule of services than is typically recommended.

Limitations

There are several limitations to this study. One limitation is that the questionnaire method relies on the family informant to make a judgment regarding the presence of language and/or speech impairment in their children and other family members. Additionally, the questionnaire called for information pertaining to immediate family members, and in some

instances the family informant may have provided information for an extended family member. Another limitation of the questionnaire method is that the family member inflicted with an impairment is not specified (i.e., brother, mother, etc.) in the questionnaire. An additional potential limitation is that the type of speech services received by the children was unknown.

Phone interviews also have their limitations. Phone interviews rely on a phone in the home and a call back if a message is left; however, 75% of those who left a phone number in the current study could not be contacted. This indicates that relying on phone interviews for information may not be the best option, especially when working with families from low socioeconomic backgrounds. Another limitation of the current study is the nine to twelve month time lapse that occurred from the time the consent forms were filled out by the caregiver to the time the phone call was made. This time lapse allowed a chance for parents to forget the study in which their child originally participated.

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APPENDIX A

PARENTAL CONSENT FORM

Language Data from Children living in Louisiana

The purpose of this study is to learn more about the ways children use language to talk about activities and events. If you have any questions about this study, you may contact Janna Oetting, LSU Professor, at 578-2545 from 9:00 am to 4:00 pm Monday thru Friday. This study will take place at your child's school or home or you may bring your child to the LSU Speech Language Hearing Clinic after school or on the week-end. Families of children who complete the study will receive a $10.00 Walmart gift card.

100 preschoolers and kindergartners (4 to 6 years old) in regular education and considered to be developing language normally and 20 children receiving speech and language services will be included in the study. Children who have a hearing loss or a history of medical, behavioral, or psychological disorders will not be able to participate in the study.

Your child will attend 4-6 sessions, lasting no longer than 25 minutes at his/her school. During the sessions, you child will complete 3 short standardized tests; play with age-appropriate toys; and explain events and actions while looking at pictures and videos of everyday events (i.e., a boy tying shoes or a girl planting a flower). We will also document your child's hearing status and educational placement status through your child's school. This study will help speech language clinicians and teachers learn about the language of children from Louisiana and help us better understand differences between children with strong and weak language learning skills. There are no known risks associated with participating in this project.

This study is confidential. All materials will be coded and children's names and personal information will be kept secure. Results of this study may be published, but no names or identifying information will be included for publication. Participant identity will remain confidential unless release is legally compelled.

Participation in the study is voluntary, and a child will become part of the study only if you and your child agree to the child's participation. Children's assent will be verbal. At any time, you or your child may choose not to participate or to withdraw from the study with no jeopardy to services provided by their childcare center/school or other penalty at the present time or in the future. We also reserve the right to discontinue your child's participation in the study if you or your child share with us information during a session that indicates that your child does not meet the inclusive/exclusive criteria for research participation listed above.

Signatures

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, LSU Institutional Review Board, (225)578-8692. I agree to participate in the study described above and acknowledge the researchers' obligation to provide me with a copy of this consent form signed by me.

_____ _____

Parent's Signature Date

Child's Name_____ Child's Date of Birth:_____ Gender:_____ Race:_____

Please circle the Mother's *highest grade completed.*
(6 = 6th grade, 12 = high school graduate, 16 = college graduate)

6 7 8 9 10 11 12 13 14 15 16 or more

Is your child receiving services by a Speech Language Pathologist / Speech Therapist? Yes No

Does anyone in your child's immediate family have difficulties with speech, language, reading, or writing? Yes No

If so, may we contact you to inquire? Yes No Telephone Number_____

If you would like us to sent you a gift certificate, and/or results of the study, please write down your address here.

APPENDIX B

FAMILY HISTORY INTERVIEW

Adapted from Lewis and Freebairn (1993)

1. Make 3 phone call attempts to participants
2. Introduction and explanation of study
3. Gather data from primary caregiver

Immediate Family

All information in this section pertains to the child and his or her immediate, biological family.

Family		DOB	Hand	Grade	Sp/Lang	Read	Spell	LD	Stutter	Hear Loss
Patient										
Mother										
Father										
Sister:	1									
	2									
	3									
	4									
Brother:	1									
	2									
	3									
	4									

The following definitions were adapted from Lewis and Freebairn (1993):

***Speech-language disorder (Sp/Lang)*:** An individual is coded as having a speech-language disorder if: a) he or she has ever been enrolled in speech-language treatment, b) he or she was unable to be understood until 5 years or older, or c) he or she currently demonstrated below age-appropriate speech-language skills on standardized measures.

***Reading and spelling*:** An individual is classified as having reading or spelling problems if: a) he or she was labeled as dyslexic in school, or b) he or she had received tutoring for reading or spelling.

***Learning disability (LD)*:** An individual is considered to have a learning disability if he or she was ever enrolled in learning disabled or special classes in school.

***Stuttering*:** An individual is coded as stuttering if: a) he or she received speech treatment for stuttering, b) there is a reported stuttering past age 5, or c) he or she currently was considered to stutter.

***Hearing Loss*:** An individual is classified as having a hearing loss if he or she has total or partial inability to hear sound in one or both ears.

Father's Biological Family

Fill in ages, then check boxes if anyone had a speech, language, reading, spelling problem, learning disability (LD), stuttering, or hearing loss.
This is all in relation to the child's father.

Family	Age	Sp/Lang	Reading	Spelling	LD	Stutter	Hear Loss
Father							
Mother							
Brother: 1							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Brother: 2							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Brother: 3							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Brother: 4							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 1							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 2							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 3							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 4							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							

Mother's Biological Family

Fill in ages, then check boxes if anyone had a speech, language, reading, spelling problem, learning disability (LD), stuttering, or hearing loss.
This is all in relation to the child's mother.

Family	Age	Sp/Lang	Reading	Spelling	LD	Stutter	Hear Loss
Father							
Mother							
Brother: 1							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Brother: 2							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Brother: 3							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Brother: 4							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 1							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 2							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 3							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Sister: 4							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							
Nephew/Niece							

VITA

Tricia McCully Rodrigue was born and raised in Paradis, Louisiana. After receiving her Bachelor of Science and Master of Science degrees in finance from Louisiana State University in May of 2002 and December of 2003, respectively, she worked as an investment officer for the Louisiana State Employees' Retirement System. She entered the Master of Arts degree program in speech language pathology as a non-matriculating student in August of 2004. She completed this thesis in partial fulfillment of the requirements for the degree of Master of Arts in the Department of Communication Sciences and Disorders.