

Testing Alternative Hypotheses Regarding the Association between Shyness and Language Skills in Early Childhood

Deepika J. Patel
Department of Psychology and Neuroscience

Thesis Advisor: Dr. Soo Rhee
Department of Psychology and Neuroscience

Dr. Linnea Avallone, Department of Atmospheric and Oceanic Sciences
Dr. Matthew Keller, Department of Psychology and Neuroscience

University of Colorado – Boulder

October 24, 2011

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Abstract

We tested the assumptions of four convincing alternative hypotheses for the negative association between shyness and language skills, examining children assessed longitudinally at ages 14, 20, and 24 months. Results from latent growth curve models suggested that there was a greater association between shyness and expressive language than between shyness and receptive language, suggesting support for the “I know it but won’t say it” model. That is, shy children are capable of attaining language skills, but have significant problems demonstrating language skills when required to do so verbally. We did not find evidence of sex differences in the association between shyness and language skills, although some previous research suggests a greater association in boys than in girls.

The association between shyness and language skills in early childhood

Language skills are essential for communicating ideas, beliefs, and thoughts in everyday life, and it is important to understand its development and etiology. Many studies have reported an inverse association between shyness and language skills (e.g., Coplan & Weeks, 2009; Cameron, 2009; Coplan & Evans, 2009; Crozier & Perkins, 2002), with shy children having lower language skills. The purpose of this study is to examine the development of shyness and language skills during toddlerhood (when there is tremendous growth in language skills) to test the assumptions of alternative hypotheses regarding the etiology of the association between shyness and language skills. Furthermore, the current study will examine whether there are significant sex differences in the association between shyness and language skills.

The association between shyness and language skills

Shyness has been defined as a hesitation to be a part of social interactions, despite the wish to be included in the social interactions surrounding them (e.g., Cameron, 2009). The association between greater shyness and lower language skills has been well-established in the literature, where shyness is associated with a wide range of language skills, including phonemic awareness (Coplan & Weeks, 2009), expressive language skills (e.g., Crozier & Badawoods, 2009; Durkin, 2009), and pragmatic skills (i.e., being able to use social contextual cues in order to understand a speaker's meaning; Cameron, 2009; Coplan & Weeks, 2009). There is evidence that the association between shyness and language skills occurs very early in life; for example, Spere and Evans (2009) found that inhibited infants show less spontaneous vocalization and speech than uninhibited infants. Although there is much research establishing the association between greater shyness and lower language skills, additional research examining *why* shyness and language skills are related is needed. Coplan and Evans (2009) recently reviewed multiple

hypotheses regarding the potential reasons for the association between shyness and language skills.

The first alternative hypothesis for the association between shyness and language skills is a “Lack of practice makes lack of perfect” model, which was suggested by Evans (1996). That is to say, shy children are less likely to engage in social interactions and participate in verbal activities, which lead to lower language skills. Although researchers have not found definitive evidence supporting this hypothesis, several researchers have suggested that shy children do engage in less social interactions and verbal activities. Crozier and Badawood (2009) found that shy children engage in more private activities and are less likely to participate in social interaction. Likewise, Coplan and Armer (2005) found that shy children are less likely to initiate social contact and tend to withdraw from peer interactions. Furthermore, Asendorpf and Meier (1993) found that not only do shy children spend less time in social interactions, but they also speak less when they do interact with peers.

The second alternative hypothesis for the association between shyness and language skills is an “I know it but won’t say it” model, which was suggested by Coplan, Wichmann and Lagace-Seguin (2001), and Crozier and Perkins (2002). That is, shy children have problems in performance when speaking with others, not in capability. A review by Coplan and Weeks (2009) concluded that shy children perform worse than their non-shy counterparts on a variety of tests of language ability, and that expressive language is particularly affected (e.g., Spere, Schmidt, Theall-Honey, and Martin-Chang, 2004; Crozier & Perkins, 2002; Evans, 1996). These results are consistent with the idea that shy children’s quietness is not due to a lack of verbal skills, but simply due to inhibition. However, some researchers have shown results conflicting

with this hypothesis and report that shy children have significantly lower receptive *and* expressive language skills than their non-shy peers (e.g., Spere & Evans, 2009).

A third alternative hypothesis for the association between shyness and language skills is a “Bolder is better” model suggested in a review by Coplan and Evans (2009). This hypothesis is unique from the others because it proposes that shy children do not have deficits in language skills, but that non-shy children have above-average language skills. That is, being shy is not a disadvantage, but being very outgoing yields an advantage. For example, Spere et al. (2004) reported that shy children obtain average scores on language tests, whereas their non-shy peers’ scores are higher than expected given their age. They also found that while there were significant differences between shy and non-shy children, the shy children were still performing at age-appropriate levels, whereas the non-shy children’s language skills were higher than that expected by their age. Crozier and Hostettler (2003) found that sociable or more talkative children obtain vocabulary scores that are somewhat higher than age norms, compared to withdrawn or reticent children who perform more poorly than the age norms.

A fourth alternative hypothesis for the association between shyness and language skills is a “Lower language skills lead to shyness” model. Coplan and Weeks (2009) suggest that restraints in speech, specifically difficulty with verbal communication, are a fundamental trait of shy children; this may indicate that it is the lower language skills that lead to the shyness, rather than vice versa. Children with poorer expressive language skills may have greater difficulty communicating effectively, which may in turn lead to lower-quality social interactions and shyness. Also, children with poorer receptive language skills may have greater difficulty understanding social contextual cues and the meaning of what people are saying, leading to decreased social interactions, loneliness, and shyness. Although there is no definitive evidence

supporting the hypothesis that poor language skills lead to shyness, there is evidence suggesting that children with poor language skills do have lower-quality social interactions. A review by Durkin (2009) concluded that children with poorer language abilities are at greater risk of poor friendship quality (e.g., Durkin & Conti-Ramsden, 2007). Coplan and Weeks (2009) found that for children with lower levels of pragmatic language, shyness is positively associated with loneliness and withdrawn behavior with peers. For example, Gertner, Rice, and Hadley (1994) found that in preschool, there are positive associations between pragmatic language skills and peer preference. These findings suggest that lower language levels may lead to shyness in children.

Researchers examining the association between shyness and language skills predict that there may be sex differences in the magnitude of the association, with shy boys being at greater risk for language problems than shy girls, because shyness in girls is more culturally accepted than shyness in boys. Coplan and Weeks (2009) suggest that shy boys (who rate themselves as more socially anxious than shy girls) are at greater risk for loneliness, lower self-esteem, poorer social skills, and poorer coping strategies than shy girls. They found that in boys, shyness was significantly and positively associated with self-reported fear of negative evaluation, but not in girls (Coplan & Weeks, 2009). A commentary by Rubin and Coplan (2004) suggests that shy boys are more at risk for maladaptive outcomes than shy girls. Furthermore, Durkin (2009) agrees that shyness may be more problematic for boys, and suspects a greater risk of developmental difficulties in boys. In addition, Prior, Bavin, Cini, Reilly, Bretherton, Wake et al. (2007) found that although shy girls had higher scores on their measure of shyness than shy boys, they had fewer behavioral problems and had higher speech/social scores than shy boys at twelve months and two years of age.

Present Study

In the present study, data from participants of the Longitudinal Twin Study (LTS) in Colorado were examined to test the assumptions of four alternative hypotheses regarding the etiology of the association between shyness and lower language skills. All four alternative hypotheses are compelling, and additional research testing the assumptions of these hypotheses is needed. Data on the development of shyness and language skills collected on toddlers at 14, 20, and 24 months were examined.

The first hypothesis is the “Lack of practice makes lack of perfect” model, which suggests that higher shyness leads to lower language skills in children. If this model is correct, shyness should be associated with both expressive and receptive skills. Also, results from latent growth modeling indicating that higher initial shyness is associated with both lower initial language skills *and* less growth in language skills from age 14 to 24 months would be consistent with the “Lack of practice makes lack of perfect” model. However, it is possible that lack of practice in language due to shyness lead to lower language skills by 14 months, and this association is already fixed by then. The second hypothesis is the “I know it but won’t say it” model. If this model is correct, there should be a greater association between shyness and expressive language skills than between shyness and receptive language skills. The third hypothesis is the “Bolder is better” model. If this model is true, we should find that shy children have average language skills, whereas their non-shy counterparts have above-average language skills. The fourth hypothesis is the “Lower language skills lead to shyness” model. Results from latent growth modeling suggesting that lower initial levels of language skills lead to an increase of shyness levels would be consistent with this model. However, we may not find this result if lower language skills lead to shyness by age 14 months, and this association is fixed by then.

Finally, we examined sex differences in the association of shyness and language skills. Given that some researchers have suggested that the impact of shyness may be more serious for boys than for girls (e.g., Durkin, 2009), we hypothesize that the association between shyness and lower language skills will be greater in boys than in girls.

Methods

Participants

Data were collected from a total of 816 children at ages 14, 20, and 24 months with available data for at least one of the shyness or language skills measures. These included 408 females and 408 males. Table 1 displays the number of children with available data for expressive and receptive language skills and observed and parent-reported shyness at each age. Participants were recruited through the Colorado Department of Health and were members of the Longitudinal Twin Study (LTS). The LTS sample included same-sex twin pairs born between 1986 and 1990 in Colorado, with the following ethnic distribution: 86.6% Caucasian, 8.5% Hispanic, 0.7% African-American, 1.2% Asian, and 2.9% other; this corresponds well to the ethnic distribution reported for Boulder County, Colorado in the 1990 United States Census (89.5% Caucasian, 3.8% Hispanic, 0.9% African-American, 2.4% Asian, and 3.4% other, U.S. Census Bureau, 1990). Further details regarding the LTS are available in Rhea, Gross, Haberstick, and Corley (2006). All data collection procedures were approved by the Institutional Review Board of University of Colorado-Boulder. The participants were paid for time spent on the project and had the option to stop participating in the study at any moment for any reason. Risks to the participants were minimized as much as possible.

Procedures

Parent reports and observational tests of shyness and observational tests of language skills were examined during the study. At age 14, 20, and 24 months, the participants were assessed in two different settings (home and laboratory). Home visits were scheduled at the convenience of the mothers and laboratory visits took place at the Institute for Behavioral Genetics at the University of Colorado at Boulder, usually within two weeks of the home visit. The home and laboratory visits were videotaped by separate examiner assistants, and then rated by trained research assistants.

Assessment of shyness. There were four measures of observed shyness: “approach,” “cling,” “Infant Behavior Record (IBR) fear,” and “lab visit shyness.” Each measure had three categories—low (0), medium (1), and high (2), and was scored the same way at each age. At each age, a mean of the four observed shyness measures was calculated. This mean score was normally distributed at each age.

To assess each twin’s level of shyness around the examiners and research equipment (video camera, identifying vests, and toys), the first five minutes of the home visit was recorded by one examiner while the other examiner interacted with the twins and mother. Every minute, data were recorded on behaviors including approaching the examiner, approaching an offered toy, proximity to mother, clinging to mother, self-soothing, vocalizing, and crying. The examiners introduced themselves, presented two toys, and placed identifying vests on each twin. Later, each twin was given scores on approaching the toy, research equipment, and/or examiner (“Approach”) and the tendency for the child to cling to the mother (“Cling”). Examiners assessed each twin’s behavior, including level of fearfulness, using the Infant Behavior Record (IBR: Matheny, 1980) during the Bayley Scales of Infant Development (Bayley, 1969; collected

at 14, 20, 24 months) and over the course of all other lab procedures. In this study, the “IBR Fear” item used was the average of the toddler’s reaction to the new strangers, strange surroundings, and test materials on a 9-point scale across the Bayley ratings and the sum across all other lab procedures. Finally, “lab visit shyness” was the examiners’ global ratings of shyness and hesitation during the lab visit.

There were also three parent ratings of shyness. These included the averages of mother and father ratings on the “shyness” scale (assessing 5 items regarding child’s behavior with strangers) of the Colorado Childhood Temperament Inventory (CCTI; Rowe & Plomin, 1977), the average of mother and father ratings on the “approach” scale of the Toddler Temperament Scale (TTS; Carey & McDevitt, 1978), and mother ratings of “fearfulness” on the Differential Emotions Scale (DES; Izard et al., 1980). Each score on the scales was converted to percentages of the maximum score, and then a composite parent-rated shyness score was formed by averaging the three percentages. The composite scores were calculated in the same way at each age, and were normally distributed at each age.

Assessment of language skills. Language skills were measured via the Sequenced Inventory of Communication Development (SICD; Hedrick, Prather, & Tobin, 1975) at age 14, 20, and 24 months. The SICD is a standardized assessment of expressive and receptive language skills. Assessment for expressive language consisted of imitation or production of sounds and words. For example, examiners asked children, “What do you wear on your feet?” Assessment for receptive language included the ability to understand words and comments. An example would be an examiner asking a child, “Give me the cup and ball.” At age 14 months, the same set of items was given to all the children. At 20 and 24 months, testers first gave children the items that they had failed at the earlier age, and then age-relevant items were added.

Analyses

Due to numerous analyses, general analytic issues will be discussed in this section, and detailed descriptions of the analyses will be presented with the results. All statistical analyses examining the association between shyness and language skills were conducted in Mplus (Muthén & Muthén, 1998-2007). An advantage of Mplus is that it takes into account non-independence of observations when computing standard errors and model fit (e.g., an alternative χ^2 that takes non-independence into account). The data from the two twins in each pair are correlated; therefore, in Mplus, the data were treated as non-independent and the twins were considered as nested within twin pairs. Statistical significance was determined by the p-value of the z-statistic, which is the ratio of each parameter estimate to its standard error. Parameter significance was determined by p-values; however, when there were inconsistencies between the conclusion regarding parameter significance from the result of the chi-square difference test (between the full model and the reduced model where the parameter estimate was dropped) and the p-value, parameter significance was determined by chi-square difference tests. Maximum likelihood with robust standard errors (MLR) estimation was used for the latent growth curve modeling. Mplus treats missing data as missing as random by utilizing the EM algorithm (Little & Rubin, 2002) when MLR is used. This allows the missing data to be a function of observed covariates and outcomes.

Results

Sex Difference in Means of Variables

T-tests were conducted to assess the sex differences in the mean level of observed shyness, parent-reported shyness, expressive language, and receptive language variables (see Table 2). In general, girls had higher shyness scores than boys, although sex differences

diminished with age and were no longer significant by age 24 months. Girls had significantly higher language expressive and receptive language skills than boys at all ages.

Individual Growth Models

Figure 1 illustrates the four growth models for observed shyness, parent-reported shyness, expressive language skills, and receptive language skills. The latent Intercept's loadings on all time points are fixed at 1.0 given the assumption that the Intercept influences behavior across all time points. The latent Slope in the model had loadings at 14 months fixed at 0, loadings at 20 months free, and loadings at 24 months fixed at 1. With this parameterization, the Intercept reflects the variance stable with the initial level of the variable and the Slope represents change from the initial time point. By freeing the Slope loading at 20 months, the model can have a non-linear pattern. In Figure 1, the free loadings for the latent Slope indicate the proportion of the total change. For example, for observed shyness model in females, 87.8% of the total change occurs by 20 months.

Table 3 presents the parameters for the growth models for males and females. In the four models, the variances of the Intercept variable were all significantly greater than zero ($p < 0.01$), indicating that there are significant individual differences in the initial levels of observed shyness, parent-reported shyness, expressive language, and receptive language. For parent-reported shyness, expressive language, and receptive language, the means of the Slope were positive and significantly higher than zero, and the variances of the Slope were also significant, suggesting that these traits increase significantly with time, and that there are significant individual differences in the rates of change. In addition, variance of the Slope of observed shyness was significant, suggesting that there are significant individual differences in the rate of change.

The correlation between the Intercept and Slope of the variables are also shown in Table 3. For both females and males, there was a significant and negative correlation between the Intercept and Slope of observed and parent-reported shyness. These results suggest that individuals with high initial levels of observed and parent-reported shyness have less growth over time for those variables. In contrast, there was a positive and non-significant correlation between Intercept and Slope of expressive language and a negative and non-significant correlation between Intercept and Slope of receptive language.

Sex Differences in the Association between Shyness and Language Skills

As noted above, there were significant sex differences in the mean level of both shyness and language skills. Therefore, in all models examining sex differences in the growth models examining the association between shyness language skills, the means and variances were allowed to differ between males and females.

To investigate sex differences in the association between shyness and language skills, we examined two models. The first model allowed all parameters free to vary between males and females. In the second model, there were no sex differences in any of the parameters, except for means and variances. A chi-square difference test was conducted to test whether the model where parameters were fixed to be equal between males and females (i.e., the reduced model) fit significantly worse than the model allowing separate parameters for males and females (i.e., the full model).

Table 4 shows the results for the chi-square difference tests. A significant p-value means that the reduced model fit significantly worse than the full model, and that there are significant sex differences in the association between shyness and language skills. The results from Table 4 show that none of the p-values were statistically significant, suggesting that fixing the parameters

to be fixed across the sexes did not lead to a decrement in the fit of the model, suggesting a lack of sex differences in the association between shyness and language skills. Thus, all subsequent results discussed will be those from models where parameters were fixed to be equal between males and females.

For the analyses examining the association between parent-reported shyness and receptive language skills, the results were slightly complicated. In the model allowing the parameters for males and females free to vary, the residual variance for the slope of the parent-rated shyness were negative and non-significant in females, and parent-rated shyness at time 1 and receptive language skills at time 1 were negative and non-significant in males; therefore, these parameters were fixed to zero. However, in the model fixing the parameters for males and females to be equal, the residual variance for parent-rated shyness at time 1 in males was now statistically significant. This means that the two models are not nested, and cannot be compared using a chi-square difference test. Therefore, results for the analyses examining parent-reported shyness and receptive language skills were presented separately for boys and girls.

Relations between Shyness and Language Skills

Latent growth curve models examining the relations between growth in language skills and growth in shyness were conducted. Four sets of analyses were conducted: observed shyness with expressive language skills, observed shyness with receptive language skills, parent-reported shyness with expressive language skills, and parent-reported shyness with receptive language skills. Results from these models are presented in Figure 2.

As described above, results from models where the parameters are fixed to be the same between males and females are shown in Figure 2 (except in the case of parent-reported shyness and receptive language). However, because all models had sex-specific means and variances for

the latent Intercept and Slope variables, the standardized parameters, which are shown in Figure 2, are different for boys and girls.

Individual differences in the variance that are stable with initial levels of the traits are represented by the Intercept while individual differences in the change across time are represented by the Slope. The expressive language skills Intercept was significantly and negatively associated to both the observed shyness and parent-reported shyness Intercepts. In contrast, the receptive language skills Intercept was not significantly associated with either observed shyness or parent-reported Intercepts.

The Slopes for shyness and language were regressed on the Intercepts for shyness and language. The cross paths from the Intercepts to Slopes show the extent to which the individual differences in the variance that are stable with initial levels of the traits influence the rate of change in the other, after controlling for the correlation between the Intercepts of the two traits. For the most part, the results indicate that most of the regression parameters are not statistically significant, with few exceptions (see Figure 2).

In several cases, the Slope and the Intercept of the same variable were significantly associated. There was a significant negative path from the Intercept for parent-reported shyness to the Slope for parent-reported shyness in the model examining the association with expressive language (and for males only in the model examining the association with receptive languages), which indicates that individuals with higher initial shyness levels show less growth in shyness over time. In addition, there was a significant negative path from the Intercept for receptive language skills to the Slope for receptive language skills in the model examining the association with observed shyness, which indicate that individuals with higher initial receptive language skills show less growth in receptive language over time.

There was only one significant cross-path between the Intercept of one variable and the Slope of another. There was a significant negative path from the Intercept for parent-reported shyness to the Slope for expressive language skills, indicating that individuals with higher initial parent-reported shyness show less growth in expressive language skills over time. However, the cross-path from the Intercept of observed shyness to the Slope for expressive language skills was not statistically significant.

The correlations between the residual variances in the Slopes (the numbers on the right side of the models) show whether the changes in language skills parallel the changes in shyness, after controlling for association between the Intercepts. This correlation was significantly negative for observed shyness and expressive language and parent-reported shyness and expressive language skills, indicating that for children whose shyness increased from age 14 to 24 months, there was less growth in language skills. There was a statistical trend for a negative correlation between the Slope for observed shyness and the Slope for receptive language skills. The correlation between the Slope for parent-reported shyness and the Slopes for receptive language skills was only significant in males.

Discussion

There is consistent evidence of a negative association between shyness and language skills, with higher shyness being associated with lower language skills (e.g., Coplan & Weeks, 2009). However, the reason for the association between shyness and language skills is still unclear. The present study examined longitudinal data from toddlers assessed at age 14, 20, and 24 months to test the assumptions of the four alternative hypotheses explaining the association between shyness and lower language skills. The four hypotheses, “Lack of practice leads to lack of perfect” model, “I know it but won’t say it” model, “Bolder is better” model, and “Lower

language skills leads to shyness” model, are all compelling, and there is some evidence supporting each of them. Overall, the present study’s results are most consistent with the “I know it but won’t say it” model.

Results of latent growth curve models examining each shyness and language variable separately suggested that there were significant individual differences in the initial levels of both shyness and language skills and the rate of change in shyness and language skills. There was significant increase in both expressive and receptive language skills from 14 to 24 months. There was also evidence of increase in parent-reported shyness, but not in observed shyness.

The correlations between the Intercept of shyness and the Intercept of language skills suggest that the association between shyness and language skills begins as early as 14 months. This association was significantly negative for observed shyness and expressive language skills and parent-reported shyness and expressive language skills. However, the correlation was not significant for observed shyness and receptive language skills and parent-reported shyness and receptive language skills. These results provide support for the “I know it but won’t say it” model.

The correlation between the Slope of shyness and the Slope of language skills suggest that changes in language skills parallel changes in shyness. This correlation was significantly negative for the association between observed shyness and expressive language, and between parent-reported shyness and expressive language. The association between parent-reported shyness and receptive language was significant in males only, and there was a statistical trend of a negative correlation between observed shyness and receptive language. These results suggest that growth in shyness parallels less growth in language skills. The results were more consistent and greater in magnitude for expressive than receptive language, providing support for the “I

know it but won't say it" model.

The cross-paths in the growth model can potentially help us understand the direction of association between shyness and language skills. A significant cross-path from the Intercept of shyness to the Slope of language skills would be consistent with the "lack of practice makes lack of perfect" model, and a significant cross-path from the Intercept of language skills to the Slope of shyness would be consistent with the "lower language skills leads to shyness" model. Overall, there was little evidence suggesting that shyness leads to lower language skills or that lower language skills lead to shyness. There was one statistically significant cross-path between the Intercept for parent-reported shyness and the Slope for expressive language skills, suggesting that higher initial shyness leads to less growth in expressive language. However, it is important to note that this same cross-path was not significant in the model examining observed shyness and expressive language skills.

Lastly, results from the growth models indicated several significant paths from the Intercept to Slope of the same variable. These correlations were significantly negative for parent-reported shyness in the model examining expressive language and in the model examining receptive language (only in males) and for receptive language in the model examining observed shyness. For example, high initial parent-reported shyness was associated with less change or growth in parent-reported shyness. Most likely, these findings indicate a "ceiling effect"; that is, those with high initial levels of any trait may have less room to grow.

Some researchers have suggested that shyness may have a more serious impact for boys than for girls because shyness in girls is more culturally accepted than shyness in boys (e.g., Durkin, 2009). Given this suggestion from the literature, we tested whether there are sex differences in the association between shyness and language skills. We found that there were

significant sex differences in the mean level of both shyness and language skills, with girls having higher shyness levels and higher language skills than boys. However, the results from the present study suggest that there are no significant sex differences in the association between shyness and language skills.

Strengths and Weaknesses

It is important to consider the strengths and weaknesses of the present study when interpreting its results. The primary strength of this study was its longitudinal design, which allowed us to use latent growth curve modeling, a strong analytic technique for studying change within individuals, individual variation in growth over time, and identifying potential factors that explain the variation (Curran, Harford, & Muthén, 1996). The longitudinal design and the use of latent growth curve modeling allowed us to test alternative hypotheses regarding the direction of effect in the association between shyness and language skills.

One compelling hypothesis was the “I know it but won’t say it” model. We were able to test this model because assessments of both expressive and receptive language skills were available. Also, we examined two different measures of shyness (observed and parent-reported), which have been shown to be significantly associated but distinct in a previous study (Smith et al., 2011). Overall, results regarding the association between shyness and language skills were similar for the observed and parent-reported shyness, which increases our confidence regarding the robustness of these results.

Examining the association between language skills and shyness in very early childhood is a strength; there is tremendous growth in language skills during the age range examined in the present study (Durkin, 2009). On the other hand, our results suggest that there are significant associations between shyness and language skills as early as 14 months, making the direction of

the effect between shyness and language skills difficult to determine, and that examining the association between shyness and language skills even earlier may be helpful.

Examining data on twins make it difficult to generalize results to the general population because only a small percentage of the population is twins. Language development may be slower in twins because they are more likely to be born premature as compared to singletons, they share prenatal environment and nutrients from the mother, and they may have other factors that influence slower language development. In addition, parents may have to adapt differently for twins than for singletons. For twins, there are other developmental, genetic, and parental influences that may influence the association between shyness and language.

Also, although our sample was large (with 816 individuals with data for at least one of the assessed measures), another limitation is low power. Although the association between shyness and receptive language was non-significant with one exception, they were always in the same direction as the association between shyness and expressive language, and some of the associations might have been statistically significant in a larger sample.

Implication and Future Directions

The current study's results suggest that shy children do not have deficits in all areas of language and that they have greater deficits in expressive language than in receptive language. This finding, along with lack of evidence for the "lack of practice makes lack of perfect" model, suggests that shyness does not inhibit language acquisition. However, the results suggesting significant associations between the initial levels of shyness and expressive language skills and the finding that individuals whose shyness increases during this age range show lower growth in expressive languages (as well as some suggestive evidence of lower growth in receptive language skills) indicate that shy children may benefit from remedial attention focusing on their

verbal expression. Also, the results suggest that assessment of language skills that include both expressive and language skills are more valid, especially for shy children.

An interesting future direction is how shyness early in life affects language skills at older ages. Although the present study, which examines shyness and language skills until age 24 months, suggests support for the “I know it but won’t say it” model, it is possible that “lack of practice makes lack of perfect” may be the correct hypothesis for language skills assessed at later ages, especially given that children who become shyer with age seem to get even less practice with expressive language. Also, it is possible that the significant relations between shyness and expressive language are simply maintained in later childhood. On the other hand, some researchers suggest that the association between shyness and lower language skills is diminished at later ages. Spere and Evans (2009) found that higher shyness was predictive of lower language skills in kindergarten, but not in Grade 1.

The present study found no evidence of sex differences in the association between shyness and language skills. However, it is important to note that sex differences may not appear until older ages, when the effects of shyness may be greater for boys than girls, as previous research indicates (e.g., Coplan & Weeks, 2009; Rubin & Coplan, 2004; Durkin, 2009). The present study was limited to age 14 to 24 months, when gender differences in language ability become pronounced and differences in the way parents treat boys and girls are just beginning (Keenan & Shaw, 1997). It is possible that at age 14 to 24 months, children are less affected by societal and parental influences. Additional research examining gender differences in the association of between shyness and language skills is needed.

Conclusions

It is crucial to understand the development and etiology of language skills. The present

study examined the assumptions of alternative hypotheses regarding the etiology of the association between shyness and language skills. Shyness was significantly associated with lower expressive language, but not receptive language, suggesting support for the “I know it but won’t say it” model. Initial levels of shyness were not significantly associated with change in language skills, and initial levels of language skills were not significantly associated with change in shyness, suggesting a lack of support for the “lack of practice makes lack of perfect” or “lower language skills lead to shyness” models. These results suggest that shyness does not inhibit language acquisition, but that shy children may be helped by greater attention to their expressive verbal skills, and that a valid assessment of language skills should include both expressive and receptive skills. Future directions include examining the association between early shyness and language and verbal skills during the later school years.

Acknowledgements

The author would like to thank the researchers who designed the Longitudinal Twin Study at the Institute for Behavioral Genetics and the participants in the Longitudinal Twin Study, whose willingness to help, give their time, and effort was greatly appreciated. The author would like to thank the proofreading helpers for their support and comments on the thesis. The author would like to thank Ashley Smith, M.A, who was incredibly helpful in completing the data analyses for the thesis, attending meetings, and discussing the results. The author would also like to thank the members of the committee—Dr. Soo Rhee, Dr. Matthew Keller, and Dr. Linnea Avallone—for reading the thesis, participating in the oral defense, and their time. It is with utmost gratitude that the author gives thanks to Dr. Soo Rhee. Without her help and assistance, this thesis would not have existed. Her guidance and advice throughout the whole thesis process was very much appreciated.

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Tables and Figures

Table 1. Number of children with expressive language skills, receptive language skills, observed shyness, and parent-reported shyness data

	Expressive Language Skills	Receptive Language Skills	Observed Shyness	Parent-reported Shyness
14 months	777	778	790	725
20 months	698	692	713	644
24 months	683	665	714	676

Table 2. Results of t-tests examining sex differences in mean level of shyness and language skills.

	Mean- female	Mean- males	t value	df	p value
Observed Shyness					
14 month	1.941	1.831	3.145	788	0.002
20 month	1.982	1.869	2.87	711	0.004
24 month	1.964	1.905	1.543	712	0.123
Parent-Reported Shyness					
14 month	0.493	0.470	2.513	723	0.012
20 month	0.506	0.488	1.719	642	0.086
24 month	0.502	0.490	1.175	674	0.240
Expressive Language					
14 month	-5.456	-5.546	3.644	775	< 0.01
20 month	-4.397	-4.650	5.018	696	< 0.01
24 month	-3.308	-3.716	5.561	681	< 0.01
Receptive Language					
14 month	-5.976	-6.230	7.318	777	< 0.01
20 month	-4.274	-4.560	5.482	690	< 0.01
24 month	-2.990	-3.282	5.546	663	< 0.01

Table 3. Results from growth models. Unstandardized parameters are shown, with the exception of standardized correlations between Intercept and Slope.

FEMALE	Variance of Intercept	Mean of Slope	Variance of Slope	Correlation between Intercept and Slope
Shyness				
Observed	0.243**	0.028	0.193**	-0.650**
Parent-Reported	0.016**	0.012*	0.007**	-0.540**
Language Skills				
Expressive	0.077**	2.140**	0.625**	0.111
Receptive	0.161**	2.967**	0.274**	-0.178

Note. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

MALE	Variance of Intercept	Mean of Slope	Variance of Slope	Correlation between Intercept and Slope
Shyness				
Observed	0.244**	0.053	0.241**	-0.774**
Parent-Reported	0.016**	0.019**	0.012**	-0.452**
Language Skills				
Expressive	0.079**	1.827**	0.520**	0.179
Receptive	0.215**	2.929**	0.358**	-0.130 ⁺

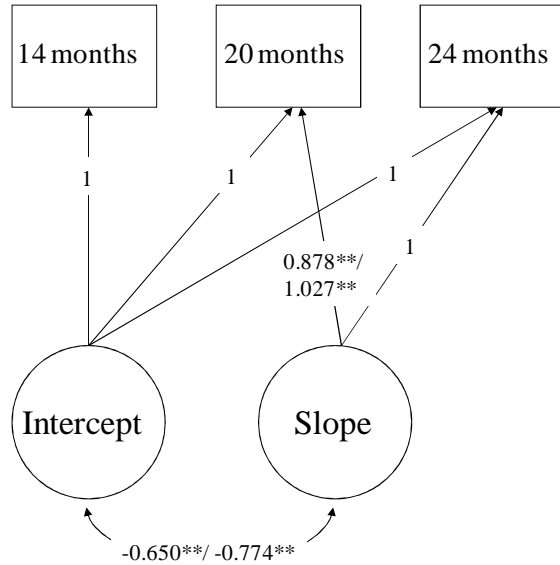
Note. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Table 4. Chi-square difference test on sex differences for the association between shyness and language skills. The results use the reduced model with all parameters fixed

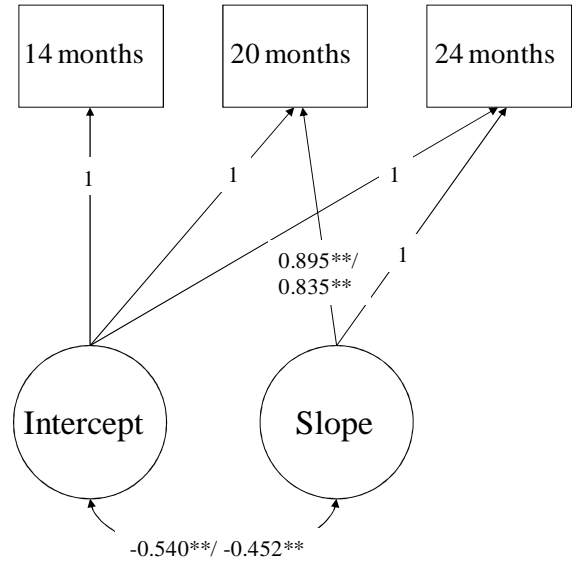
	$\Delta\chi^2$	Δdf	p-value
Observed Shyness with Expressive Language	9.413	8	0.309
Observed Shyness with Receptive Language	6.774	8	0.561
Parent-Reported Shyness with Expressive Language	5.715	8	0.679
Parent-Reported Shyness with Receptive Language	N/A	N/A	N/A

Figure 1. Results from growth models observed shyness, parent-reported shyness, expressive language skills, and receptive language skills. Unstandardized parameters are shown, with the exception of the standardized correlation between Intercept and Slope. Sexes are represented female/male. Note. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

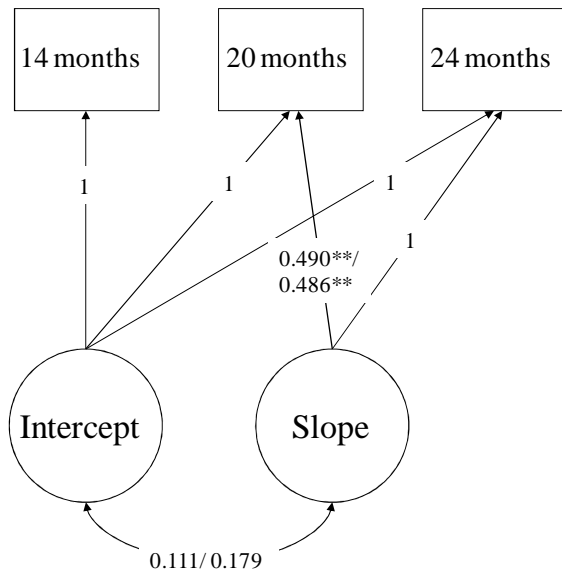
A. Observed Shyness



B. Parent-Reported Shyness



C. Expressive Language Skills



D. Receptive Language Skills

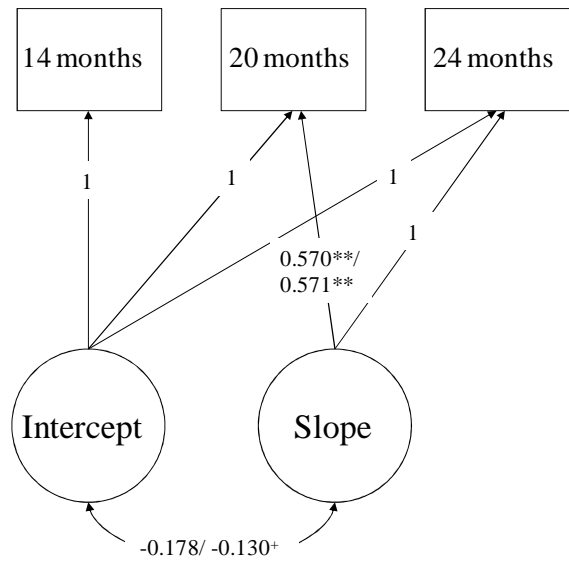
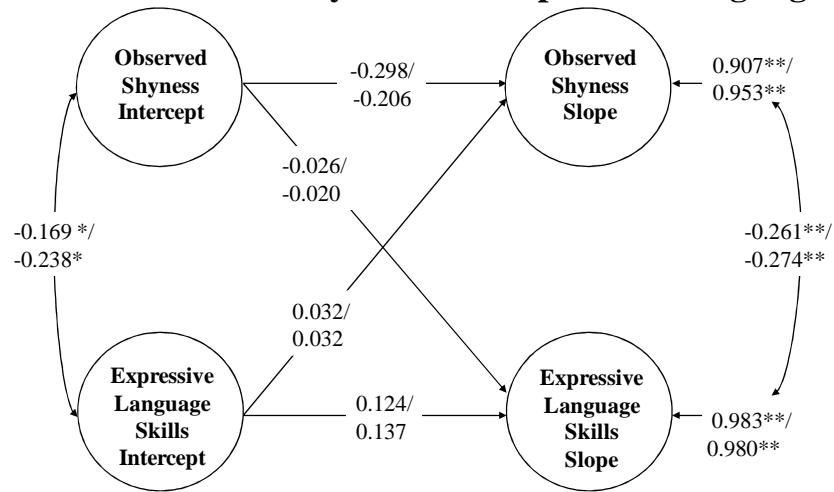
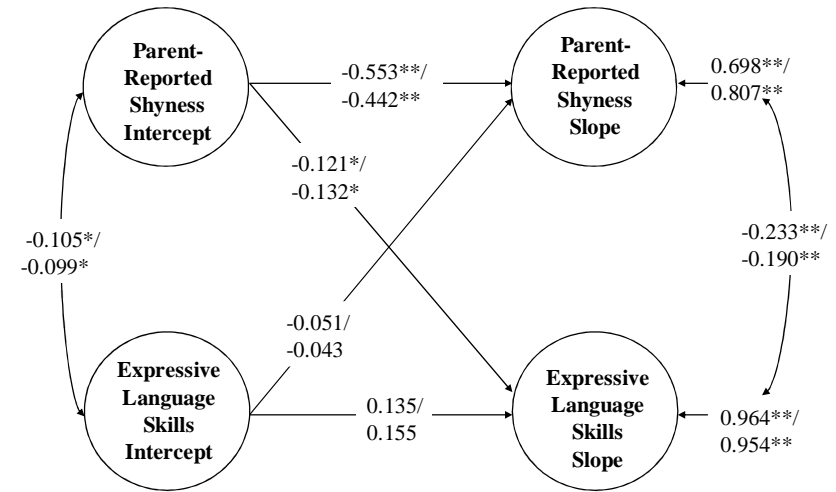


Figure 2. Results for growth analyses examining the relations between language skills and shyness. Sexes are represented female/male. Standardized parameters are shown. Note. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

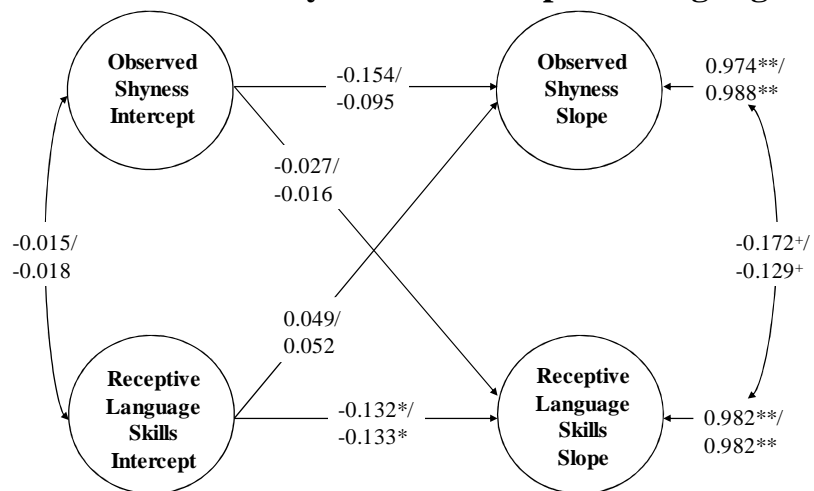
A. Observed Shyness with Expressive Language



B. Parent-Reported Shyness with Expressive Language



C. Observed Shyness with Receptive Language



D. Parent-Reported Shyness with Receptive Language

