Impact of Health-Related Family Factors on School Enrollment in Bolivia: Implications for Health Education

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Abstract

This study identified the extent to which family factors increase school enrollment in Bolivia, after adjusting for human and financial capital. The sample was drawn from the 1998 Demographic and Health Survey. Logistic regression models were used to determine the effect of human capital, financial capital and family factors on school enrollment. Results of the study indicated that mother's education, the socioeconomic status of the family and the mother's knowledge of health issues all influence children's school enrollment. Mothers who were able to correctly identify when during their ovulatory cycle they could conceive were 1.5 times (p-value =.012) more likely to have their children enrolled in school. The odds of children being enrolled in school also went up with increases in the mother's education and the family's socioeconomic status, and decreased for girls. Result indicated that school enrollment in Bolivia may be increased by addressing the health knowledge of mothers as well as human, financial, and demographic factors of the family.

Key Words: *Determinants, Knowledge, Health, Gender, School Enrollment*

Introduction

The influence of family environment on educational outcomes has been the subject of considerable research, both in developed and developing countries (1-4). Several models examined how family environment might affect children's education. Buchmann and Hannum (5) explained larger structural factors (national conditions, state policies and global forces) influencing both educational and economic outcomes through two intermediate factors: supply and demand. In their model, supply includes schooling (inputs, processes and organization) and community (structure and resources). Demand includes socioeconomic status, structure, and organization (5).

In a second model, described by Guo and Harris (2), the relationship between family poverty and intellectual development is mediated by several variables including the physical environment at home, mother's involvement with the child, cognitive stimulation at home, the child's health, and the quality of child care (2). Coleman (1) identified three types of family capital influencing education: human, financial and social. Human capital is generally measured as parents' education or more simply the father's or mother's level of formal schooling (1). Financial capital is generally assessed through family ownership of physical resources such as a television, car or telephone.

Figure 1 provides the conceptual framework guiding this research. It is based on Coleman's work which indicates that human and financial capital is critical to children's education. However, our conceptual framework expands upon his work by including health-related family factors. Our choice of these factors was limited partly by the data available in the Demographic and Health Survey. Nevertheless, we were able to include three categories of health-related family factors: mother's knowledge of health issues, access to water and sanitation, and awareness and use of health care services. We use school enrollment as our dependent variable.

Using Demographic and Health Survey (DHS) data from Bolivia, we found that school enrollment for children 6-14 years old was 92.0% (92.9% for males and 91.0% for females). These percentages are slightly lower than those found in the region including in Peru (94.0% for males and 92.0% for females 6-14 years old), and the Dominican Republic (93.7% for males and 94.6% for females 6-14 years old). However, school enrollment in Bolivia is higher than in other developing countries, including many countries in Africa. For example, data from the Guinea DHS suggest that only 25.5% of children ages 6-14were enrolled in school with a larger difference between males (29.2%) and females (21.2%). In Niger, these rates were 22%, 25.7%, and 18.1%, respectively (6). Understanding factors influencing school enrollment in Bolivia may help increase school enrollment there and elsewhere in the developing world.

The purpose of this study is to identify whether health-related family factors--in addition to human and financial capital factors--increase school enrollment in Bolivia. If health-related family factors are an important predictor of school enrollment, policy makers should be able to increase school enrollment through a variety of mechanisms, including improving caregivers' and families' health knowledge, access to health services, and their environment at home.

Methods

The data from this study came from the 1998 Bolivian Demographic and Health Survey (7). The sample included data from the household, individual, and children's surveys, which were merged. The household file provided information on school attendance and files for mother and children were used to measure the health environment. Information on the data collection process can be found in the literature (7).

This study included all children between the ages of 9 (when a sharp decline in school enrollment is observed, see figure 2) and 14 (no information about enrollment status is available from the DHS for children older than 14 years of age). The total sample size was 7,355, including 3,653 boys and 3,702 girls.

Definition of Variables

The dependent variable is the children's school enrollment status. Human capital is measured by parents' highest educational attainment (no education, incomplete primary, complete primary, incomplete secondary and higher). Financial capital is measured by a social class index (range 0-5) that sums the availability of physical resources for the family including electricity, radio, television, refrigerator, and telephone; and flooring, roof and wall material. Health-related family factors include mother's knowledge of select health issues (her own ovulatory cycle, any method of contraception, oral rehydration therapy, and appropriate food and liquid

intake during diarrheal episodes), access to water and sanitation (source of drinking water, type of toilet facility), and awareness and use of health care services (knowledge of institutions which provide health services, source of contraceptives, and whether the mother discussed family planning with health personnel).

Data Analysis.

The dependent variable (school enrollment) is dichotomous; consequently logistic regression was used to assess the relationship between human capital, financial capital, family factors and children's enrollment in school. Coefficients represent the odds of being enrolled in school versus not as a linear function of the independent variables. Six separate models were used to examine the relationship between human and financial capital and family factors: (1) human capital (2) financial capital (3) mother's knowledge of health issues, (4) access to water and sanitation, (5) awareness and use of health services, and (6) all factors combined. Backward stepwise regression was used to identify the factors associated with children's school enrollment. Variables found to be insignificant were dropped from the models. We adjusted for several variables in the models including age and sex of children, area of residence (countryside, town, small city or capital), number of children five years of age and under, and literacy (cannot read, reads with difficulty, or reads easily). The final model retained all significant variables from the five separate models. It was developed adjusting for the variables previously mentioned. The above analyses were then repeated stratifying by gender. Six new models were created for boys and six for girls.

Results

Sample Characteristics

Data for the analysis are taken from the 1998 Demographic and Health Survey of Bolivia. A representative sample of households was contacted and detailed interviews were conducted with women in the childbearing ages (14-45 years old). A household roster includes information on all persons in the household. We selected children aged 6-14 for this analysis. A total of 11728 cases were available for analysis. The sample was evenly divided between males (50.7%) and females (49.7%). Only 7.3 percent of the children were reported to be unenrolled in school. In contrast, 17.0% of the mothers reported having no schooling and 50.3% reported only completing primary school.

Regression Analyses

Results from logistic regression analyses for each factor are shown in Table 1 (only significant variables are included). In the first model (human capital), mother's education significantly influenced children's school enrollment. The odds of the child being enrolled in school increased with increases in mother's educational attainment (the reference category being higher than incomplete secondary education), but not with increases in father's educational attainment adjusting for demographic variables (results for fathers not shown). Odds of being enrolled in school were higher for younger children, males, children with fewer siblings age five and under, those who did not live in the countryside and children of mothers who read with difficulty compared with those who could not read at all.

The second model included financial capital variables (socioeconomic status, and floor, wall and roof materials). Of these variables, only socioeconomic status was significantly associated with school enrollment. Improvements in socioeconomic status increased the odds of children being enrolled in school, adjusting for demographic variables.

The third model included variables related to the mother's knowledge of health issues. Mothers who could correctly identify when during their ovulatory cycle they could conceive were 1.6 times (p-value =.012) more likely than mothers who could not identify when they could conceive to have their children enrolled in school. Mothers who correctly identified how much their children should drink during diarrheal episodes were 1.7 times (p-value =.001) more likely than mothers who did not possess correct knowledge to have their children enrolled in school

In the next model, variables related to access to water and sanitation were regressed to predict school enrollment adjusting for the same demographic covariates. Results indicated that the source of drinking water and type of toilet facility influenced whether the children were enrolled in school. Children who came from homes with no piped drinking water and those who came from homes with drinking water outside the household were only 0.7 times (p-value = .033 and.005, respectively) as likely as those who came from home with internally-piped drinking water to enroll in school. Demographic covariates were also adjusted for in this model; all achieved significance and were in the expected direction.

Model 5 included variables related to awareness and use of health care services. Of these variables only the source of contraceptives achieved

significance. Women who had received their contraceptives from private health care services were 1.2 more likely to have their children enrolled in school compared to women who received contraceptives from public health care services.

The final model retained all variables found to be significant from the other five models. Backward stepwise regression revealed that mother's knowledge of health issues, and variables measuring human and financial capital were the only factors to significantly influence children's enrollment in school, after adjusting for demographic covariates. Access to water and sanitation and awareness and use of health care services did not influence the children's school enrollment. Mothers who could correctly identify when during their ovulatory cycle they could get pregnant were 1.5 (p-value =.017) times more likely than mothers who could not do so to have their children enrolled in school. Likewise, mothers who correctly identified how much their children should drink during diarrheal episodes were 1.6 times (p-value =.001) more likely than mothers who could not correctly identify how much their children should drink during diarrheal episodes to have their children enrolled in school.

Tables 2 and 3 replicate the above analyses for boys and girls, respectively. Table 2 presents the odds of school enrollment for boys according to human and financial capital and family factors. Model 1 for males indicates that parents' education was associated with boys' school enrollment. As with the models that included boys and girls, school enrollment decreased with increased age and increased number of children five years of age and under. Compared to boys living in the countryside, boys living in the capital were 6.4 times more likely to be enrolled in school; those living in small cities were 4.1 times more likely to be enrolled; and those living in towns were 3.3 times more likely to be enrolled in schools.

In the second model, socioeconomic status was the only financial capital variable that was significantly related to boys' school enrollment. In the model incorporating mother's knowledge of health issues, only the mother's knowledge of her own ovulatory cycle was significantly related to a boy's school enrollment. Women who could correctly identify when during their ovulatory cycle they could get pregnant were 1.6 times (p-value = .017) more likely to have their sons enrolled in school. Increases in literacy levels were associated with increases in the odds of school enrollment for boys.

In the fourth model, the type of toilet facility was the only access variable significantly associated with boys' school enrollment. Boys from households with no toilet facility, and non-flush toilets were only 38.9% and 44.2%, as likely, respectively to be enrolled in school than boys from households with flush toilets. Area of residence was significantly associated with school enrollment. Boys who resided in larger cities were more likely to be enrolled in school compared to boys from smaller cities.

In the model relating to awareness and use of health care services, women who obtained their contraceptives from private sources were 1.3 times (p-value=.030) more likely than women who obtained them from public sources to have their sons enrolled in school. The final model for boys indicated that only mother's education and financial capital (represented by socioeconomic status) were significantly associated with the odds of school enrollment for boys after adjusting for the effect of the children's age, literacy and area of residence. In this model, odds of school enrollment increased with gains in mother's education, socioeconomic status, and for boys living in larger cities, but decreased for older boys.

Table 3 presents the odds of school enrollment for girls based on human and financial capital, as well as family factors. The first model indicates that the odds of school enrollment for girls increased with gains in the mother's education, literacy levels, living in larger cities, and having more children less than five years of age living in the household, but decreased with age.

As with boys, socioeconomic status was the only financial capital variable that was significantly related to school enrollment. None of the variables relating to mother's knowledge of health issues or awareness and use of health care services was significantly related to school enrollment for girls. The only access variable associated with school enrollment was the type of toilet facility. However, in the final model, none of the family factors was significantly related to school enrollment for girls. Variables found to be significantly associated with school enrollment for girls included mother's education, socioeconomic status, age of the child, and the number of children five years old and younger in the household.

Discussion

Results from the Bolivia Demographic and Health Survey indicated that human capital represented by mother's education (but not father's education) was positively associated with children's school enrollment. Furthermore, the effects of mother's education were consistently higher for girls than for boys.

Limitations of this study include the lack of available data on school enrollment for children above the age of 14, when education is no longer compulsory in Bolivia. Lack of information on immunizations and access to health care for children in the sample may have further reduced our ability to predict the impact of access to health care services on school enrollment. It is also important to point out that school enrollment is a crude measure. School enrollment cannot be equated with school attendance or school performance. Thus the long-term benefits of schooling may not be assumed valid here since we did not examine school attendance and performance.

Results from our study are consistent with several other studies (8-10). One study from Turkey, indicated that the positive impact of increased human capital is larger for girls than boys (10). However, previous studies are inconsistent in their findings regarding the impact of higher education for mothers and fathers. Two studies, one from Indonesia and the other from Bangladesh, indicated that the mother's education was more important to children's education and enrollment than the father's education (9,11). On the other hand, one study found strong effects of paternal education, but not maternal on the educational attainment of children in Vietnam (12). Yet, another study found that increased maternal education was associated with lower education for children (13).

In our study, mother's education and knowledge of health factors were important variables in increasing school enrollment. Possible pathways for the positive impact of maternal education on children's survival have been explored in the literature (14, 15). Many of these can be extrapolated to school enrollment. For example, Caldwell posited that the mother's education may encourage mothers to be less "fatalistic" about illness, strengthen women's resolve to follow health professionals' advice and secure the attention of providers, and change the traditional structure of family relationships (i.e. mothers may be more involved in decisions regarding health care, spending money and so on). These pathways, together with the positive impact of mothers' knowledge regarding health issues indicate that increasing education in general, and more specifically health education for mothers may be an important pathway to improving the health of children, limiting the number of children women have, and reducing gender inequalities and inequities, thus increasing children's school enrollment.

Socioeconomic status is an important predictor of children's school enrollment in Bolivia. Similar to our results, Maitra (9) found that increased household income was always associated with increased school enrollment for children in Bangladesh. However, while in our study socioeconomic status was important for boys, this was not the case for girls. Our findings differ from previous research, which indicates that income is important to both girls' and boys' educational attainment and that income has a much larger impact on girls' educational attainment than on that of boys (10). However, some studies that aimed to predict school enrollment and educational attainment failed to adjust for the number of siblings five years of age and younger.

In the current study, the number of children five years old and younger was found to be an important predictor of school enrollment, especially for girls. It may be that girls are often kept home from school to take care of their younger siblings. In fact, the number of children five years old and younger may be a more important predictor of school enrollment for girls than the family's socioeconomic status. Parish and Willis (16) indicated that in Taiwan, school enrollment was associated with both number of siblings and household economic security; specifically the negative effects of number of siblings became weaker with increased economic security, but even in the highest economic group, there was a negative impact of the increased number of siblings.

Ahn et al. (12), on the other hand, indicated that in their analysis of Vietnamese children's school enrollment, family size was a reflection of other household variables such as residence in urban or rural areas, region, parental education, household wealth and child's age. Connelly and Zheng (8) found that region of residence, sex of child, parental education, and number of siblings were all associated with school enrollment; specifically they identify rural girls to have the most disadvantage in both school enrollment and graduation rates.

In our study, area of residence did not seem to play a role in school enrollment for children. Interestingly, it was an important predictor of school enrollment for boys but not for girls. The results showed that mother's education, and the number of siblings ages five and under were the most important predictors for girls' school enrollment. Meanwhile, boys' school enrollment was better predicted using mother's education, the socioeconomic status of the family, number of siblings age five and under and the area of residence.

From a health education perspective, the results of this study suggest at least two interventions. First, mothers' knowledge regarding ORT and their own ovulatory cycle (perhaps an important proxy for women's control over their own bodies) can be linked to children's school enrollment. As such, these and other health matters constitute a legitimate focus of health educators and have a demonstrable

association with children's school enrollment. Second, because human and financial capital variables were also associated with school enrollment, broad efforts are needed to improve school enrollment rates. Such efforts should simultaneously address lack of health information, lack of schooling for girls and women and poverty.

Conclusion

This study supports the idea that health-related family factors including mother's knowledge of health issues, access to water and sanitation, and awareness and use of health services are mechanisms by which school enrollment may be improved in Bolivia. Several of these family variables may simply reflect the effect of other factors which more directly influence enrollment such as mother's education and financial resources. Even so, some health-related family factors remain important. In particular, women's knowledge about their own ovulatory cycle and the amount of liquids a child should consume during diarrheal episodes are related to school enrollment. These findings suggest that programs designed to simultaneously improve women's education, lift families out of poverty, and provide basic information about maternal and child health could improve children's enrollment in school.

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Figure 1. Conceptual Model of the Impacts of Human and Financial Capital, and Family Factors on School Enrollment for Children ages 9-14 in Bolivia.

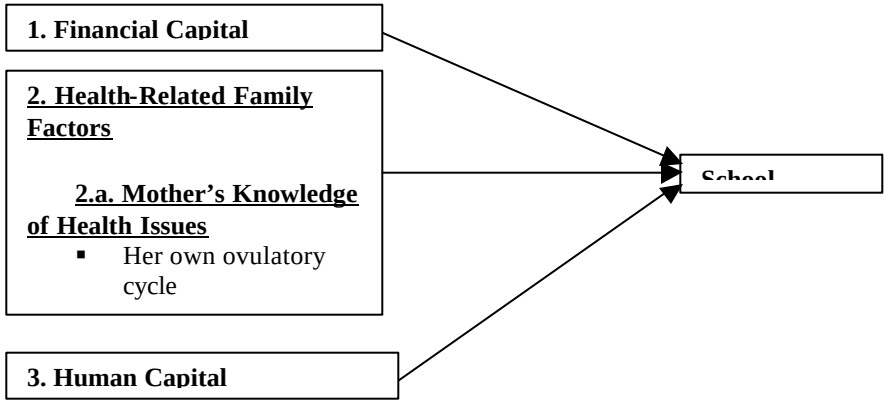

Figure 2. School Enrollment of Bolivian Children by Age and Gender.

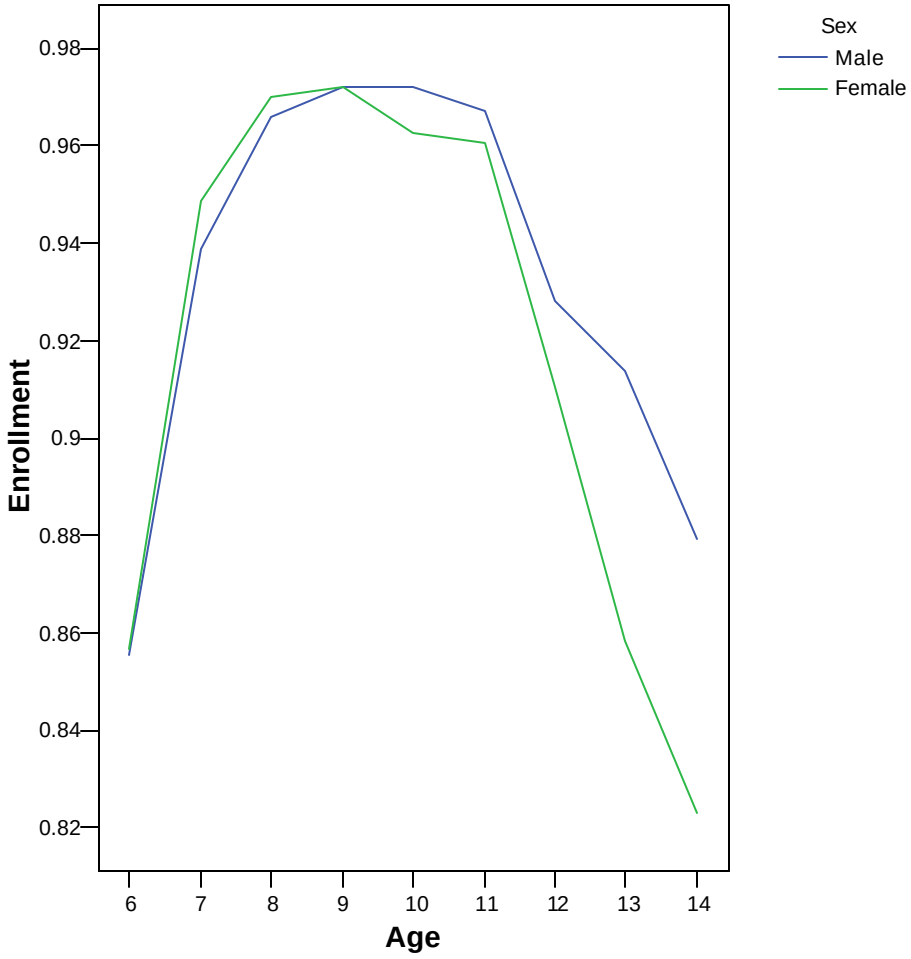

Table 1. Odds and p-values of school enrollment according to six models of human and financial capital and health-related family factor variables, based on data from 1998 Bolivian DHS.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6 (Final)
Human capital						
Mother's education						
No education	.084***					.135***
Incomplete primary	.148**					.250*
Complete primary	.062***					.114***
Incomplete secondary	.208*					.316*
Higher	---					---
Financial Capital						
Socioeconomic status		1.905***				1.837***
Health-Related Family Factors						
Mother's knowledge of health issues						
Ovulatory cycle						
Incorrect/Does not know			---			---
Middle of Period			1.602***			1.453*
Drinking patterns with diarrhea						
Incorrect/Does not know			---			---
Same amount or more			1.654***			1.553***
Hygiene and Health Environment						
Source of drinking water						
Not piped				.673**		
Piped outside				.691*		
Piped inside				---		
Type of toilet facility						
No facility				.793***		
Non-flush toilet				.869		
Flush toilet				---		
Awareness and Use of Health Care Services						
Source of contraceptives						
Public					---	
Private					1.249*	
Control Variables						
Age of child	.638***	.618***	.636***	.642***	.638***	.621***
Sex of child						
Male	---	---	---	---	---	---
Female	.689***	.686***	.689***	.688**	.685***	.687***
Number of children 5 and under	.777***	.820***	.756***	.752***	.758***	.799***
Area of residence						
Countryside	---		---	---	---	
Town	3.012***		3.012***	2.196***	2.740***	
Small city	2.681***		2.551***	2.660***	2.962***	
Capital	3.996***		4.595***	3.623***	4.806***	
Literacy						
Cannot Read	---	---	---	---	---	
Reads with difficulty	1.819*	1.885***	2.006***	1.927***	2.030***	
Reads easily	1.431	2.354***	2.420***	2.253***	2.628***	
-2LL	3101.51	2.980.04	3122.39	3113.88	3143.23	2.930.10
df	13	7	11	14	10	12

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

Table 2. Odds and p-values of school enrollment for boys according to six models of human and financial capital and health-related family factor variables, based on data from 1998 Bolivian DHS.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6 (Final)
Human capital						
Father's education						
No education	.310*					
Incomplete primary	.312*					
Complete primary	.602					
Incomplete secondary	.532					
Higher	---					
Mother's education						
No education	.075*					.059**
Incomplete primary	.215*					.173*
Complete primary.	.063*					.059**
Incomplete secondary	.232					.199
Higher	---					---
Financial Capital						
Socioeconomic status		1.905***				1.855***
Health-Related Family Factors						
Mother's knowledge of health issues						
Ovulatory cycle						
Incorrect/Does not know			---			
Middle of Period			1.577*			
Hygiene and Health Environment						
Type of toilet facility						
No facility				.389*		
Non-flush toilet				.442		
Flush toilet				---		
Awareness and Use of Health Care Services						
Source of contraceptives						
Public					---	
Private					1.329*	
Control Variables						
Age of child	.598***	.576***	.600***	.599***	.599***	.575***
Number of children 5 and under	.818**		.802**	.801***	.799***	
Area of residence						
Countryside	----	---	---	---	---	---
Town	3.339***	1.815	3.401	3.346***	3.316***	1.931
Small city	4.120***	1.844	4.082***	3.955***	4.099***	1.952**
Capital	6.346***	1.886***	8.921***	7.754***	8.575	2.041***
Literacy						
Cannot Read		---	---	---	---	
Reads with difficulty		2.541***	2.716***	2.814***	2.622***	
Reads easily		2.609***	2.759***	2.965***	2.671***	
-2LL	1620.31	1570.02	1656.25	1656.07	1657.105	1544.78
df	14	7	9	10	9	9

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

Table 3. Odds and p-values of school enrollment for girls according to six models of human and financial capital and health-related family factor variables, based on data from 1998 Bolivian DHS.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6 (Final)
Human capital						
Mother's education						
No education	.137*					.159*
Incomplete primary	.172*					.228*
Complete primary.	.086***					.151*
Incomplete secondary	.266					.406
Higher	---					---
Financial Capital						
Socioeconomic status			1.763***			
1.735***						
Health-Related Family Factors						
Hygiene and Health Environment						
Type of toilet facility				.095**		
No facility				.160***		
Non-flush toilet						
Flush toilet						
Control Variables						
Age of child	.683***	.664***	.681***	.681***	.681***	.664***
Number of children 5 and under	.738***	.779***	.771***	.741***	.771***	.804**
Area of residence						
Countryside	---		---		---	
Town	1.676		1.859**		1.859**	
Small city	2.189**		2.705***		2.705***	
Capital	2.692**		2.728**		2.728**	
Literacy						
Cannot Read	---	---	---	---	---	
Reads with difficulty	1.335	1.358	1.559*	1.553*	1.559*	
Reads easily	2.115*	1.990**	2.860***	2.384***	2.860***	
-2LL	1448.12	1338.07	1465.32	1443.44	1465.32	1381.87
df	12	6	8	9	8	8

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