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Center for the Study of Reading

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Abstract

Few studies have provided precise data on how much reading school children do. Fewer still have examined the relation between amount of reading and reading achievement. In the studies reported here, 155 fifth graders wrote down every day on activity forms how many minutes they spent on a wide range of out-of-school activities. Forms were completed for periods ranging from 8 to 26 weeks. The distribution of times for most activities was positively skewed. Among all the ways children spent their time, reading books was the best predictor of several measures of reading achievement, including gains in reading achievement between second and fifth grade. However, on most days most children did little or no book reading. An implication of these facts is that parents and teachers ought to give a higher priority to promoting book reading.

Growth in Reading and How Children Spend Their Time Outside of School

> Every habit and faculty is preserved and increased by correspondent actions--as the habit of walking, by walking; or running, by running.
>
> How the semblances of things are to be combatted.
>
> Epictetus

One of the success stories of the educational research of the 1970s was to establish that reading achievement depends upon how children spend their time in school (Denham & Lieberman, 1980; Rosenshine & Stevens, 1984). Much less is known about the influence of how children spend their time out of school, but it would be myopic to suppose that it is unimportant.

There is a rather bulky literature on children's out-of-school activities. Most previous studies, though, have suffered from one or more of the following defects: The focus was narrow, limited, perhaps, to completing homework, watching television, or reading for pleasure. The method was dubious, depending, for instance, on parents' answers to a questionnaire. The time interval probed was brief, as in the single question, answered once, "How many hours did you spend watching television yesterday?" Alternatively, the interval probed was indeterminate and the response options were vague, as in the question, "How often do you find out about the news from magazines? (Circle

one) Never, Several Times a year, Several times a month, Several times a week, Every day." Only a superficial description of average trends was provided, with little information about differences among individuals or about relationships among factors, and, typically, no empirically grounded insights into possible causes and possible effects.

So far as we are aware, the present paper reports the most intensive study of children's out-of-school activities that has ever been done. Children completed a daily record of activities for periods ranging from two to six months. While special attention was paid to reading, a comprehensive assessment of children's activities was made. Individual and temporal patterns of activities were studied in some depth. The relationships between time spent in activities and several measures of reading proficiency were examined. The interesting question of whether out-of-school activities are in the causal nexus that produces reading growth was explored.

The study closest to the present one in scope and method was completed by Vincent Greaney of the Educational Research Centre at St. Patrick's College in Dublin, Ireland (1980). All of the 920 fifth grade pupils in a sample of 31 Irish primary schools, stratified according to location, completed a diary of out-of-school activities on three specified days during a one-week period. Several of Greaney's findings will be discussed in detail later. In the meantime, briefly, children were found to

spend large amounts of leisure time in such activities as play, outings, hobbies, television viewing, and helping in the home. Overall, 5.4% of leisure time was spent in reading. Amount of time spent reading comics and, especially, the amount of time spent reading books was positively associated with reading achievement.

Method

Subjects. The subjects were 155 fifth graders, 52 from two classrooms in a village school and 103 from five classrooms in a school in a middle class area of a small city. Both communities are in east central Illinois. There were 85 boys and 70 girls in the total sample. While there were some blue collar, low income, and minority children in the sample, these groups were underrepresented in terms of their proportions in the nation as a whole. On a standardized reading comprehension test, the sample was above the national average but showed a typical spread in ability (see Table 2).

Activity forms. Based on discussions with two classes of fifth graders, an initial "activity form" was developed that aimed to divide children's activities into mutually exclusive and exhaustive categories. The questions on the initial form were refined on the basis of a tryout and further discussion with the children.

The final activity form consisted of one side of a single sheet of paper on which there were questions, such as "I spent

_____ minutes listening to music," "I spent _____ minutes eating dinner." Several questions asked for further specification of the activity, for instance: "I spent _____ minutes playing a sport called _____," and "I spent _____ minutes reading a book. The book was called _____. The book was written by _____."

It would have been desirable to ask detailed questions about every type of activity in which children engage, but this was not feasible. Completing the forms would then have taken too much time over the rather extended duration of this study, and might have jeopardized the cooperation of the schools and the children themselves. Thus, finely-discriminating questions were asked only about categories that especially interested us, such as reading and homework, whereas other questions probed activities lumped together in broader categories.

Slightly different versions of the activity form were used in the two schools. Children in the village school were asked to make sixteen separate time estimates whereas the children in the city school were asked to make twenty estimates. In three cases the form used in the city school divided what was a large category in the village school into two smaller ones; therefore, it was possible to get approximately the same information for the two schools by combining these smaller categories. The form used in the city school also included an "Other" category.

Reading tests. A battery of three reading tests was given twice, once at the beginning of the period during which activity forms were completed and again following this period. The first test was the reading comprehension test from the Metropolitan Achievement Tests. The second was a checklist vocabulary test of the type described by Anderson and Freebody (1983). Subjects indicated whether they knew the meaning of 97 English words, representing a wide range of difficulty, intermixed with 66 close-to-English nonwords. A subject's score on the test is the percentage of words marked as known minus a correction for the number of nonwords marked as known. The third test was intended to measure reading speed in words per minute. Subjects read a lengthy, interesting, grade-appropriate selection for ten minutes. Every two minutes they made a slash mark in the text at the point where they were then reading. This was done in the hope that it would be possible to identify the point, if any, where a child abandoned close reading and began skimming.

The foregoing tests were administered by one of the investigators. Also obtained were standardized reading test results from school files for Grade 2. Total reading scores were available for most children from the village school on the Stanford Achievement Test and most children from the city school on the Metropolitan Achievement Test.

Procedure. One of the investigators explained to each class how to complete the activity form. The children were encouraged

to think of the nonschool part of each day in terms of regular mileposts such as getting up, eating breakfast, leaving for school, getting home from school, participating in regularly scheduled extracurricular practices or lessons, eating dinner, watching favorite TV shows, going to bed, and going to sleep. Children were provided an instruction sheet to which they could refer that explained the kinds of activities that should be included under each question. They were urged to become "time conscious," and to make mental notes of when they started and stopped doing things. A considerable period was spent on the arithmetic of time calculations. When it was discovered that some children had trouble converting large blocks of time to minutes, a conversion table was provided that listed hours and quarters of an hour and the corresponding numbers of minutes. When it was discovered that some children were underreporting time, they were urged to make sure that they accounted for at least 330 minutes on weekdays and 630 minutes on weekends and holidays. The investigator came back five straight days to answer questions, discuss problematical cases, and help children complete the forms.

Children completed an activity form each school day that covered out-of-school activities the previous day. In six of the seven classrooms, completing activity forms was the first task in the morning when school began. In the remaining classroom, the forms were usually done right after lunch. Once the children had

about a week of experience, it took from five to ten minutes to complete a form. Following weekends and holidays, children from the village school were asked to complete forms for these days as well. Children from the city school had to complete forms covering these days during free time.

Children from the village school filled out activity forms in the spring for an eight-week period during March and April. Compliance was high in this school and was maintained throughout the study. The ratio of forms actually received to the total that would have been possible if every child had turned in a form for every one of the fifty-seven days, expressed as a percentage, was 91%. Pains were taken to conceal from the children in the village school that reading was the primary interest of the investigators.

Children from the city school began filling out forms the following fall for a twenty-six week period beginning in November. Compliance was lower in the city school, mainly because classroom time was not provided to complete weekend and holiday forms and because cooperation which was voluntary, tailed off toward the end of the study, after about eighteen weeks. These problems were not unanticipated and an incentive system was introduced to try to keep the children motivated. Briefly, points were awarded for completing forms, with extra points given for weekend and holiday forms. Children who accumulated enough points received a t-shirt, which they had helped design, at the

end of the study; 43 of the 103 children got a t-shirt. That the incentive system was not entirely successful is indicated by the fact that just 48% of the total possible number of forms was actually received. Children in the city school discovered during the course of the study that the investigators were especially interested in reading.

Approach to analysis. The original plan for this study was to measure children's competence as readers, to determine their out-of-school activities for a period of several months, measure their competence again, and then assay the influence of the activities on reading growth during the several month period. This plan had to be abandoned. One problem was that by the date of the second administration of the tests the children were tired of the study and many didn't try very hard on the tests. That this is so is suggested by informal observation and by the fact that, if one takes the data seriously, the children in both schools showed negative reading growth, on the average, over the course of the study.

An even more fundamental problem overlooked in the initial plan is that out-of-school activities probably are persistent behavior patterns. These behavior patterns probably were established long before we asked children to complete activity forms and probably continued long afterwards. Moreover, such proximate influence as individual teachers were able to have on children's out-of-school activities, because of homework policy,

the priority given to independent reading, and the like, already would have taken hold by the time of our "pretest."

The revised plan, therefore, involved keying on the three reading tests administered in the middle of the fifth grade just before the children began completing the activity forms. To assay the influence of out-of-school activities on reading growth, the change from the end of the second grade to the middle of the fifth grade was examined. Interviews with sixteen children from the village school, and their parents, suggest that most children who read frequently in the fifth grade first begin to do so in the third or fourth grade.

For the sake of clarity and economy of presentation, the data from the two schools were pooled. Every analysis done with pooled data was also done with the data from each school separately. With just a few exceptions, the findings with the separate data sets were very similar. Nonetheless, pooling the data from the two schools was not as simple as combining the data. The reason is that the two sets of data were not quite commensurate: Notably, the battery of three reading tests was given for the first time four months earlier in the city school than in the village school, and the scores pulled from files in the two schools to estimate reading ability in the second grade were based on different standardized tests. Including school as a factor in the analyses precluded artifacts that otherwise would have arisen because of these differences.

Generally, there was a reasonable correspondence between the time reported on the activity forms and the time available in the day. Average total reported time was somewhat less than estimated nonschool, nonsleeping hours, but this is plausibly attributable to the fact that the activity forms did not include questions that covered such activities as dressing and undressing, grooming and personal hygiene, or getting to and from school.

Of course, on some days some children reported unrealistically large or small amounts of time. Several techniques were tried for dealing with outliers: (a) deviant figures were thrown out; (b) deviant figures were replaced with figures either one standard deviation above or one standard deviation below the mean (after a normalizing transformation; see below); (c) all figures were proportionalized to average total reported time. A child with very deviant scores was dropped. Otherwise, analyses involving figures that had been manipulated in one or another of these ways differed hardly at all from analyses involving all the time figures in their simple form. Hence, we used the simple figures, confident that our results and conclusions were not unduly influenced by outliers.

Throughout this paper, book reading time includes only instances when the child wrote down either the title or the author of the book, or both. When the instances in which the child did not state the title or the author are included, total

book reading time is slightly higher (mean = 10.4, standard deviation = 17.0) but its correlation with reading comprehension percentile goes down somewhat. This suggests that constraining the measure to instances where the child can state the title or the author gives a more valid indicator of actual reading.

Most of the time variables were highly skewed, as is apparent (see Table 1) from the fact that the medians are smaller than the means and the fact that the standard deviations are large in relation to the measures of central tendency. A transformation was sought which would normalize the time variables and would linearize their relationships with reading achievement. The one finally chosen was the logarithm of average time per day in minutes, m, plus a small constant: $\ln(m + .5)$. This did a good overall job of satisfying both objectives. Skewness and kurtosis were improved for 11 of the 14 variables; in most cases, the distribution of transformed times was within normal bounds. The transformation increased the absolute value of the correlation between a time variable and Metropolitan reading comprehension percentile in eight cases and made it smaller in six cases. In most cases, the change was slight. However, when regression analyses were done predicting reading comprehension percentile, percentage of vocabulary known, and reading speed, in each case more variance was explained when the transformed time variables were used as predictors instead of the raw time variables.

Special attention was paid to amount of time spent reading books. The transformation, ln ($\underline{m}$ + .5), made the distribution almost perfectly normal. Following the transformation, the correlation with reading comprehension percentile went up considerably and the residuals were evenly distributed around the function predicting reading comprehension percentile.

Three variables were not helped by the ln ($\underline{m}$ + .5) transformation. In the cases of time spent eating dinner and time spent going out, the perturbations were minor. In the case of time spent watching TV, the (negative) correlation with reading comprehension percentile was reduced quite a bit (i.e., moved toward zero), suggesting that the relationship is not loglinear. Later in this paper, time spent watching TV is given special treatment. Another factor that had to be given special treatment was time spent doing homework, for reasons that will be explained later.

There was reason to worry that the results would be confounded by variations among the subjects in compliance with the demands of the study. As already noted, compliance became quite poor at the city school near the end of the study. However, the results did not change much when the last eight weeks of data from the city school were dropped, so all of the data are included in the analyses reported in this paper. One measure of compliance is the percentage of days on which a child returns an activity form. This variable correlated only + .01

with reading comprehension percentile. Similarly, average total minutes reported per day correlated + .02 with reading comprehension percentile. Thus, the fear that low compliance or variability in compliance would queer the results seems groundless.

Missing reading proficiency data was a problem that was solved in a manner that made maximum use of available information. Missing scores on any of the three reading tests administered in the middle of the fifth grade (i.e., the tests given just before the children began the activity forms) were estimated via a regression equation from scores on the same test administered at the end of the fifth grade. In this manner, 14 missing reading comprehension scores, 16 missing vocabulary scores, and 19 missing speed scores were estimated. A simpler method of estimating missing second grade total reading percentiles was used. In nine cases, the third grade reading percentile was used; in six cases; where there was no third grade score, the fourth grade percentile was used. The $\underline{ns}$ available for analyses ranged from 143 to 152. Naturally, these methods of plugging the holes left by missing data inflate error, but they introduce less error than the standard practice of plugging holes with mean scores. And, they are less wasteful than wholesale discarding of cases, which seems wanton considering that children contributed as much as twenty-five hours of their time for this project.

Results

Table 1 contains the means, medians, and standard deviations of the time variables, and the means and standard deviations of the transformed time variables. Included are variables representing the time children reported spending in fourteen kinds of activities. These are the activities questioned on the activity form used in the village school, except for homework. Three separate homework activities were collapsed into one category, because analysis suggested that there was no additional information in the fine subdivisions. Table 2 contains the means and standard deviations of the reading proficiency measures.

Insert Tables 1 and 2 about here.

Table 3 illustrates the wide variation among children in amount of reading. The scale is percentile rank on each of several measures of amount of reading. The figures for average minutes per day of reading come directly from the activity forms. The values under Text include time reported reading newspapers and magazines as well as books. All reading includes comics in addition to books, magazines, and newspapers, but this category does not include mail because, unaccountably, there was a negative relationship between time spent on mail and reading proficiency. The words per year figures were obtained by multiplying average minutes per day by words per minute and then

extrapolating to a full year. Words per year from all reading could not be estimated, because it would not have been reasonable to assume that children cover the same number of words per minute while reading comics as they do while reading text.

Insert Table 3 about here.

The estimates of minutes per day of reading shown in Table 3 are quite reliable. For instance, an estimate of the reliability of minutes of book reading per day was obtained by correlating the time reported on odd days with the time reported on the even days during a representative 40 day period when the children were completing activity forms. Using the Spearman-Brown formula, the reliability of the measure of amount of book reading over the 57 days that the typical child in the study completed activity forms was calculated to be .86. The estimates of words read per year shown in Table 3 are unstable since the error in the constituent measures is magnified.

Table 4 presents the correlations of the transformed time variables with the measures of fifth grade reading proficiency. The effects associated with school have been partialed out, because, as already explained, the data sets for the two schools are incommensurate. The columns under the heading, Status, display correlations with the tests administered during the middle of the fifth grade just before the children began

completing the activity forms. The columns under the heading, Growth, display the correlations of the time variables with the measures of fifth grade reading proficiency after Grade 2 reading level has been partialed out. This method of representing the influence of out-of-school activities on reading growth was chosen, because, unlike residual gain scores, the influence is expressed in terms of the readily understandable metrics of the fifth grade tests.[1]

Insert Table 4 about here.

Table 5 presents regression analyses predicting fifth grade reading comprehension and growth in reading comprehension from the second to the fifth grade as a function of the transformed time variables. Variance associated with school was removed first. In the growth analysis, the variance attributable to second grade reading level was removed next. Each analysis terminated when there was no unentered variable that would account for significant (alpha = .05) additional variance. The column labeled Final F presents tests of the significance of the regression coefficients at the step at which the analysis terminated. Likewise, the column labeled Final B gives unstandardized regression coefficients from the last step in the analysis. Each coefficient expresses the change in reading comprehension percentile attributable to a one unit change in the

predictor; in the case of the time variables these are unit changes on the scale, ln (m + .5). For each variable that did not enter the analysis, presented are the F value and the sign of the regression weight which would have been observed if the variable had entered at the next step.

Tables 6 and 7 summarize comparable analyses predicting fifth grade vocabulary and fifth grade reading speed. The analysis of vocabulary is identical in conception to the analysis of comprehension. In the case of speed, six orthogonal contrasts coding classroom were entered instead of school. This was done because the speed measure was quite labile, probably because performance was influenced by the classroom climate during the administration of the test.

Insert Tables 5, 6, and 7 about here.

In the analyses predicting comprehension, vocabulary, and speed, all of the possible interactions of children's sex and second grade reading level with the time they allocated to the various out-of-school activities were explored. None was significant.

Finally, Table 8 summarizes an analysis of time spent reading books as a function of teacher, second grade reading level, sex, and the amount of time reported in other out-of-school activities. The most newsworthy finding is that the

teacher has a significant influence on the amount of book reading children do out of school. The influence is substantial; the class that read the most averaged 16.5 minutes per day while the class that read the least averaged only 4.1 minutes per day.

The fact that the teacher is a major influence on children's reading means that, because of the way this study was done, the analyses presented so far give a conservative view relationship between amount of book reading and reading proficiency. The reason is that the practices of a fifth grade teacher will have had only a limited opportunity to influence reading proficiency by the middle of the year. In fact, when the influence of the teacher is partialed out, the correlation of amount of book reading with reading comprehension rises from + .39 to + .41 and the correlation with vocabulary rises from + .32 to + .36. (The influence of the teacher has already been discounted in the analysis of reading speed shown in Table 7.)

One purpose of the analysis summarized in Table 8 was to see whether other activities compete with book reading. Although watching television had a nearly significant negative relationship, there was no strong evidence that any out-of-school activity interfered with book reading. In fact, small but significant positive associations were uncovered between amount of book reading and doing chores, doing homework, and reading comic books. Children who were good readers in the second grade did more reading in the fifth grade. Girls read more than boys.

There were no effects on book reading from interactions between activities and second grade reading level or sex.

Insert Table 8 about here.

Discussion

Reading books was the out-of-school activity that proved to have the strongest association with reading proficiency. Time spent reading books was fairly strongly associated with the measures of a child's status as a reader in the fifth grade. More interesting, and important, is the fact that time spent reading books was the best predictor of a child's growth as a reader from the second to the fifth grade. After accounting for the child's second grade reading level, each log unit increase in book reading time reported in the fifth grade led to a 4.9 percentile gain in reading comprehension, a 2.6% gain in vocabulary words known, and a 12 word per minute gain in reading speed.

The study revealed truly staggering differences among children in amount of out-of-school reading. The wide variation is evident on every measure summarized in Table 3. Notice that most children do little reading, while successive groups of children read for increasingly long periods of time and cover increasingly large numbers of words. For instance, the child who is at the 90th percentile in amount of book reading spends nearly

five times as many minutes per day reading books as the child at the 50th percentile and over two hundred times as many minutes per day reading books as the child at the 10th percentile.

The study suggested that teachers have an important influence on how much time children spend reading books. The class that did the most reading read 3.6 times as much on the average as the class that did the least reading, after discounting differences in second grade reading level and proportions of boys and girls. Among the things teachers do to promote reading are assuring access to interesting books at a suitable level of difficulty, using incentives to increase motivation for reading, reading aloud to children, and providing time for reading during the school day (for a more extended discussion, see Fielding, Wilson, & Anderson, 1986).

The relationship between fifth grade reading comprehension and amount of time spent reading books is graphed in Figure 1. The figure shows that reading comprehension rises sharply between 0 and about 10 minutes a day of book reading and then levels off. It might be supposed that the interpretation of this fact is that those who can read do, those who can't don't. However, this interpretation provides a poor account of the data; a model in which children who did any book reading at all were coded '1' (Readers) and those who did no book reading were coded '0' (Nonreaders) explained relatively little variance in reading comprehension. Significantly more variance was explained when a

straight line was fit through the full range of reading times. This means that gradations in amount of book reading (beyond no reading at all) make a difference in reading proficiency. Further, the log function pictured in Figure 1 explained significantly more variance than a straight line. This means that additional time invested in reading books yields diminishing returns in reading proficiency.

Insert Figure 1 about here.

The findings of this investigation with respect to book reading are comparable to the findings of other investigations (e.g., Long & Henderson, 1973; Greaney & Hegarty, n.d.). Notably, the findings are similar to those of two recent investigations with large samples and complete descriptions of methods and data.

The first is the study by Greaney (1980), who also reported that the distribution of book reading time is highly skewed. Fully 44% of the Irish school children he studied did not read books on any of the three days they completed diaries. At the other extreme, 6.4% of the pupils devoted at least an hour a day of their leisure time to book reading. Greaney applied a logarithmic transformation to the time variables. Presumably this normalized the distributions of times and linearized the relationships with reading achievement, but no corroborating

evidence that this was so was provided. Greaney reported a correlation of + .31 between the logarithm of book reading time and a measure of reading achievement.

The findings of the investigation described in this paper are also similar to those of Walberg and Tsai (1984), who analyzed data from a stratified, nationwide sample of 2,890 American 13-year-olds who participated in the 1979-80 National Assessment of Educational Progress. These students answered two multiple-choice questions about leisure reading, "How often do you read for enjoyment during spare time?", for which the response options were "Never, Less than once a week, Once or twice a week, and Almost every day;" and, "Amount of time spent reading for enjoyment yesterday?", for which the response options ranged from none, an hour or less, to six or more hours in one hour increments. On the latter question, 44% marked "none" whereas only 5% indicated three hours or more; thus, the distribution was very skewed. Walberg and Tsai found that the answers to both questions had logarithmic relationships to reading achievement. The correlations of the logarithm of reading time with reading achievement were + .18 and + .10 for the general and the specific question, respectively.

Most of the variability among these studies in the size of the correlation found between time spent reading hooks and reading proficiency is probably attributable to differences in reliability of measurement. The most reliable measurement of

reading time was obtained in the present study, in which children filled in activity forms for a median of 57 days. Next most reliable was the Greaney measure. Based on the intercorrelations (furnished by Greaney in a personal communication) among the book reading times reported on the three days children completed diaries, the estimated reliability of his measure is .68. As noted in the previous section, this compares with an estimated reliability of .86 for the measure of book reading time obtained in the present study. If the correlations of book reading time with reading proficiency observed in the two studies are corrected for attenuation due to unreliability of the measures of book reading time, the figures for the two studies are quite close, + .42 for the present study and + .38 for Greaney's study.

Much less reliable, presumably, were the answers to the single questionnaire items analyzed by Walberg and Tsai. While we don't know what these reliabilities actually were, it is plausible to suppose that the corrected coefficients would be in the vicinity of the ones obtained in the present study and the Greaney study. Hence, the evidence appears to converge and the following conclusion seems warranted: There is a moderately strong association between out-of-school reading and reading achievement, a relationship of about the same magnitude as the strongest relationships reported with in-school use of time (Barr & Dreeben, 1983; Rosenshine & Stevens, 1984).

These studies also provide tolerable convergence on the absolute amount of reading done each day by the typical child. The variability that does exist among the studies could reflect real differences between American fifth and seventh graders or between American and Irish children. It is tempting, though, to dismiss the variability as merely reflecting differences in the way reading was broken into categories, the manner in which questions were phrased, and the manner in which data were collected and analyzed.

Greaney (personal communication) lumped magazines together with books and put newspapers into a separate category whereas we kept books separate and lumped magazines with newspapers. Pooling books, magazines, and newspapers, the mean reading time from Greaney's study is 18.2 minutes per day and the mean from our study is 14.8 minutes per day.[2] Our figure reflects just the instances in which the children reported the author, title, or--in the case of magazines and newspapers--the topic of the selection. When all reading of books, magazines, and newspapers is counted, mean reading time per day rises to 15.5. Greaney's sample was representative of Irish school children whereas our sample was somewhat above average for American school children. Furthermore, Greaney found a mean of 8.2 minutes per day reading comic books while we found only 2.1 minutes. Therefore, it does appear that the typical Irish child in the middle grades may spend more time reading than the comparable American child.

On the general question examined by Walberg and Tsai, the median child reported reading about one day out of five, an outcome similar to ours. However, considering Walberg and Tsai's specific question, if one leans on the assumption that the distribution underlying the answers was log normal, then it would be estimated that the median child in their sample read 7.2 minutes per day. This compares with the higher median in the present study of 11.1 minutes for all out-of-school reading (see Table 3). The apparent difference between the two studies may be attributed to the fact that Walberg and Tsai's sample was less able (but more representative) than ours or that their question was restricted to reading for enjoyment, whereas ours included all reading, whether done for enjoyment or not. Perhaps most important, Walberg and Tsai's questions did not specify the types of reading material that were to be considered; it is possible that some of the respondents did not include time spent reading magazines, newspapers, and, especially, comics. On the other hand, we counted only reports of reading when the child listed the author, title, or topic.

Hence, a close reconciliation of the data from the three studies on the absolute amount of reading is not possible. Nonetheless, it can be confidently concluded that the typical child in the middle grades reads less than 30 minutes a day out of school. The amount appears to be considerably less than this in the United States, maybe as little as 8-12 minutes per day

when all types of reading material are included, and maybe as little as 4-5 minutes a day when only books are counted. The amount of reading is almost certainly much lower than many have supposed (e.g., Feeley, 1973; Heyns, 1978; Medrich, Roizen, Rubin, & Buckley, 1982; Witty, 1965).

Does reading, particularly book reading, cause growth in reading proficiency? The fact that book reading was a significant predictor of growth suggests that the answer is yes. Notice, that if anything, it could be argued that the present investigation underestimates the causal force of out-of-school reading, because time devoted to reading was assessed after the period during which the growth occurred. It stands to reason that if time devoted to reading had been assessed throughout the period of growth, its association with growth in proficiency would have been stronger.

A causal attribution that depends upon correlational analysis, as does the present one, is never completely trustworthy. One worry is that the second grade reading proficiency measure was less reliable than the fifth grade measure. If this were so, the role of amount of book reading in reading growth would have been exaggerated.

According to the usual ways of reckoning, a factor such as amount of book reading would be given credit as a causal force only to the extent that it explained unique variance in the criterion measure. In the present case, before considering other

factors, amount of book reading explains 14.4% of the variance in fifth grade reading comprehension. However, 7.8% is covariance shared with second grade reading level, a figure that might rise if the possibly lesser reliability of the second grade measure could be considered. Thus, at most, 6.6% of the variance in fifth grade reading comprehension is uniquely explainable in terms of amount of reading.

However, in this case, we are inclined to reject the usual assumptions of causal modeling founded on intercorrelations. Giving priority to second grade reading level when attempting to explain fifth grade reading level is like treating the child's mind as a ballistic missile, set into motion by the genes and early childhood experience, whose trajectory is unaffected by later experience. More reasonable is the assumption that second grade level gets translated into fifth grade level through a cascade of intervening events, including the reading a child does. In other words, engaging in the act of reading should be regarded as a proximate cause of growth in reading ability, and it ought to have a claim to the covariance shared with distal causes such as second grade level.

Experimental evidence on the value of reading books, which, of course, when it is feasible, is the best way to establish that one factor is a cause of another, comes from evaluations of so-called "book floods." Striking evidence was obtained by Elley and Mangubhai (1983) who placed libraries of English storybooks

in the classrooms of Fiji children. The children made much larger gains on achievement tests than children in comparison classrooms, an advantage that continued to appear on several measures over a period of years. These findings might be discounted, though, on the grounds that the children, who were not native speakers of English, and who were being taught by the notorious audio-lingual method, otherwise would have had almost no opportunity to hear and read interesting, natural English. A book flood with native English speaking children produced positive but less dramatic results (Ingham, 1981).

Other approaches intended to increase amount of book reading have had mixed results. The trend in the United States has been to follow McCracken's (1971) model of Sustained Silent Reading. Gambrell (1978) and Hong (1981) present two of the several good practical papers on how to implement sustained silent reading in the classroom. Most of the literature, in fact, has been practical. Moore, Jones, and Miller (1980) lament the lack of persuasive research on sustained silent reading. They conclude in their review that the practice tends to improve student and teacher attitudes; however, they also find that the evidence of any influence on student achievement is thin.

Among the studies of sustained silent reading that appear to have been well designed and executed is one by Cline and Kretke (1980), who evaluated a three-year-long junior high school program in Boulder, Colorado. The students in the school with

the reading program had significantly more positive attitudes about reading books of their own choice, going to the library, and the importance of reading. Collins (1980) reported an experiment with matched classrooms from the second through sixth grade. The students who did sustained silent reading moved faster through their basal readers. Furthermore, they showed no decline in spelling and English test scores even though they gave up as much as a half an hour per day of instruction in spelling and English for silent reading. Manning and Manning (1984), in the only study to compare different approaches for increasing children's amount of reading, carried out a year-long project with 24 fourth grade classes. They found that approaches that emphasized peer interaction and individual teacher-student conferences produced significantly better attitudes than the control condition and the traditional sustained silent reading approach. In addition, the peer interaction approach produced significant gains on a reading achievement test.

Thus, interventions to increase amount of book reading often have desirable effects, but studies of these interventions are not completely convincing. One general observation can be made about almost all of this research: Nobody measures the amount of reading, even at the group level, nor does anyone explicitly relate amount of reading to changes in reading achievement at the individual level. Hence, the really penetrating research remains to be done. Our conjecture is that well-designed evaluations of

sensible interventions to increase amount of book reading would consistently show fairly strong results.

Turning now to other out-of-school activities, time spent eating dinner had positive relationships with reading status in the fifth grade and growth in reading proficiency from the second to the fifth grade. One explanation for this fact is functional: Dinner time provides occasions for discussions with parents and others, and thereby promotes language development. Another possible explanation is that time eating dinner is a social indicator: Spending more time eating dinner may mean a greater likelihood of a two-parent family, greater family stability, or a stronger commitment to joint family activities. There are no clues in the present data that suggest a choice between these explanations.

Some sort of social-indicator explanation provides the most plausible account of the negative relationships between time spent doing chores and the measures of reading proficiency. Maybe the child from a single-parent family more often is called upon to look after younger brothers and sisters, or possibly the poor child more often has to deliver newspapers or do farm chores. This picture is blurred by the fact that time spent doing chores had a significant positive relationship with amount of book reading.

Listening to music was another negative predictor of reading proficiency. Probably it is the passive child who spends mind-

numbing amounts of time listening to music. Contrary to popular opinion, "book worms" tend to be active children. They do not, in Greaney's (1980) picturesque phrase, spend much time "lying about." Greaney found a significant negative relationship between empty hours and amount of reading.

Watching television had small negative relationships with measures of reading proficiency in the present study. Williams, Haertel, Haertel, and Walberg (1982) did a comprehensive synthesis of the research on television viewing and school achievement. They found that achievement rises slightly up to about ten hours a week of viewing, then falls sharply, and finally levels off, as the number of hours per week of viewing increases. We took their finding as a warrant to fit a third-degree polynomial to our TV viewing and reading comprehension data. This is the simplest function that could reproduce the Williams et al. finding, though it should be cautioned that only the linear component accounted for significant variance. Figure 2 shows the result. As can be seen, the results are in close agreement with the finding. The one difference is that the function fit to the data from this study did not level off as the number of hours a week of viewing became extreme, but only 10% of the children from this study watched as much as 25 hours of TV a week.

Insert Figure 2 about here.

In the analyses reported so far, doing homework has shown small, nonsignificant relationships with the measures of reading proficiency. But these analyses underestimate the value of homework, because there is wide variation among classes in the average amount of homework reported, ranging from 12.9 to 32.6 minutes per day. Presumably this variation is attributable to such factors as the amount of homework teachers assign, the perceived interest and value of the assignments, and the perceived consequences of not completing assignments. Notice, however, that homework being done in the fifth grade could have only a limited opportunity to influence performance on tests given in the middle of the fifth grade or, particularly, growth from the second to the fifth grade. Therefore, variation among fifth grade classes in amount of time being spent on homework could obscure persisting benefits from homework. In fact, when between-class variation is removed, amount of time spent on homework then has a significant influence on growth in reading comprehension from the second to the fifth grade. Homework enters the equation after book reading and listening to music, Final $F = 5.07$, Final $B = +3.48$, $p < .05$, % Var = 1.8. When the data are analyzed in this way, doing homework is being treated as a persistent behavior tendency which depends, no doubt, on the

motivation and discipline of the child, the press of the home, and the cumulative influence of previous teachers.

In sum, the principal conclusion of this study is that the amount of time a child spends reading books is related to the child's reading level in the fifth grade and growth in reading proficiency from the second to the fifth grade. The case can be made that reading books is a cause, not merely a reflection, of reading proficiency. While this case falls short of being conclusive, it is as strong as the case for any other practice in the field of reading, in or out of school.

The policy implication is clear. In the words of Becoming a Nation of Readers (Anderson, Hiebert, Scott, & Wilkinson, 1985, pp. 77-78):

> Increasing the amount of time children read ought to be a priority for both parents and teachers. Reading books . . . is probably a major source of knowledge about sentence structure, text structure, literary forms, and topics ranging from the Bible to current events. Independent reading is probably a major source of vocabulary growth . . . [and] a major source of reading fluency.

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Footnotes

[1]Note, though, that correlations of time variables with residual gain scores are larger than correlations of time variables with posttest scores after pretest scores have been partialed out, even though essentially the same relationship is being expressed. For instance, in this study the correlation of the log of book reading time with second to fifth grade residual gain in reading comprehension is + .38. The comparable partial correlation (see Table 4) is + .28.

[2]Means, rather than medians, which would have been preferred, are used in comparing Greaney's data with ours, because medians are not additive, and Greaney did not provide medians for all of the aggregates that need to be compared.

Table 1

Means, Medians, and Standard Deviations (SDs) of Minutes per day in Out-of-School Activities

	Minutes per day			Logarithm of Minutes per day +.5	
Activity	Mean	Median	SD	Mean	SD
Doing chores	15.1	10.7	14.5	2.2	1.2
Doing homework	18.9	14.5	17.3	2.6	1.0
Eating dinner	27.1	26.9	10.2	3.2	.4
Going out	98.6	93.7	58.2	4.4	.8
Listening to music	30.8	18.0	46.1	2.8	1.2
Playing games	17.1	10.3	21.7	2.2	1.2
Practicing	13.7	9.0	15.1	1.9	1.5
Reading books	10.1	4.6	16.8	1.5	1.3
Reading comics	2.1	.2	4.4	.18	1.1
Reading mail	1.4	.4	2.6	.16	.8
Reading newspapers & magazines	4.8	2.0	6.8	.97	1.2
Talking on phone	8.1	4.3	9.7	1.5	1.2
Watching television	131.1	111.0	88.4	4.6	.7
Working on hobby	10.9	3.3	19.9	1.4	1.5

Table 2

Means and Standard Deviations (SDs) on Measures of Reading Proficiency

Measure	Scale	Mean	SD
Second grade total reading	Percentile rank	70.2	24.8
Fifth grade reading comprehension	Percentile rank	62.9	25.6
Fifth grade vocabulary	Percentage known	64.4	20.9
Fifth grade reading speed	Words per minute	179.2	59.7

Table 3

Variation in Amount of Independent Reading

Percentile	Minutes of reading per day			Words read per year	
Rank	Books	Text	All reading	Books	Text
98	65.0	67.3	71.1	4,358,000	4,733,000
90	21.2	33.4	37.8	1,823,000	2,357,000
80	14.2	24.6	27.9	1,146,000	1,697,000
70	9.6	16.9	19.5	622,000	1,168,000
60	6.5	13.1	15.1	432,000	722,000
50	4.6	9.2	11.1	282,000	601,000
40	3.2	6.2	7.1	200,000	421,000
30	1.8	4.3	5.3	106,000	251,000
20	.7	2.4	2.4	21,000	134,000
10	.1	1.0	1.1	8,000	51,000
2	0	0	0	0	8,000

Table 4

Correlations of Log Minutes per Day Spent in Out-of-School Activities with Measures of Reading Proficiency

Activity	Reading Comprehension		Vocabulary		Reading Speed	
	Status	Growth	Status	Growth	Status	Growth
Second grade reading	.76	--	.67	--	.41	--
Doing chores	-.05	-.07	-.11	-.12	-.08	-.07
Doing homework	.14	.19	.02	.01	-.03	-.04
Eating dinner	.22	.14	.22	.15	.06	-.01
Going out	.31	.15	.27	.12	.12	-.01
Listening to music	-.22	-.13	-.21	-.06	-.15	-.03
Playing games	.21	.14	.24	.20	.13	.09
Practicing	.29	.14	.30	.17	.19	.07
Reading books	.39	.29	.32	.17	.33	.23
Reading comics	.10	.19	.13	.18	.13	.16
Reading mail	-.15	-.09	-.17	-.06	.08	.17
Reading newspapers and magazines	-.06	.07	.00	.14	.13	.23
Talking on phone	-.13	.01	-.10	.03	-.15	-.07
Watching television	-.12	-.17	-.05	-.06	.06	.06
Working on hobby	.06	.05	.06	.08	.12	.14

Table 5

Regression of Fifth Grade Reading Comprehension on Log Minutes per Day Spent in Out-of-School Activities

	Fifth Grade Status				Second/Fifth Growth			
Variable	Order of Entry	Percent Variance	Final F	Final B	Order of Entry	Percent Variance	Final F	Final B
School	1	.2	4.76	+ 7.6	1	.0	16.4	+11.6
Second gr. reading					2	58.4	137.32	+ .7
Doing chores			2.99	-	6	1.1	4.42	- 2.4
Doing homewk.			2.22	+			3.38	+
Eating dinner	5	4.3	10.84	+14.1	5	1.4	7.56	+ 9.2
Going out	4	6.2	5.99	+ 5.1			3.24	+
Listening to music	3	7.4	11.94	- 5.3	4	1.4	6.54	- 3.0
Playing games			2.41	+			2.59	+
Practicing	7	3.3	7.98	+ 3.3			2.03	+
Reading books	2	15.6	37.64	+ 8.1	3	3.4	20.9	+ 5.1
Reading comics			1.00	+			3.56	+
Reading mail	6	3.3	7.07	- 5.7			2.35	-
Reading news-papers & mags.			.49	-			.03	+
Talking on phone	8	1.7	4.25	- 3.0			.14	-
Watching television			2.18	-			2.27	-
Working on hobby			.47	+			.49	+
Constant	-16.3				-27.7			
Multiple R	.65				.81			
Total variance explained	42%				66%			

Table 6

Regression of Fifth Grade Vocabulary on Log Minutes per Day Spent in Out-of-School Activities

	Fifth Grade Status				Second/Fifth Growth			
Variable	Order of Entry	Percent Variance	Final F	Final B	Order of Entry	Percent Variance	Final F	Final B
School	1	4.0	2.33	-4.5	1	4.5	.02	- .4
Second gr. reading					2	43.4	119.16	+ .6
Doing chores	8	2.1	4.93	-2.9			2.26	-
Doing homewk.			.11	-			.21	+
Eating dinner	5	4.5	+13.5	13.4			3.22	+
Going out			1.99	+			1.34	+
Listening to music	4	6.4	13.5	-4.9			1.05	-
Playing games	7	2.3	5.11	+2.8			3.33	+
Practicing	3	5.2	7.7	+2.9			2.71	+
Reading books	2	10.0	17.97	+4.9			2.75	+
Reading comics			1.86	+	3	1.8	4.87	+2.7
Reading mail	6	4.5	7.69	-5.0			2.71	-
Reading newspapers & mags.			1.02	+			.81	+
Talking on phone			1.72	-			.10	+
Watching television			1.66	-			.45	-
Working on hobby			1.17	+			.11	+
Constant	30.1				25.1			
Multiple R	.63				.71			
Total variance explained	39.1%				49.7%			

Table 7

Regression of Fifth Grade Reading Speed on Log Minutes per Day Spent in Out-of-School Activities

	Fifth Grade Status				Second/Fifth Growth			
Variable	Order of Entry	Percent Variance	Final F	Final B	Order of Entry	Percent Variance	Final F	Final B
Teacher	1	19.5			1	19.7		
Second gr. reading					2	13.5	19.57	+ .8
Doing chores			2.92	-	5	2.0	4.37	-8.1
Doing homewk.			.86	-			1.55	-
Eating dinner			1.58	+			.92	-
Going out			1.31	+			.56	-
Listening to music			.71	-			.73	-
Playing games			1.87	+			.29	+
Practicing			3.25	+			.74	+
Reading books	2	8.8	20.68	+15.8	4	2.3	6.92	+9.9
Reading comics			.67	+			.41	+
Reading mail			1.24	+			.66	+
Reading newspapers & mags.			3.21	+	3	3.6	7.25	+10.5
Talking on phone	3	3.2	6.47	-9.1			3.25	-
Watching television			1.66	+			1.11	+
Working on hobby			1.18	+			.44	+
Constant	166.1				114.8			
Multiple R	.56				.64			
Total variance explained	31.6%				41.1%			

Table 8

Regression of Log Minutes Per Day Spent Reading Books on Log Minutes Per Day Spent in Other Out-of-School Activities

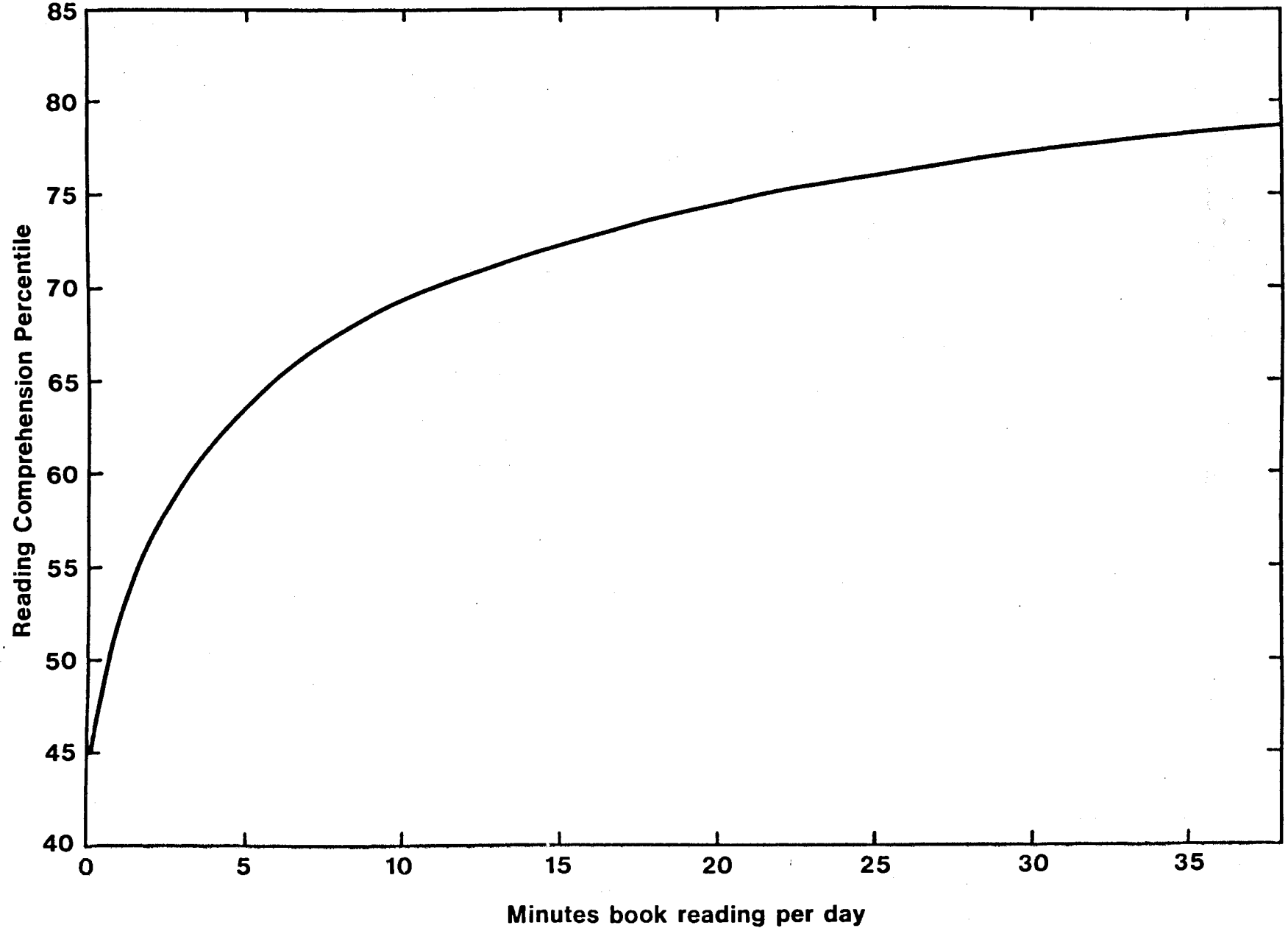
Variable	Order of Entry	Percent Variance	Final F	Final B
Teacher	1	11.1	6.81	
Second grade reading	2	8.9	16.65	+.02
Sex	3	3.5	4.46	-.41
Doing chores	4	5.7	7.89	+.23
Doing homework	5	3.7	8.51	+.29
Eating dinner			1.64	-
Going out			.15	-
Listening to music			.16	+
Playing games			.77	+
Practicing			.63	+
Reading comics	6	3.4	7.02	+.24
Reading mail			.45	+
Reading newspapers and magazines			.50	+
Talking on phone			1.82	+
Watching television			3.20	-
Working on hobby			.70	+

Constant	-.12
Multiple R	.60
Total variance explained	36%

Figure Captions

Figure 1. Reading comprehension percentile as a function of minutes per day reading books.

Figure 2. Reading comprehension percentile as a function of hours per week watching television.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Reading Comprehension Percentile
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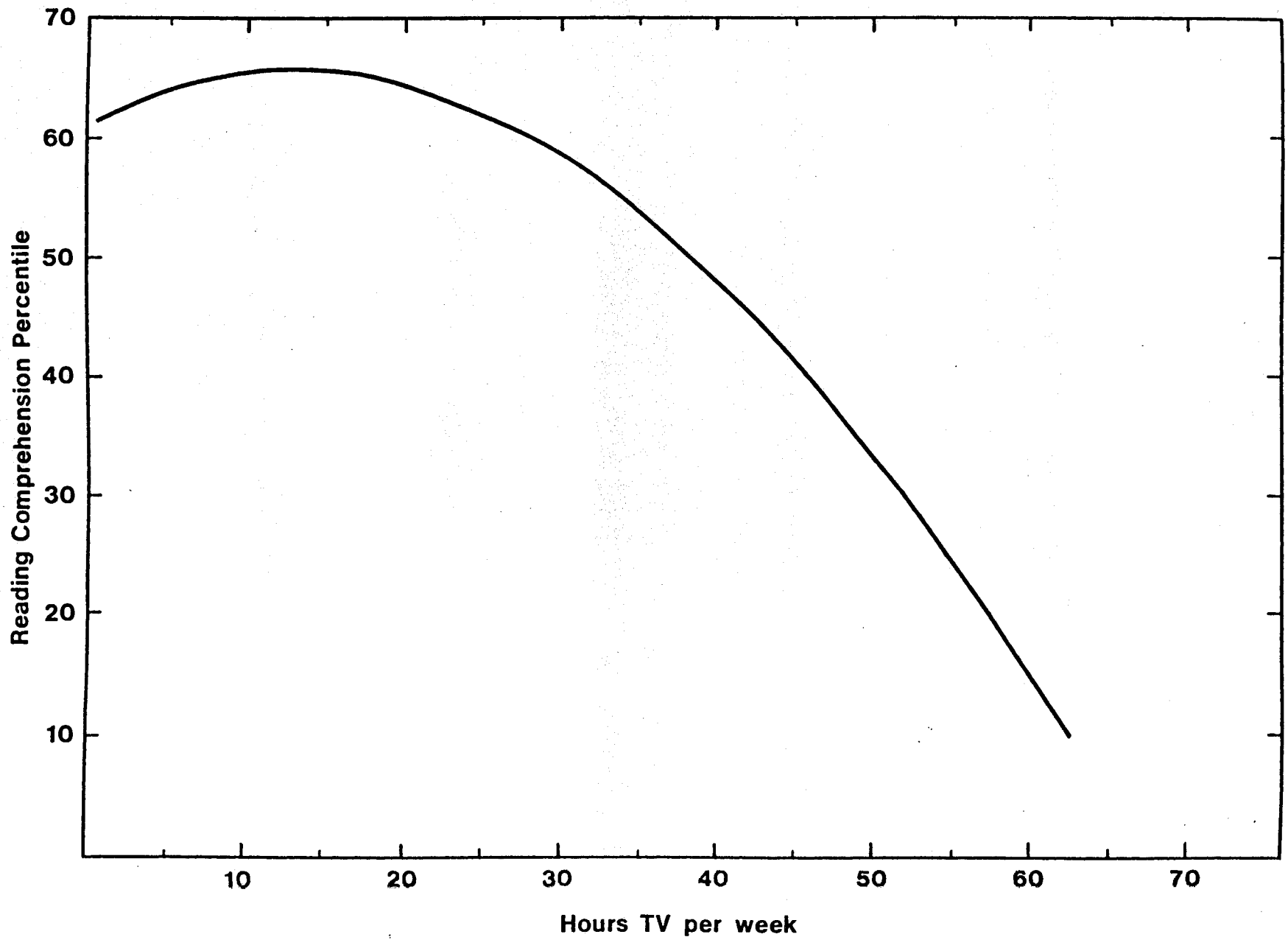
Minutes book reading per day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Reading Comprehension Percentile
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Hours TV per week