Home Schooling: The Ameliorator of Negative Influences on Learning?

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Brian D. Ray

The modern home school movement appears to be making a noticeable mark on society in general and on education in particular (Clark, 1994; Kantrowitz & Wingert, 1998; Lines, 1994; Toch, 1991a). *Home schooling* is the practice in which the education of children is clearly parent-controlled or parent-directed (and sometimes student-directed) during the conventional-school hours during the conventional-school days of the week. Although it did not begin a resurgence in the United States until the 1970s, parent-led and home- and family-based education have been practiced by many cultures throughout history, and it never disappeared in some of them. Gordon and Gordon (1990) made it clear that education centered in and around the home and family has played a key role throughout the history of Western civilization. An examination of education in America indicates that home education, in one form or another, was prevalent until the late 19th century. "In general, then, seventeenth and eighteenth century parents—particularly the father—bore the primary responsibility for teaching their children. ... Christian doctrine, vocational skills, and how to read and, to a lesser extent, write and figure" (Carper, 1992, p. 254). During the 19th century, "the school was a voluntary and incidental institution: attendance varied enormously from day to day and season to season" (Tyack, 1974, p.

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16). Furthermore, the parents and community controlled the school during that period of history. Schooling or book learning was only a small and often incidental part of the total education of a child because he "acquired his values and skills from his family and from neighbors of all ages and conditions" (Tyack, 1974, pp. 14–15). The growth in popularity of compulsory school attendance at the end of the 19th and the early 20th centuries, along with the idea that trained professionals could best teach children, decidedly moved the education of children into the hands of school personnel as the 20th century began. The Gordons' brief couple of pages dedicated to home schooling at the end of the 20th century puts into perspective that today's home education has a rich heritage and is one more significant expression of the importance of the historical concept and practice of home- and family-based learning. A fast-growing number of parents in the United States and in other countries (Farris, 1998; Klicka, 1997; Meighan, 1984, 1997; Ray, 1994; D. S. Smith, 1993) are renewing this practice, and their activities are attracting researchers of various interests.

Kirschner (1991) surveyed the shifting roles of family and school as educator to make sense of the surge in home education:

> We find many Americans turning to "family values" and scriptural religion in a search for stability and something to believe in. ... In the home-school movement one finds a hint of optimism in this age of cynicism not seen in quite a while. (p. 156)

Even the secular media by the mid-1990s was addressing the breakdown of the traditional nuclear family that had occurred during the preceding 3 decades (Leo, 1992, p. 24).

Mayberry (1988, pp. 12, 13), a sociologist, also perceived home education as a way for parents to regain control of their children's and their own lives, a way to make the impact they want on the next generation (see also Caldwell, 1999). This choice is being made by a wide variety of people. For example, despite the unfounded claim of some critics (e.g., a representative of the National Education Association) that many parents choose home schooling due to their racism (Caldwell, 1999), it appears that an increasing proportion of African Americans, Hispanics, and other minorities are choosing home education (Home School Legal Defense Association [HSLDA], 1996; Romm, 1993). Romm, for example, found that a variety of families in Atlanta, Georgia, including African American Muslims, African American Christians, American Indian Christians, European American secular humanists, European American Christians, and others were practicing home education to transmit particular cultural and ethnic values to their offspring. Research suggests that currently more than 90% of

home schoolers are non-Hispanic White in terms of racial or ethnic background (Ray, 1990b, 1997b), but it appears that a rapidly increasing number of minorities are engaging in home-based education (HSLDA, 1996; Romm, 1993; Safley, 1998).

This educational life that closely integrates parents and children, however, is contrary to the modern trend toward the institutionalization and professionalization of education. In 1980, close to 100% of children and youth aged 6 to 18 were in institutional schools; about 88% of those were in state-operated (public) schools (U.S. Department of Education [USDE], 1998b). Over the course of just 2 decades, the United States has changed to the point where 1.3 million to 1.7 million school-aged children and youth are home schooled (Lines, 1998; Ray, 1998b, 1999). In the fall of 1996, it was estimated that there were more home school students than public school students in nine states combined (Ray, 1999; USDE, 1998a). If these estimates are correct, the home school population is now about 24% of the size of the private school student population (USDE, 1998b). This represents a very notable change in the educational choices of parents and students. If this trend were to continue at a modest 7% annual growth rate (Lines, 1998; Ray, 1998b), about 3 million students would be home educated during the fall of 2010. It now appears that what some observers thought would be a passing fad—home schooling—has become a visible movement animated by a robust mix of parents and children and capable local and national leaders (Caldwell, 1999; Clark, 1994; Hadeed, 1991; Kantrowitz & Wingert, 1998; Lines, 1994; Toch, 1991a).

Purpose of the Study

Twenty years ago, the public and researchers began asking many questions about home schooling related to topics such as the social and psychological development of the home educated, whether home school families are sufficiently participating in important social and political aspects of American life, the proper role of the government and law in the education of children, and the history of parent-directed and family-based education. The public and researchers also asked, Does it work? Is it possible for parents, who are not professionally trained teachers, to teach and guide their children's education successfully? More specifically, how will these students perform in terms of academic achievement?

The purpose of this study was twofold and could be addressed by the following questions:

1. How were the home educated, across the nation, performing in terms of academic achievement in the mid-1990s compared to their performance nationwide and in state-specific studies in the past?

2. Perhaps more important, are selected background variables more or less helpful with respect to explaining the academic achievement of the home educated compared to that of the conventionally schooled?

Review of Related Literature

Dozens of studies have been completed regarding the academic achievement of home-educated students. In general, children who are taught by their parents score above national averages on standardized achievement tests. Following are summaries of several characteristic studies.

Wartes (1987, 1988, 1989, 1990b, 1991), a public high school counselor, studied the Stanford Achievement Test scores of thousands of home-educated students, from kindergarten to Grade 12, in Washington State for several years. He found that these students consistently scored above the national average in all academic areas, with the median score at about the 67th percentile on national norms.

Students in Alaska's Centralized Correspondence Study, a state-managed form of home education, consistently have scored higher than conventional school students nationwide on the California Achievement Test in math, reading, language, and science (Alaska Department of Education, 1984, 1985, 1986; Falle, 1986). These students also scored higher on achievement tests than did their conventional school Alaskan peers (Alaska Department of Education, 1985, 1986; Falle, 1986).

State departments of education often report that the home-educated students (for whom they have scores) in their states are scoring well above average on standardized achievement tests. The Oregon Department of Education (1990, 1998) found their median percentile range to be the 71st to 80th, and the Tennessee Department of Education (1988) reported they were generally in the 70th to 80th percentile range.

Ray's (1990b) nationwide study, the largest of its kind at that time, involved approximately 1,500 families and 4,600 children in them. The home-educated students averaged at or above the 80th percentile on standardized achievement tests in all subject areas.

The HSLDA (1994–1995) provided a summary of the Iowa Test of Basic Skills (ITBS) scores (in several subject areas) of 16,311 home-educated students in kindergarten through Grade 12; the scores were obtained from a national testing service. The basic battery scores, by grade level, ranged from a low of the 62nd percentile to a high of the 87th percentile, with a majority of the percentile scores in the 70s.

A number of other studies have resulted in similar findings: Home-educated students in Canada averaged at the 79th percentile on the

basic battery (Ray, 1994); Indiana students averaged at the 86th percentile on the basic battery (Ray, 1997a); Massachusetts students were at the 85th percentile on the basic battery (Ray, 1998a); Montana students were at the 72nd and 70th percentile on the basic battery in two separate studies (Ray, 1990a, 1995); North Dakota students taught at home had averages at about the 85th percentile (Ray, 1991); those taught by their parents in Oklahoma scored, on average, at the 88th percentile in the combination of their reading, language, and mathematics performance (Ray, 1992); the home educated in Pennsylvania scored from the 60th to 74th percentiles (Richman, Girten, & Snyder, 1990; see also Butler, 1994; Frost, 1987; Havens, 1991).

Not all studies, however, show home-educated students scoring above average. A study in California by Delahooke (1986) compared the intelligence and academic achievement of home school and private school 9-year-olds. She found no significant differences between the two groups in terms of intelligence and achievement test scores, and both were average on national norms. Rakestraw (1987, 1988) found first- and fourth-grade home education students to be scoring below the national average in mathematics, and the home educated in Grades 2, 3, 5, and 6 were above average; average reading scores for the first- through sixth-grade students were at the 54th through 97th percentile. The Washington State Superintendent of Public Instruction (1985) also found scores that were not particularly high, with the home educated scoring at the 62nd percentile in reading, 53rd percentile in mathematics, and the 56th percentile in language. The New Mexico State Department of Education once reported that their records showed that the academic achievement of the home educated was generally above average, but not as high as reported in most research studies (Pat Rael, personal communication, February 17, 1998).

Overall, the research base to date (see also Ray, 1988, 1993, 1999) indicates that home school students perform at least as well as public school students in the subject areas considered to be the "basics" of American education.

Relations Between Academic Achievement and Other Variables

Several researchers have explored whether the academic achievement of the home educated is related to selected variables that might be of particular interest to policymakers, educators, and others. One of these factors is whether the home school parents are government-certified teachers. Studies in Alabama, Oklahoma, Pennsylvania, Texas, nationwide in the United States, and nationwide in Canada all revealed that there was no significant relation between student achievement and the teacher certification

status of their parents (Havens, 1991; Rakestraw, 1988; Ray, 1990b, 1992, 1994). Duvall, Ward, Delquadri, and Greenwood (1997) and Duvall (Steven F. Duvall, personal communication, January 23, 1999) found that special-needs children were successfully home educated by parents who were not certified teachers. One study in Montana found that whether the father was a certified teacher was not significant, whereas the mother's certification status was significant (Ray, 1995). Medlin (1994), on the other hand, found a weak relation between achievement and whether the mother was a certified teacher.

The formal educational attainment of parents and its relation to student achievement is another factor that is of interest to policymakers and some researchers. In three studies, Havens (1991), Rakestraw (1988), and Ray (1992) found no relation between parents' educational attainment and the academic achievement scores of their home-educated children in Texas, Alabama, and Oklahoma, respectively. On the other hand, Ray (1990b, 1991) found statistically significant relations, which were relatively weak in practical terms, between parents' educational attainment and their children's achievement scores in his earlier nationwide and North Dakota studies. Likewise, Wartes (1990a) found weak to moderate relations in his Washington research. Even with these correlations, the home educated of lower education level parents still tended to score above average on achievement tests.

The relation between family income and student achievement has been of interest to policymakers and researchers. As Wartes (1990a) wrote, "Within the general school population ... the children of parents who earn more money tend to do better than those where the parents earn less" (p. 50; see also Coleman et al., 1966; Coleman & Hoffer, 1987, chap. 5; "Outstanding High Schools," 1999; Snow, Barnes, Chandler, Goodman, & Hemphill, 1991; Toch, 1991b). There was no significant relation between family income and student achievement in home school studies done in North Dakota (Ray, 1991), in most comparisons in an Oklahoma study (Ray, 1992), and in Washington (Russell, 1994). On the other hand, Wartes (1990a) and Ray (1990b) found mixed results with some weak relations between income and test scores in Washington and in a nationwide study. Even with these correlations, the home educated of lower income families scored above average.

Many policymakers are interested in whether home schoolers should be regulated more heavily by the state. Research to date has shown little to no relation between the degree of regulation by the state and the students' academic achievement (Ray, 1990b).

Economists, sociologists, and policymakers also wonder whether the money spent on home education is related to student achievement. Research findings have suggested there is no relation (Ray, 1990b, 1998a).

Various researchers have studied many factors and their relation to the academic achievement of the home educated. Table 1 provides a summary of these relations before this study was conducted.

Based on some generally recognized correlates of academic achievement performance in conventional schools, past research on home education, and the goals of this exploratory study, several independent variables were selected for analysis and are listed subsequently in the methodology section.

Methodology

The larger study (Ray, 1997b) on which this study was based included cross-sectional descriptive, multivariate, and longitudinal design elements; detailed methodology was provided by Ray.

The Instrument

The data collection instrument used in this study was based on the surveys used by Ray (1990b, 1994). It also contained selected items from the

Table 1
Relation Between Various Independent Variables and Academic Achievement Test Scores of Home School Students

Variable of Interest	*Relation to Academic Achievement in Home Schooling*
Money spent on education	No relation
Family income	No relation most studies; a few studies found weak positive
Degree of state regulation	No relation
Legal status of family	Typically no relation; one study found underground performed better
Father's formal education level	Mixed results
Mother's formal education level	Mixed results
Father been certified teacher	Typically no relation; few studies found weak positive
Mother been certified teacher	Typically no relation; few studies found weak positive
Gender of student	No relation
Years student home educated	Typically no relation; few studies slight positive
Time spent in formal instruction	No relation
Age began formal instruction	No relation
Use of libraries	Typically no relation; occasional slight positive
Use of computer	Typically no relation; occasional slight positive
Who administered test to student	Typically no relation; occasional slight

Note. This is a summary of the findings of many studies preceding the study reported here.

National Assessment of Educational Progress (USDE, 1992) and the National Education Longitudinal Survey (USDE, 1996). Guidelines for survey research delineated by Borg and Gall (1989) were followed; the instrument was reviewed and revised by experts on home education (e.g., home school leaders and researchers), and consensus was reached on the validity of the items and their wording. The instrument addressed variables regarding descriptive information about parents and family, the home education legal status of the family, information on the students (e.g., demographics, achievement scores), and volunteering to participate in a longitudinal study. The instrument resulted in 190 variables being available for analysis, 99 per family and 91 per child. The entire instrument is reproduced in Ray's (1997b) book.

Definitions

For this study, *academic achievement* was defined as the demonstration of learning (including knowledge, understanding, and thinking skills) attained by a student as measured by standardized academic achievement tests. *Degree of structure* in the practice of home education varies greatly; it ranges from a very unstructured (e.g., unschooling) learning approach, centered on the child's interests, to the use of a planned, structured, and highly prescribed curriculum. Given the preceding explanation, parents rated their own practice on a 7-point scale, ranging from 1 (*very unstructured*) to 7 (*very structured*). *Formal instruction* was defined as planned or intentional instruction in areas such as reading, writing, spelling, or arithmetic; it is done to meet a learning objective. *Structured learning* was defined as time during which the child is engaged in learning activities planned by the parent; it is a time during which the child is not free to do whatever he or she chooses.

Population and Sample

The target population was all families in the United States who were educating their school-age children at home. Linear systematic sampling was used to select families from the lists of various national and statewide organizations. Home education support organizations—and contacts via word-of-mouth and personal networks—assisted in contacting home education families throughout the country. This combination of using support organizations, publications, and word-of-mouth was the best way to contact the widest variety of home educators in a practical and efficient man-

ner. This method of using support organizations for making contact with a variety of home education families has been used successfully in prior research (e.g., Knowles, Mayberry, & Ray, 1991; Ray, 1990b, 1991, 1992, 1994; Richman et al., 1990). Neither this method, nor any other reasonable method, would either (a) necessarily result in a representative sample of home education families or (b) necessarily introduce sampling bias.

Distribution and Collection of the Instrument, and Response Rate

First-class mail was used to distribute a total of 5,995 copies of the instrument to individual home education families and home education support groups in all states from late January to late February 1996. All usable instruments returned were included in this study. The total number of completed and usable instruments included in the study was 1,657 (i.e., 1,657 families, including information on 5,200 children), which is equivalent to a response rate of 28.8% or more. The minimum response rate of 28.8% compares favorably with that of 24.7% reported by Knowles et al. (1991), who dealt with a wide variety of home education organizations and a variety of means of obtaining names and addresses of home educators, and with the 31.3% response rate reported by Ray (1994). The response rate for this study is typical of what can be expected in this type of social science research (Fowler, 1988).

Data Analysis and Statistical Hypotheses

Students' test score percentiles were converted to *z* scores (Hopkins, Glass, & Hopkins, 1987, Appendix Table A) for statistical analyses. *Z* scores were used because they provided the most reasonable way to aggregate scores from many students using a variety of tests and to analyze how those scores compared to standardized test norms and to each other. It was not assumed in this study that scores on different tests meant, necessarily, the same thing about the students who took them (Gronlund & Linn, 1990), nor was it assumed that students in this study were perfectly analogous to those students represented by norms for the standardized tests that these students took. It was assumed, however, that the use of aggregated scores from a variety of standardized achievement tests is an acceptable practice, provides valuable information (Frisbie, 1992; Hunter & Schmidt, 1990, pp. 516–518), and would provide the best data for this study.

Multiple regression analysis (stepwise) was used to determine whether any of several independent variables explained significant amounts of variance in students' total reading, total language, total mathematics, and complete battery on standardized achievement tests. The researcher decided that only these four dependent variables would be used, for two reasons. First, past research that has explored many independent variables and test scores has shown that few independent variables explain statistically significant and practically significant amounts of variance in home-educated students' test scores (Rakestraw, 1988; Ray, 1990b, 1992, 1994; Russell, 1994; Wartes, 1990a). Second, reducing the number of dependent variables reduces the number of statistical tests to be performed, which, in turn, reduces multiple error rate (R. Good, 1984).

Furthermore, the researcher originally planned to include the student's age and the degree of structure in the home education environment as independent variables. Analyses of collinearity between independent variables, however, gave evidence that these two variables should be excluded from analyses to increase the likelihood of valid and meaningful multiple regression results.

The statistical hypothesis tested in all cases was the null hypothesis. Alpha was set at 0.01 for statistical tests in this study for several reasons. First, this level of alpha (rather than a larger one) helps to take into account multiple error rate (R. Good, 1984). Second, this approach was consistent with prior research (Ray, 1990b, 1994). Finally, this level of alpha helps reduce the probability of Type I error in this situation in which the rejection of a true null hypothesis might involve potential harm to people like those involved in the study (Shavelson, 1988, p. 286)—for example, suggesting government policy that could jeopardize family integrity and children's learning. The study was designed to provide basic descriptive statistics and to test the following hypothesis: There is no significant relation between the dependent variable of student academic achievement and the following independent variables: (a) highest formal education level attained by the father, (b) highest formal education level attained by the mother, (c) teacher certification status of the father (i.e., whether the father had ever been a certified teacher), (d) teacher certification status of the mother (i.e., whether the mother had ever been a certified teacher), (e) family income, (f) amount of money spent on the home education of the student, (g) legal status of the family (i.e., underground, notified district but not attempting to fully comply with statute, satisfied statutory requirements, in a current legal dispute, and other), (h) gender of the student, (i) the number of years the student was home educated, (j) the extent to which the family visits public libraries, (k) the time spent in formal educational activities, (l) the age at which formal education of the student commenced,

(m) the degree of regulation of home education by the state (i.e., low, moderate, and high, which are defined in the Findings section), (n) who administered the achievement test (which is explained in the Findings section), and (o) the use of a computer in the education of the student. Independent variables (a) through (l) were addressed using multiple regression; (m) through (o) were addressed via tests of comparison.

Assumptions

The researcher assumed that parents and their children (their students) were honest and accurate in completing the surveys. It was assumed that parents and their students were the ones who would have the most accurate information, for the purposes of this study, about the functioning of home education for their family. The researcher also assumed that only one survey per family was completed. Finally, it was assumed that the standardized academic achievement tests, from which scores were reported in this study, were reasonably reliable and valid (e.g., Borg & Gall, 1989; Hopkins, Stanley, & Hopkins, 1990; Mitchell, 1983, 1985) and that they were properly administered and scored.

Delimitations and Limitations

The first delimitation is that this study does not examine the extent to which several objectives of home education parents (e.g., productive adulthood, adherence to a particular belief and value system) are met (Cizek, 1991, 1993; Ray, 1988). Second, this is not a causal-comparative study (Borg & Gall, 1989); background variables in this ex post facto study are not controlled in such a way as to make possible conclusions about the causes of academic achievement test scores being higher or lower than those of students in conventional schools. The first limitation is that the sample in this study is composed of volunteers, and, therefore, characteristics of volunteers must be considered when interpreting the findings (Borg & Gall, 1989, p. 228). Second, it is practically impossible to include a random sample of all home education families in the United States, and, therefore, one should keep in mind the limitations of representativeness and generalizability. Third, this study is descriptive and exploratory in nature. It is one of the relatively few nationwide studies that have been completed on home education.

Findings

For 1,952 students in this study, the most frequently used (by 37.3%) academic achievement test was the ITBS; 29.8% took the Stanford Achieve-

ment Test; 15.6% used the California Achievement Test; 6.7% used the Comprehensive Test of Basic Skills; 2.7% used the Metropolitan Achievement Test; 0.2% used the Tests of Achievement and Proficiency; 7.9% used one of a variety of other tests (and the total exceeds 100% due to rounding error). The average age of students taking achievement tests was 11.00 (SD = 2.89, n = 1,864), and the average grade level of the tests was 5.43 (SD = 2.89, n = 1,824). The person who administered the test was a public school teacher in 10.3% of the cases, a private school teacher in 12.3% of the cases, the parent in 43.9% of the cases, and some other administrator (such as a home education support group member or a qualified test administrator) in 33.5% of the cases. Copies of test results from the test publisher or test administrator were submitted for 77% of the students.

The students scored, on the average, at the following percentiles on standardized achievement tests: (a) total reading, 87th; (b) total language, 80th; (c) total math, 82nd; (d) total listening, 85th; (e) science, 84th; (f) social studies, 85th; (g) study skills, 81st; (h) basic battery (typically reading, language, and mathematics), 85th; and (i) complete battery (all subject areas in which student was tested), 87th. Table 2 presents summary statistics on academic achievement. Not all students were tested in all subject areas; therefore, sample sizes varied.

The reading, language, and math test score data were examined to determine whether low scores were ever reported by the parents. In reading, scores at or below the 16th percentile (–1.0 SD) were reported for 26 students. In language, scores at or below the 16th percentile were reported for 39 students. In math, scores at or below the 16th percentile were reported

Table 2
Summary of Home Educated Students' Standardized Achievement Test Scores

Variable	*National Percentile*[a]	*M z*	*SD z*	*N*
Reading, total	87	1.15	.84	1,594
Listening, total	85	1.05	.85	580
Language, total	80	.85	.90	1,486
Math, total	82	.90	.87	1,613
Science	84	1.00	.82	1,133
Social studies	85	1.03	.82	1,099
Study skills	81	.87	.81	916
Basic battery	85	1.05	.81	1,338
Complete battery	87	1.11	.80	1,092

Note. A given percentile may have slightly different z scores associated with it due to lack of precision in conversion.

[a]All means for the home educated were significantly higher ($p < .001$) than the 50th percentile national average (Ray, 1997b).

for 35 students. The lowest score possible on achievement tests was reported for both language and math.

Variables that explain achievement scores—multivariate analyses. Seven of the 12 independent variables did not explain statistically significant amounts of variance in students' test scores. These 7 were (a) father's certification status, (b) mother's certification status, (c) family income, (d) money spent on home education, (e) legal status of family, (f) time spent in formal educational activities, and (g) age at which formal education began.

Five of the 12 independent variables explained statistically significant amounts of variance in students' test scores for any of the subject areas explored. The 5 significant variables were (a) father's education level, (b) mother's education level, (c) years taught at home, (d) gender of the student, and (e) number of visits to the public library. The maximum amount of variance in the test scores that any one of these independent variables explained was 5.0% (and this was by father's education level for the complete battery scores).

Father's education level, years the student was taught at home, and number of visits to the public library explained statistically significant amounts of variance in total reading scores (see Table 3). The strongest predictor of the reading score was the father's education level. The reading *z* score would be .048 higher per additional year of the father's formal education. This would be .02 to 1.9 percentiles of reading score per year of father's education (in this study). Father's educational level explained 2.5% of the variance in reading scores. The number of years home educated and number of visits to the public library per month were positively related to reading scores.

Father's education level, gender of the student, mother's education level, and number of years home educated explained statistically significant amounts of variance in the total language scores (see Table 4). Father's education was the strongest predictor. The student's language *z* score would be .054 (or .01–2.2 percentiles) higher per additional year of father's formal education. The number of years home educated and mother's education level were positively related to language scores. Girls scored somewhat higher in language than did boys.

Mother's education level, father's education level, and gender of student explained statistically significant amounts of variance in the total math scores (see Table 5). Mother's education was the strongest predictor. The student's language *z* score would be .056 (or .02–2.2 percentiles) higher per additional year of mother's formal education. The father's education level was positively related to math scores. In addition, boys scored somewhat higher in math than did girls.

Table 3
Coefficients of Determination, Analysis of Variance, and Other Statistics Regarding the Multiple Regression for Total Reading Test Scores With Three Significant Independent Variables

Independent Variable	R^2 *Adjusted*	R^2 *Change*
FATHED	.02472	
HOMEYRS	.03385	.009
LIBRPUB	.03825	.004

Analysis of Variance

	df	*SS*	*MS*
Regression	3	38.01040	12.67013
Residual	1,331	902.59261	.67813

Variables in the Equation

Variable	*B*	*SE B*	β	*T*	*Significant T*
FATHED	.047810	.007834	.163971	6.103	.0000
HOMEYRS	.033061	.008748	.101579	3.779	.0002
LIBRPUB	.026689	.010019	.071580	2.664	.0078
Constant	.140582	.138328		1.016	.3097

Note. FATHED = father's education level; HOMEYRS = years home educated; LIBRPUB = visits to public library. $F(3, 1331) = 18.68390$, $p < .01$.

Father's education level and mother's education level explained statistically significant amounts of variance in the complete battery scores (see Table 6). Father's education was the strongest predictor. The student's language z score would be .050 (or .01–2.0 percentiles) higher per additional year of father's formal education. The mother's education level was positively related to complete battery scores.

Correlation coefficients between the test scores and the interval-data independent variables mentioned in the preceding section on multiple regression are relatively small in magnitude. Ray (1997b, p. 123) provided these correlations and accompanying statistics in detail.

Degree of regulation of home education in the state and test scores. An analysis of variance was conducted to test whether the degree of regulation of home education by a state has an effect on students' basic battery test scores. States were categorized as having either low regulation, moderate regulation, or high regulation (see Table 7). *Low regulation* was defined as

no state requirement on the part of the home school parents to initiate any contact with the state. *Moderate regulation* was defined as the state requiring home school parents to send to the state notification or achievement test scores and/or evaluation of the student's learning by a professional. *High regulation* was defined as the state requiring home school parents to send to the state notification or achievement test scores and/or evaluation by a professional and, in addition, having other requirements (e.g., curriculum approval by the state, teacher qualifications of parents, or home visits by state officials). There was no significant difference between students' scores in the three groups.

Test administrator and test scores. There was a significant difference between basic battery scores of students based on who administered the test (i.e., public school teacher, private school teacher, parent, and other), $F(3,$

Table 4
Coefficients of Determination, Analysis of Variance, and Other Statistics Regarding the Multiple Regression for Total Language Test Scores With Four Significant Independent Variables

Independent Variable	R^2 *Adjusted*	R^2 *Change*			
FATHED	.04149				
SEX	.06103	.020			
MOTHED	.06568	.005			
HOMEYRS	.07014	.004			
		Analysis of Variance			
	df	*SS*	*MS*		
Regression	4	72.55888	18.13972		
Residual	1,234	919.40706	.74506		
		Variables in the Equation			
Variable	*B*	*SE B*	β	*T*	*Significant T*
FATHED	.054312	.009601	.174736	5.657	.0000
MOTHED	.036936	.013567	.084083	2.722	.0066
SEX	−.253990	.049130	−.141909	−5.170	.0000
HOMEYRS	.025061	.009519	.072232	2.633	.0086
Constant	−.547542	.196476		−2.787	.0054

Note. FATHED = father's education level; SEX = sex of student; MOTHED = mother's education level; HOMEYRS = years home educated. $F(4, 1234) = 24.34658$, $p < .01$.

Table 5
Coefficients of Determination, Analysis of Variance, and Other Statistics Regarding the Multiple Regression for Total Math Test Scores With Three Significant Independent Variables

Independent Variable	R^2 *Adjusted*	R^2 *Change*
MOTHED	.03577	
FATHED	.04749	.012
SEX	.05487	.007

Analysis of Variance

	df	*SS*	*MS*
Regression	3	58.81049	19.60350
Residual	1,347	973.51453	.72273

Variables in the Equation

Variable	*B*	*SE B*	β	*T*	*Significant T*
FATHED	.037344	.009053	.122984	4.125	.0000
MOTHED	.056156	.012794	.130859	4.389	.0000
SEX	.157257	.046314	.089939	3.395	.0007
Constant	−.585768	.177116		−3.307	.0010

Note. MOTHED = mother's education level; FATHED = father's education level; SEX = sex of student. $F(3, 1347) = 27.12431$, $p < .01$.

Table 6
Coefficients of Determination, Analysis of Variance, and Other Statistics Regarding the Multiple Regression for Complete Battery Test Scores With Two Significant Independent Variables

Independent Variable	R^2 *Adjusted*	R^2 *Change*
FATHED	.04997	
MOTHED	.05621	.006

Analysis of Variance

	df	*SS*	*MS*
Regression	2	33.70664	16.85332
Residual	908	544.61842	.59980

Variables in the Equation

Variable	*B*	*SE B*	β	*T*	*Significant T*
FATHED	.050286	.010042	.181658	5.007	.0000
MOTHED	.037568	.014193	.096028	2.647	.0083
Constant	−.232221	.195413		−1.188	.2350

Note. FATHED = father's education level; MOTHED = mother's education level. $F(2, 908) = 28.09823$, $p < .01$.

Table 7
Basic Battery Test Scores Compared According to Degree of Regulation of Home Education by the State

Analysis of Variance					
Source	*df*	*Sum of Squares*	*M Squares*	*F Ratio*	*F Probability*
Between groups	2	.1179	.0589	.0898	.9141
Within groups	1,236	811.3733	.6565		
Total	1,238	811.4911			

Group	*Count*	*M*	*SD*	*SE*	*95% Confidence Interval*
1	187	1.0721	.8437	.0617	.9504 to 1.1938
2	758	1.0515	.7921	.0288	.9950 to 1.1079
3	294	1.0711	.8343	.0487	.9753 to 1.1668
Total	1,239	1.0592	.8096	.0230	1.0141 to 1.1043

Note. Group 1 (low regulation) = states of ID, IL, IN, MI, MO, NJ, OK, and TX. Group 2 (moderate regulation) = states of AK, AL, AZ, CA, CO, CT, DC, DE, FL, GA, HI, IA, KS, KY, LA, MD, MS, MT, NC, NE, NH, NM, OH, OR, SC, SD, TN, VA, WI, and WY. Group 3 (high regulation) = states of AR, MA, ME, MN, ND, NV, NY, PA, RI, UT, VT, WA, and WV.

1258) = 7.9542, $p = .000$. All four groups had scores that were above average. The least significant difference multiple range test (with a set at .05) revealed that there was no significant difference in basic battery scores when students were tested by public school teachers (M = 85th percentile) compared to when they were administered tests by their parents (M = 88th percentile); scores of students who were tested by their parents, however, were significantly higher than scores of those tested by private school teachers (M = 81st percentile) and by others (M = 84th percentile).

Use of computer for education of the child and test scores. A comparison was made between achievement scores of children who used a computer for their education and those who did not. The t tests revealed no significant differences in language, $t(1448) = 2.27$, $p = .02$; math, $t(1571) = 1.32$, $p = .19$; science, $t(1112) = .06$, $p = .95$; and social studies, $t(1079) = .19$, $p = .85$. There was a significant difference in reading, $t(1554) = 2.59$, $p = .01$; those using computers for their education scored higher (M = 88 percentile) than did those not using computers (M = 85 percentile).

Conclusions and Discussion

The home-educated students in this study fared well on standardized academic achievement tests. The average age of students taking achievement tests was 11, and the average grade level of the tests was fifth. The students scored, on the average, at or above the 80th percentile in all areas tested. These scores were consistent with those average scores, typically in the 65th to 85th percentile range, found by most researchers who have studied the home schooled in state-specific studies and nationwide in the United States and in Canada. In addition, very few demographic or learning environment factors were significantly related to their achievement.

Variables That Explain Academic Achievement Scores

Several analyses were conducted to determine which independent variables were significantly related to academic achievement. Five of the 12 independent variables used in multiple regression explained statistically significant amounts of variance in students' test scores for any of the subject areas explored. Only 1 of these significant variables (i.e., father's education level) was significant in all regressions performed. The 5 significant variables were father's education level, mother's education level, years taught at home, gender of the student, and frequency of visits to the public library. The maximum amount of variance in the test scores that any 1 of these independent variables explained was 5.0% (and this was by father's education level for the complete battery scores).

Father's education level, years the student was taught at home, and number of visits to the public library were all positively related to and together explained 3.8% of the variance in total reading scores. This explanatory power is, practically speaking, unremarkable. Father's education level (i.e., a positive relation), gender of the student (i.e., girls outperformed boys), mother's education level (i.e., a positive relation), and number of years home educated (i.e., a positive relation) together explained 7.0% of the variance in total language scores. This explanatory power is, practically speaking, not very remarkable. Mother's education level (i.e., a positive relation), father's education level (i.e., a positive relation), and gender of student (i.e., boys outperformed girls) explained 5.5% of the variance in total math scores. Again, this explanatory power is, practically speaking, rather unremarkable. Father's education level and mother's education level were positively related to and explained 5.6% of the variance in complete battery scores (which are partially based on reading, language, and math scores).

The effect of three other variables on achievement was considered using tests of comparison. The degree of regulation of home education by the state, who administered the tests to students, and the use of computers for the education of the student all had little to no effect on academic achievement.

Table 8 provides a summary of all the statistical analyses that explored the relation between the several independent variables and various achievement test scores in this study.

The father's education level was the only variable that consistently (i.e., four of four analyses) explained significant amounts of variance in achievement. The education level of the mother (who does most of the formal teaching of the students) was significant in three of four analyses and was a weaker predictor than was the father's education level. In sum, relatively little variance in achievement was explained by the variables examined in this study. Variables such as parent education level and family income may be better predictors of achievement in public schools (Coleman & Hoffer, 1987; Coleman, Hoffer, & Kilgore, 1982; Snow et al., 1991) than they are in home schooling.

One explanation for why little variance in academic achievement was explained by the independent variables in this study is range restriction. It is difficult to know for certain to what extent range restriction, in this study, affected the regression coefficients (Cohen & Cohen, 1983, p. 71). Furthermore, if range restriction does exist, it would be very difficult (if at all possible) to estimate the true correlations adjusted for range restriction. Future research that includes more home school students with more varied backgrounds and characteristics and research that entails a careful causal-comparative design will reveal more about the effects of home schooling on academic achievement and whether selected background variables have positive or negative effects within the practice of home schooling and compared to the effects within conventional schooling. Based on the findings at hand and those from other research, however, some implications can be suggested.

While this report was being written, Rudner (1999) published some findings that add to those of this study and others. He examined the ITBS and Tests of Achievement and Proficiency scores of 20,760 home school students from 11,930 families across the United States:

> The median scores for home school students are well above their public/private school counterparts in every subject and in every grade. The corresponding percentiles range from the 62nd to the 91st percentile; most percentiles are between the 75th and 85th percentile. (Rudner, 1999, p. 15)

Table 8
Summary of Statistical Analyses Showing Which of the Selected Independent Variables Were Statistically Significantly Related to Achievement Test Scores in This Study

Independent Variable	*Reading*	*Language*	*Math*	*Science*	*Social Studies*	*Basic Battery*	*Complete Battery*
Father's education	Yes, positive	Yes, positive	Yes	n/a	n/a	n/a	Yes, positive
Mother's education	No	Yes, positive	Yes, positive	n/a	n/a	n/a	Yes, positive
Father is certified teacher	No	No	No	n/a	n/a	n/a	No
Mother is certified teacher	No	No	No	n/a	n/a	n/a	No
Family income	No	No	No	n/a	n/a	n/a	No
Money spent on education	No	No	No	n/a	n/a	n/a	No
Legal status	No	No	No	n/a	n/a	n/a	No
Sex	No	Yes, girls higher	Yes, boys higher	n/a	n/a	n/a	No
Years home educated	Yes, positive	Yes, positive	No	n/a	n/a	n/a	No
Use of libraries	Yes, positive	No	No	n/a	n/a	n/a	No
Time in formal instruction	No	No	No	n/a	n/a	n/a	No
Age began formal instruction	No	No	No	n/a	n/a	n/a	No
Degree of state regulation	n/a	n/a	n/a	n/a	n/a	No	n/a
Test administrator	n/a	n/a	n/a	n/a	n/a	Yes, mixed results	n/a
Use of computer	Yes, positive	No	No	No	No	n/a	n/a

Note. n/a = not applicable—no statistical test was done.

As in some of the previous studies that examined the three independent variables of number of years the student was home educated, family income, and parent's formal education level, Rudner (1999) found significant positive relations between these and achievement. Contrary to previous research, Rudner found a significant relation between amount of money spent on home education and achievement. Consistent with most previous research, he found no relation between achievement and whether at least one of the parents was a certified teacher. Consistent with critiques of the methodology involved in many studies on home schooling, Welner and Welner (1999) argued that Rudner should have more clearly described the possible bias in his sample.

The Home Schooling "Treatment" and its Possible Ameliorative Effects

Decades of research on what causes or is associated with improved learning (i.e., academic achievement) in conventional classroom schools have provided wide-ranging findings and conclusions. The factors that are associated with increased achievement, at the macrolevel, include (but are not limited to) the following (which are listed in no particular order):

1. Clear and articulated objectives for schools and teachers—for example, learning and achievement are of the highest priority (Brophy & Good, 1986; Oswald, 1995; USDE, 1986).
2. Rewarding teachers, administrators, and students for high achievement (Oswald, 1995).
3. Holding high and reasonable expectations of students (Brophy & Good, 1986; Lumsden, 1997; USDE, 1986).
4. Individualization of curriculum for each student (Brophy & Good, 1986; T. L. Good & Brophy, 1987).
5. Increased feedback to the student (Brophy & Good, 1986; Educational Resources Information Center/Languages and Linguistics [ERIC/LL], 1997).
6. Emphasis on direct instruction by a teacher (Brophy & Good, 1986; USDE, 1986).
7. Increased academic learning time (and/or academic engaged time [AET]; Brophy & Good, 1986; Medley, 1982; USDE, 1986).
8. Greater amounts of social capital (Coleman & Hoffer, 1987; Stockard & Mayberry, 1992).
9. Greater amounts of human capital.
10. Smaller class size (Colorado Department of Education, 1996; Finn, 1998; Glass & Smith, 1979).

11. Tutoring versus group instruction, especially in certain situations—for example, beginning reading instruction (Brophy & Good, 1986; T. L. Good & Brophy, 1987; USDE, 1986).
12. Mastery learning (Brophy & Good, 1986; T. L. Good & Brophy, 1987).
13. Cooperative learning (Stahl, 1994).
14. Increased contextualization (or helping students link new concepts and information to the already familiar) of teaching and curriculum in experiences and skills of home and community (Brophy & Good, 1986; ERIC/LL, 1997).
15. Increased parent involvement (Baker & Soden, 1998; Chavkin, 1993; Giles, 1998; Henderson, 1987; Henderson & Berla, 1994; USDE, 1986, 1991, 1994).
16. Certain teacher traits—for example, knowledgeable, able to structure information for students, able to present with clarity, enthusiastic, caring, able to explain concepts, and capable in managing a classroom (Brophy & Good, 1986; Medley, 1982).

Assuming, for the sake of discussion and based on a multitude of studies, that home schooling is associated with high academic achievement (and possibly causes it), one could ask whether there is any link between the preceding list of positive factors and the nature of the educational "treatment" known as home schooling.

Before proceeding, several comments are in order. First, it should be recognized that research on what makes for effective teaching and learning in schools may be neither conceptually nor theoretically applicable to what makes for effective teaching and learning in the home-based environment (see, e.g., Sheffer, 1995, pp. 22, 23). Enough is known, however, about home schooling and its practices (e.g., Bliss, 1989; Breshears, 1996; Colfax & Colfax, 1988; Gustavsen, 1980; Guterson, 1992; Howshall, 1998; Johnson, 1991; Knowles, 1987; Macdonald & Marchant, 1992; Mayberry, 1988; Mayberry, Knowles, Ray, & Marlow, 1995; Medlin, 1994, 1996; Ray, 1990b, 1997b; Sheffer, 1995; Taylor, 1992, 1993; Van Galen, 1988) that it is possible to address whether it is likely that the features of effective schools that might reasonably apply to home schooling are generally, in fact, a part of home schooling. If they are a part of home schooling, then it may be likely they would work to the academic advantage of home school students. Second, proposing ideas about home schooling that appear to ascribe only "positive" attributes to home schooling may make a scholar vulnerable to charges of partiality. It may be that until more scholars whose focus has always been state-run education and whose preferences have clearly lain with the modern common school study home schooling and discuss its potential benefits and positive traits that the topic of parent-directed and

family-based education will be held in abeyance within academe (on the topic of scholars avoiding the topic of white racism, cf. Scheurich & Young, 1998, p. 28).

The following, therefore, is a brief consideration of certain features of effective schools that might be features of typical home school situations and may contribute to the apparent high academic achievement of the home educated. This is not to suggest that research findings clearly substantiate that all of these positive traits exist in all (or even most) home school families. The following comments are offered to encourage researchers to make sure that these considerations are made in future research on home schooling.

Value consistency, value communities, and social capital. Social capital "exists in the relations between persons" (Coleman & Hoffer, 1987, p. 221). Coleman and Hoffer presented trust as a form of social capital. "A group within which there is extensive trustworthiness and extensive trust is able to accomplish much more than a comparable group without that trustworthiness and trust" (Coleman & Hoffer, 1987, p. 221). They gave evidence that even if families possess high levels of human capital (i.e., skills and capacities in people as may be acquired in schools), the children may be at an academic disadvantage if there is little social capital in the family. This low level of social capital might be caused by the physical absence of family members (i.e., a "structural deficiency") or the absence of strong relationships between children and parents (i.e., a "functional deficiency"). Coleman and Hoffer used the construct of social capital to explain why private school students outperform public school students in terms of academic achievement. Based on research regarding the characteristics and practices of home school families (cited previously), it appears that home school families likely possess a large measure of social capital (Ray, 1989, 1990c).

As a part of their overall analysis that hinges on social capital, Coleman and Hoffer (1987) discussed the importance of value consistency and value communities—that is, the sharing of values between school personnel, parents, and students leads to efficient social function and schools in which students learn effectively. It may be that the home education environment and home education communities provide a high level of value consistency and a shared-value community in which children may learn successfully. Children who engage in home-based education are presented by their parents, friends, home education communities, and religious groups with a relatively coherent worldview—rather than the menagerie of competing value systems that often is encountered in state schools (Glanzer, 1998; Nord, 1995; Vitz, 1985).

Class size and tutoring. Although there have been mixed results, the weight of evidence on class size shows that smaller classes generally are associated with higher achievement (Colorado Department of Education, 1996; Finn, 1998; Glass & Smith, 1979). Most home school students find themselves in a group of two to four children or youth for the majority of the time they spend on their more-structured studies and learning. Many home-educated children are, therefore, essentially tutored—that is, they have private instructors, their parents and others, in a one-to-one or small-group instructional setting. The average home school family has about three children; one of these is preschool age, and two are in the conventional kindergarten to Grade 12 range. Thus, there is one adult teaching only two school-age children most of the day. When the other parent is not at work, there are potentially two adults to teach two children. Even when the family is larger—for example, with six children—the parent who conducts most of the formal instruction is still only teaching five children. In these larger families, furthermore, it is often the case that the older children help teach the younger ones. Again, then, this approaches a one-to-one tutoring situation for most of the children most of the time.

Literature on tutoring defines it and explains its advantages, as seen in Bloom (1984):

> Students learn the subject matter with a good tutor for each student, or for two or three students simultaneously. This tutoring instruction is followed periodically by formative tests, feedback-corrective procedures, and parallel formative tests as in the mastery learning classes. The need for corrective work under tutoring is very small. (p. 4)

Bloom (1984) and his associates tried to find teaching-learning methods that were as effective as tutoring. Bloom wrote on some controlled research settings:

> The most striking of the findings is that under the best learning conditions we can devise—(tutoring)—the average student is 2 sigmas [2 standard deviations of the control group] above the average control student taught under conventional group methods of instruction. (p. 6)

In the home education setting, qualitative researchers have witnessed ongoing feedback, formative evaluation, intimate interaction during academic learning, and efforts by parents to holistically affect every area of their children's lives (e.g., Taylor, 1993, pp. 85, 133; Treat, 1990, pp. vii, 120–136).

From a more historical perspective, Gordon and Gordon (1990) said, "Tutoring, as we will use it, encompasses the academic, moral and philosophical growth of the individual child. Tutors identified themselves closely with their pupils" (p. 6). Tutors often became quasi-family members, and tutoring made education a family affair:

> It often involved the parents with the tutor in combining education and the family as a unified life-long experience. This is what distinguished a "tutor" from a "classroom teacher." The tutor's highly individualistic approach transcended education's academic lessons. At its best tutoring attempted to reach out and touch a child's intellectual, moral and spiritual fiber in a dynamic personal process. The tutor remained a counselor into adulthood, long after the lessons had ceased. These concepts were found originally in the "tutorial ideal" of the ancient world. (Gordon & Gordon, 1990, p. 6)

Individualization and flexibility. About 70% of home educators say that they design the curriculum for their children (Ray, 1990b, 1997b)—that is, they hand-pick the materials that they think are best fit to the individual student. This may be an indication that they are individualizing the curriculum for their students, which may cause high achievement (T. L. Good & Brophy, 1987).

Academic learning time and academic engaged time. Academic learning time (ALT) is "the amount of time a student spends performing relevant academic tasks with a high level of success" (T. L. Good & Brophy, 1987, p. 35). High ALT generally is associated with high academic achievement. Students at home may experience more ALT and AET than do students in conventional schools. Data show that home-educated students spend only 3 to 4 hr per day in planned structured learning, compared to the 6 or more hr per day in school plus homework that conventional school students experience. The relatively small amount of time that the home educated spend in academics may be, in fact, largely ALT. Duvall et al. (1997) found that special-needs students who were home educated were involved in AET 59.0% of the time versus 22.5% of the time for special-needs students in public schools. A new study corroborates this finding (Steven F. Duvall, personal communication, January 23, 1999).

Positive social interactions, cooperative learning, and age integration. Educators have struggled perennially to ensure that same-age peer-group so-

cial interactions are positive and conducive to learning (academic achievement). The reality in the classroom is that the social interactions are not always of this nature. One line of research and practice that appears to have met reasonable success in this area is cooperative learning. Stahl (1994) delineated the essential elements of successful cooperative learning. Although it would be inappropriate to casually claim that the technical aspects of conventional school cooperative learning apply to the typical home school setting, some of the essential elements of cooperative learning may be inherent to home schooling. These might be positive social interaction behaviors and attitudes, heterogeneous groups (both within the family and outside the family at events and classes organized for home schoolers), individual accountability, and sufficient time being spent on learning (Stahl, 1994).

Although the integration of variously aged students in a learning environment has a long history (e.g., one-room schoolhouses, dame schools, agrarian societies), it has been largely uncharacteristic of American schools for many decades. Recent research, however, suggests that age mixing among children and adolescents may have educational and other benefits (Feldman & Gray, 1999). These researchers concluded, regarding age mixing, that (a) younger children actively use older children to learn and acquire skills and take responsibility for their own learning, (b) "age-mixed play offers unique opportunities for creativity and the practice of skills" (Feldman & Gray, 1999, pp. 509–510), (c) it is sometimes a means of matching abilities, and (d) "Older children feel a sense of responsibility for younger children and develop an increasingly sophisticated understanding of that responsibility" (Feldman & Gray, 1999, p. 511). It should be noted that age mixing is the everyday and yearly experience of the majority of home school students. They are born into a family and regularly interact with their parents and other adults, their siblings, other home school students, neighborhood peers, and children and youth at community activities such as scouts, 4-H, group sports, Sunday school, and dance classes. Their world, including the conventional school "school hours," is an age-integrated world. It may be that the typical individual home schooler is not aware that he or she "should" think of himself or herself as part of a peer group or "a tribe apart," as Hersch described adolescents in schools who feel isolated from the grown-up world and alienated from parents (as cited in Mattox, 1999; cf. Delahooke, 1986; Sheffer, 1995; Shyers, 1992).

Although peer pressure can be positive and motivate students to higher achievement and better behavior, in many instances peer pressure distracts students from academic pursuits, reduces their efficient use of time, and draws students into behaviors that are neither beneficial nor virtuous (Coleman, 1961, as cited in T. E. Smith, 1992; Larson, 1983, as cited in T. E.

Smith, 1992; T. E. Smith, 1992). Many parents recognize this social problem that accompanies conventional schools.

Although much of the verbal and nonverbal behavior that permeates a conventional school is that which many adults consider normal and relatively harmless, the physical violence in schools is a more extreme but obvious example of what few consider to be harmless (USDE, 1994, p. 15). Toch (1991a) reported that the exodus from public schools was largely fueled by the fact that "many parents view the public schools as ineffective and dangerous, and are exploring other options before it's too late" (p. 66). Home school parents cite safety as one of their reasons for home schooling their children (Mayberry et al., 1995; Ray, 1997a; Sheffer, 1995). Students whose learning is based in the home may be experiencing a safe and relatively orderly daily environment—one that often may not exist in public schools (USDE, 1994).

Expectations of students. One of the main reasons why parents choose home education is success in academics. With this in mind and the probability that these parents want their children to do well and live up to their intellectual potential, it is plausible that they generally hold high expectations of them. Research findings have suggested repeatedly that high expectations lead to children doing well. Perhaps this cycle is typically at work within home school families.

Human capital. A large body of evidence positively links the formal education level of parents to the achievement of their children in public schools. Generally speaking, the education level of home educators is somewhat above the national average, and this appears to explain, in some vague way, some of their children's high academic achievement (Ray, 1990b, 1997b; Rudner, 1999; Russell, 1994).

Parent involvement. Within the milieu of conventional public and private schools, the overwhelming opinion of practitioners and research evidence indicate that parent involvement is an important key, if not the primary key, to students' academic success. It may not be obvious to everyone, but most people with whom I have had extended conversations about home schooling—both detractors from and advocates of home schooling—have opined that home educators are the paragon of parent involvement. To be sure, there are likely exceptions to this stereotype among the 700,000 or so home school families in the United States; generally, however,

these parents direct, engage in, monitor, and enjoy their children's educational lives. In fact, many of them do not even think of their children's educational lives as constructs distinctly separate from their own lives in general—that is, the parents' involvement in the children's lives, and vice versa, is one rather continuous, roughly seamless intertwining of the learning, applying, and practicing of values, knowledge, and culture and familial, social, religious, and political activities as the children move from the womb to adulthood and the parents move from being parental novitiates to veterans to grandparents. Home schooling, generally speaking, is, de facto parent involvement and family-within-community life.

I have heard many negative critics of home schooling—and others who are simply trying to explain the positive success of the home educated—suggest that any child who has parents as involved in his or her education as are the parents of the home-educated child would probably do just as well in conventional public schools as in home schooling. This hypothesis has a ring of truth to it. This suggestion ignores, however, at least two important points. First, parents who send their children away from themselves and their home for 6 to 9 hr per day do not have the available time to be as involved with their children as do home school parents. Second, conventional schools, systemically speaking, are in many ways impervious to efforts by parents to be wholly involved in their children's educational lives (see, e.g., Epstein, as cited in Baker & Soden, 1998; USDE, 1994). It is possible, then, that the suggestion that if only public school parents would be as involved in the lives of their children as are home school parents then the public school children would have just as high achievement as the home educated is an example of the logical fallacy of a hypothesis contrary to fact; perhaps this level of parent involvement simply cannot exist when a child is enrolled in a conventional classroom school.

Despite the fact that various professional educators (e.g., National Association of Elementary School Principals, 1989–1990, 1993; National Association of State Boards of Education, 1996; National Education Association, 1990, 1999) claim that home education is not good for students, research evidence continues to mount that home education benefits children and youth. The conjectural advantages of state-run, conventional schools are things such as professionally trained and state-certified teachers; experiencing a wide variety of cultures and worldviews; academic and extracurricular activities that are not available to the home educated; a quality and quantity of laboratory and technical equipment that exceeds what most families possess; school personnel who are receptive to and tolerant of a variety of philosophical and religious beliefs and the expression thereof; 6 to 9 hr of daily social interaction with a large number of same-age peers; and 6 to 9 hr per day with a variety of adults outside the family who are,

generally, neither psychologically nor emotionally close to the child. The weight of research evidence, however, suggests that the lack of these things, which allegedly benefit students in conventional schools, are not harming the home educated.

In summary, the various studies related to the learning and thinking skills of home-educated students, almost without exception, lead to the conclusion that a variety of families who represent varied philosophical and religious worldviews, socioeconomic statuses, and races and ethnicities are clearly successful at teaching their children via home education. Regarding the cause of these children's high academic achievement, however, there is little consensus, and the problem has not been thoroughly investigated.

An observer might be tempted to suggest that the significance of this study and others on academic achievement is that home schooling is generally associated with or causes higher achievement than does public schooling. It has been pointed out, however, that this topic was only one part of this study and this article, and that very limited research of a causal-comparative design has been done. This work, rather, in addition to other studies, might suggest that there is something inherent to the modern practice of home education that could (or does) ameliorate the effect of background factors that are associated with lower academic achievement when students are placed in conventional public schools. One might submit, therefore, that the "treatment" that is currently called home schooling is simply a combination, or at least is potentially a combination, of many factors that make for effective schooling and learning in conventional classroom schools. Furthermore, it should be noted that home schooling may be not only comprised of these factors, but may include some that have neither been identified nor about which anyone has thought and presented to the world of scholarship.

Perhaps most home school parents and students naturally—that is, without formal training—practice many of the things that researchers have found to be effective for teaching and learning. In the estimation of T. L. Good and Brophy (1987), private individualized tutoring "is the method of choice for most educational purposes, because both curriculum (what is taught) and instruction (how it is taught) can be individualized and because the teacher can provide the student with sustained personalized attention" (p. 352). Perhaps it should not surprise anyone—state- or private-school teacher, educational policymaker, teacher union leader, or parent—that the home educated do well in terms of learning. T. L. Good and Brophy went on to say, "Unfortunately, private tutoring is too expensive for most families to afford" (p. 352). Perhaps they were not aware, while writing their book, of the then-burgeoning home education movement. It now appears that both low- and high-income families, and both

families that professional educators and policymakers would consider low- and at-risk, have been finding a way to make a form of tutoring affordable and effective through the practice of home schooling.

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