Parental Influences on Girls' Mathematical Expectancies and Course Plans

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Recently, growing concern has been expressed over the differential participation of boys and girls in high school mathematics courses. Compared to boys, fewer girls elect to participate as soon as this option is available to them (Fennema, 1976; Fox, 1976). It is indisputable that this underparticipation has serious short and long-term ramifications. Fennema (1976) has argued that the non-election of mathematics courses is the most important cause of sex-related differences in the learning of mathematics. Further, in terms of the future educational and career potentials of women, Sells (1976) has proposed that the avoidance of high school mathematics courses acts as a "critical filter". Because mathematics is a prerequisite for many college majors, limited mathematics background effectively precludes women from entering numerous career areas including those in science and mathematics.

Investigation of the determinants of one's decision to take or not to take mathematics is the goal of this project. Because choice is our major focus, we selected for study variables which have been linked to choice. The expectancy/value model of behavior, advanced by theorists in decision, achievement and attribution theory, links behavioral choice to two particular cognitions: one's expectancy for success and the incentive value of the task for the individual. Various forms of this model have identified other psychological variables as important mediating cognitions and have suggested various socialization factors that might be important precursors of individual differences on these variables. It is the goal of this paper to present a brief overview of this theoretical model and to summarize our findings concerning the role of parents in the socialization of students' math expectancies and values.

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Insert Figure 1

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Figure 1 presents a simplified version of the theoretical model that has guided our research project. As can be seen, it is basically a cognitive model of the socialization of expectancies and values. We assume that certain events and attitudes exist as a part of our culture and as a part of each of our unique past histories. Our current expectancies and values are influenced by this reality in two ways: first, through its effect on the beliefs and behaviors of those around us, especially those who play a major role in our socialization and secondly, through its direct impact on our beliefs about our abilities, about task demands and characteristics and about our future goals. What is important to note in this model is the central role played by psychological or cognitive variables. We believe, and have presented supporting data elsewhere, (Kaczala, et. al., 1979) that it is not the reality itself that determines children's expectancies, values, or choice but rather it is their beliefs about that reality that are the important causal determinants.

While I will touch upon some data today that provides support for this assumption, the major focus of my talk will be on the role of parents as one of the important socializers in this model. It has been suggested by many achievement theorists that parents influence their children's achievement behaviors through both their role as models and their more direct role as expectancy and value socializers. In addition, we are suggesting that the child's perceptions of both of these influences mediate their impact on the child's achievement expectancies and values. It is to these two predictions that the remainder of my talk is addressed.

To assess both the relation of parents' beliefs to children's expectancies and values, and the mediating role of the children's perceptions of parents' beliefs, approximately 250 children in grades 5-11 and their parents filled out questionnaires regarding a wide range of beliefs and attitudes about math and English. The subjects lived in a small mid-western city. Testing took place in the spring of 1978.

The parent questionnaire included three types of items: questions asking for parents' estimates of their own math ability, math enjoyment, and importance of math skills to themselves; questions asking for the parents' attitudes toward the importance of math for their child and questions asking for parents' estimates of their child's math ability and enjoyment of math. The child questionnaire contained the following types of items among many others: items asking for the child's perception of his/her parents' attitudes, items asking for the child's achievement self-perceptions and values, items asking for the child's current and future expectancies and an item asking for his/her plans to go on in math. In most cases these scales consisted of 2 or more questions each requiring a response on a 7 point Likert-type scale. In addition, an aptitude score was estimated by using a transformed mean score reflecting scores on the MAT, CAT and past grades. Most of the scaled items discussed in this paper are presented in Table 1.

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Insert Table 1

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Let me turn to the modeling hypothesis first. The importance of role models in socialization is a recurring theme throughout the sex difference literature. According to this hypothesis, important models, in particular parents, exhibit behaviors which children come to imitate and later adopt as part of their own behavioral repertoire. If female models exhibit different behavior patterns than male models, then it is argued that girls and boys will acquire similarly sex-differentiated behavioral patterns. With regard to math expectancies in particular, this hypothesis takes the following form: girls exhibit more math avoidance and have lower math expectancies than boys because mothers are more likely to exhibit math avoidance behaviors than are fathers. To test this hypothesis, we compared the mathematics-relevant self concepts of the mothers and fathers in our sample. The results are summarized in

Table 2. The pattern of results is clear.

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Insert Table 2
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Fathers think that they are and have always been better at math, that math is and always has been easier for them, that they needed to expend less effort to do well at math, that they enjoy and have enjoyed math more and that math always is and was more useful and important to them, than mothers think. In sum, fathers are more positive toward math and have a more positive self concept regarding their math abilities. What is more, we found that these sex differentiated beliefs were specific to math. Consistent with the fact that girls on the average outperform boys in school, mothers rated their general high school performance higher than did fathers.

In line with the modeling hypothesis, one might be tempted to conclude at this point that we have identified a major source of the sex differentiated math self concept in today's school children. Boys and girls differ because their parents' behavior is sex differentiated. But one needs to demonstrate a relation between parents' behaviors and children's beliefs before this conclusion is justified. The mere existence of a sex differentiated pattern of beliefs in the parent population tells us nothing about the importance of this difference in socialization. To test the modeling hypothesis more directly one has to test for the relation between parents' and children's beliefs. To do this we correlated the parent self concept variables with the children's responses to the student questionnaire and to their past performance scale. None of the more than 100 correlations were significant. Thus, while parents' self concepts do differ in the predicted direction, the role of these differences in the socialization of children's math self concept is minimal.

What about parents as more direct socializers? Do parents express sex differentiated beliefs about either the math abilities of their children or the importance of math for their children? To assess this possibility we compared the parents' of boys perceptions of their sons' math ability, interest, effort, their expectancies for their sons' future performance in math and their perceptions of the relative importance of a variety of courses for their sons to similar beliefs of the parents of girls. The data are summarized in Table 3.

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Insert Table 3
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It is clear that the sex of the child has a definite effect on parents' perceptions of their child's math ability and on the parents' perceptions of the relative importance of various high school courses. While parents do not rate their daughters' math abilities any lower than they rate their sons', they do think that math is harder for their daughters, and that their daughters have to work harder to do well in math.

This latter finding is especially interesting in light of both our previous findings and a common finding in the attribution literature. In previous work we found that girls think they have to try harder than boys to do well in math (Kaczala, et al., 1979) and , on an experimental task, actually rate their efforts as greater even though an objective measure of effort did not reveal a sex difference (Parsons, 1978). Interestingly, women have been shown to attribute their successes more to effort than do men (Frieze, et. al., 1978). Taken together these findings suggest that females think they will have to try harder to receive a good grade than males think they will have to try. What is more, our data suggest that parents are reinforcing this tendency. Whether parents initiate the bias or merely echo the bias is not clear but they certainly are not providing their daughters with a counter-interpretation.

But, is it necessarily harmful that both girls and their parents think girls have to try harder to do well in math? It has been argued in the attributional literature that because attributions to effort do not contribute to a stable notion of one's ability in a particular domain, attributing one's success to effort is not as ego enhancing as attributing it to ability. Attributing one's successes to effort may also leave doubt about one's future performance on increasingly difficult tasks. If one is having to try very hard to do well now and one expects next year's math course to be even harder, one may not expect to do as well next year. In support of this suggestion and as we have reported elsewhere, perceptions of how hard one is trying in the present are negatively correlated with future expectancies and with one's estimates of one's ability and the difficulty of the task. If one adds to this dynamic the fact that both girls and their parents think that continuing math is less important for them than do boys and their parents, then a cognitive set emerges that certainly could produce a lower tendency in girls to continue in advanced math courses.

But does it? Are these parental beliefs and children's self concepts actually predictive of future math expectancies and future course plans? This is the same question I raised earlier. To show that parents, and children for that matter, have sex differentiated beliefs does not, in itself, demonstrate the link between these beliefs and future plans. To assess this relation, we correlated the major parent and child variables to each other and to the children's expectancies and course plans.

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Insert Table 4
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The zero-order correlation for these analyses are presented in Table 4. As you can see, the children's plans, future expectancies and current expectancies are related consistently in the predicted direction to variables tapping their own self concept of their math ability, to their perceptions of their parents' beliefs and expectancies (see items 851,854, and 856), to their parents' actual beliefs and expectancies about their child (see items 4301-4305 and 5301-5305) and to our measure of the child's math aptitude and past performance (see item 4451). Thus it seems that parents' beliefs about their children's ability to do well in math are predictive of their children's course plans. What is more, there is a sex difference in these beliefs that might be accounting for, or at least contributing to, the sex difference in math expectancies and plans.

But what is the nature of this link? Is it a causal link or does it merely reflect a shared knowledge of the child's aptitude? And if it is a causal link, how is it mediated? This brings us back to our original set of predictions. We have found support for the hypothesis that parents' beliefs are related to their children's expectancies and plans. We predicted that this link would be mediated by the children's perceptions of their parents' beliefs rather than affected directly by the parents' beliefs themselves or by the shared knowledge of the children's math aptitude. To assess this hypothesis, we performed a recursive path analysis on the mother and father data separately. These paths are displayed in Figures 2 and 3.

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Insert Figures 2 and 3
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These diagrams represent reduced path analyses composed of the major predictors outlined in our model (see Figure 1). Only paths with path coefficients significant at the .01 level or less are included. The zero-order correlations for the significant paths are included in parentheses. Other zero-order correlations are listed in Table 4. The percent of variance accounted for by all preceding variables for each of the predictor and criterion variables and their residuals (unexplained variance) are listed in Table 5.

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Insert Table 5
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The order of the path analyses was governed by our theoretical model (see Figure 1). The first column or step includes variables we assume to be exogenous to the system or those considered to be part of the cultural milieu or past history. The variables in the second column or step represent estimations of the parents' and teachers' beliefs about the children's math abilities and math effort. The third column or step includes the children's perceptions of the parents' beliefs and the teachers' and parents' expectancies for the children. The fourth column or step includes the children's math self concept variables. Columns five, six and seven represent the criterion variables in the predicted causal ordering.

While there are many interesting findings from these path analyses, I will focus on only a few. First, note the similarity of the two path analyses. The major conclusions I will discuss are valid for each analysis. There are, however, fewer significant paths with the father data than with the mother data. This difference reflects, to some extent, the difference in sample size; fewer children had complete father data than had complete mother data. Other data that I'll not be presenting today also suggests that children are not as accurate in their perceptions of their fathers' beliefs as they are in their perceptions of their mothers' beliefs. This difference could account for the reduced number of significant paths linking the fathers' beliefs to the children's beliefs. In general, all of the insignificant father paths are similar to the mother paths in the direction of the statistical relationship, differing only in the magnitude of that relationship. The remainder of my comments will be addressed specifically to the mother path analysis (see Figure 2).

In support of our basic cognitive model, expectancies and plans are most directly related to the children's math self concept and to their perceptions of their parents' beliefs about their math aptitude and potential. While the zero-order correlations of the children's aptitude measure to these criterion measures were significant, the path coefficients, when other cognitive mediators are partialled out, are not significant. Thus, at least statistically, children's cognitive constructs play a more important role in course plans and expectancies than do past objective measures of the children's performance. Also in support of our model, any effect that these past objective measures have on the children's self concept is mediated by their impact on the perceptions of teachers and parents, rather than by their direct effect on the children's estimate of their own ability. It is also of interest that the parents' and teachers' estimates of the children's ability are only partially determined by the children's actual past performances; for the mothers, in particular, only a very small portion of variance in their estimates of their children's ability is accounted for by our estimation of aptitude. And yet the mothers' estimates of their children's ability have both a big direct and indirect effect on the children's ability self concept.

Finally, I want to draw your attention to the two major criterion variables in this paper: future expectancies and course plans. Among the variables we have selected for analysis, only future expectancies have a significant relation to plans. In turn, future expectancies are related most directly to the children's sex, and to their perceptions of their parents' expectancies for them, neither of which are highly correlated with or directly related to actual performance. Furthermore, the effect of children's sex on future expectancies is not mediated by the cognitive self concept variables we have selected for study. The source of this effect, then, can not be determined from our data.

In conclusion, parents do have sex-differentiated perceptions of their children's math aptitude despite the similarity in the actual performance of boys and girls. Parents also feel advanced math is more important for their sons than for their daughters. Parents' perceptions of and expectations for their children are related to both the children's perception of their parents' beliefs and to the children's self concept, future expectations and plans. Parents' beliefs and the children's perceptions of these beliefs are more directly related to children's self concepts, expectancies and plans than are the children's own past performances in math. Finally, parents as role models of sex differentiated math behaviors do not have a direct effect on their children's self concepts, expectations or course plans.

That parents feel their daughters had to try harder to do well in math is particularly interesting. It suggests that both parents and their daughters share the perception of how hard girls need to try in order to do well. We don't really know whether this reflects an echoing on the part of parents of comments they've heard their daughters make or whether it demonstrates the parents' strength as teachers of good or bad attitudes towards math. But it seems likely that it would lead parents to support their daughters' decisions to drop out of math, especially since they don't believe math is that important for their daughters' futures. In the same way, parents would be less tolerant of a son's decision to drop math, as it is seen as relatively easier and more important for their sons than for their daughters.

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Heller, K.A., Parsons, J.E., Meece, J.L., & Kaczala, C. The effects of teachers' expectancies and attributions on students' expectancies for success in mathematics-Part I. Paper presented at SRCD, San Francisco, 1979.

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Table 1

Items Used in Path Analyses

Variable	Questionnaire Items(s) used to Assess Variable
1. Child's math ability (CHMA-APT)	Average of standardized scores on MAT's, CAT's, and past math grades.
2. Parent's perception of importance of math for child (PARIMPCH)	How important is it to you that your child do well in math? Compared to other academic subjects, how important is it to you that your child do well in math? (Relative Importance for Child)
3. Parent's perception of child's ability (PARABCH)	My child is (not at all good at math/very good at math). In comparison with other academic subjects, my child is (much worse in math than in other subjects/much better in math than in other subjects. (Relative Ability)
4. Parent's perception of child's effort needed to do well. (PAREFFCH)	To do well in math, my child has to try (a little/ a lot) (Effort) In comparison with other academic subjects, to do well in math, my child has to try (much less than in other subjects/much more than in other subjects) (Relative Effort)
5. Parent's future expectancy for child (PARFEXCH)	If your child plans to take math next year, how well do you expect him/her to do? How well do you think your child would do in first year algebra? (Parent Expectancy for Algebra) How well do you think your child would do in an advanced math course like calculus?
6. Teacher's perception of child's ability (TEACHABCH)	How much mathematical aptitude or ability do you feel _______________ has?
7. Teacher's future expectancy for child (TEACHEXCH)	How well do you think ____________ would do in an andvanced high school math course?
8. Child's perception of parents' beliefs about child's ability (PARABIL)	How good at math does your mother (father) think you are?
9. Child's perception of parents' expectancies for child (PAREXP)	How well do you think your mother (father) expects you to do in math this year?

10.	Child's perception of parent's perception of the difficulty of advanced math courses (PARDIF)	How hard does your mother (father) think advanced high school math will be (is) for you?
11.	Child's perception of own math ability (ABILITY)	How good at math are you? If you were to order all the students in your math class from the worst to the best in math, where would you put yourself? In comparison to most of your other academic subjects, how good are you at math?
12.	Child's perception of the difficulty of future math course (FUTDIF)	How hard to you think advanced high school math will be for you? Compared to most other school subjects you may take in high school, how hard do you think advanced high school math will be for you?
13.	Child's perception of the difficulty of current math course (CURDIF)	How hard is math for you? Compared to most other students in your class, how hard is math for you? Compared to most school subjects that you take, how hard is math for you?
14.	Child's current expectancies for own math performance (CUREXP)	Compared to other students in your class, how well do you expect to do in mathematics this year? How well do you expect to do on your next math test? How well do you think you will do in your math course this year?
15.	Child's future expectancies for own math performance (FUTEXP)	How well do you think you'll do in your mathematics course? How successful do you think you'd be in a career which required mathematical ability? How well do you think you will do in advanced math courses?
16.	Intention to take more math (PLANS)	Would you take more math if you didn't have to?

Table 2

Mean Ratings of Parents' Attitudes & Evaluations of Mathematics

Item[a]	Mothers	Fathers	Mean Difference	*t* Value	*p*
Past Enjoyment	4.25	4.97	-.72	-4.12	.0001
Past Importance	5.73	5.72	.97	.08	ns
Past Relative Importance	4.57	4.94	-.37	-3.81	.0002
Past Perception of Ability	4.29	5.20	-.91	-5.40	.0000
Past Perception of Relative Ability	3.72	4.50	-.78	-4.75	.0000
Past Perception of Effort Needed to do Well	5.31	4.59	.73	4.39	.0000
Past Perception of Relative Effort Needed to do Well	5.06	4.40	.66	4.43	.0000
Past Difficulty	4.75	3.80	.95	5.73	.0000
Past Relative Difficulty	4.97	4.18	.79	5.32	.0000
Past Perception of Usefulness	4.46	5.28	-.82	-5.11	.0000
Past High School Performance	5.90	5.62	.28	2.58	.0106
Current Difficulty in Solving Problems	3.60	2.87	.73	4.87	.0000
Current Difficulty with Job Involving Math	3.80	2.18	1.62	9.20	.0000
Current Importance of Basic Skills	5.98	5.92	.60	.47	ns
Current Importance of High School Math	4.28	4.86	-.58	-3.31	.0011
Current Importance of being Good at Math	5.17	5.92	-.75	-5.71	.0000
Current Math Aptitude	4.27	5.41	-1.14	-8.30	.0000
Current Enjoyment	4.35	5.36	-1.01	-6.67	.0000

[a]'Past' variables refer to high school experiences

Table 3
Mean Ratings of Parents Perceptions of and
Values for their Children

Variable	Mothers				Fathers			
	Sons	Daughters	F Value	p	Sons	Daughters	F Value	p
Enjoyment[a]	5.18	4.83	2.87	ns	5.01	4.53	6.49	.0115
Relative Importance[a]	4.88	4.67	1.90	ns	4.76	4.48	3.93	.0485
Relative Ability[a]	4.59	4.43	.91	ns	4.52	4.23	4.18	.0422
Effort[a]	4.25	4.83	7.62	.0062	4.46	4.90	5.84	.0165
Relative Effort[a]	4.22	4.76	9.08	.0028	4.28	4.78	9.88	.0019
Task Difficulty[a]	3.71	4.16	5.25	.0228	3.58	4.28	16.32	.0001
Relative Task Difficulty[a]	4.03	4.58	9.83	.0019	4.07	4.51	7.77	.0058
Parent Expectancy for Algebra[a]	5.45	5.21	.76	ns	5.32	4.79	3.47	ns
Perception of Performance in school at present[a]	5.65	5.96	3.91	.0491	5.64	5.97	4.60	.033
Relative Importance for Child[b]	5.05	4.77	5.30	.0222	5.02	4.87	1.37	ns
Importance of English[b]	5.91	6.14	2.07	ns	5.32	5.97	14.61	.0002
Importance of Geometry[b]	6.20	5.55	18.33	.0000	5.84	5.62	1.88	ns
Importance of Trig./Calculus[b]	5.42	4.65	12.37	.0005	5.54	4.99	6.94	.009
Importance of Chemistry[b]	5.89	5.47	6.08	.0143	5.63	5.45	1.10	ns
Importance of American History[b]	6.05	5.96	.44	ns	5.32	5.84	9.11	.0028
Encouragement to go on in math[b]	5.55	5.46	.14	ns	5.86	5.29	5.20	.0246
PARABCH[a]	10.16	9.94	.51	ns	9.97	9.60	1.85	ns
PAREFFCH[a]	8.50	9.59	9.07	.0029	8.73	9.67	9.32	.0025
PARTDCH[a]	7.75	8.73	7.77	.0057	7.64	8.78	13.53	.0003
PARFEXCH[a]	10.98	10.67	.89	ns	10.83	10.08	2.38	ns
PARIMPCH[b]	11.10	10.65	4.46	.0357	10.84	10.64	.94	ns

Note: df $\simeq$ 1,250 with the exception of the 8th & 16th mother variables and the 8th, 16th, & 20th father variables (1, 106 $\leq$ df $\geq$ 1, 128)

[a] parent perception of child

[b] parent values for child

Table 4

Zero Order Correlation Matrix

VARIABLE	543. PLANS	852. FUTEXP	850. CUREXP	853. ABIL	858. FUTDIF	855. CURDIF	4305. PARFEXCH	5305. PARFEXCH	696. TEACHEXCH	854. PARABIL	851. PAREXP	856. PARDIF
543. PLANS	1.0000											
852. FUTEXP	.4899 (337)	1.0000										
850. CUREXP	.3066 (337)	.6203 (337)	1.0000									
853. ABIL	.3143 (337)	.6410 (337)	.7935 (337)	1.0000								
858. FUTDIF	-.1040 (337)	-.3831 (337)	-.3837 (337)	-.4046 (337)	1.0000							
855. CURDIF	-.1870 (337)	-.4860 (337)	-.6010 (337)	-.6737 (337)	.6112 (337)	1.0000						
4305. PARFEXCH [a]	.2895 (239)	.4359 (239)	.4781 (239)	.4798 (239)	-.1791 (239)	-.4092 (239)	1.0000					
5305. PARFEXCH [b]	.2311 (220)	.3189 (220)	.2893 (220)	.3629 (220)	-.1476 (220)	-.2659 (220)	.6901 (197)	1.0000				
696. TEACHEXCH	.1911 (331)	.2997 (331)	.4919 (331)	.5354 (331)	-.1970 (331)	-.4469 (331)	.5080 (237)	.4976 (217)	1.0000			
854. PARABIL	.3144 (336)	.5645 (336)	.6273 (336)	.7054 (336)	-.2573 (336)	-.4900 (336)	.5599 (238)	.3664 (219)	.3858 (330)	1.0000		
851. PAREXP	.2481 (335)	.5277 (335)	.4915 (335)	.4552 (335)	-.2464 (335)	-.3109 (335)	.3496 (238)	.1971 (219)	.1618 (329)	.5110 (335)	1.0000	
856. PARDIF	-.1469 (334)	-.3047 (334)	-.3603 (334)	-.3965 (334)	.3718 (334)	.4964 (334)	-.2928 (237)	-.1903 (218)	-.2680 (328)	-.4136 (333)	-.2743 (333)	1.0000
4304. PARIMPCH	.0052 (247)	.1941 (247)	.1661 (247)	.1406 (247)	-.0931 (247)	-.1040 (247)	.2720 (242)	.1342 (204)	.0191 (245)	.2207 (246)	.2245 (245)	-.0851 (244)
5304. PARIMPCH	.0675 (222)	.1679 (222)	.0864 (222)	.0813 (222)	-.0256 (222)	.0071 (222)	.1435 (199)	.2520 (222)	.0594 (219)	.0852 (221)	.1907 (221)	.0171 (220)
4301. PARABCH	.3449 (248)	.4288 (248)	.4531 (248)	.5529 (248)	-.1782 (248)	-.4064 (248)	.6814 (241)	.4716 (204)	.4989 (245)	.5223 (247)	.3172 (246)	-.2279 (245)
5301. PARABCH	.3054 (220)	.3762 (220)	.3767 (220)	.4970 (220)	-.1709 (220)	-.3659 (220)	.6509 (197)	.7199 (220)	.5260 (217)	.4815 (219)	.2433 (219)	-.2593 (218)
4302. PAREFFCH	-.2139 (246)	-.3479 (246)	-.3381 (246)	-.4225 (246)	.2936 (246)	.4999 (246)	-.4631 (241)	-.3630 (203)	-.3689 (244)	-.3807 (245)	-.2564 (244)	.3729 (243)
5302. PAREFFCH	-.1728 (221)	-.3087 (221)	-.3280 (221)	-.3844 (221)	.2097 (221)	.3797 (221)	-.4552 (198)	-.4094 (221)	-.3307 (218)	-.3402 (220)	-.1948 (220)	.3147 (219)
698. TEACHABCH	.2507 (324)	.2931 (324)	.4137 (324)	.4913 (324)	-.1813 (324)	-.4254 (324)	.4894 (231)	.5069 (214)	.9174 (324)	.3526 (323)	.1440 (322)	-.2486 (321)
1. SEX	.0518 (337)	.1694 (337)	.0845 (337)	.0966 (337)	-.1704 (337)	-.1390 (337)	.0609 (242)	.0536 (222)	.0223 (332)	.0814 (336)	-.0235 (335)	-.0553 (334)
4400. MTYPE	.0769 (251)	.1791 (251)	.0743 (251)	.1205 (251)	-.1395 (251)	-.1198 (251)	.1523 (241)	.1203 (204)	.1436 (249)	.1102 (250)	.1661 (249)	-.1168 (248)
5204. PARTDPR	-.0089 (223)	-.0465 (223)	-.0772 (223)	-.0605 (223)	-.0008 (223)	.0829 (223)	-.1020 (197)	-.0592 (219)	-.0020 (220)	-.0277 (222)	-.0203 (222)	.0192 (221)
4451. CHMAAPT	.2443 (296)	.2795 (296)	.3515 (296)	.3721 (296)	-.0150 (296)	-.3049 (296)	.5121 (211)	.5277 (191)	.5254 (294)	.3558 (295)	.0822 (294)	-.1401 (293)
4300. PARIM2CH	.3929 (248)	.4295 (248)	.4337 (248)	.4356 (248)	-.1566 (248)	-.2686 (248)	.5553 (242)	.4511 (205)	.4255 (246)	.4523 (247)	.2331 (246)	-.1566 (245)
5300. PARIM2CH	.3593 (220)	.3669 (220)	.3021 (220)	.3477 (220)	-.1266 (220)	-.1838 (220)	.4568 (197)	.5878 (220)	.3943 (217)	.3752 (219)	.2098 (219)	-.1036 (218)
4303. PARTDCH	-.2897 (244)	-.4421 (244)	-.4200 (244)	-.5205 (244)	.3502 (244)	.5456 (244)	-.5656 (238)	-.4290 (201)	-.4384 (242)	-.4568 (243)	-.2899 (242)	.3803 (241)
5303. PARTDCH	-.2049 (219)	-.3459 (219)	-.4318 (219)	-.5181 (219)	.2494 (219)	.4355 (219)	-.4850 (196)	-.4532 (219)	-.4341 (216)	-.4501 (218)	-.2591 (218)	.2746 (217)

[a] All 4000 numbered parent items are mother responses
[b] All 5000 numbered parent items are father responses

Table 4 cont'd.

Zero Order Correlation Matrix

VARIABLE	4304. PARIMPCH	5304. PARIMPCH	4301. PARABCH	5301. PARABCH	4302. PAREFFCH	5302. PAREFFCH	698. TEACHABCH	1. SEX	4400. MTYPE	5204. PARTDPR	4451. CHMAAPT	4300. PARIM2CH	5300. PARIM2CH	4303. PARTDCH	5303. PARTDCH
4304.PARIMPCH[a]	1.0000														
5304.PARIMPCH[b]	.3359 (210)	1.0000													
4301.PARABCH	.1867 (253)	.1245 (210)	1.0000												
5301.PARABCH	.0970 (208)	.1765 (226)	.6522 (208)	1.0000											
4302.PAREFFCH	-.0728 (253)	-.0251 (209)	-.5616 (252)	-.4892 (207)	1.0000										
5302.PAREFFCH	-.1089 (209)	-.1460 (227)	-.4367 (209)	-.5005 (226)	.5050 (208)	1.0000									
698. TEACHABCH	-.0021 (239)	.1157 (216)	.5203 (239)	.5569 (214)	-.4119 (238)	-.3793 (215)	1.0000								
1.SEX	.1427 (250)	.0801 (224)	.0445 (250)	.0830 (222)	-.1849 (249)	-.1957 (223)	.0667 (325)	1.0000							
4400.MTYPE	-.0033 (249)	.0352 (206)	.0357 (249)	.1796 (204)	-.1520 (248)	-.0815 (205)	.1775 (243)	-.0692 (256)	1.0000						
5204.PARTDPR	-.0143 (204)	-.0398 (221)	.0120 (204)	-.0545 (219)	-.1047 (203)	.1100 (220)	-.0088 (217)	-.1197 (227)	.0361 (210)	1.0000					
4451.CHMAAPT	.0084 (219)	-.0252 (193)	.4409 (219)	.4750 (191)	-.3370 (218)	-.3077 (192)	.5512 (290)	-.0065 (297)	.0908 (223)	-.0300 (195)	1.0000				
4300.PARIM2CH	.1637 (254)	.1419 (211)	.6183 (254)	.5177 (209)	-.2417 (253)	-.2392 (210)	.4143 (240)	-.0265 (251)	-.0121 (250)	.0941 (205)	.4401 (220)	1.0000			
5300.PARIM2CH	.0874 (208)	.2630 (226)	.4210 (208)	.6141 (226)	-.1782 (207)	-.1624 (226)	.4055 (214)	-.0059 (222)	.1181 (204)	.0864 (219)	.4155 (191)	.5724 (209)	1.0000		
4303.PARTDCH	-.1162 (250)	-.0526 (207)	-.6423 (250)	-.5588 (205)	.8021 (250)	.5678 (206)	-.4694 (236)	-.1789 (247)	-.1148 (246)	.1455 (201)	-.3798 (217)	-.4143 (251)	-.2793 (205)	1.0000	
5303.PARTDCH	-.0325 (207)	-.1253 (225)	-.5004 (207)	-.6212 (223)	.5105 (206)	.7308 (224)	-.4610 (213)	-.2381 (221)	-.0804 (203)	.1011 (218)	-.3617 (192)	-.3465 (208)	-.3040 (223)	.6339 (204)	1.0000

[a]All 4000 numbered parent items are mother responses
[b]All 5000 numbered parent items are father responses

Table 5

R^2 and Residual Values for Mother and Father Data

	Mother Data		Father Data	
Variable	R^{2a}	Residual[b]	R^{2a}	Residual[b]
PARIMPCH	.02	.99	.02	.99
PARABCH	.22	.88	.24	.87
PAREFFCH	.18	.91	.14	.93
TEACHABCH	.30	.84	.30	.84
PARFEXCH	.58	.65	.60	.63
TEACHEXCH	.84	.40	.87	.36
PARABIL	.41	.77	.26	.86
PAREXP	.20	.89	.11	.94
PARDIF	.21	.89	.15	.92
ABIL	.66	.58	.67	.57
FUTDIF	.22	.88	.24	.87
CURDIF	.51	.70	.47	.73
CUREXP	.75	.50	.68	.57
FUTEXP	.64	.60	.61	.62
PLANS	.37	.79	.38	.79

a. R^2 = % variance accounted for by all pre-determined variables

b. Residual = $\sqrt{1-R^2}$

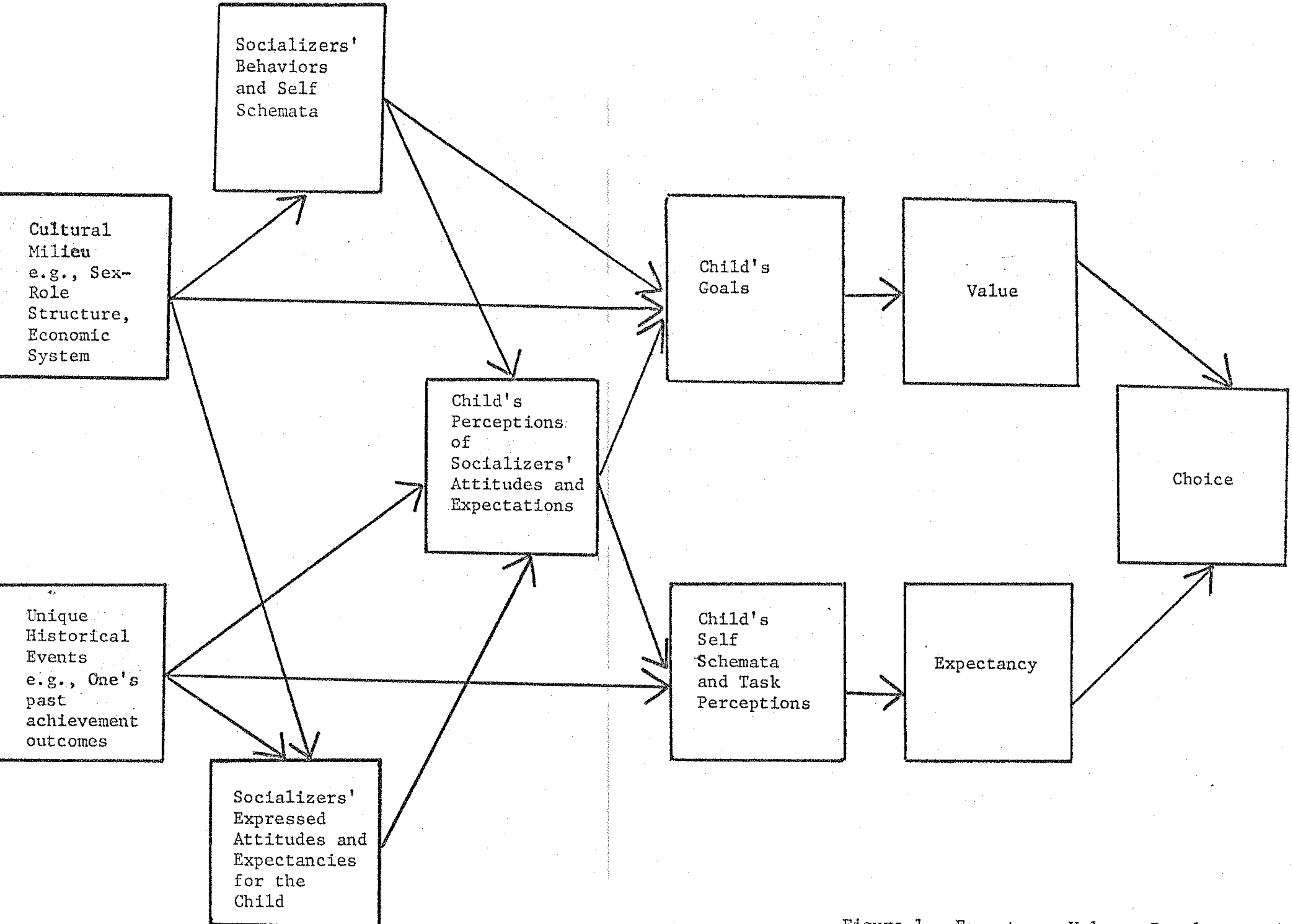

Figure 1. Expectancy-Value: Developmental Model.

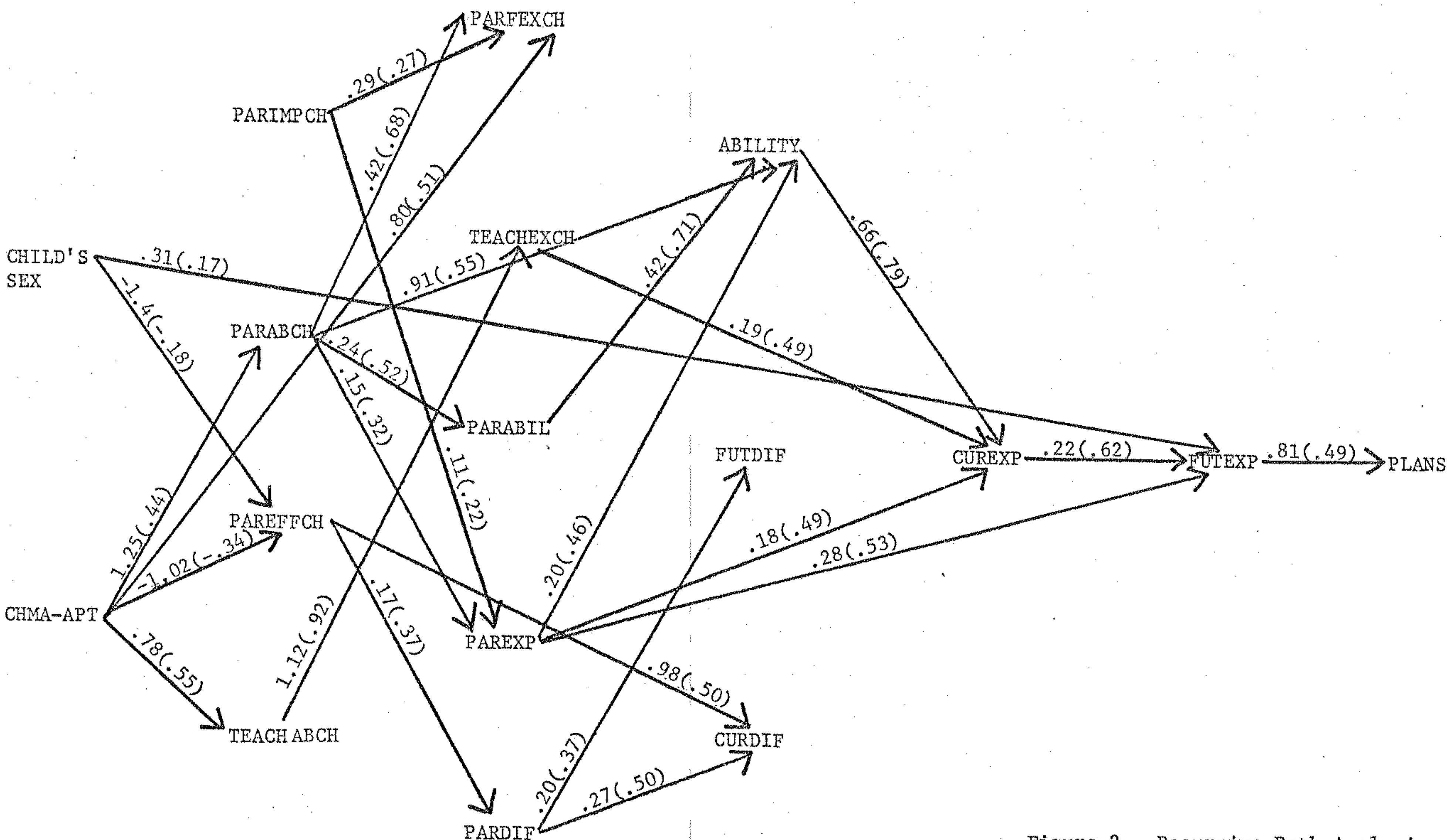

Figure 2. Recursive Path Analysis. Only mothers' data are used. The values in parentheses represent zero order correlations; the other numbers are unstandardized path coefficients. All paths at p$>$.01 are deleted.

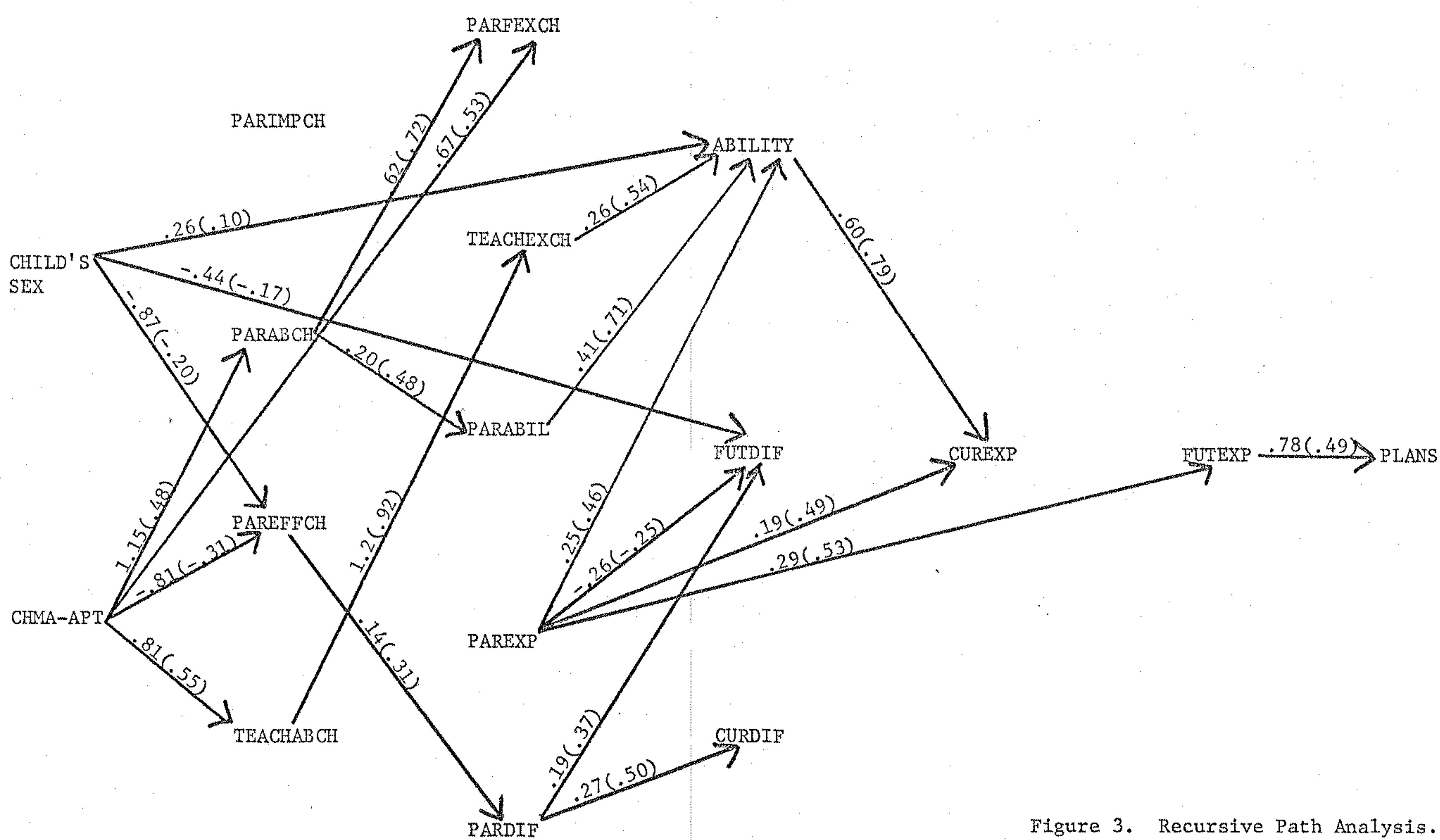

Figure 3. Recursive Path Analysis. Only fathers' data are used. The values in parentheses represent zero order correlations; the other numbers are unstandardized path coefficients. All paths at $p > .01$ are deleted.