

4.3 An Expectancy-Value Model of Achievement Choices: The Role of Ability Self-Concepts, Perceived Task Utility and Interest in Predicting Activity Choice and Course Enrollment

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- Why, despite recent efforts to increase the participation of women in advanced educational training and high-status professional fields, are women still under-represented in many fields - particularly those associated with physical science, engineering, and applied mathematics?
- Why do fewer women than men enroll in advanced math and physics courses?
- Why do fewer females than males at all ages participate in organized sports?

Over the past 15 years, my colleagues and I have tried to answer these types of questions. We have focused on the motivational and social factors influencing such long- and short-range achievement goals and behaviors as career aspirations, vocational and avocational choices, course selections, persistence on difficult tasks, and the allocation of effort across various achievement-related activities. Given the striking differences in the educational, vocational, and recreational patterns of males and females, we have been particularly interested in the motivational factors underlying males' and females' educational, vocational, and recreational decisions. Frustrated with the number of seemingly disconnected theories proliferating to explain sex differences in these achievement patterns, we developed a comprehensive theoretical framework to guide our research endeavor.

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Drawing upon the theoretical and empirical work associated with decision-making, achievement theory, and attribution theory, we have elaborated a model of achievement-related choices. This model, depicted in Figure 1, links educational, vocational, and other activity choices most directly to two sets of beliefs: the individual's expectations for success, and the importance or value the individual attaches to the various options perceived by the individual as available.

The model also specifies the relation of these beliefs to cultural norms, experiences, aptitudes, and to those personal beliefs and attitudes commonly assumed to be associated with achievement-related activities by researchers in this field (Eccles et al., 1983). In particular, the model links achievement-related beliefs, outcomes, and goals to causal attributional patterns, to the input of socializers (primarily parents and teachers), to gender-role beliefs, to self-perceptions and self-concept, and to one's perceptions of the task itself. Each of these factors is assumed to influence both the expectations one holds for future success at the various achievement-related options, and the subjective value one attaches to these various options. In turn, the expectations and the value attached to the various options are assumed to influence choice among these options.

For example, let us consider course enrollment decisions. The model predicts that people will be most likely to enroll in courses that they think they will do well in and that have high task value for them. Expectations for success depend on the confidence the individual has in his/her intellectual abilities and on the individual's estimations of the difficulty of the course. These beliefs have been shaped over time by the individual's experiences with the subject matter and by the individual's subjective interpretation of those experiences (e.g., does the person think that her/his successes are a consequence of high ability or lots of hard work?). The value of a particular course is also influenced by several factors, including the following: Does the person like doing the subject material?; Is the course required?; Is the course seen as instrumental in meeting one of the individual's long- or short-range goals?; Have the individual's parents or counselors insisted that the course be taken or, conversely, have other people tried to discourage the individual from taking the course?; Is the person afraid of the material to be covered in the course?

This example should make clear an very important feature of our perspective: the explicit assumption that achievement-related decisions, such as the decision to enroll in an accelerated math program or to major in education rather than law or engineering, are made within the

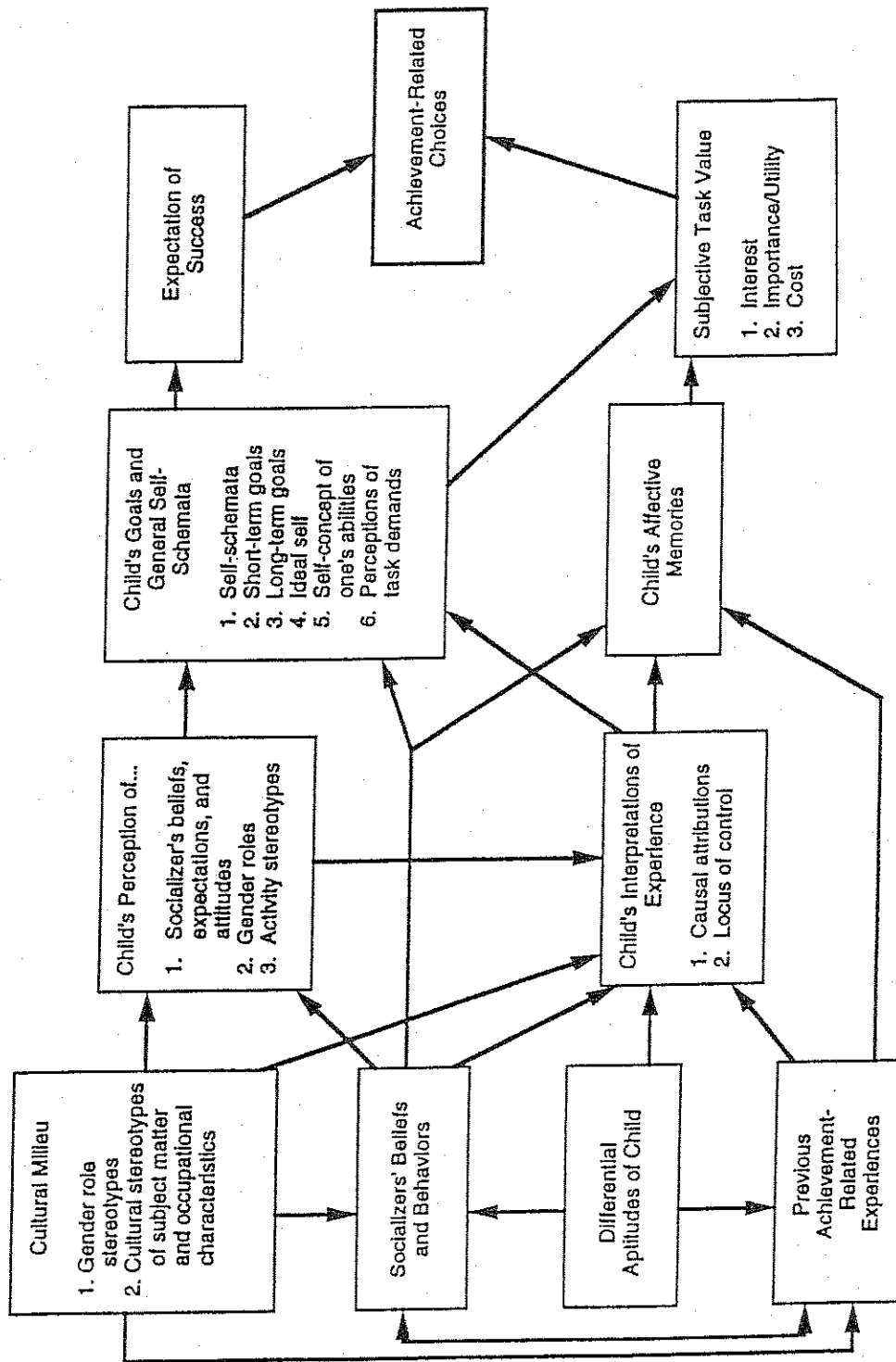


Fig. 1: Eccles et al. Model of Achievement-related Choices

context of a complex social reality that presents each individual with a wide variety of choices, each of which has both long-range and immediate consequences. Furthermore, we acknowledge that the choice is often between two or more positive options or between two or more options each of which has both positive and negative components. For example, the decision to enroll in an advanced math course is typically made in the context of other important decisions such as whether to take advanced English or a second foreign language, whether to take a course with one's best friend or not, whether it's more important to spend one's senior year working hard or having fun, etc. Theorists have too often focused attention on the reasons why gifted, capable women do not select high-status achievement options but have failed to ask why they select the options they do. This approach implicitly assumes that complex choices such as career and course selection are made in isolation from one another; for example, it is assumed that the decision to take advanced math is based primarily on variables related to math. We explicitly reject this assumption, arguing instead that it is essential to understand the psychological meaning of the roads taken as well as the roads not taken if we are to understand the dynamics leading to the differences in men's and women's achievement-related choice.

As an example, consider two junior high school students: Mary and Barbara. Both young women enjoy mathematics and have always done very well. Both have been identified as gifted in mathematics and have been offered the opportunity to participate in an accelerated math program at the local college during the next school year. Barbara hopes to major in journalism when she gets to college and has also been offered the opportunity to work part time on the city newspaper doing odd jobs and some copy editing. Mary hopes to major in biology in college and plans a career as a research scientist. Taking the accelerated math course involves driving to and from the college. Since the course is scheduled for the last period of the day, it will take the last two periods of the day as well as 1 hour of after-school time to attend the course. What will the young women do? In all likelihood, Mary will enroll in the program because she both likes math and thinks that the effort required to take the class and master the material is worthwhile and important for her long-range career goals. Barbara's decision, however, is more complex. She may want to take the class but may also think that the time required is too costly, especially given her alternative opportunity at the city paper. Whether she takes the college course or not will depend a lot on the advice she gets at home and from her counselors. If they stress the importance of the math course, then its

subjective worth to her will increase. If its subjective worth increases sufficiently to outweigh its subjective cost, then Barbara will probably take the course despite its cost in time and effort.

In summary, we assume that achievement-related choices, whether made consciously or unconsciously, are guided by the following: (a) one's expectations for success on the various options, (b) the relation of the options to both one's short- and long-range goals and to one's core self-identity and basic psychological needs, (c) the individual's gender-role schema, and (d) the potential cost of investing time in one activity rather than another. All of these psychological variables are influenced by one's experiences, by cultural norms, and by the behaviors and goals of one's socializers and peers.

In this paper, we present findings from our longitudinal study of adolescent development in Southeastern Michigan—the Michigan Study of Adolescent Life Transitions (MSALT)—that are directly relevant to this model. This longitudinal study began in 1984 with a cohort of sixth graders drawn from 10 school districts in southeastern Michigan. The vast majority of the sample is white and comes from working and middle class families living in primarily middle class communities. We have followed approximately 1200 of these youths through seven waves of data collection: two while they were in the sixth grade, two while they were in the seventh grade, one while they were in tenth grade, one while they were in twelfth grade, and one in 1992-3 when most of them were 21-22 years of age. The data reported here come from the waves collected while the adolescents were in the tenth and twelfth grades.

The data were collected via self-administered questionnaires completed during school hours. The seventh grade waves were collected in the adolescents' math classrooms. For the tenth and twelfth grade waves, the adolescents were released from their classrooms to fill out the questionnaire in a large room, usually the lunchroom. In addition, complete school records from grade five on were collected for all participants; these included grades, absences, courses taken, and any disciplinary measures taken by the schools.

In this paper, we use the results to test the hypotheses represented on the far right side of the model, namely, that individual differences in activity choices and course enrollment decisions are mediated by individual differences in constructs linked to expectancies for success (e.g., self-concept of one's ability) and in constructs linked to subjective task value (e.g., perceived task importance/utility and enjoyment while engaged in the activity). We focus on the following specific questions:

- 1) are there gender differences in involvement in sports and in enrollment patterns in advanced mathematics courses and physics courses in high school?
- 2) are there gender differences in expectations of success and perceived task value in math, physics, and sports; and
- 3) do these gender differences mediate the gender differences in course enrollment and sport participation?

We use the following three sets of data:

- 1) tenth grade measures of the students' ability self-perceptions, perceived task importance, and enjoyment for math, physics, and sports;
- 2) objective measures of the adolescents' mathematical ability—the quantitative sub-score for the Differential Aptitude Test collected at grade 9; and
- 3) indicators of the adolescents' course enrollment patterns and sport participation at both grade 10 and grade 12.

Results

Sports

As expected, the males participated in team sports to a greater extent than the females in both tenth and twelfth grade. Figure 2 illustrates the path analyses for participation on a competitive sports team at both tenth and twelfth grades. We entered all three psychological predictors at the same time in these analyses. As can be seen, the gender differences in participation in both grade 10 and grade 12 were totally mediated by the three psychological predictors measured at grade 10. The strongest predictor was perceived importance/utility. Tenth grade enjoyment/interest was a significant predictor only for tenth grade sport participation. However, these three psychological predictors are highly intercorrelated by grade 10; this intercorrelation problem is especially marked for self-concept of ability and liking/interest. Consequently, we also ran the models with each predictor alone. Interest was a significant predictor when it was entered alone, as is illustrated in Figure 3.

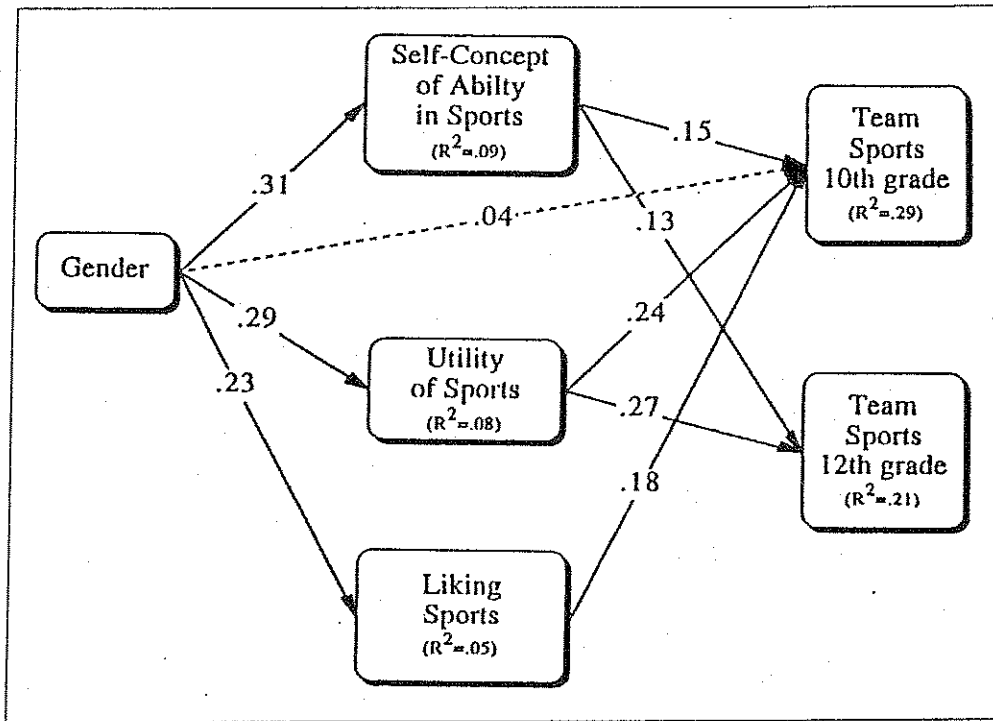


Fig. 2: Predicting Team Sports Participation.1

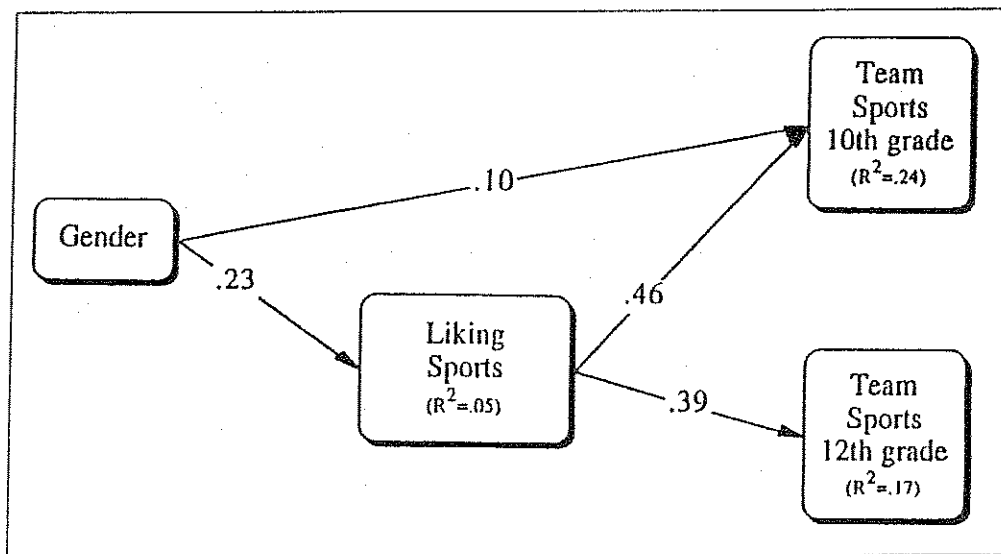


Fig. 3: Predicting Team Sports Participation.2

Honors Track Math

Figures 4, 5, and 6 illustrate the results for predicting the number of honors math courses taken in high school by those adolescents who began high school in the honors math track. Because we were interested in the effects of gender independent of any actual ability differences that might exist, we included the students' Differential Aptitude Test (DAT) quantitative score as a control for ability differences in each analysis. Figure 4 shows the significant zero-order relation of both gender and DAT to the number of honors track math courses taken in this set of students: the males took slightly more courses than the females, and those with higher DAT-quantitative scores took slightly more courses than those with lower DAT-quantitative scores.

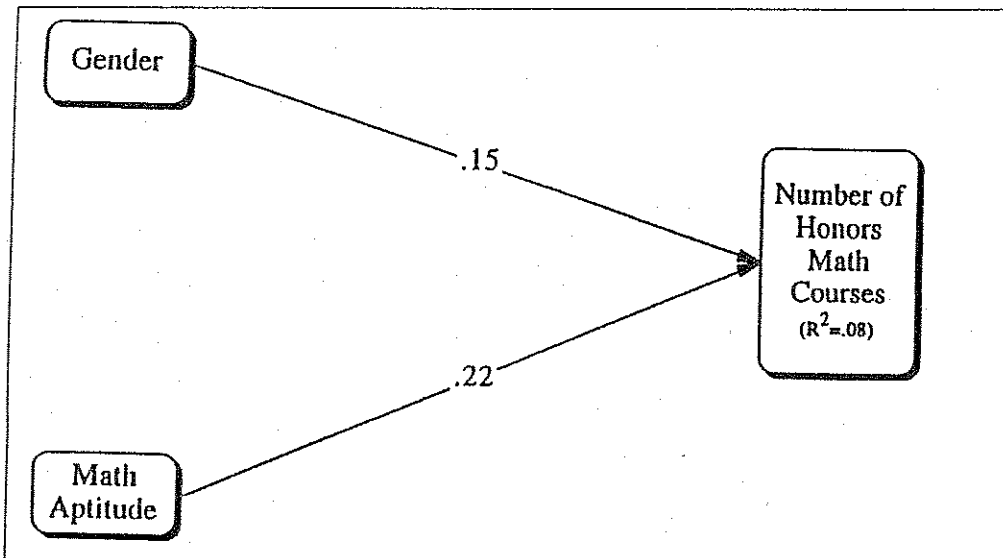


Figure 4: Predicting Number of Honors Math Classes. 1
($N = 223$ Honors Students)

Figure 5 illustrates the path analysis with all three psychological predictors entered as mediators. The gender effect was totally mediated by perceived importance/utility. The DAT effect was also substantially mediated by perceived importance/utility. Neither tenth grade enjoyment/interest nor self-concept of ability predicted number of courses taken. However, interest was a significant predictor when it was entered as the sole predictor (see Figure 6).

Interestingly, however, neither sex nor DAT scores predicted individual differences in reported liking of math in this group of students. Given

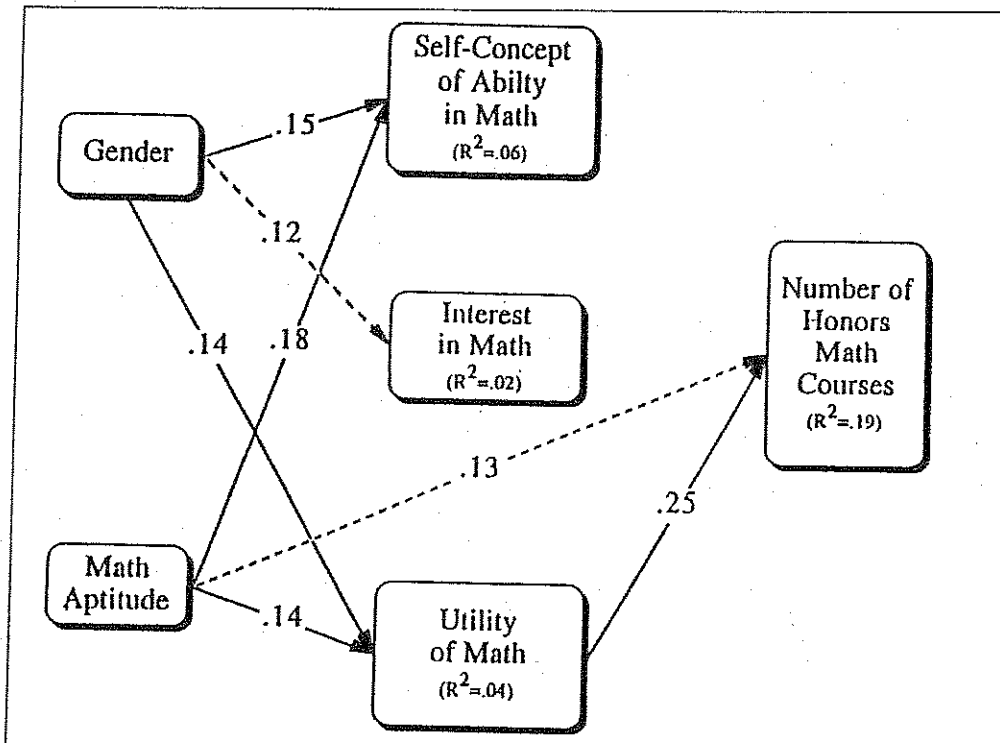


Figure 5: Predicting Number of Honors Math Classes. 2
(N = 223 Honors Students)

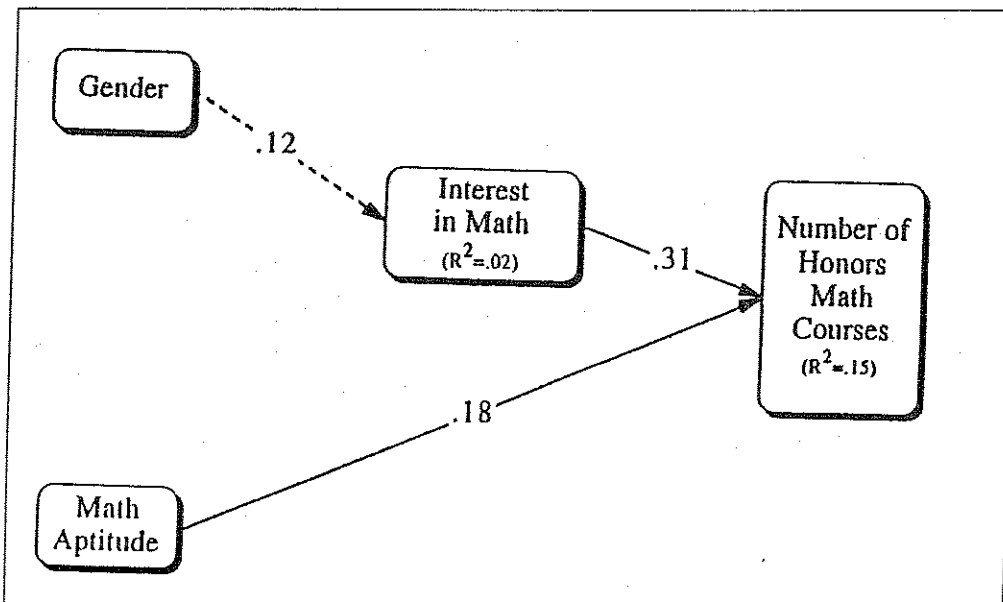


Fig. 6: Predicting Number of Honors Math Classes. 3
(N = 223 Honors Students)

other work suggesting the importance of efficacy/ability self-concept beliefs as a mediator of gender differences in course enrollment, we also ran the path model with only self-concept of ability and importance/utility as mediators (Betz & Fitzgerald, 1987; Eccles, 1994). The results are illustrated in Figure 7.

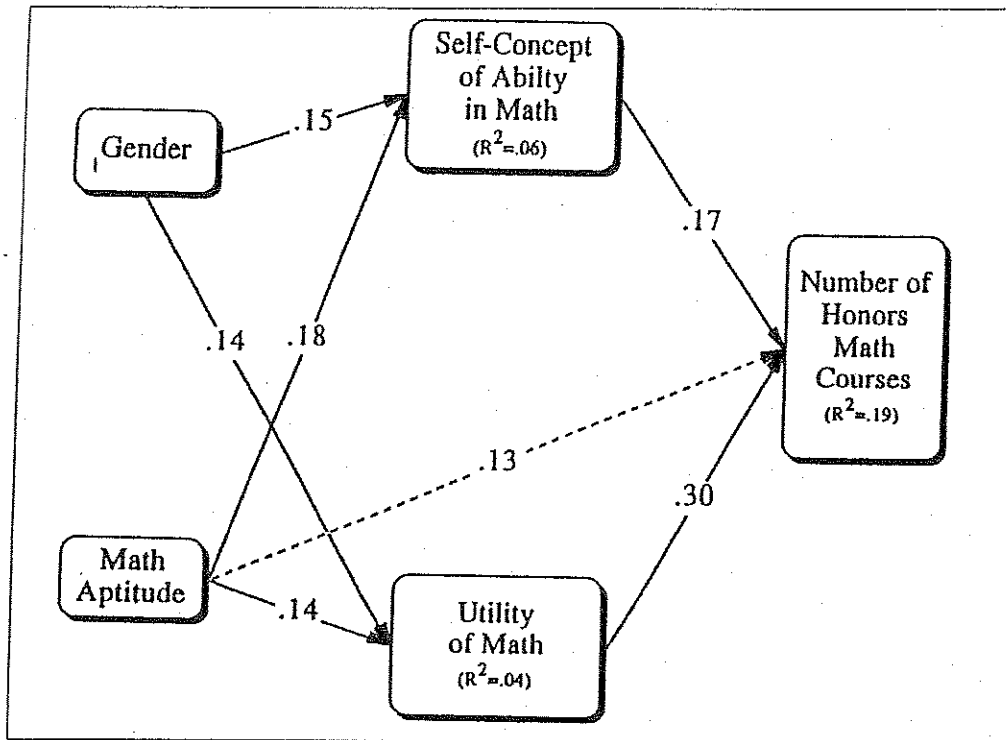


Fig. 7: Predicting Number of Honors Math Classes. 4
($N = 223$ Honors Students)

As can be seen, self-concept of ability did partially mediate both the gender and the DAT effects when interest was omitted from the model.

These results provide good support for the Eccles et al. model, particularly with regard to the power of the two subjective value belief constructs in explaining both individual differences and gender differences in honors students' high school math course enrollment patterns. We were particularly struck by the strength of the importance/utility construct. Recall the example provided earlier about the two young women who were deciding whether or not to take the college course. We stressed the importance of the perceived utility of the course for the young women's future plans. These data support this emphasis. At this point in these students' lives, they must begin to

choose among elective courses. These findings suggest that they weigh the utility of the course for their future educational and vocational goals heavily in making these choices.

Physics

The females in this sample were also less likely than the males to take physics courses in high school. Figures 8 and 9 illustrate the path analytic results for predicting the number of physical science courses taken in high school for those 695 adolescents with complete data in our longitudinal sample.

Figure 8 illustrates the path analyses for the total number of physics courses testing the mediating role of the students' attitudes toward physics. Neither the gender nor the DAT effect was totally mediated by the psychological predictors. However, perceived utility/importance had an independent predictive relation to the number of physics courses taken and was also weakly related to both gender and math

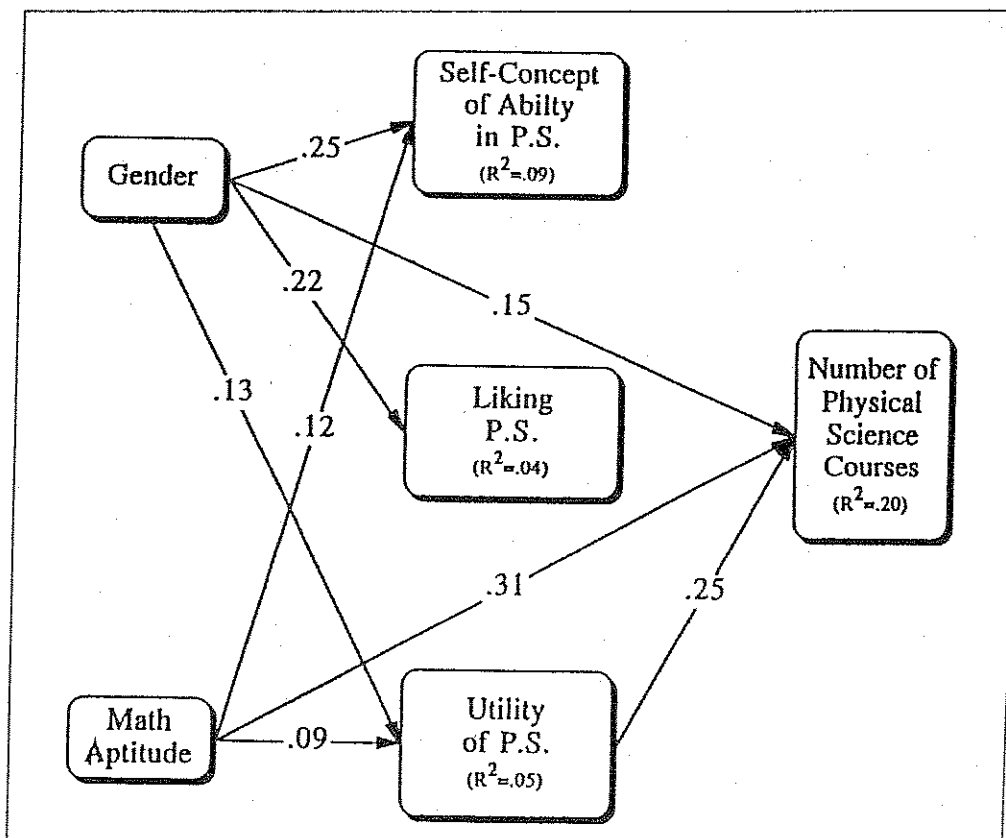


Fig. 8. Predicting Number of Physics Classes. 1

aptitude, suggesting a weak indirect effect of these predictors passed through perceived utility.

The mediating effect of liking alone is illustrated in Figure 9. As is true for both sports and honor's math, liking of physics significantly predicted number of courses taken when it was the sole mediator, and it was significantly linked to gender in the expected direction (males reported liking physical science better than females), suggesting an indirect effect of gender passed through liking in addition to the significant direct.

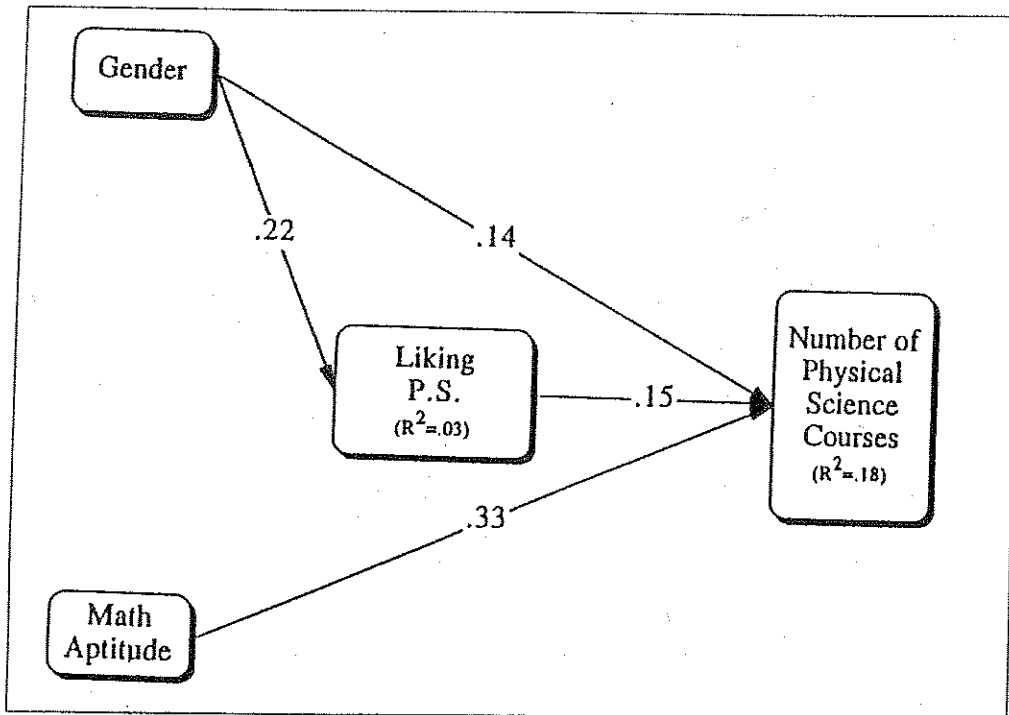


Fig. 9: Predicting Number of Physics Classes. 2

In conclusion, we would like to stress the fact that perceived importance/utility, rather than either self-concept of ability or liking, was the strongest predictor of these types of activity choices. This pattern was especially true in the academic domain perhaps because we controlled for individual differences in aptitude. There is currently considerable debate regarding the relation between performance and self-concept of ability; the safest conclusion is that they are reciprocally related. Although the data presented here do not speak to this debate directly, the results for the honors math course enrollment patterns suggests that among students with sufficient ability to take honors math courses, self-concept of ability does play some role in predicting enrollment decisions.

What is especially interesting in these findings is that gender predicted variations in self-concept of ability even after controlling for DAT scores. We have other findings from earlier waves in this study suggesting that males in the highest achieving group are overestimating their math ability, while females in this same group are estimating their math ability quite accurately (although lower in an absolute sense than the males). The results reported here suggest that this overestimation continues into high school and facilitates more extensive enrollment in honors math courses among these male students.

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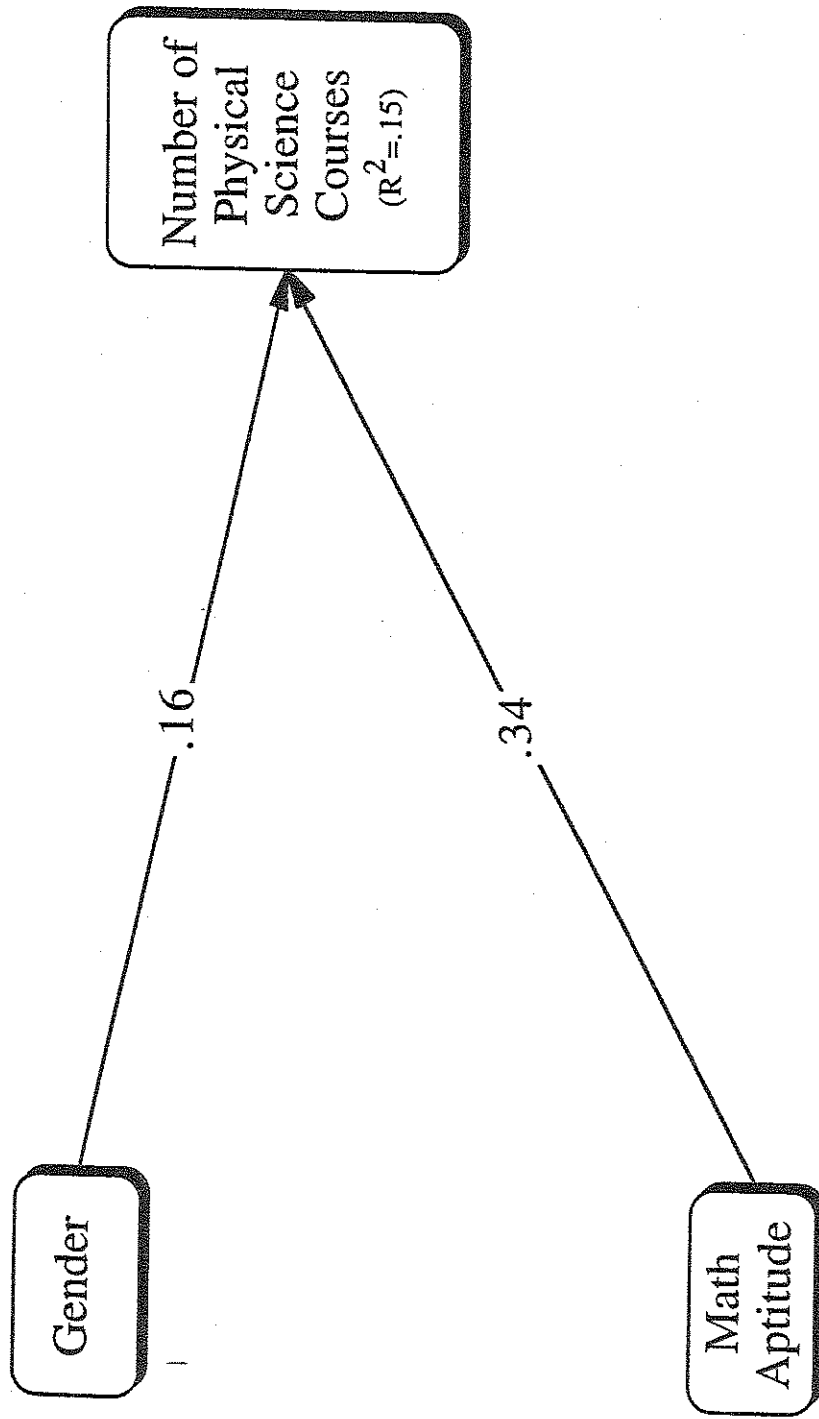
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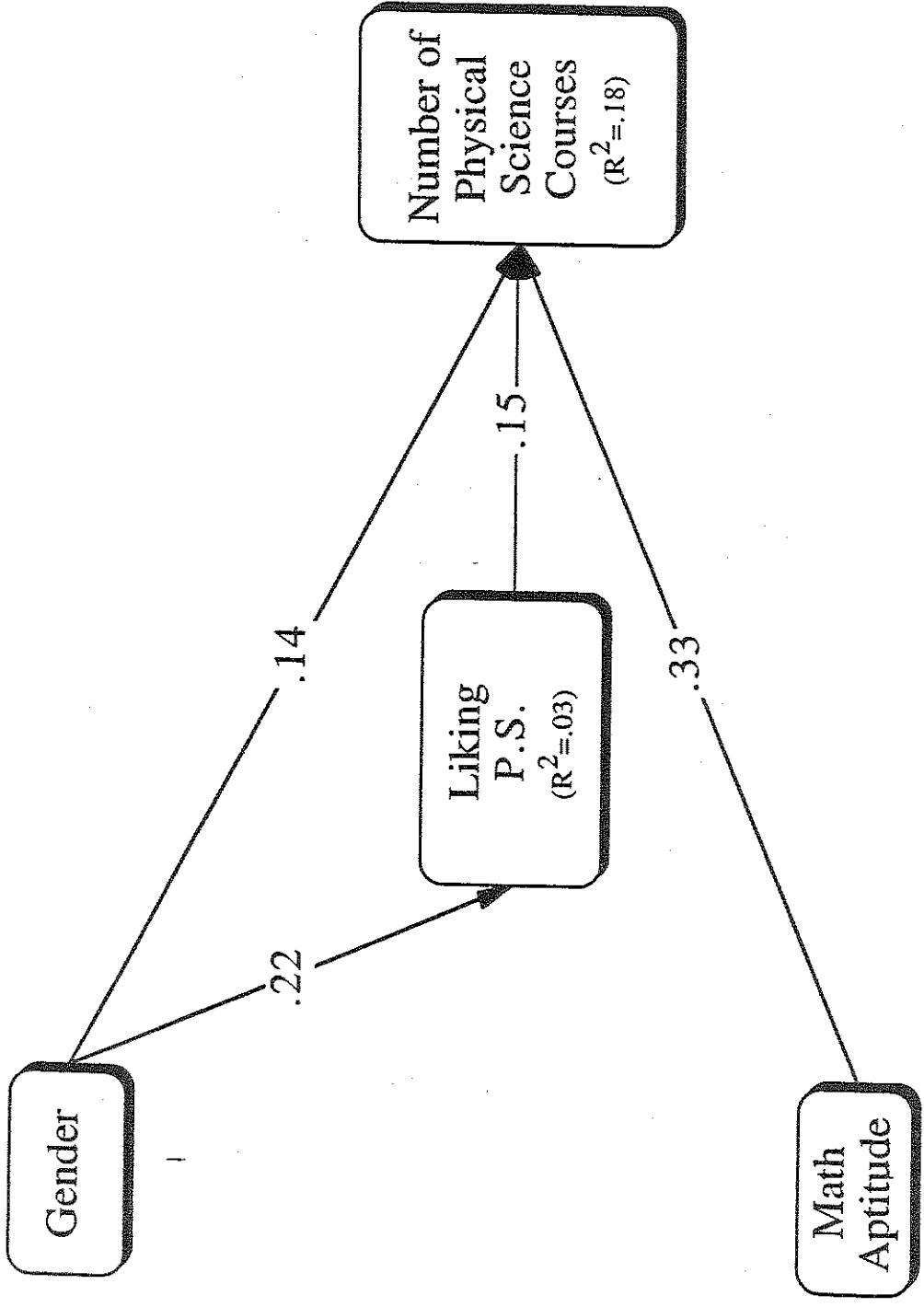
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Predicting # of Physical Science Classes (sex, DNT) .1



Predicting Number of Physical Science Classes .3



Predicting # of Physical Science classes .5

