In the Mind of the Actor: The Structure of Adolescents' Achievement Task Values and Expectancy-Related Beliefs

Jacquelynne S. Eccles
Allan Wigfield
University of Michigan

The authors assessed the dimensionality of and relations between adolescents' achievement-related beliefs and self-perceptions, focusing on subjective valuing of achievement. Beliefs derived from expectancy-value theory (adolescents' valuing of achievement activities, expectancies for success and ability perceptions, and perceptions of task difficulty) were assessed. Adolescents completed questionnaires once a year for 2 years. Confirmatory factor analyses indicated that achievement-related beliefs separate into three task values factors (interest, perceived importance, and perceived utility), one expectancy/ability factor (comprising beliefs about one's competence, expectancies for success, and performance perceptions), and two task difficulty factors (perceptions of difficulty and perceptions of effort required to do well). Task values and ability perceptions factors were positively related to each other and negatively correlated to perceptions of task difficulty.

Individual differences in achievement-related behaviors have been a central concern of social and personality theory for at least the last 40 years. Because most achievement theories derive from classic expectancy/value models of behavior (e.g., Atkinson, 1957), they typically include constructs linked to both expectancies and task value. However, most theorists have focused on the expectancy component of the expectancy/value dichotomy, and so constructs related to this component have proliferated in the literature. In contrast, until recently, very little attention has been given to either defining and measuring the value component or empirically assessing its relationship to the expectancy component. In this article, we undertake these tasks, focusing in particular on the values construct. We begin by reviewing existing work on expectancies and values.

Expectancies

Expectations for success, and related constructs, have been assigned a central role in almost all cognitive theories of motivation, such as attribution theory (e.g., Weiner et al., 1971), self-efficacy theory (Bandura, 1986), the self-worth perspective (Covington, 1984), and classic expectancy/value theory (Atkinson, 1957). Theorists have differed, however, in their operational definitions of expectations for success and in how broadly they conceptualize the construct. Atkinson (1957) defined subjective expectancy and objective task difficulty as synonymous, and he operationally defined expectancy in terms of the proportion of individuals who have succeeded at the task in the past. He labeled this construct P_s (probability of success) and gave it a prominent role in his classic theory of achievement motivation.

In contrast, other theorists have argued for a more explicit operational distinction between subjective expectancy and task difficulty, arguing that task difficulty, defined as the proportion of individuals in the population who succeed in the task, is just one of several influences on subjective expectancy (e.g., Bandura, 1986; Crandall, 1969; Eccles, 1987; Eccles [Parsons] et al., 1983; Feather, 1982; Heckhausen, 1977; Kukla, 1972, 1978; Weiner et al., 1971). For example, in their

Authors' Note: Allan Wigfield is now at the University of Maryland. The writing of this article was supported in part by a grant from the National Science Foundation (BNS-8510504) to Jacquelynne S. Eccles and Allan Wigfield. Data collection was supported by a grant from the National Institute of Child Health and Human Development (G78-0022) to Jacquelynne S. Eccles. Address correspondence to Jacquelynne S. Eccles, 5271 ISR, University of Michigan, Ann Arbor, MI 48106-1248.

PSPB, Vol. 21 No. 3, March 1995 215-225

model of motivated task choice and performance, Eccles (Parsons) et al. (1983) distinguished between self-concept of one's domain-specific abilities and perceived task difficulty, and predicted that these two beliefs would interact in predicting expectations for success in particular school subjects. Self-concept of domain-specific ability was predicted to relate positively to expectancies, whereas task difficulty perceptions were predicted to relate negatively to expectancies.

The importance of distinguishing between constructs associated with confidence in one's ability and task-specific expectancy has become very salient in the past 15 years, as more and more theorists have emphasized domain-specific self-concept of ability and domain-specific self-efficacy beliefs as prime psychological mediators of behavior (e.g., Bandura, 1986; Covington, 1984; Harter, 1982; Kukla, 1972; Nicholls, 1984). Generally, then, although the theorists discussed have all endorsed the important role of expectancies in motivating behavior, the conceptualization of this construct and its causal antecedents have become much more refined, and the role of domain-specific ability perceptions has gained prominence.

Task Value

Atkinson (1957) defined task value in terms of the incentive value of anticipated success (the anticipated pride one would feel in accomplishment). He operationally defined it in terms of P_s, arguing that the incentive value of success at any particular task is inversely related to its objective difficulty (i.e., incentive value = $1 - P_s$). This definition effectively eliminated task value from his equation for achievement behavior, which may account for the relative sparsity of either theoretical or empirical work on task value within the achievement literature (see Eccles, 1987; Eccles [Parsons] et al., 1983; Parsons & Goff, 1980; Wigfield & Eccles, 1992).

A variety of other theorists have offered less mathematically precise but broader definitions of task value. Both Battle (1966) and Crandall (1969) defined task value in terms of the subjective attainment value (the importance of attaining a goal) and objective task difficulty. Rotter (1982) defined task value as the anticipated reward the individual will receive from engaging in the activity. Rewards may derive either directly from the activity itself or indirectly through the activity's instrumental role in acquiring other desired consequences.

Building on Rokeach's (1980) work on broader human values, Feather (1982) discussed task value in terms of systems that

> capture the focal, abstracted qualities of past encounters, that have a normative or oughtness quality about them, and that function as criteria or frameworks against which present experience can be tested. They are tied to our feelings and can function as general motives. (p. 275)

In terms of motivational consequences of these value systems, he assumed that values affect the valence of specific activities or situations for the individual and, therefore, are linked to action (e.g., approaching or avoiding the activity).

Building on a similar conception of values, value systems, and activity valence, Eccles and her colleagues (Eccles [Parsons] et al., 1983; Parsons & Goff, 1980) offered a broad definition of subjective task value and specified several subcomponents. In general, these investigators assumed that task value is determined by characteristics of the task itself; by the broader needs, goals, values, and motivational orientations of the individual; and by affective memories associated with similar tasks in the past. The degree to which a particular task is able to fulfill needs, confirm central aspects of one's self-schema, facilitate reaching goals, affirm personal values, and/or elicit positive versus negative affective associations and anticipated states is assumed to influence the value a person attaches to engaging in that task. In turn, Eccles (Parsons) et al. predicted that individuals will be more likely to engage in valued tasks; thus individuals' values are posited to have both motivational and behavioral consequences. Finally, Eccles and her colleagues (1987; Parsons & Goff, 1980) argued that gender differences in task value may underlie many of the gender differences in role-choice behaviors, such as occupational and leisure activity choice.

Eccles and her colleagues (1987; Parsons & Goff, 1980) further argued that task value be conceptualized in terms of four major components: attainment value, intrinsic value or interest, utility value, and cost. Like Crandall (1969), they defined attainment value as representing the importance of doing well on a task in terms of one's self-schema and core personal values. Intrinsic or interest value is the inherent enjoyment or pleasure one gets from engaging in an activity (see also Deci & Ryan, 1985). Utility value is the value a task acquires because it is instrumental in reaching a variety of long- and short-range goals. Finally, cost is what is lost, given up, or suffered as a consequence of engaging in a particular activity (see Eccles, 1984; Eccles [Parsons] et al., 1983). The first three components are best thought of as attracting characteristics that affect the positive valence of the task. Cost, in contrast, is best thought of as those factors (such as anticipated anxiety and anticipated cost of failure) that affect the negative valence of the activity.

Relations Between Expectancy and Task Value Constructs

As discussed earlier, Atkinson (1957) proposed that expectancies for success and incentive values are inversely related. Unlike Atkinson, few other investigators have made explicit predictions concerning the relationship between subjective task value and expectancies for success, and those who have make discrepant predictions. For example, decision theorists typically assume that expectancies and values are independent of one another (e.g., Fischoff, Goitein, & Shapira, 1982). In contrast, Feather (1982) hypothesized a positive relationship because of people's tendency toward wishful thinking: People will overestimate their probability of success on activities they value highly. One also would expect a positive association based on principles of classical conditioning: To the extent that affective memories influence task value, it seems likely that the constructs linked to task value will be positively, rather than negatively, associated with self-perceptions linked to expectancy. This should be especially true for those activities that are inherently challenging or at least moderately difficult, such as most activities in academic achievement contexts.

Summary and Specific Analytic Goals

Thus, over time, there has been an evolution in the conceptualization of constructs linked to expectancy for success and task value, as well as a refinement in the components of each construct. In this study, we addressed these issues by examining the dimensionality of a set of items measuring the components of task value, expectancies for success, and perceptions of task difficulty, and by looking at the relations between these constructs. We assessed domain-specific beliefs (in this case beliefs about math) because recent work in the self-beliefs literature suggests that individuals' beliefs are domain specific and the strongest links between beliefs and behavior occur at this level (Fishbein & Ajzen, 1975; Marsh & Shavelson, 1985). Previous work using exploratory factor analytic procedures with this set of variables from a different sample of adolescents (see Parsons, 1980) yielded a fairly simple three-factor solution: Self-Concept of Ability (which included the perceived competence, perceived performance, and expectancy indicators), Perceived Task Difficulty (which included the required and actual effort and task difficulty indicators), and Subjective Task Value (which included the items assessing all four of the task value components). Although these results suggest that many of the distinctions being made in the theoretical literature do not obtain in the minds of lay individuals, they also suggest that expectancy-ability measures are distinct from perceptions of task difficulty and task value. In this study, we used confirmatory factor analysis to obtain a more sensitive test of the factor structure underlying this set of variables and to test more explicitly our model of the dimensionality of these different constructs.

Based on the literature reviewed earlier, the model proposed by Eccles (Parsons) et al. (1983) and the empirical work (on a different sample of adolescents) reported in Eccles, Adler, and Meece (1984) and Parsons (1980), we predicted a three-factor structure for the Subjective Task Value items reflecting the latent variables of intrinsic interest value, attainment value (importance of being competent in the domain), and extrinsic utility value of engaging in the activity. We predicted two separate factors for expectancy/ability beliefs, with the expectancy items factoring separately from the ability and performance perception items. For the Perceived Task Difficulty items, we predicted that two factors will be distinguished, one tapping perceptions of the difficulty of the subject area, and the other the amount of effort required to do well in the subject.

In previous work, a measure of subjective task value that combined attainment value, intrinsic value, and extrinsic utility value of an activity related positively to the subjects' ability perceptions (Parsons, 1980). In this study, we assessed how each of these constructs relates to adolescents' ability/expectancy perceptions. We hypothesized that individuals should come to like or enjoy (intrinsically value) those activities at which they have done well at in the past and are reasonably confident of being able to succeed. Conversely, individuals should come to dislike those tasks that they have done poorly at in the past, especially if they have attributed previous poor performance to lack of a culturally valued ability. Thus liking and expectancy/ability perceptions should be positively related (for similar arguments, see Fishbein & Ajzen, 1975). A similar positive association between expectancy-related constructs and attainment value (perceived importance) seems likely to the extent that individuals are interested in maintaining a positive self-image. One effective way to maintain one's self-esteem is to rate as very important those activities that one is most confident about succeeding at and to rate relatively less important those activities one is least confident about succeeding at (for related arguments, see Eccles, Wigfield, Blumenfeld, & Harold, 1984; Epstein, 1973; Harter, 1985).

Predictions regarding perceived utility are more tentative. Because the perceived utility value of any particular task is determined by its links to goals and activities that are extrinsic to the task, utility value can be influenced by a wide range of things, such as the gender role-appropriateness of the goals or activities the task is seen as instrumental in achieving. Given these other influences on utility value, we predicted that the positive links between expectancy-related constructs and the utility value of math will be weaker than the links between expectancy-related constructs and attainment value and interest.

We also tested how expectancy-related constructs and task value relate to task difficulty perceptions. Based on the literature reviewed previously, we predicted negative relations between perceptions of expectancy/ability and perceptions of task difficulty. Because of the predicted positive association between the expectancy/ability constructs and the value constructs, there should be negative associations between the components of task value and the components of perceived task difficulty. However, because we viewed this negative association as mediated by the impact of perceived task difficulty on the expectancy/ability constructs, we expected that these latter negative associations should be weaker. It is important to note that this prediction is counter to the association hypothesized by Atkinson (1957). He predicted that the value of success on a task would increase with increasing perceived task difficulty. Although this prediction may be true for broad ranges of task difficulty (e.g., very easy to moderately difficult) and for more mature reasoners, we predicted that it will not be true for adolescents' beliefs about academic subject areas that they perceive as rather difficult. In that situation, we believe the self-esteem maintenance motives outlined above will dominate adolescents' judgments of task value.

METHOD

Participants

The Year 1 sample consisted of 742 predominantly White, middle-class adolescents in Grades 5 through 12, with approximately 90 adolescents at each grade. Adolescents comprised the sample because they have differentiated self-beliefs (Marsh & Shavelson, 1985) and extensive experience with mathematics. There were 366 females and 376 males in the sample. Data from the Year 1 sample were used to develop the various models. The Year 2 sample consisted of 575 adolescents in Grades 6 through 12 (88% of the 5th through 11th graders of Year 1). The Year 2 data were used to test the models developed with the Year 1 data. The sample was drawn using the mathematics classroom as an intermediate sampling unit. Classrooms at each grade level were chosen randomly from among classrooms whose teachers volunteered to participate in the study. Within each classroom, all adolescents were asked to participate. Project staff members administered questionnaires to adolescents who had returned permission slips (about 85% of the adolescents) indicating their willingness to participate. All questionnaires were administered during the spring of each year of the study. In the analyses reported in this article, only adolescents with complete data on all measures are included (n for Year 1 = 707, n for Year 2 = 545).

Self- and Task-Perception Questionnaire

The Self- and Task-Perception Questionnaire contained items assessing many different constructs related to adolescents' beliefs, attitudes, and values about particular achievement domains as well as items assessing more general characteristics such as gender-role orientation and locus of control. The psychometric properties of the items and scales are quite good and have been reported elsewhere (see Eccles, Adler, & Meece, 1984; Eccles [Parsons] et al., 1983; Parsons, 1980). The items used in the analyses in the present study included 29 items comprising the following theoretically generated domain-specific constructs: enjoyment in doing task, perceived importance of task, perceptions of the extrinsic utility value of the subject area, ability perceptions, performance perceptions, expectations for success, perceived task difficulty, amount of effort required to do well, and actual amount of effort exerted. All items focused on the domain of mathematics. Responses for all of these items were made on 7-point Likert-type scales anchored only at the end points.

ANALYSIS

In the present study, the factor structure of these constructs was explored through exploratory and confirmatory factor analyses of the 29 items. The data were collapsed across age and gender, based on analyses of the invariance of the covariance structure of the data (see below), and also because developmental studies suggest that by the fifth grade, children have acquired these belief structures (Marsh & Shavelson, 1985; Nicholls, 1978; Parsons & Ruble, 1977). The exploratory factor analyses were used to eliminate items in order to define the constructs more precisely. The confirmatory analyses were used to test predictions concerning the factor structure of the general constructs (task value, task difficulty perceptions, and ability perceptions) and assessed relations between the various constructs (Long, 1983).

RESULTS

Covariance Invariance Analyses

To determine whether we could test the models on the whole sample, we assessed the invariance of the covariance matrices of the items for boys and girls, and younger (5th through 7th grade) and older (8th through 12th grade) adolescents, following procedures described by Jöreskog and Sörbom (1984). Results of the covariance invariance analyses showed that the matrices were reasonably invariant across groups. For the boys and girls, the chi-square with 190 degrees of freedom was 280.98, and Jöreskog and Sörbom's goodness-of-fit index (GFI) was .96, indicating invariance across the two groups. For the younger and older groups, the chi-square with 190 degrees of freedom was 535.86, with a GFI of .95, again indicating reasonable invariance across groups. The fit was somewhat poorer in the analysis of the younger and older adolescents, primarily because one of the covariance terms (between two of the values items) was smaller in the older group than in the younger group. Based on these results, we tested our models on the full sample.

Exploratory Factor Analyses

Separate exploratory factor analyses using an oblique rotation were conducted on the item sets measuring task values, task difficulty perceptions, and ability perceptions. Factors with eigenvalues equal to or greater than 1.0 were retained. For the nine task value items, the exploratory analyses suggested that a two- or three-factor solution best fit the data, based on an examination of the eigenvalues (the first three were 3.58, 1.16, and .99). Two of the nine items did not load highly in any of the exploratory analyses and so were dropped from the subsequent analyses reported in this article. The three-factor solution was consistent with the theoretical framework used to generate the items; the first factor of this three-factor set represented intrinsic value, the second represented attainment value, and the third represented extrinsic utility value (see appendix). Because the third eigenvalue was slightly less than 1.0, in the confirmatory analyses we assessed both two- and three-factor models of adolescents' task values.

For the 10 ability perceptions items, a one-factor solution appeared to best fit the data (the first three eigenvalues were 5.67, .83, and .66). All the items had loadings on this factor exceeding .50. A two-factor solution produced many double loadings and a weak second factor. Because only one factor appeared to be needed to describe the interrelations between the 10 variables, the five items loading greater than .70 were retained in the analyses reported below. These items are listed in the apendix.

For the 10 task difficulty perception items, a two-factor solution appeared to best describe the data (the first three eigenvalues were 4.58, 1.23, and .84). Three items assessing adolescents' perceptions of the actual effort they exert in math did not load highly on any of the factors in the exploratory analyses, and so they were dropped from subsequent analyses, leaving seven items (see appendix).

The retained 19 items tapping task values, task difficulty perceptions, and one's own ability perceptions are presented in the appendix. A principal components analysis of this set of items indicated that a three-factor solution best described the data (the first three eigenvalues were 7.27, 2.71, and 1.38). Inspection of the loadings from an oblique factor rotation indicated that the seven math items assessing perceptions of task difficulty loaded on the first factor, the seven math task value items on the second factor, and the five math ability perception items on the third factor. Few double loadings occurred. The items comprising each factor, and models proposing relations between the factors, were explored further using confirmatory factor analyses.

Confirmatory Factor Analyses

Confirmatory factor analysis (CFA) allows the researcher to test more precisely theoretically derived hypotheses about the structure of a set of variables, and it allows for the explicit comparison of different alternative models. It also provides statistical information about the models that help the researcher choose the best fitting model. In these ways (and others), CFA is an important advance over exploratory factor analytic techniques (see Long, 1983). CFA is best used when models are derived from explicit theories; because the models tested in the present study were derived from the theoretical model of Eccles (Parsons) et al. (1983) of children's achievement beliefs, CFA was very appropriate to use in this study. We used CFA to assess the factor structure of individuals' self-perceptions and to compare the structures in different groups. The particular program used was LISREL VI (Jöreskog & Sörbom, 1984).

Various goodness-of-fit indexes are used in CFA to assess how well a given model fits the data; unfortunately, there still is no one generally accepted index (see Marsh, Balla, & McDonald, 1988). We report two frequently used overall fit indexes—chi-square and Jöreskog and Sörbom's (1984) GFI. Marsh et al. (1988) showed that with increasingly large samples, the chi-square value for the same model increases, making it more likely that the model will be rejected. In their comparison of different goodness-of-fit indexes for the same model assessed with different sample sizes, they concluded that the GFI was one of the least affected overall indexes, and so we focus on that index.

For the comparisons of different factor models, we report the Tucker-Lewis (1973) index (TLI), which compares the fit of a theoretically derived model to a "null" model positing no relations between the variables. Marsh et al. (1988) showed that this index is less affected by sample size than are some other comparative indexes. We also used chi-square difference tests (see Long, 1983) to compare different target models. Finally, for the comparisons across groups, we examined whether the covariance matrices were invariant across groups (see Jöreskog & Sörbom, 1984; Marsh & Hocevar, 1985). This test has been described as the most rigorous way to examine invariance in the pattern of relations in a set of variables across different groups.

We first present separate CFAs of the items measuring each individual construct (five items tapping ability perceptions, seven items assessing task difficulty perceptions, and seven items assessing task value perceptions). These analyses assessed our predictions concerning the dimensionality of each of these sets of constructs. By comparing the fit of different alternative models, we were able to assess the usefulness of adding additional dimensions to explain the structure underlying superordinate constructs. Then we present a factor model based on all 19 items that assessed the dimensionality of all the general constructs and the relations between the different constructs. We developed the models using the data from Year 1, and then used the Year 2 data as an independent test of final models generated on the Year 1 data. We also assessed whether the covariance matrices were invariant across Year 1 and Year 2.

For these models, we assumed that the items would load on only one factor (the theoretical factor they were designed to measure), and we estimated all the factor loadings. The variances of the latent variables were set to 1, and the relations between the latent variables and the measurement error variances for each variable were estimated. We also allowed measurement error for items with similar wording or content to covary.

Task value. GFIs for a series of CFAs assessing the null, one-factor, two-factor (generated by combining in all possible ways the three theoretically defined components), and the three-factor models of task value are presented in Table 1. The null model fit very poorly, and each of the other models represented a highly significant improvement in fit over the null model. Inspection of the various GFIs indicated that in line with our predictions, the three-factor model fit the data quite well and represented a highly significant improvement in fit over all the one- and two-factor models. Thus the three-factor model was preferred for this set of items. The standardized confirmatory factor loadings and relations between factors in each year's sample are presented in Table 2. As predicted, adolescents' task value perceptions consisted of three components: an intrinsic interest component, an attainment value component, and an extrinsic utility value component. Also as predicted, these components were all positively related. In the Year 2 model, the three-factor model also provided very good fit. The pattern of factor loadings and relations between factors were very similar to those in the Year 1 analyses (see Table 2). The covariance invariance test presented in Table 1 shows that the matrices of these five items were invariant across years.

Expectancy/ability-related perceptions. The exploratory analyses indicated that a one-factor solution best described the data. Because we had predicted that there would be two factors, we generated both a two-factor model and a one-factor model in the confirmatory analyses. The GFIs for the null, one-, and two-factor models for ability perceptions are presented in Table 1. As can be seen, the null model fit quite poorly, and the one-factor model showed highly significant improvement in fit over the null model. In the one-factor model, we allowed for correlated error between Items 2 and 5, because the wording on those items was similar. The two-factor model actually fit more poorly because the constraint that items could only load on one factor was not tenable. Also, the correlation between the two factors was .95. Thus the one-factor model best described the interrelations in this set of items. The items loading on this factor in both years assessed adolescents' perceptions of their math ability, expectancies for success in math, and perceived performance in math (see appendix). This one-factor model also provided excellent fit in the Year 2 data (see Table 1), and the factor loadings were very similar. The covariance invariance test presented in Table 1 shows that the matrices of these five items were invariant across years.

Task difficulty perceptions. GFIs for null, one-, and two-factor models of task difficulty are presented in Table 1. The one- and two-factor models each provided significant improvements in fit over the null model. In terms of the various GFI criteria, the two-factor model fit better than the one-factor model and fit well in an absolute sense. We allowed for a correlated error term between Items 8 and 12 in this model, because the wording of those items was similar. Loadings for this model from each year are presented in Table 3. One factor in this model represented adolescents' perceptions of the difficulty of the subject area, and the other represented their perceptions of how much effort they thought was required to do well in the subject area (see appendix). The relationship between the two factors (.88) was strong and positive. In the Year 2 model, the two-factor model also provided excellent fit. The pattern of factor loadings and relation between the two factors were quite similar to the Year 1 model (see Table 3). The covariance invariance test presented in Table 1 shows that the matrices of these seven items were relatively invariant across years, although the GFIs indicated less invariance than for either the ability perceptions or the task values items.

Based on the results of both the exploratory and confirmatory factor analyses, we constructed scales for each of these different constructs. The reliabilities are presented in the appendix. The reliabilities were quite good, especially given the minimal number of items comprising some of the scales.

Six-factor model. The separate CFAs done on the individual constructs suggested that there were three task value factors, two perception of task difficulty factors, and one self-ability perception factor. Thus we next specified a six-factor model of the relations between all 19 of the observed variables. As in the analyses of the individual constructs, in this larger model we assumed that the items would load on only one factor, and we estimated all factor loadings (19 loadings). The variances of the six

TABLE 1: Goodness-of-Fit Indexes (GFI) for the Factor Models

	df	*Chi-Square*	*GFI*	*Tucker-Lewis Coefficient*
Task value perceptions				
Null model, Year 1	21	1409.55	.52	
Null model, Year 2	21	1355.01	.45	
One-factor model, Year 1	14	155.53	.94	.85
Two-factor A, Year 1	13	66.90	.97	.94
Two-factor B, Year 1	13	98.53	.91	.90
Two-factor C, Year 1	13	124.17	.95	.87
Three-factor model, Year 1	11	16.78	.99	.99
Three-factor model, Year 2	11	6.97	.99	.99
Invariance, Year 1—Year 2	28	40.56	.99	
Ability perceptions				
Null model, Year 1	10	2462.90	.34	
Null model, Year 2	10	2057.61	.34	
One-factor model, Year 1	4	13.52	.99	.99
One-factor model, Year 2	4	16.50	.99	.98
Two-factor model, Year 1	4	109.37	.93	.89
Invariance, Year 1—Year 2	15	41.68		.98
Task difficulty perceptions				
Null model, Year 1	21	2189.72	.40	
Null model, Year 2	21	2006.03	.36	
One-factor model, Year 1	13	126.12	.95	.92
Two-factor model, Year 1	12	63.60	.97	.96
Two-factor model, Year 2	12	25.43	.98	.99
Invariance, Year 1—Year 2	28	61.64	.98	
Task value, ability perceptions, and task difficulty perceptions				
Null model, Year 1	171	7247.16	.29	
Null model, Year 2	171	6260.73	.25	
Six-factor model, Year 1	135	435.03	.94	.95
Six-factor model, Year 2	135	356.04	.93	.95
Invariance, Year 1—Year 2	190	283.77	.97	

specified latent variables were set to 1, and the relations between the latent variables were estimated. Measurement error variances for each individual variable were also estimated. We also allowed measurement error for items with similar wording or content to covary. This model was compared to a null model postulating no relations between the constructs.

The GFIs for this model in the Year 1 and 2 data sets are presented in Table 4. As can be seen, the null model fit very poorly. The six-factor model provided a highly significant improvement in fit over the null model and fit quite well in an absolute sense. Table 4 presents the factor loadings and relations between factors in this model. Each of the items loaded highly on the appropriate factor. The relations between the different factors confirmed our predictions. As in the analysis of the individual constructs, relations between each of the values factors were positive, as were relations between the two task difficulty factors. The task value factors all related positively and moderately strongly to the ability perceptions factor, with the weakest of these relations occurring between utility value and ability perceptions, as predicted. The task difficulty perception factors related negatively to the ability perceptions and task value factors, with this negative relationship particularly strong for ability perceptions and task difficulty, as predicted. As with the other models, this six-factor model also fit very well in the Year 2 data. The factor loadings and relations between factors were quite similar to those at Year 1. The covariance invariance test showed that the matrices were quite similar each year.

DISCUSSION

Results of both the exploratory and confirmatory factor analytic findings suggest that adolescents' ability perceptions, task difficulty perceptions, and task value perceptions are clearly distinguishable from one another. Moreover, more fine-grained distinctions can be made within two of these general constructs. The fact that these distinctions emerged in both years of the study and were quite similar both years lends credence to their theoretical and substantive meaning.

Our results concerning achievement task values argue strongly for distinguishing task values from expectancies, and so we take a broader view of task value than that

TABLE 2: Factor Loadings for the Task Value Perceptions Model and Relations Between Factors

Item Number	*Factor 1. Intrinsic*	*Factor 2. Utility*	*Factor 3. Importance*
Item 1	.74 (.72)		
Item 2	.84 (.88)		
Item 3		.75 (.82)	
Item 4		.60 (.57)	
Item 5			.75 (.81)
Item 6			.69 (.72)
Item 7			.54 (.64)

Factor	*Intrinsic Interest*	*Importance*
Intrinsic interest	1.00	
Importance	.78 (.78)	1.00
Utility	.55 (.67)	.72 (.78)

NOTE: Factor loadings and relations between factors are standardized estimates from the confirmatory factor analyses. Year 2 values are in parentheses.

TABLE 3: Factor Loadings for Ability Perceptions and Task Difficulty Perceptions Models, and Relations Between Factors

Model/Item Number		*Factor 1. Ability/Expectancy*
Ability perceptions		
Item 8		.84 (.87)
Item 9		.83 (.78)
Item 10		.79 (.80)
Item 11		.87 (.87)
Item 12		.79 (.83)
	Factor 1. Difficulty	*Factor 2. Effort Required*
Task difficulty perceptions		
Item 13	.77 (.86)	
Item 14	.78 (.77)	
Item 15	.73 (.76)	
Item 16		.59 (.63)
Item 17		.65 (.64)
Item 18		.78 (.80)
Item 19		–.73 (–.78)
Relations between factors:	.88 (.93)	

NOTE: Factor loadings and relations between factors are standardized estimates from the confirmatory factor analyses. Year 2 values are in parentheses.

proposed by Atkinson (1957) in his initial formulation of the achievement motivation model. We find clear support for the theoretical components of task value that Eccles (Parsons) et al. (1983) proposed: attainment value, or the importance of doing well on a task; intrinsic value, or how much the individual is interested in and likes the task; and utility value, or the usefulness of the task for achieving future goals. Once again, these factors are positively correlated, but the correlations are not as strong as in the analyses of adolescents' ability perceptions or task difficulty perceptions. More important, the three-factor model provides such a good fit for these data that we are quite confident that the distinctions between these different aspects of task value are both theoretically and substantively meaningful.

Given the clarity of these factors, we believe that researchers should assess the development of perceived task values and how the components of task value become differentiated from one another. We also suggest that researchers study the differential prediction of various types of behavior from the different components of task value. For instance, which component of task value most strongly predicts adolescents' continuing participation in various activities once participation is optional? Is it their interest in the activity or domain, as one might argue from an intrinsic motivation perspective? Or would perceived utility value be a stronger predictor, such that adolescents continue to engage in those activities that they believe have the most relevance to their future goals? Developmental studies (Harter, 1981) suggest that children's motivation for academic achievement, in particular, becomes more extrinsic as they get older. If this is so, then older children's course selection, for example, might be more influenced by the perceived utility value of a course, whereas younger children's enrollment plans might be more influenced by their interest in the subject matter. In support of this possibility, Wigfield and Eccles (1989) found age differences in how the components of task value predicted adolescents' intentions to keep taking math. For junior high school adolescents, only their intrinsic interest in math predicted their intentions. For the high school adolescents, both their intrinsic interest in the subject area and the perceived utility of the subject area predicted their future enrollment plans.

Regarding adolescents' expectancy-related beliefs, one factor emerges in the CFAs. This factor can best be characterized as an ability/expectancy/competence factor, because the items loading on the factor concern adolescents' perceptions of how good they are at the task and also how well they think they will do at the task. Although we could empirically distinguish these adolescents' ability/expectancy perceptions from their perceptions of task difficulty and task value, we find little evidence to justify distinguishing among their ratings of their ability, their current levels of performance, and their expectations regarding their future levels of performance, even using CFA.

Concerning task difficulty perceptions, we find that a two-factor model best fits the relations between the different items. The first factor can be characterized as the "objective" difficulty of math for adolescents (for themselves and in comparison to other adolescents and other

TABLE 4: Factor Loadings for the Six-Factor Model and Relations Between Factors

Item Number	*Interest*	*Import*	*Utility*	*Ability*	*Difficulty*	*Effort Required*
Item 1	.73 (.70)					
Item 2	.85 (.88)					
Item 3		.75 (.81)				
Item 4		.67 (.71)				
Item 5		.57 (.66)				
Item 6			.75 (.81)			
Item 7			.59 (.57)			
Item 8				.83 (.85)		
Item 9				.84 (.78)		
Item 10				.80 (.82)		
Item 11				.86 (.86)		
Item 12				.80 (.83)		
Item 13					.74 (.84)	
Item 14					.80 (.80)	
Item 15					.74 (.76)	
Item 16						.57 (.62)
Item 17						.63 (.63)
Item 18						.79 (.80)
Item 19						–.73 (–.78))
Factor	*Interest*	*Import*	*Utility*	*Ability*	*Difficulty*	
Interest	1.00					
Importance	.77 (.77)	1.00				
Utility	.56 (.69)	.71 (.79)	1.00			
Ability	.53 (.51)	.53 (.51)	.37 (.40)			
Difficulty	–.44 (–.44)	–.30 (–.35)	–.27 (–.30)	1.00		
Effort Required	–.24 (–.32)	–.14(–.23)	–.13 (–.22)	–.63		

NOTE: Factor loadings and relations between factors are standardized estimates from the confirmatory factor analyses. Year 2 values are in parentheses.

subjects), and the second can be characterized as the amount of effort required to do well in math. The correlation between these two factors is quite high, which suggests that adolescents see a close correspondence between how hard a task is and how much effort they need to exert to do well on it. Most lay individuals likely use both these dimensions in arriving at judgments of task difficulty. Given the relation between required effort and task difficulty, it is intriguing that the actual effort adolescents report exerting in math (included in the exploratory analyses) does not relate to either of these two sets of items. This finding suggests that task difficulty is not a major determinant of the amount of effort adolescents actually do put into a task; other influences must be more important.

Turning to the relations between these factors, the ability perception and task value factors are positively related, and both of these belief systems relate negatively to adolescents' task difficulty perceptions. Hence adolescents tend to value an activity when they think they are good at it. Adolescents are less likely to believe they are good at something if they think it is difficult, and they devalue the activity if they think it is difficult. These relations do not support Atkinson's (1957) contention that expectancies/ability perceptions and values are inversely related; rather, we find support for the views of Eccles (Parsons) et al. (1983), Battle (1966), Crandall (1969), and Harter (1985) that people value those activities in which they excel. We believe that this positive relation will help individuals maintain their self-esteem, because it shows that values and ability perceptions are in congruence rather than inversely related. If individuals placed the most value on tasks that they thought they had the least likelihood of completing successfully, their behavioral strivings would often be frustrated, which could lead to declines in self-esteem.

As predicted, we also find that adolescents' perceptions of ability relate more strongly to the attainment value and intrinsic interest in the task than to its perceived utility value. The perceived utility value of a task or activity may be more influenced by other factors, such as broader cultural values, gender-role stereotyping, and so on, rather than by individual's perceptions of their own abilities.

Results of this study cannot tell us the direction of causality in these relations. Do adolescents first decide what they are good at and then attach values accordingly, or does the opposite pattern occur? Or do both constructs have quite different but correlated antecedents? Many current achievement theories (e.g., Covington, 1984; Nicholls, 1984) posit ability perceptions as taking causal precedence over other achievement self-perceptions. We believe this issue needs scrutiny, particularly in studies with younger children whose achievement self-perceptions are becoming established. We predict that task values have other antecedents, such as the needs and goals of the individuals in addition to their ability perceptions.

It is also critical that future research assesses the extent to which these three different types of perceptions relate to various types of behaviors. Our previous work suggests that performance on a task (e.g., course grades) is most highly related to self-concept of ability, whereas task choices (e.g., course enrollment decisions) are more highly related to the perceived task value constructs. In contrast, neither course grades nor enrollment patterns have related very strongly to perceived task difficulty in our previous work (Eccles, 1984; Eccles, Adler, & Meece, 1984; Eccles [Parsons] et al., 1983; Meece, Wigfield, & Eccles, 1990). Because few studies include measures of the various self- and task perceptions as well as multiple types of behaviors, we know relatively little about the generalizability of these findings to nonacademic activity domains.

APPENDIX

Items Assessing Children's Self- and Task Perceptions in the Domain of Mathematics

PERCEIVED TASK VALUE ITEMS

Intrinsic Interest Value

Item 1. In general, I find working on math assignments (very boring, very interesting)

Item 2. How much do you like doing math? (not very much, very much)

Alpha coefficient = .76

Attainment Value/Importance

Item 3. Is the amount of effort it will take to do well in advanced high school math courses worthwhile to you? (not very worthwhile, very worthwhile)

Item 4. I feel that, to me, being good at solving problems which involve math or reasoning mathematically is (not at all important, very important)

Item 5. How important is it to you to get good grades in math? (not at all important, very important)

Alpha coefficient = .70

Extrinsic Utility Value

Item 6. How useful is learning advanced high school math for what you want to do after you graduate and go to work? (not very useful, very useful)

Item 7. How useful is what you learn in advanced high school math for your daily life outside school? (not at all useful, very useful)

Alpha coefficient = .62

ABILITY/EXPECTANCY-RELATED ITEMS

Item 8. Compared to other students, how well do you expect to do in math this year? (much worse than other students, much better than other students)

Item 9. How well do you think you will do in your math course this year? (very poorly, very well)

Item 10. How good at math are you? (not at all good, very good)

Item 11. 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? (the worst, the best)

Item 12. How have you been doing in math this year? (very poorly, very well)

Alpha coefficient = .92

PERCEIVED TASK DIFFICULTY ITEMS

Task Difficulty

Item 13. In general, how hard is math for you? (very easy, very hard)

Item 14. Compared to most other students in your class, how hard is math for you? (much easier, much harder)

Item 15. Compared to most other school subjects that you take, how hard is math for you? (my easiest course, my hardest course)

Alpha coefficient = .80

Required Effort

Item 16. How hard would you have to try to do well in an advanced high school math course? (not very hard, very hard)

Item 17. How hard do you have to try to get good grades in math? (a little, a lot)

Item 18. How hard do you have to study for math tests to get a good grade? (a little, a lot)

Item 19. To do well in math I have to work (much harder in math than in other subjects, much harder in other subjects than in math)

Alpha coefficient = .78

NOTE: All items were answered on Likert-type scales ranging from 1 to 7.

REFERENCES

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review, 64*, 359-372.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Battle, E. (1966). Motivational determinants of academic competence. *Journal of Personality and Social Psychology, 4*, 534-642.

Covington, M. V. (1984). The motive for self-worth. In R. Ames & C. Ames (Eds.), *Research on motivation in education* (Vol. 1, pp. 77-113). New York: Academic Press.

Crandall, V. C. (1969). Sex differences in expectancy of intellectual and academic reinforcement. In C. P. Smith (Ed.), *Achievement-related motives in children* (pp. 11-45). New York: Russell Sage.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Eccles, J. S. (1984). Sex differences in achievement patterns. In T. Sonderegger (Ed.), *Nebraska Symposium on Motivation* (Vol. 32, pp. 97-132). Lincoln: University of Nebraska Press.

Eccles, J. S. (1987). Gender roles and women's achievement. *Psychology of Women Quarterly, 9*, 15-19.

Eccles, J. S., Adler, T. F., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology, 46*, 26-43.

Eccles, J., Wigfield, A., Blumenfeld, P., & Harold, R. (1984). *Psychological predictors of competence development.* Unpublished grant proposal to the National Institute for Child Health and Human Development.

Eccles (Parsons), J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motivation* (pp. 75-146). San Francisco: W. H. Freeman.

Epstein, S. (1973). The self-concept revisited or a theory of a theory. *American Psychologist, 28*, 405-416.

Feather, N. T. (1982). Human values and the prediction of action: An expectancy-value analysis. In N. T. Feather (Ed.), *Expectations and actions: Expectancy-value models in psychology* (pp. 263-289). Hillsdale, NJ: Lawrence Erlbaum.

Fischoff, B., Goitein, B., & Shapira, Z. (1982). The experienced utility of expected utility approaches. In N. T. Feather (Ed.), *Expectations and actions: Expectancy-value models in psychology* (pp. 315-339). Hillsdale, NJ: Lawrence Erlbaum.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental Psychology, 17*, 300-312.

Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development, 53*, 87-97.

Harter, S. (1985). Competence as a dimension of self-evaluation: Toward a comprehensive model of self-worth. In R. L. Leahy (Ed.), *The development of the self* (pp. 55-121). New York: Academic Press.

Heckhausen, H. (1977). Achievement motivation and its constructs: A cognitive model. *Motivation and Emotion, 1*, 283-329.

Jöreskog, K. G., & Sörbom, K. (1984). *LISREL VI: Analysis of linear structural relationships by maximum likelihood and least squares methods.* Chicago: National Educational Resources.

Kukla, A. (1972). Foundations of an attributional theory of performance. *Psychological Review, 79*, 454-470.

Kukla, A. (1978). An attributional theory of choice. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 11, pp. 113-144). New York: Academic Press.

Long, J. S. (1983). *Confirmatory factor analysis.* Beverly Hills, CA: Sage.

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin, 103*, 391-410.

Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First- and higher-order factor models and their invariance across groups. *Psychological Bulletin, 97*, 562-582.

Marsh, H. W., & Shavelson, R. (1985). Self-concept: Its multifaceted hierarchical structure. *Educational Psychologist, 20*, 107-123.

Meece, J. L., Wigfield, A., & Eccles, J. S. (1990). Predictors of math anxiety and its consequences for young adolescents' course enrollment intentions and performances in mathematics. *Journal of Educational Psychology, 82*, 60-70.

Nicholls, J. G. (1978). The development of the concepts of effort and ability, perceptions of academic attainment, and the understanding that difficult tasks require more ability. *Child Development, 49*, 800-814.

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*, 328-346.

Parsons, J. E. (1980). *Self-perceptions, task perceptions and academic choice: Origins and change.* Unpublished final technical report to the National Institute of Education, Washington, DC. (ERIC Document Reproduction Service No. ED 186 477)

Parsons, J. E., & Goff, S. B. (1980). Achievement motivation and values: An alternative perspective. In L. J. Fyans (Ed.), *Achievement motivation* (pp. 349-373). New York: Plenum.

Parsons, J. E., & Ruble, D. N. (1977). The development of achievement-related expectancies. *Child Development, 48*, 1075-1079.

Rokeach, M. (1980). Some unresolved issues in theories of beliefs, attitudes, and values. In M. M. Page (Ed.), *Nebraska Symposium on Motivation* (pp. 261-304). Lincoln: University of Nebraska Press.

Rotter, J. B. (1982). Social learning theory. In N. T. Feather (Ed.), *Expectations and actions: Expectancy-value models in psychology* (pp. 241-260). Hillsdale, NJ: Lawrence Erlbaum.

Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*, 1-10.

Weiner, B., Frieze, I., Kukla, A., Reed, L., Rest, S., & Rosenbaum, R. M. (1971). *Perceiving the causes of success and failure.* Morristown, NJ: General Learning.

Wigfield, A., & Eccles, J. S. (1989, March). *Relations of expectancies and values to students' math grades and intentions.* Paper presented at the meeting of the American Educational Research Association, San Francisco.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*, 1-41.

Received January 13, 1992
Revision received June 30, 1993
Accepted June 30, 1993