

Self-Concept, Attributional Beliefs, and School Achievement: A Longitudinal Analysis

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A continuing dispute in the field of educational psychology has been whether self-concept influences children's academic achievement, or the reverse: that children's academic achievement influences self-concept. This project examined the relationship between academic self-concept and academic achievement longitudinally and explored whether or not that relationship is mediated by children's attributional beliefs about the reasons underlying performance outcomes. Forty-six children were measured at Age 8 and Age 10 on academic self-concept and attributional beliefs. Grades were collected from school records about 4 months after each measurement point. Causal modeling analyses indicated that a bidirectional relationship operated between self-concept and school achievement across the 2 years. Although success attributions to ability were positively related to self-concept and achievement at each measurement point, attributions were not a direct predictor of achievement across the 2-year period. © 1994 Academic Press, Inc.

Academic self-concept—in other words, children's views of themselves as learners—has been frequently posited as an important predictor of achievement motivation, and thus, of school performance (e.g., Song & Hattie, 1984; Wylie, 1979). Thus children who view themselves as capable of academic success presumably work harder and therefore perform better than their peers. The relationship between academic self-concept and achievement is robust: In Hansford and Hattie's (1982) meta-analysis of 128 studies, the overall relationship between the two factors was .42 (see also Bridgeman & Shipman, 1978; Chapman, Cullen, Boersma, & Maguire, 1981; Marsh, Byrne, & Shavelson, 1988).

Because it is likely that children's academic self-concepts are heavily influenced by their current achievement levels, the direction of causality

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between the two has been disputed. For instance, some research indicates that academic achievement is causally related to self-perceptions of ability (Byrne, 1986; Newman, 1984). These findings are in support of a skill development theory in which self-concept is thought to be a consequence, rather than a cause, of achievement.

On the other hand, several other studies show that self-concept has a strong effect on achievement (Bridgeman & Shipman, 1978; Marsh, 1987; Shavelson & Bolus, 1982; Song & Hattie, 1984). These findings are in line with the self-enhancement theory in which self-concept is assumed to determine achievement (Scheirer & Kraut, 1979). According to this approach, a favorable self-concept may be an important precondition for coping with difficult learning situations, which in turn will facilitate academic success.

Another possibility is that self-concept and academic achievement influence each other in a reciprocal manner. For example, Marsh (1984) proposed a dynamic equilibrium model suggesting that academic achievement and self-concept are interwoven in a network of reciprocal relations such that a change in one variable produces changes in the other to reestablish the equilibrium (see also Skaalvik & Hagtvet, 1990). Chapman and his colleagues (1981) found evidence for a reciprocal relationship between self-concept and achievement across a 12-month interval. Using cross-lagged panel analyses, these authors found coefficients ranging from .41 to .52 between self-concept and achievement and vice versa for the two age groups measured (Grades 3 and 4; Grades 5 and 6).

Given the conflicting findings noted to date, more research is needed to explore the nature of the relationship between self-concept and academic achievement. In her comprehensive review of the self-concept literature, Byrne (1984) recommended that studies which address the direction-of-causality question follow these prerequisites: (a) a statistical relation must be established, (b) longitudinal designs should be used with a clearly established time precedence, and (c) a causal model must be tested.

As Marsh (1990) has recently noted, surprisingly little longitudinal work has been conducted in this area. Further, few studies have used structural equation models (SEMs), which are statistically superior to investigations relying on correlations or cross-lagged panel analyses (Marsh, 1990; Rogosa, 1980). We were able to locate five studies which used SEMs to analyze longitudinal self-concept and achievement data (Byrne, 1986; Marsh, 1990; Newman, 1984; Shavelson & Bolus, 1982; Skaalvik & Hagtvet, 1990). However, for two of the studies (Byrne, 1986; Shavelson & Bolus, 1982), measurement was conducted during a single school year (i.e., within a period of 6 months), seriously limiting the generalizability of the results.

In Marsh's (1990) investigation, more than 1400 students were mea-

sured at four time points on academic self-concept and reported school grades. Marsh reported that grade averages in Grades 11 and 12 were significantly affected by academic self-concept measured the previous year, while grades had no effect on subsequent measures of academic self-concept. These results are in opposition to those of Newman (1984) who found that math achievement predicted math self-concept across Grades 2, 5, and 10. His results indicated that math achievement was causally related to math self-concept across the two intervals, although the relationship was much weaker for the later interval. In his data, self-concept was not predictive of achievement for either time interval.

Marsh observed that one possible explanation for the difference between his results and those of Newman is that Newman used standardized achievement scores as a measure of achievement, while Marsh used school grades (Marsh, 1990). We would suggest that another difference between the two studies is the age of the subject populations: Marsh used students in Grade 11 through one year after high school, whereas Newman used younger subjects. In fact, the majority of the research in this area has been conducted with teenagers (e.g., Marsh, 1987, 1990; Shavelson & Bolus, 1982; Song & Hattie, 1984). Because the elementary school years are a formative period during which children are learning what factors contribute to school success and are forming identities of themselves based on their perceptions of their academic abilities, the elementary years would presumably be an important time frame in which to study how academic self-concept and achievement influence each other. To our knowledge, the studies by Newman (1984) and Skaalvik and Hagtvet (1990; younger cohort) are the only longitudinal studies to date that utilized SEMs to investigate this research question in elementary school-aged children.

Skaalvik and Hagtvet (1990) found that different causal models could be confirmed for the two cohorts of their sample (third and sixth graders): Whereas a recursive model held for the younger sample in that achievement in Grade 3 affected self-concept assessed about 18 months later in Grade 4, a reciprocal causal relationship between achievement and self-concept was found for the older cohort. Skaalvik and Hagtvet concluded from their results that, from a developmental perspective, the initial causal predominance of achievement over self-concept diminishes over time, leading to reciprocal relationships between the two concepts.

Although this finding by and large corresponds to the results reported by Newman (1984), the empirical evidence regarding the causal relationship between the two variables in young elementary school children still seems scarce. Further, a problem in both the Newman (1984) and Skaalvik and Hagtvet (1990) studies was that self-concept and achievement were measured simultaneously at each age level. Thus one purpose

of this study was to investigate the direction of causality between young children's academic self-concept and their school achievement when self-concept is assessed before school performance (and not simultaneously as in the studies by Newman, 1984, and Skaalvik and Hagtvet, 1990). A second purpose was to determine the role of attributional beliefs in the achievement-self-concept relationship.

Self-Concept and Achievement Attributions

High self-esteem children tend to credit their academic successes to internal factors such as ability or effort expenditure, rather than to external factors such as a powerful other or luck (Arkin, Appleman, & Burger, 1980; Fitch, 1970; Marsh, 1984). Conversely, academic self-concept is negatively correlated with attributions of failure to ability. In other words, low self-esteem children often attribute their academic failures to a lack of ability. Attribution theorists have pointed out that this belief results in a lack of motivation to work harder (Cauley & Murray, 1982; Weiner, 1979). Dweck has shown that children who take little personal responsibility for task outcomes are more likely to "give up" in the face of failure than their peers who believe that outcomes are personally controllable (Dweck & Reppucci, 1973).

Although most research in this area indicates that attributions of ability for success situations are positively related to both academic self-concept and academic achievement (e.g., Ames, Ames, & Felker, 1976; Covington & Omelich, 1979; Stipek & Weisz, 1981; Uguroglu & Walberg, 1979), there has been less agreement about the relationship between effort attributions and self-concept. Nicholls (1979) reported that self-concept was negatively correlated with attributions of effort for success situations and positively correlated with effort attributions for failure. In contrast, Marsh (1984) found exactly the opposite relationships: in a sample of fifth graders, Marsh reported a positive correlation between self-concept and belief in effort for success, and a negative relationship between self-concept and effort attributions for failure.

Thus in addition to exploring the direction-of-causality question between self-concept and achievement, a second purpose of this study was to examine the relationships among attributional beliefs, self-concept, and school achievement. In particular, we attempted to determine if the relationship between self-concept and achievement is mediated by attributional beliefs about the reasons underlying school successes and failures for young children and to see if these relationships varied developmentally.

METHOD

Subjects

Forty-six children from Munich, Germany participated in the project. Children were

tested on attributional beliefs and self-concepts at two time points separated by a 2-year interval. The mean ages for the two times of testing were 8.5 years and 10.5 years. In addition, grades were collected from school records at the end of the 2 school years. Children were from two intact Grade 2 classrooms when the project started, and were in two Grade 4 classrooms at the end of the study.

Materials and Procedure

All testing was conducted in groups in the children's classrooms during school hours. The attribution questionnaire included eight vignettes of school experiences—four portraying success and four portraying failure—with forced-choice responses explaining why the hypothetical event occurred (Krause, 1983). For example, "Imagine that you did so poorly on an essay assignment that the teacher asked you to write it over. Why do you think that might happen?" For each item, the possible responses reflected ability, effort expenditure, luck, task difficulty, or help from the teacher. The items were read aloud, and children were asked to indicate their first- and second-choice responses for each item. Scoring was collapsed across items within outcome categories (i.e., success, failure); 3 points were given for first-choice responses and 1 point for second-choice responses. Thus scores in each attribution and outcome category ranged from 0 to 16 points.

Self-concept was measured with a histogram test in which children ranked their performances relative to those of their peers (Nicholls, 1978). Each histogram was a vertical column of 25 faces, with the bottom face labeled "worst in the class" and the top face labeled "best in the class". The test included two non-academic items for practice: height (i.e., shortest and tallest in the class) and sports. Three academic items (i.e., reading, story recall, German) were used at the first test period and four (German, reading, story recall, math) at the second test period. The items were selected to correspond to school curriculum and evaluation (i.e., grades) at each grade level. Children's responses were scored from 1 (low) to 25 (high) corresponding to which face was circled on each histogram; thus 13 would represent average performance.

Math and German grades were collected from school records for the second graders, and math and dictation grades were collected for fourth graders. Attribution and self-concept data were collected in the spring of the school year. School grades were collected in the summer. Thus approximately 4 months elapsed at each test time between experimental testing and teachers' assignment of grades.

RESULTS

Stability and Change of Attributional Beliefs and Self-Concept

Self-concept scores were averaged across the three items for 8-year-olds and across the four items for 10-year-olds to yield a composite self-concept measure at each time point. Attribution and self-concept means for the two time periods are shown in Table 1. In order to test the stability of these factors, product-moment correlations were computed for individual attribution and self-concept scores across the 2 years. All 10 correlations between attributions at Age 8 and attributions at Age 10 were non-significant (all $r_s < .15$), indicating very little stability in children's responses across the 2 years. In contrast, children's self-concept ratings were more stable: The correlation between Age 8 and Age 10 composite self-concept scores was $r(45) = .48, p < .001$.

In order to examine changes in attributions across the two years, re-

TABLE 1
SELF-CONCEPT AND ATTRIBUTION SCORES ($N = 46$)

	Age 8	Age 10
Academic self-concept	18.75 (4.35)*	16.54 (4.56)
Attributional beliefs		
Success		
Effort	5.22 (3.49)	6.90 (3.24)
Ability	4.74 (3.64)	4.30 (3.35)
Help	.41 (.98)	.76 (1.46)
Task	3.67 (2.33)	2.41 (2.32)
Luck	1.91 (2.20)	1.65 (1.82)
Failure		
Effort	4.28 (3.63)	5.06 (3.88)
Ability	2.26 (2.28)	2.87 (2.79)
Help	1.30 (2.49)	1.11 (1.75)
Task	5.96 (3.69)	4.74 (3.14)
Luck	2.17 (2.47)	2.26 (2.75)

* Standard deviations appear in parenthesis.

peated measures analysis of variance were conducted on the 5 attribution scores, using Outcome (success, failure) and Age as within-subject factors. These analyses indicated that at Age 10, children attributed success more often to effort and less often to task difficulty than at Age 8, $F(1, 45) = 5.1$ and 7.3 , respectively. All other effects were nonsignificant. A repeated measures analysis of variance on composite self-concept scores showed that scores decreased significantly, $F(1, 47) = 9.0$, indicating a less optimistic self-concept at the later measurement point. Although self-concept scores decreased across the 2 years, they were more realistic at the later time point. In other words, if children's estimates of performance relative to classmates were accurate, we would expect a group average of approximately 13, the middle of the self-concept scale. However, children's self-concept means at both Age 8 and Age 10 were well above that (see Table 1).

Children's Beliefs about Academic Success and Failure

As described above, attribution theorists have posited that adaptive

beliefs would include attributing success to internal factors, especially to ability, and failure to either external factors or to effort (e.g., I didn't try hard enough; if I try harder in the future, I might succeed). Using this argument, one would expect that school grades would be positively correlated with internal success attributions and external and/or effort failure attributions. Similarly, achievement should be negatively correlated with external success attributions, and with ability as a failure attribution. To determine if our data fit this theory, correlations were computed between attributional beliefs and self-concept scores and school grades at each grade level. Attribution responses for task difficulty, luck, and help from someone else were summed to create a single external attribution score. These analyses used the composite self-concept scores described above. The correlations appear in Table 2.

Attributions for success. As anticipated, ability success attributions were positively correlated with both self-concept and grades for children at Age 10. At Age 8, a belief that success was caused by ability was positively related to self-concept and German grades, but not math grades. Contrary to our expectations, effort success attributions were negatively correlated with self-concept and achievement at both age points. Thus the highest achievers among these children tended to attribute their successes to high ability, while the low achievers tended to attribute their successes to effort expenditure. For success items, external attributions did not show any consistent relationship to either self-concept or school grades.

Attributions for failure. Among failure items, no consistent patterns were found in 8-year-olds' responses. This result is consistent with other studies which indicate that 8-year-old children are just beginning to develop an understanding of how various factors influence academic out-

TABLE 2
CORRELATIONS BETWEEN ATTRIBUTIONAL BELIEFS AND CHILDREN'S SELF-CONCEPT
AND SCHOOL GRADES ($N = 46$)

	Success			Failure		
	Effort	Ability	External	Effort	Ability	External
Grade 2						
Self-concept	-.28	.43	-.18	.01	.08	-.04
German grade	-.27	.30	-.02	-.10	.07	.06
Math grade	-.08	.12	-.07	-.03	.17	-.07
Grade 4						
Self-concept	-.26	.27	-.01	.10	-.28	.11
Dict. grade	-.27	.32	-.06	-.03	-.25	.24
Math grade	-.26	.28	-.01	.12	-.34	.14

comes (Nicholls, 1978). Among 10-year-olds, negative correlations were found as expected between ability attributions and achievement. In other words, low achievers were more likely than high achievers to attribute their academic failures to a lack of ability. Similarly, ability failure attributions were negatively correlated with self-concept for 10-year-olds.

External failure attributions were positively correlated with 10-year-olds' dictation grades; however, the remaining correlations (i.e., external and effort failure attributions with self-concept and school grades) were nonsignificant. Thus higher-achieving 10-year-olds had a tendency to attribute their failures to external factors such as task difficulty, and lower-achieving 10-year-olds attributed failure to a lack of ability.

Developmental Patterns Among Beliefs and Achievement

We used structural equations modeling (SEM) procedures to test the relationships among academic self-concept, attributional beliefs, and achievement. The major advantages of SEM procedures over traditional regression analyses are the following: (1) structural/causal relationships are estimated at the level of latent variables or theoretical constructs rather than on the basis of more fallible observed variables; (2) these procedures distinguish between a measurement model (describing the relationships among observed variables and latent factors) and a structural model (describing interrelationships among theoretical constructs), thus allowing for a separate estimation of measurement errors in the observable and specification errors in the structural part of the model; and (3) several goodness-of-fit tests exist enabling the researcher to determine the degree of fit between the causal model and the data set to which it is applied (Koerkel & Schneider, 1991; Schneider, 1989a).

Latent Variables Partial Least Squares (LVPLS) is an exploratory modeling procedure which can be used with small samples, and is especially useful when assumptions about normality of distributions cannot be met (Lohmoeller, 1984; Schneider, 1989a; Wold, 1982). As has been noted by Byrne (1984) and Marsh (1990), the use of structural equations modeling (SEM) procedures is imperative when trying to determine the direction of causality between self-concept and achievement; further, SEM procedures were even more desirable here because of the shared variance among self-concept and achievement measures at the two time points. As has been outlined elsewhere, SEM procedures rely on multiple measures of individual constructs to determine what portion of variance is shared and what variance is unique to each. In this way, it is possible to determine the strength of path coefficients between latent variables that presumably reflect shared variance of the two theoretical constructs (for a more detailed discussion, see the special section on causal modeling in *Child Development*, 1987, No. 1).

The four latent variables that we represented in the first model were self-concept and achievement at Age 8, and self-concept and achievement at Age 10. Self-concept was represented by the three subtest scores at Age 8 and by four scores at Age 10. Achievement was represented by math and German grades at Age 8 and by math and dictation grades at Age 10. In the initial exploratory analysis, self-concept and achievement were allowed to correlate at each time point, and paths were allowed from self-concept and achievement at Age 8 to both self-concept and achievement at Age 10 (see Fig. 1).

Our results indicated a bidirectionality between self-concept and achievement across the 2 years, with a somewhat stronger path from early self-concept to later achievement (.28) than from early achievement to later self-concept (.16). Path coefficients indicated stability across the two years for both self-concept (.47) and achievement (.45), as well as significant correlations between self-concept and achievement at each time point. We concluded from these results that our data do not exclusively support either the self-enhancement or skill-development models, but rather indicate that the relationship between self-concept and achievement is bidirectional.

Attributional Beliefs as a Mediating Variable

The second purpose of this project was to determine if young children's attributional beliefs serve as a mediating factor between self-concept and

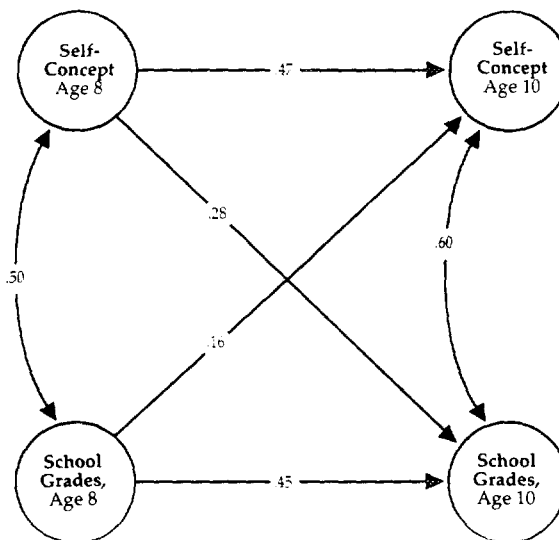


FIG. 1. Relationships between self-concept and school achievement from Age 8 to Age 10.

achievement. In other words, children who have a relatively low view of their own abilities are more likely than peers to attribute academic failures to a lack of ability, rather than controllable factors such as effort or task difficulty. These negative attributions, in turn, may discourage the child from further effort, thus increasing the probability of failure. In this scenario, then, attributional beliefs are closely intertwined with self-concept in influencing the child's achievement outcomes. Low achievement, in turn, further damages the child's self-concept and may likewise promote negative attributional beliefs.

LVPLS was again used in order to examine the relationships among attributional beliefs, self-concept, and achievement. The six latent variables that we represented in this model were success-ability attributions, self-concept, and school grades for the two time points. Success ability attributions were used rather than a composite of ability and effort attributions for success because of the negative correlations found between those two variables. Further, because of the positive correlations reported above between ability attributions and school grades, and because of the similar positive relationships found between ability attributions and task performance for German children in earlier work (Carr, Kurtz, Schneider, Turner, & Borkowski, 1989; Schneider, Borkowski, Kurtz, & Kerwin, 1986), it seemed clear that for these children, attributions of success to one's personal capacity were related to both self-concept and to school performance.

Measured variables representing self-concept were the three self-concept items at Age 8 and the four items at Age 10. Success ability attributions were measured by the single underlying measured variable at each time point. School grades were represented by math and German grades at Age 8 and by math and dictation grades at Age 10. Correlations among measured variables appear in Table 3.

In the initial exploratory analysis, self-concept and success-ability attributions at Age 8 were posited as the two exogenous factors, with paths indicated to all four endogenous variables. School grades from Time 1 were allowed to predict all three latent constructs for Time 2, and paths were allowed from self-concept and ability attributions at Time 2 to school achievement. In addition, self-concept and ability attributions were posited to correlate at each time point (see Fig. 2).

Paths less than .15 were eliminated after the initial analysis, and the resulting model was shown to adequately fit the data. Stable paths were noted between self-concept and school grades at each measurement point (.44 at Time 1 and .77 at Time 2). The path between school grades at Age 8 and self-concept at Age 10 was weak, but significant (.16); in contrast, the path between self-concept at Age 8 and school grades at Age 10 was nonsignificant.

TABLE 3
CORRELATIONS AMONG SELF-CONCEPT, ATTRIBUTIONS, AND SCHOOL GRADES ($N = 46$)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Grade 2 reading self-concept	1.0											
2. Grade 2 story recall	.36	1.0										
3. Grade 2 German self-concept	.35	.53	1.0									
4. Grade 2 success ability attrib.	.23	.38	.37	1.0								
5. Grade 2 math grade	.31	.32	.42	.32	1.0							
6. Grade 2 German grade	.31	.36	.45	.30	.61	1.0						
7. Grade 4 reading self-concept	.25	.16	.40	.14	.14	.15	1.0					
8. Grade 4 story recall self-concept	.43	.27	.37	.21	-.05	.42	.58	1.0				
9. Grade 4 math self-concept	.42	.27	.15	.15	.40	.20	.36	.30	1.0			
10. Grade 4 success ability attrib.	.16	.17	.19	-.06	.10	.16	.14	.37	.13	1.0		
11. Grade 4 math grade	.29	.37	.22	.21	.46	.39	.33	.45	.76	.28	1.0	
12. Grade 4 dictation grade	.34	.37	.27	.31	.20	.45	.48	.85	.38	.32	.68	1.0

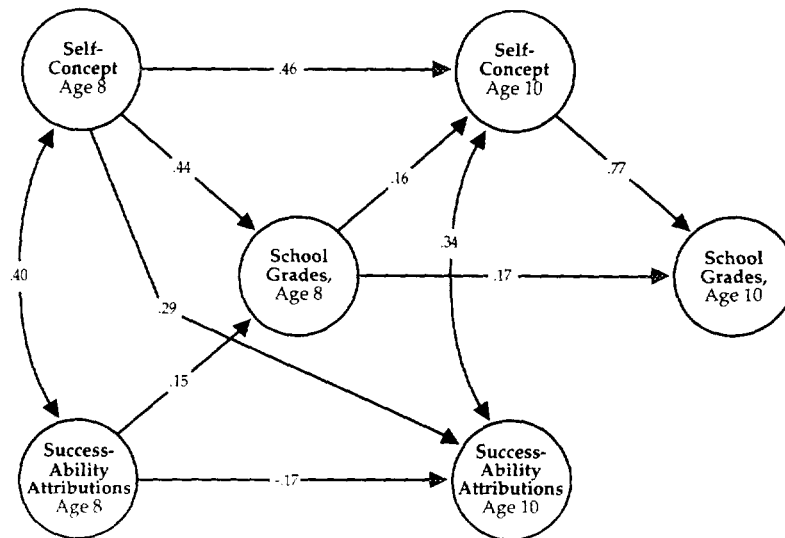


FIG. 2. Relationships among self-concept, ability attributions, and school achievement from Age 8 to Age 10.

Ability attributions had a minor impact on school grades at Time 1, and no influence at Time 2. However, it should be noted that attributions were moderately intercorrelated with self-concept at each time point. Thus, at Time 1, attributions influenced school grades both directly and indirectly (i.e., via self-concept), while only an indirect path (via self-concept) for the attributions-school grade relationship was found at Time 2.

Consistent with the correlation analyses reported above, children's academic self-concepts were relatively stable across the 2 years (.46), while success-ability attributions were not. Although the path between school grades at Age 8 and school grades at Age 10 was weak (.17), the correlation between the two constructs was $r = .47$. Thus the path coefficient was likely reduced by the variance shared by self-concept and school grades.

DISCUSSION

The primary purpose of this project was to determine whether assessments of young children's academic self-concept and achievement support the skill development versus self-enhancement theories. While our data in some ways yielded mixed results, overall they indicated that neither of these theories holds the whole truth; rather, the relationship between self-concept and achievement is bidirectional. Results of the causal modeling procedures examining only self-concept and achievement over

the two time periods indicated that self-concept at Time 1 predicted achievement at Time 2, and that achievement at Time 1 predicted self-concept at Time 2.

As anticipated, children's attributions of success to ability were positively related to self-concept and achievement as indicated by correlational analyses, and attributions of success to effort or to external factors were negatively related to self-concept and achievement. Our SEM analysis indicated that 8-year-olds' attributions of success to ability had a direct, though modest effect on second grade achievement, and an indirect influence on school achievement 2 years later. Although both self-concept and achievement showed moderate stability across the two years, children's success ability attributions at Age 8 were actually negatively related to success ability attributions at Age 10.

Self-Concept and Achievement: The Direction of Causality Question¹

Newman's (1984) study of math self-concept and math achievement from Grade 2 through Grade 10 indicated that achievement at Grade 2 predicted Grade 5 self-concept, while earlier self-concept was not predictive of later achievement. Similarly, Skaalvik and Hagtvet (1990) reported that Grade 3 achievement affected self-concept assessed 18 months later, although they reported a reciprocal relationship operating from Grade 4 to Grade 6. However, both of these studies had a methodological flaw related to their measures of achievement. When standardized achievement scores are used as a measure of achievement rather than school grades, very strong test-retest correlations are often found across time. As a consequence of these high correlations, the amount of variance explained in the structural equation models for these repeated measures is almost perfect from Time 1 to Time 2, thus leaving no possibility for other variables (in this case, self-concept) to account for any variance in the school performance data. Both the Skaalvik and Hagtvet (1990) and Newman (1984) studies reported high test-retest correlations for achievement scores (see Skaalvik and Hagtvet for a further discussion of this point).

Given the high test-retest correlations found for standardized achievement test scores, it would seem advisable to use school grades as a measure of achievement when addressing the self-concept/achievement relationship. Correlations between school grades across 1- or 2-year intervals

¹ Although structural equation modeling procedures are based on correlations, and correlation does not imply causality, results gleaned from SEMs are usually discussed in "causal" terms. As Mulaik (1987) has argued, "causation implies correlation" (p. 20), thus when testing hypotheses regarding causal relationships, and when finding support for these relationships, it only makes sense to discuss the results in terms of support for causality (see Bagozzi, 1980, and Biddle & Marlin, 1987, for further discussion of this point).

are typically in the .6 to .7 range, thus enabling other variables to account for additional variance. In our view, school grades as the indicator of achievement hold two advantages over standardized achievement scores in this question. First, as outlined above, school grades show less stability than standardized achievement scores from one year to the next, thus increasing the probability that other factors may emerge as significant predictors in the causal modeling analyses. Since test-retest correlations for self-concept are usually in the same range (i.e., .6 to .7), use of school grades provides a fairer test of the self-enhancement versus skill development theories. Second, young children are generally well aware of their school grades, while they are often not informed of their standardized test scores. Therefore, if academic achievement is presumed to influence the child's self-concept, it is more likely that this relationship would emerge when school grades are used as the indicator of achievement rather than standardized scores.

Using school grades as the indicator of academic achievement, we found that our data did not exclusively support either the skill development nor the self-enhancement model, but rather indicated a bidirectional relationship. This conclusion reconciles inconsistencies in previous research, and also makes a great deal of sense. Children's school grades influence their views of themselves as learners; academic self-concept, in turn, serves as a motivating factor that shapes future achievement. It should be noted that the PLS technique used in this study is less accurate than a large-sample LISREL model. Thus, significance should not be attached to the difference in magnitude between the Grades \rightarrow Self-Concept path versus the Self-Concept \rightarrow Grades path. The important conclusion to be drawn from our results is the evidence for bidirectionality between the two factors.

Although our data clearly support a bidirectional relationship between self-concept and school achievement from Age 8 to Age 10, we would like to note the developmental limitations of our study. In other words, it is possible that the self-concept/achievement relationship changes after Age 10, particularly since preadolescence and early adolescence mark significant changes in children's self-concepts. Because academic self-concept is increasingly accurate (and less optimistic) through the later elementary grades and junior high, it is quite possible that its relationship to school achievement changes during this period. As noted above, Newman (1984) found a change in this relationship after Grade 5, with weaker paths from achievement to self-concept. However, Skaalvik and Hagtvet (1990) reported a change in the relationship after Grade 4, with a reciprocal causal relationship between self-concept and achievement occurring from Grade 4 to Grade 6. Thus although our measurement ended at Age 10 (approximately Grade 4) it is quite possible that the self-concept/achievement relationship continues to be bidirectional in early adolescence.

Attributional Beliefs as a Mediating Factor

Although it is conceptually clear that a child's school grades would directly influence her academic self-concept, the opposite relationship is less obvious. Proponents of the self-enhancement model claim that academic self-concept is primarily a cause rather than an effect of the child's achievement history, and suggest that a high self-concept may be a necessary precondition for persistent, effortful performance in learning situations (Helmke, 1992). Conversely, children with low self-concepts avoid difficult learning situations, thus making less effort in school (Dweck & Reppucci, 1973).

We would like to argue that children's attributional beliefs about the factors that determine performance outcomes are intimately related to academic self-concept, and likely serve as a mediating factor between self-concept and achievement. In other words, a positive self-concept must be linked to a belief that positive achievement outcomes are a product of effortful performance in order for self-concept to serve as a motivating factor. Thus a high self-esteem child who believes that (1) she is a high achiever, and (2) that her achievement is due to a combination of native ability and effort expenditure is likely to exert effort and to succeed in the future. In contrast, a child who has high self-esteem, yet who believes that success is due to external factors, will likely fail when confronted with an especially difficult task.

In our data, self-concept and attributional beliefs were moderately related at each measurement point. Our results replicated earlier work with German children indicating that both self-concept and achievement were positively related to success attributions for ability rather than effort. When examining results of our SEMs for short-term prediction of achievement, self-concept emerges as a stronger predictor than attributional beliefs. In terms of long term prediction (i.e., prediction of Age 10 achievement using Age 8 self-concept and attributions), neither self-concept nor attributional beliefs at Age 8 have a direct effect on Age 10 achievement. However, both self-concept and attributional beliefs had an indirect effect on performance at Age 10. In our view, these results indicate that the self-enhancement and skill-development models are too simplistic in representing the underlying processes. Although we do not have the data structure to test the Marsh (1984) model of reciprocal relationships (this would require more measurement points for all variables within rather short time intervals), we believe that such a model may be more adequate in describing the dynamic interaction among these three variables.

A goal of future research would be to further substantiate the mechanisms underlying the self-concept/achievement causal link. We believe that children's attributional beliefs about the reasons underlying achieve-

ment outcomes are likely an integral part of this relationship. However, as has been noted elsewhere (e.g., Schneider, 1989b), attributional theorists have, to date, been largely unsuccessful in overcoming conceptual and methodological problems in the field, particularly related to attribution measurement. Thus an important preliminary to future research in this area should be establishing valid and reliable measures of young children's attributional beliefs (cf. McCall & Kurtz-Costes, 1993).

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