Causal Ordering of Academic Self-Concept and Academic Achievement: A Multiwave, Longitudinal Panel Analysis

Herbert W. Marsh
School of Education and Language Studies
University of Western Sydney, Macarthur, New South Wales, Australia

There is surprisingly little sound research on the causal ordering of academic self-concept and academic achievement in longitudinal panel studies, despite its theoretical and practical significance. Data collected in Grades 10, 11, and 12, and one year after graduation from high school that were used in this study come from the large (N = 1,456 students), nationally representative Youth in Transition study. It was found that reported grade averages in Grades 11 and 12 were significantly affected by academic self-concept measured the previous year, whereas prior reported grades had no effect on subsequent measures of academic self-concept. The results provide one of the few defensible demonstrations of prior academic self-concept influencing subsequent academic achievement, and the study appears to be methodologically stronger than previous research.

A positive self-concept is valued as a desirable outcome in many educational settings and is frequently posited as a mediating variable that facilitates the attainment of other desired outcomes such as academic achievement. A growing body of literature (e.g., Byrne, 1984; Hansford & Hattie, 1982; Marsh, 1986, 1987; Marsh, Byrne, & Shavelson, 1988: Shavelson & Bolus, 1982) indicates that academic self-concept is clearly differentiable from general self-concept and that academic self-concept is more highly correlated with academic achievement and other academic behaviors than is general self-concept. Marsh, Byrne, and Shavelson, for example, found that none of the general self-concept scales from three different instruments were significantly correlated with school grades in English, mathematics, or all school subjects, whereas academic self-concept scales were substantially correlated with achievement. This pattern of relations supports the construct validity of academic self-concept responses and the need for educational researchers to consider academic self-concept instead of relying on general self-concept scales.

Wylie (1978) suggested that students' perceptions of their academic ability are based largely on school performance, so that standardized ability test scores should add little to the prediction of self-concept beyond the contribution of school performance measures. Literature reviews (e.g., Hansford & Hattie, 1982; Wylie, 1979) have found school performance indicators to be more highly correlated with self-concept than are IQ or general academic achievement. However, I noted in Marsh (1987) (also see Davis, 1966), that school performance measures typically are normalized relative to other students within the school, whereas standardized tests are normalized in relation to a broader population. I suggested that high school students may use both frames of reference in forming their academic self-concepts. I also argued that school-based performance is more likely to be affected by effort and motivational influences than are standardized test scores, so that prior academic self-concept is more likely to affect subsequent school performance than to affect standardized test scores. For these reasons, I indicated the need to consider separately the effects of standardized tests scores and school performance in evaluating relations between academic self-concept and achievement.

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Perhaps the most vexing theoretical question in academic self-concept research involves determining the causal ordering of academic self-concept and academic achievement. This question is of practical importance because many self-concept enhancement programs are based on the assumption that an improvement in self-concept will lead to gains in academic achievement.

Byrne (1984) noted that much of the interest in the relation between self-concept and achievement stems from the belief that academic self-concept has motivational properties such that changes in academic self-concept will lead to changes in subsequent academic achievement. Calsyn and Kenny (1977) contrasted self-enhancement and skill development models of the relation between self-concept and achievement. According to the self-enhancement model, self-concept is a primary determinant of academic achievement. Support for this model would provide strong justification for the self-concept enhancement interventions that are explicit or im-

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Correspondence concerning this article should be addressed to Herbert W. Marsh, School of Education and Language Studies, University of Western Sydney, Macarthur, P.O. Box 555, Campbelltown, New South Wales 2560, Australia.
precede grades. Because students were asked to report their grades from the previous year, I posited that school grades preceded academic self-concept. Similarly, at Time 2 reported average grades were posited to precede academic self-concept. At Time 3 and at Time 4, only one construct was considered, so there was no need to posit a causal ordering within each wave. One should note, however, that the ordering of variables within a given wave has no influence on the overall goodness of fit of the model and almost no influence on the path coefficients relating variables from different waves. In this a priori model, correlated residuals relating the uniquenesses of the same indicator of academic self-concept administered at different points in time were also posited as shown in Figure 1. Such correlated residuals are usually found in longitudinal panel studies, and their existence is likely to inflate estimates of the stability of the underlying construct. These residual effects were accommodated by fixing a series of alternative models.

In preliminary analyses, three models were evaluated in terms of their ability to fit the data. Each of the three models was reasonable in that the iterative procedure converged to a proper solution; each of the constructs inferred from multiple indicators was well-defined; and the overall goodness-of-fit indices, particularly given the large sample sizes, was moderate to good (for a discussion of evaluating goodness of fit, see Bentler & Bonett, 1980; Marsh, Balla, & McDonald, 1988). Model 1 (Table 2) did not include the correlated residuals that were hypothesized a priori. The fit of Model 1 is much poorer than the other two models, thus supporting the inclusion of the correlated residuals. Model 2 is the a priori model originally hypothesized and it fits the data very well. Inspection of the modification indices provided by LISREL, however, suggested that one additional correlated residual was required between two of the multiple indicators of academic ability (Model 3 in Table 2; also see Figure 1). The inclusion of this additional parameter made a small but statistically significant improvement in the goodness of fit. Model 3 provides an excellent fit and is the basis of subsequent analyses.

In SEMs latent constructs are automatically corrected for estimates of unreliability that are based on the design of the model, so long as