Structural Equation Modeling of Student Involvement in Transition-Related Actions: The Path of Least Resistance

Deanna J. Sands, Karen C. Spencer, Jeff Gliner, and Randall Swaim

Structural equation modeling was used to examine the relative influence of, and interaction between, three exogenous latent factors (student skills, family climate, educational opportunities) and two endogenous factors (student self-determination, student action taking). Data were collected from 237 middle school and high school students with disabilities from three different school districts representing rural, suburban, and urban settings. The hypothesized relationships among five latent factors were partially supported by findings. When nonsignificant paths were eliminated, a final model revealed a number of significant paths between latent factors and the residuals of individual variables. The latent factor Educational Opportunities was significantly related to student self-determination. Residuals from the latent factors Student Skills and Family Climate were significantly related to student self-determination and action taking. An unexpected finding was the apparent lack of significant relationships between student skills and family climate, and student self-determination and student action taking. Findings and proposed direction for future research are discussed.

A focus on active student involvement in transition-related services has grown in response to legislation and changing attitudes about the importance of self-determined behavior as an educational outcome for students with disabilities (Ward, 1996; Wehmeyer, 1996). The Individuals with Disabilities Education Act (IDEA) of 1990 (P.L. 101-476) and the IDEA Amendments of 1997 (P.L. 105-17) call for instruction in self-determination through a mandate for active student participation, decision making, and expression of their interests and goals in transition planning (Martin & Huber Marshall, 1996). Thus, research in the area of self-determination, and specifically within the context of transition-related services, can be of great importance as educators execute these policies. A majority of the research in the area of self-determination has focused on the development of conceptual frameworks (Mithaug, 1996a, 1996b; Wehmeyer, 1992, 1996), assessment tools (Wehmeyer & Kelchner, 1995; Wolman, Campeau, DuBois, Mithaug, & Stolarski, 1994), and curriculum materials (Field & Hoffman, 1996a; Powers et al., 1996; Serna, 1996). Conceptual frameworks about self-determination are particularly important as we attempt to understand variables that influence active student involvement in transition-related actions. Similar to other ecological frameworks believed to influence and drive special education research (Curry Sontag, 1996), theories of self-determination recognize the interdependence of student, family, and community variables on the development of attitudes, skills, and behaviors associated with the construct (Abery & Stancil, 1996; Cook, Brotherson, Weigel-Garrey, & Mize, 1996; Mithaug, 1996a, 1996b; Schunk & Zimmerman, 1994).

Understanding how to best facilitate and support student self-determination necessarily requires that we understand the interaction among, and contributions of, those sets of variables. This is the case with transition services. If we are to facilitate active student involvement in transition-related actions, we must understand the relative contributions of and relationships among student, family, and school variables.

This study is part of a 3½-year research project funded by the Office of Special Education and Rehabilitative Services (OSERS) to investigate student, family, and school variables that influence active student participation in transition-related actions. As part of that project, Spencer (1995) conducted an exploratory study to identify salient predictors of student participation by using stepwise linear regression. She found five variables that accounted for 40% of the variance in a criterion measure of student participation in transition-related actions (Martin & Marshall, 1994). The predictor variables and their order of entry included (a) students receiving special education...
services in general education classrooms, (b) teacher perception of students’ job competence, (c) the amount of time a student spends in general education classes, (d) students coming from family environments that are noncontrolling, and (e) a student’s ability to engage in self-regulatory behaviors. Spencer’s (1995) research helped to substantiate that, indeed, school, family, and student variables are important to student participation in transition-related actions. At the conclusion of that research, Spencer (1995) recommended further research to specify a tentative model that would begin to explain how student, family, and school variables interact with the constructs of student self-determination and action taking related to the student’s transition plans. Development of such a model could inform educational practice in general and how we can specifically support active student involvement in transition-related actions.

This study builds on the multiple regression methodology used by Spencer (1995) to more closely examine the relative influence of, and interaction between, student, family, and school variables as they relate to student participation in transition-related actions and student self-determination. Specifically, this study proposes a preliminary model based on structural equation modeling (SEM; Bentler & Weeks, 1980) to explain how student, family, and school variables interact with the constructs of student self-determination and participation in transition-related actions.

SEM can serve as a powerful explanatory tool, allowing for the statistical examination of relationships among latent variables. According to Kerlinger (1986), a latent variable is “an unobserved entity that is presumed to underlie observed variables. In science, our real interest is more in the relations among latent variables than it is in the relations among observed variables because we seek to explain phenomena and their relations” (p. 37). Latent variables are derived from the correlation between observed variables. There are several advantages to an SEM approach over traditional regression methods. First, it allows for the testing of causal relationships with non-experimental data. This is assessed most strongly within longitudinal data sets for which the temporal relationships among latent variables can be established. The present study is based on cross-sectional data, which means that the results must be considered as preliminary for testing causal relationships. However, we will identify hypothesized relationships that can be validated with a subsequent longitudinal design. An additional advantage to SEM as compared to a multiple regression approach is that it partitions measurement error so that the relationship among latent variables is more accurately specified.

Figure 1 depicts the hypothesized structural model that was used to guide our research, including both the latent variables and the predicted relationships and direction (paths) among those variables. Three exogenous factors, Student Skills, Family Climate, and Educational Opportunities, were postulated to be directly and positively related to two endogenous factors, Self-Determination and Student Action Taking (in transition-related activities). In addition, a direct positive path from Self-Determination to Student Action Taking was predicted.

The five latent factors in our hypothesized model were based on conceptual and theoretical work in the areas of transition services and self-determination. For example, the basic purpose of the transition requirement in the IDEA involved students’ skills—it was to “better prepare students with disabilities to enter the workplace, go on for further training; become as independent as possible, and contribute to society” (Storms, DeStefano, & O’Leary, 1996, p. 3). The construct of transition services is based on the notion that if we can improve students’ skills, we can ultimately improve their quality of life. Self-determination theories have also targeted student skills, as well as family and environmental factors, as important variables to increasing students’ capacity to act in more empowered ways (Field & Hoffman, 1996b; Mithaug, 1996a, 1996b; Wehmeyer, 1996). Families have been identified as critical contributors to both transition services as well as to their children’s developing capacities for self-determination (Abery & Stancliffe, 1996; Cook et al., 1996; Doss & Hatcher, 1996; Storms et al., 1996; Szymanski, 1994). School professionals and the

![Figure 1. Hypothesized structural model.](image-url)
school environment are key to supporting transition-related actions and providing students with opportunities to be actively involved in transition-related services and to develop and practice emerging skills of self-determination (Mithaug, 1996a, 1996b; Spencer, 1995). Finally, a relationship between self-determination and active student participation in transition services has been presumed (Martin & Huber Marshall, 1996; Syzmanski, 1994).

Method

Participants and Settings

This research was conducted in three different settings: a Rural Board of Cooperative Education Services (BOCES), a suburban school district, and an urban school district. Data were collected from 237 middle school and high school students with disabilities, along with their families and teachers. Eighty-one students were from the rural district, 66 from the suburban school district, and 66 were from a large inner-city/metro- politan area school district. Students were between 14 and 21 years of age, had been declared eligible for special education services, and had Individualized Education Programs (IEPs). A total of nine disability categories characterized the students, with the majority of them classified as having specific learning disabilities (60.8%). The second most common type of disability was serious emotional disturbance (8.8%), followed by mental retardation (7.9%), speech-language impairment (7.5%), health impairment (3.3%), multiple disabilities (2.1%), vision and hearing impairments (.8%), and traumatic brain injury (.4%).

The students and their families represented diverse ethnic and socioeconomic backgrounds. A majority of students were White (39.2%), followed by students who were Hispanic (24.2%), Native American (4.6%), and African American (2.1%). It should be noted that 40.4% of the participating families elected not to report their ethnic background, preventing us from interpreting our data related to ethnicity. Data on the socioeconomic status of students' families was obtained based on the Stevens and Cho (1985) occupational classification scheme. With a possible range in scores from 13.98 (based on occupational titles such as machine operators and assemblers) to 82.44 (based on occupational titles such as executive and specialized professionals), our sample yielded an average score of 40.49 (N = 127, median = 34.4, mode = 34.7, SD = 19.12), suggesting that families with low-to-moderate incomes characterized the sample.

Procedure

The instruments were color-coded, copied, and packaged according to student, family, and teacher protocols. Family and teacher packets were mailed or hand delivered. Their completed packets were returned in postage-paid envelopes or picked up at each school by the researchers. Participating students were asked to complete instruments in person during their regular school day with the individualized support of the researchers. Although the majority of students were able to complete the instruments independently, some students required the researcher's assistance with reading or marking responses. For approximately 10 students, their disabilities prevented them from participating. However, the parents and teachers of these students still provided data for the study.

Measures

Groupings of 47 student, family, and school variables constituted the five latent factors illustrated in the hypothe nized structural model in Figure 1. Variables comprising each latent factor were specified a priori by the researchers. Tables 1 through 5 illustrate the variables comprising each of the five latent factors and the instrumentation used to measure each variable along with means, standard deviations, and ranges.

As indicated in Table 1, the latent factor Student Skills was comprised of the following 10 variables (variable labels are included in parentheses). Teachers evaluated each student's performance in the areas of reading (read), mathematics (math), spelling (spell), and writing (write). Teachers indicated the degree(s) to which students were performing at or above grade level for each subject. Teachers and students completed measures of student job competence (job, job2), overall scholastic competence (scholast, scholast2), and social competence (social, social2). Family Climate, the second latent factor, was measured by 16 variables listed in Table 2. Two variables had to do with transition-related measures. The first was whether the family had attended the child's transition meetings (transmtg), and the second was results from a questionnaire regarding parental awareness of transition-related issues (parawar). Other variables included a measure of socioeconomic status (ses), number of adults in the family working outside the home (employ), a measure of the parents' perceptions of their parenting competence (prntexp), a measure of the parents' expectations for their student's performance (prntcomp), and 10 measures of family characteristics obtained from the Family Environment Scale (Moos & Moos, 1994)—family cohesion (cohe sion), conflict (con), expressiveness (express), independence (indep), achievement orientation (achiev), intellectual/cultural orientation (intelcul), active/recreational orientation (activrec), moral/religious orientation (moralrel), organization (organiz), and control (control).

The latent factor Educational Opportunities was comprised of 10 variables, which are presented in Table 3. First, four aspects of school climate were reported by students and included measures of extent of teacher authority in the school (auth), extent of student engagement in meaningful activities while at school (engage), the school's focus on rules and consequences (rules), and the extent to which students at the school were engaged in focused learning (lrng). Data describing the students' educational programs included measures of the percentage of time each student
TABLE 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>Instrument</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reading achievement*</td>
<td>read</td>
<td>Teacher report of number of years above or below grade level</td>
<td>3.27</td>
<td>1.25</td>
<td>5</td>
</tr>
<tr>
<td>2. Math achievement*</td>
<td>math</td>
<td>Teacher report of number of years above or below grade level</td>
<td>3.17</td>
<td>1.2</td>
<td>5</td>
</tr>
<tr>
<td>3. Spelling achievement*</td>
<td>spell</td>
<td>Teacher report of number of years above or below grade level</td>
<td>3.45</td>
<td>1.17</td>
<td>5</td>
</tr>
<tr>
<td>4. Writing achievement*</td>
<td>write</td>
<td>Teacher report of number of years above or below grade level</td>
<td>3.52</td>
<td>1.19</td>
<td>5</td>
</tr>
<tr>
<td>5. Job competence (as perceived by student)</td>
<td>job2</td>
<td>Subscale—Adolescent Self-Perception Profile (Harter, 1988)</td>
<td>2.64</td>
<td>1.37</td>
<td>4</td>
</tr>
<tr>
<td>6. Job competence (as perceived by teacher)*</td>
<td>job</td>
<td>Subscale—Teacher Rating Scale of Student’s Abilities (Harter, 1988)</td>
<td>2.98</td>
<td>.63</td>
<td>2.4</td>
</tr>
<tr>
<td>7. Scholastic competence (as perceived by student)</td>
<td>scholast2</td>
<td>Subscale—Adolescent Self-Perception Profile (Harter, 1988)</td>
<td>2.46</td>
<td>.60</td>
<td>3.0</td>
</tr>
<tr>
<td>8. Scholastic competence (as perceived by teacher)*</td>
<td>scholast</td>
<td>Subscale—Teacher’s Rating Scale of Student’s Abilities (Harter, 1988)</td>
<td>2.85</td>
<td>.75</td>
<td>3.5</td>
</tr>
<tr>
<td>9. Social competence (as perceived by student)*</td>
<td>social2</td>
<td>Subscale—Adolescent Self-Perception Profile (Harter, 1988)</td>
<td>2.90</td>
<td>.67</td>
<td>3</td>
</tr>
<tr>
<td>10. Social competence (as perceived by teacher)</td>
<td>social</td>
<td>Subscale—Teacher’s Rating Scale of Student’s Abilities (Harter, 1988)</td>
<td>2.76</td>
<td>.92</td>
<td>4</td>
</tr>
</tbody>
</table>

*This variable retained as a measure for a latent factor after Confirmatory Factor Analysis.

spent in community-based learning (comm), general education classes (gen), and special education classes (sped). Finally, three measures were obtained describing the number of opportunities schools provided to students to choose (goalopp), express (expropp), and take action (actopp) on IEP/transition-related goals.

Self-Determination, the fourth latent factor, was based on seven variables described in Table 4. Five of these included the four subscale scores plus the total score (arctotal) obtained from the Arc’s Self-Determination Scale (Wehmeyer & Kelchner, 1995), which was completed by students. The subscale scores entered included measures of autonomy (autonom), self-regulation (regulate), empowerment (empower), and self-realization (selfreal). A measure of student perception of global self-worth (worth) was taken from the Adolescent Self-Perception Profile (Harter, 1988). The last variable, locus of control (locus), was obtained from students using the Nowicki-Strickland Internal and External Scale for Adults (Nowicki & Duke, 1974).

Student Action Taking, the last latent factor, was based on four variables measured by the previously mentioned ChoiceMaker Instrument. These four variables are listed in Table 5 and include teacher ratings of observed student behavior during the student’s transition process. The first variable measured the extent of active student planning related to transition goals (stuplan). Student action taking (stuact) comprised the second variable, followed by a measure of the extent to which students self-evaluated (stueval) their progress related to their transition goals and actions. Finally, student self-adjustment or self-regulation (stuadj) related to transition goals and activities was measured.

Analyses

To evaluate the hypothesized structural model (Figure 1), two steps were undertaken. First, confirmatory factor analysis (CFA) was applied to determine how well the variables measured the latent factors depicted in the hypothesized structural model. All the latent factors were allowed to covary using CFA. Multiple measures of fit were used to evaluate the hypothesized model to determine which variables would remain in the subsequent models: the initial structural model and the final structural model. These included the chi-square/df ratio, which controls for model complexity; the Non-Normed Fit Index (NNFI; Bentler; 1990a); and the Comparative Fit Index (CFI; Bentler, 1990b), which is identical to the Tucker-Lewis Index. For the NNFI and the CFI, indexes of .90 or higher are indications of good model fit. For the chi-square/df ratio, an index of 2.00 or lower is indicative of a good model fit (Newcomb, 1990, 1994).

The second step in our analysis was to test the relationships among the five latent factors in our hypothesized structural model. For the present study, the relationships in the hypothesized structural model were specified a priori. We tested our hypothesized structural model using the Bentler-Weeks (Bentler & Weeks, 1980) model for simultaneous equations. EQS (Bentler, 1995) was used for all analyses using maximum likelihood estimation.
TABLE 2

Variables Contributing to Latent Factor Family Climate and Related Instrumentation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>Instrument</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parental attendance at transition meetings*</td>
<td>transmtg</td>
<td>Parent report on author-designed questionnaire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Family awareness of transition issues*</td>
<td>parawar</td>
<td>Parent report on 14-item questionnaire developed by authors</td>
<td>31.01</td>
<td>12.43</td>
<td>49</td>
</tr>
<tr>
<td>3. Family socioeconomic status</td>
<td>ses</td>
<td>Occupational Classification Scheme (Stevens &amp; Cho, 1985)</td>
<td>40.49</td>
<td>19.14</td>
<td>71.31</td>
</tr>
<tr>
<td>4. Number of adults in family working outside the home*</td>
<td>employ</td>
<td>Parent report on author-designed questionnaire</td>
<td>1.47</td>
<td>.82</td>
<td>5</td>
</tr>
<tr>
<td>5. Parental perceptions of own competence as parents*</td>
<td>prntcomp</td>
<td>Subscale—Parental Expectations Questionnaire (Powers, 1994)</td>
<td>32.53</td>
<td>6.95</td>
<td>33</td>
</tr>
<tr>
<td>6. Parental expectations for student’s performance</td>
<td>prntexp</td>
<td>Subscale—Parental Expectations Questionnaire (Powers, 1994)</td>
<td>84.45</td>
<td>13.53</td>
<td>111</td>
</tr>
<tr>
<td>7. Family cohesion*</td>
<td>cohesion</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>6.93</td>
<td>2.19</td>
<td>9</td>
</tr>
<tr>
<td>8. Family expressiveness*</td>
<td>express</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>5.69</td>
<td>1.89</td>
<td>9</td>
</tr>
<tr>
<td>9. Family conflict</td>
<td>con</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>2.84</td>
<td>2.10</td>
<td>8</td>
</tr>
<tr>
<td>10. Family independence*</td>
<td>indep</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>6.38</td>
<td>1.29</td>
<td>7</td>
</tr>
<tr>
<td>11. Family achievement orientation*</td>
<td>achiev</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>5.76</td>
<td>1.58</td>
<td>9</td>
</tr>
<tr>
<td>12. Family intellectual-cultural orientation*</td>
<td>intelcul</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>5.39</td>
<td>2.16</td>
<td>9</td>
</tr>
<tr>
<td>13. Family active-recreational orientation*</td>
<td>activrec</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>4.86</td>
<td>2.35</td>
<td>9</td>
</tr>
<tr>
<td>14. Family moral-religious emphasis*</td>
<td>morarel</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>5.75</td>
<td>2.19</td>
<td>9</td>
</tr>
<tr>
<td>15. Family organization*</td>
<td>organiz</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>6.27</td>
<td>2.07</td>
<td>9</td>
</tr>
<tr>
<td>16. Family control and rules*</td>
<td>control</td>
<td>Subscale—Family Environment Scale (Moos &amp; Moos, 1994)</td>
<td>5.01</td>
<td>1.72</td>
<td>8</td>
</tr>
</tbody>
</table>

*This variable retained as a measure for a latent factor after Confirmatory Factor Analysis.

Results from testing the hypothesized structural model were used to construct an initial structural model (see Figure 2). A second CFA was conducted to confirm the goodness of fit of the remaining 33 variables as measures for the five latent factors. The last step in our analyses was to specify a final structural model (see Figure 3) from the initial structural model. This was accomplished by eliminating paths that were not statistically significant on the basis of the Wald test (Bentler & Dijkstra, 1985) and adding standard and specific paths that were both theoretically sound and statistically warranted, using the LaGrange Multiplier Test (Chou & Bentler, 1990). One advantage of the Bentler-Weeks model is that, in addition to specification of regression paths between latent factors (standard paths), it also permits the specification of paths between the residuals of the variables to other variables or to latent factors (specific paths). Each variable was targeted to measure only a single latent factor. The portion of variance for each variable that is shared with other variables is manifested in its factor loading on the latent factor. The residual of each variable represents that portion of the variance that was not related to the latent factor. This identifies relationships within a model that are specific to the variables rather than relying only on relationships between latent factors.
### TABLE 3
Variables Contributing to Latent Factor Educational Opportunities and Related Instrumentation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>Instrument</th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Student’s perception of teacher authority and support at school</td>
<td>authsupp</td>
<td>Variable identified from a factor analysis of a modified Classroom Environment Scale (Trickett, Leone, Fink, &amp; Baaten, 1993; Trickett &amp; Moos, 1973)</td>
<td>7.08</td>
<td>2.64</td>
<td>10</td>
</tr>
<tr>
<td>2. Student’s perception of extent to which all students are meaningfully engaged while at school</td>
<td>engage</td>
<td>Variable identified from a factor analysis of a modified Classroom Environment Scale (Trickett et al., 1993; Trickett &amp; Moos, 1973)</td>
<td>3.00</td>
<td>1.98</td>
<td>7</td>
</tr>
<tr>
<td>3. Student’s perception of extent to which his or her school emphasizes rules</td>
<td>rules</td>
<td>% of student time spent in this learning environment</td>
<td>.13</td>
<td>.34</td>
<td>3</td>
</tr>
<tr>
<td>4. Student’s perception of extent to which students at his or her school engage in focused learning</td>
<td>lmrng</td>
<td>% of student time spent in this learning environment</td>
<td>.63</td>
<td>.28</td>
<td>1</td>
</tr>
<tr>
<td>5. Teacher report of student’s time spent in community-based learning</td>
<td>comm</td>
<td>% of student time spent in this learning environment</td>
<td>.35</td>
<td>.30</td>
<td>1.5</td>
</tr>
<tr>
<td>6. Teacher report of student’s time spent in general education classes</td>
<td>gen</td>
<td>% of student time spent in this learning environment</td>
<td>.35</td>
<td>.30</td>
<td>1.5</td>
</tr>
<tr>
<td>9. Teacher report of student’s opportunity to express IEP/transition goals*</td>
<td>expopp</td>
<td>Subscale—ChoiceMaker Self-Determination Transition Checklist and Curriculum Matrix (Martin &amp; Marshall, 1994)</td>
<td>77.52</td>
<td>34.77</td>
<td>124</td>
</tr>
<tr>
<td>10. Teacher report of student’s opportunity to take action related to IEP/transition goals*</td>
<td>actopp</td>
<td>Subscale—ChoiceMaker Self-Determination Transition Checklist and Curriculum Matrix (Martin &amp; Marshall, 1994)</td>
<td>77.52</td>
<td>34.77</td>
<td>124</td>
</tr>
</tbody>
</table>

*This variable retained as a measure for a latent factor after Confirmatory Factor Analysis.

### TABLE 4
Variables Contributing to Latent Factor Self-Determination and Related Instrumentation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>Instrument</th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Student’s perception of own self-determination</td>
<td>selfdet</td>
<td>Total score from The Arc Scale (Wehmeyer &amp; Kelchner, 1995)</td>
<td>48.5</td>
<td>17.39</td>
<td>99</td>
</tr>
<tr>
<td>2. Student’s perception of own autonomy*</td>
<td>autonom</td>
<td>Subscale—The Arc Scale (Wehmeyer &amp; Kelchner, 1995)</td>
<td>33.51</td>
<td>14.70</td>
<td>85</td>
</tr>
<tr>
<td>4. Student’s perception of own psychological empowerment*</td>
<td>empower</td>
<td>Subscale—The Arc Scale (Wehmeyer &amp; Kelchner, 1995)</td>
<td>2.54</td>
<td>2.35</td>
<td>11</td>
</tr>
<tr>
<td>5. Student’s perception of own level of self-realization*</td>
<td>selfreal</td>
<td>Subscale—The Arc Scale (Wehmeyer &amp; Kelchner, 1995)</td>
<td>3.65</td>
<td>1.73</td>
<td>10</td>
</tr>
<tr>
<td>6. Student’s global self-worth*</td>
<td>worth</td>
<td>Adolescent Self-Perception Profile (Harter 1988)</td>
<td>3.0</td>
<td>.69</td>
<td>2.8</td>
</tr>
<tr>
<td>7. Student’s locus of control*</td>
<td>locus</td>
<td>Nowicki-Strickland Internal External Control Scale for Adults (Nowicki &amp; Duke, 1974)</td>
<td>16.22</td>
<td>4.66</td>
<td>21</td>
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</tbody>
</table>

*This variable retained as a measure for a latent factor after Confirmatory Factor Analysis.
TABLE 5  
Variables Contributing to Latent Factor Student Action Taking and Related Instrumentation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>Instrument</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
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</thead>
</table>

*This variable retained as a measure for a latent factor after Confirmatory Factor Analysis.

Results

The 47 student, family, and school variables were entered into an initial CFA to evaluate the five latent factors. Variables that had inadequate factor loading (below .4) were removed with one exception. Teacher evaluation of student job skills was retained as a measure for the Student Skills latent factor with a factor loading of .34. This parameter was significant (p ≤ .001) and was retained for conceptual integrity of this factor. As a result of the initial CFA, 14 variables were dropped and not included as measures for the latent factors in the initial or final structural models (Figures 2 and 3). The final group of 33 variables used to measure the 5 latent variables are denoted in Tables 1 through 5. For example, “cohesion” remained as a contributing measure for the latent factor Family Climate, whereas “conflict” did not.

Results from the second CFA to determine the goodness of fit in the initial model based on the 33 remaining variables indicated that the measurement characteristics of the initial model were adequate (see Note), chi-square (482) = 1127.46, p < .001; chi-square/df = 2.34; NNFI = .91; CFI = .91. Although the chi-square/df ratio was greater than 2.0, this was likely due to model complexity. The other fit indices were adequate. Therefore, the variables as specified in the initial model were good measures of the latent factors and were maintained for the final structural model.

Fit indices for the initial structural model (see Figure 2) fell just short of the criteria specified for adequate model fit, chi-square (485) = 1368.82, p < .001; NNFI = .87; CFI = .88. This indicated to us that there were other sources of variance that needed to be accounted for to improve the model. (This was addressed in the final structural model when specific variables and their residuals were entered into the analysis.) Furthermore, a number of predicted structural paths proved to be nonsignificant. Both Student Skills and Family Climate failed to predict Self-Determination and Student Action Taking. Significant paths were found between the following latent factors: (a) Student Skills and Educational Opportunities, (b) Educational Opportunities and Student Action Taking, (c) Educational Opportunities and Self-Determination, and (d) Self-Determination and Student Action Taking.
Nonsignificant paths from the initial model were deleted for the indices-of-fit analysis of the final model. In addition, variables and their residuals were entered into the analysis. As a result, a number of structural paths between latent factors that had been statistically significant in the initial structural model were no longer statistically significant in the final structural model (Figure 3). For example, Educational Opportunities was no longer significantly related to Student Action Taking, and Student Skills was no longer significantly related to Educational Opportunities.

The indices-of-fit analysis of the final model revealed a number of significant positive specific paths between residuals of variables and other variables or latent factors. The residual from the variable of teacher rating of student job skills was significantly related to two of the variables that made up the latent factor Educational Opportunities—student opportunities to set (goalopp) and express (expropp) goals. In addition, teacher rating of student job skills was significantly related to the latent factor Student Action Taking. The residual of the variable, teacher ratings of students' social skills, was significantly related to the latent factor Student Action Taking.

Only one variable from the latent factor Family Climate had predictive value in the final structural model (Figure 3). The residual of the variable measuring parent awareness of the transition process was positively related to the latent factor of Self-Determination. Two significant additional paths to emerge in the final model were the positive association between student opportunities for action taking (actopps) and both the variable that measured the degree to which students demonstrated action-taking skills (stuact) and the latent factor Student Action Taking.

Discussion

Both the significant and nonsignificant paths revealed during this study provided us with important information as we
strove to understand the nature of student involvement in transition-related actions and the nature of self-determination. The evaluation of our hypothesized model generated several important results. First and foremost, students’ skills, such as scholastic competence, and student performance in reading, writing, math, and spelling were not significantly related to students’ family climate, self-determination or student action taking during the transition process. This means that a student’s skills do not appear to be an indicator of student participation in transition-related actions or of the student acting in self-determined ways. A second important finding indicated that family climate (parental employment outside the home, parenting competence, family cohesion, family achievement orientation) did not appear to influence student skills, educational opportunities, self-determination, or action taking. Although further research is warranted in this area, our findings suggest that family and school may be separate phenomena. Through future research, it will be important to determine whether and how family–school relations have an impact on students during the transition process.

Furthermore, because family climate had very little influence on student self-determination and no significant relationship to student participation in transition-related actions, it appears that regardless of the nature of a student’s family environment, all students have the potential to act in self-determined ways and to participate in transition-related actions. We must, therefore, not underestimate the powerful influence of schools on youth with disabilities and the need to look closely at educational programs if we want to promote self-determined student action taking during the transition process.

As we consider the results from the final structural model (Figure 3), it appears that residuals from variables comprising the latent factor Student Skills are related to other variables or latent factors. Specifically, residuals from teacher perceptions of the student’s social competence (social) and job competence (job) had a significant influence on the latent factor for Student Action Taking. Thus, teacher perceptions appear to have an impact on whether students act in more involved ways during the transition process, which reinforces the notion that teachers are very influential in the lives of students (Heal, Khoju, & Rusch, 1997). Two additional residual paths from teacher perception of students’ job competence led to variables making up the latent factor Educational Opportunities, suggesting the presence of some unmeasured aspect of job competence, which affects the availability of transition-related learning opportunities at school. This finding raises the question of self-fulfilling prophecies—a teacher perceives that a student is not competent and subsequently reduces or fails to provide learning opportunities when these opportunities may, in fact, be the vehicle for increasing student competence. This, too, is an area that requires further investigation. Kohn (1996) offered a proactive way of operating on our perceptions and beliefs about students. He posited that if a student disappoints us (in other words, if we have perceptions that they are not competent), it is almost always because they are missing what they need (such as skills, behaviors, and attitudes) (Kohn, 1996). Research has indicated a positive relationship between allowing students to set and act on their own goals and skill development (Fuchs et al., 1997; Jackson & Altman, 1996; Pintrich, Roese, & DeGroot, 1994; Schunk, 1985, 1996; Umbreit & Blair, 1996). Therefore, when we perceive that students may not have job competence, it becomes incumbent on us to not to limit their opportunities in those areas but to help them set, implement, evaluate, and adjust learning goals in those areas.

The final structural model also informs us that when school environments provide students with overt opportunities to set, express, and act on their goals, students are more likely to act in self-determined ways. Furthermore, there appears to be a relationship between students being provided with opportunities to act and their ability to express their goals and actually take action within transition-related activities. Although intuitively these findings make good sense, we know from research in the field that students with disabilities are generally not provided with overt, ongoing opportunities to participate in goal-related activities having to do with their school and postschool environments (Kozleski & Sands, 1992; Sands & Kozleski, 1994; Stancliffe & Wehmeyer, 1995). Fortunately, however, the finding that providing students with opportunities leads to the use of those skills is consistent with recommendations for curriculum and instruction within the fields of transition services and self-determination. That is, students must be taught and provided with opportunities to practice and use skills that will assist them to set, implement, evaluate, and adjust their goals (Doll, Sands, Wehmeyer, & Palmer, 1996; Field & Hoffman, 1996b; Martin & Huber Marshall, 1996; Powers et al., 1996).

Another important finding from this study has to do with the relationship between the constructs of self-determination and student action taking related to the transition process. Intuitively, it would seem that students who are more self-determined would be more likely to be involved actively in their transition-related activities. In fact, our results indicate that there was not a significant relationship between these latent factors. A student, therefore, may be self-determined but choose not to be actively engaged in his or her transition-related activities. We also may be successful in teaching and supporting a student to be actively involved in their transition-related activities, but this may not have a direct impact on the student’s overall ability to act in self-determined ways. This finding is consistent with views that an individual’s ability to act in self-determined ways may be contextually dependent—that is, there will be times and situations that either inhibit or promote self-determination or where the individual just chooses not to act in a self-determined manner (Mithaug, 1996a; Wehmeyer, 1996). From a practice standpoint, this finding indicates that professionals and parents cannot assume that behaviors demonstrated in one context
will automatically generalize to others. Students must be supported across many contexts—their classrooms, homes, jobs, and social situations—to act in self-determined ways and to actively participate in making and carrying out decisions about their lives.

**Recommendations for Future Research**

Much research remains if we are to adequately understand how we can maximize student participation in transition-related actions and help them to achieve self-determination as an educational outcome. This study helps to contribute to a growing body of investigations with that outcome in mind. Several investigations would be useful to build on or to extend results of this study. First, we need to conduct longitudinal research studies that include larger samples of participants. Second, we need to examine more closely those variables for which the residuals were positively related to other variables or to the latent factors. For example, we know that some aspects of teachers' perceptions of students' social competence is related to student involvement in transition-related actions. We must find what aspect(s) of the social domain is directly influencing the latent factor Student Action Taking. This task will be complex because the social domain represents knowledge and skills executed both internally and externally to an individual. Similar investigations must examine other residual paths originating from teachers' perceptions of students' job competence (job), parent awareness of the transition process (parawar), and school opportunities for students to act on their transition goals (actopp). Third, we may need to expand our conceptualization of variables related to student action taking in transition activities and self-determination beyond those typically studied, such as student academic skills and family variables. It may be that variables far more subtle, such as environmental opportunities or student habits and attitudes, are more potent when it comes to predicting high levels of student involvement and self-determination. Finally, to build accurate theoretical models of constructs, such as transition and self-determination, we must continue to be vigilant in our efforts to further refine and expand valid and reliable measures of educational processes and outcome variables.

**Conclusions**

This study both informs our understanding and raises additional questions about the complexities involved in promoting self-determination and student involvement in transition-related activities. Specifically, findings from this study suggested that the educational environment, including teachers, has important effects on students' abilities to act in self-determined ways and to be actively involved in their transition-related actions. Most important, if we want to fulfill the expectation that students become actively involved in the planning, implementation, and adjustment of goals to guide their postschool activities, the results of this research suggest that they must be given ongoing, overt opportunities to engage in those behaviors.

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**NOTE**

For the CFA and all subsequent models, three correlated error terms were specified. Each error term was for the three teacher ratings of students and likely reflects a global teacher assessment of the student. These error terms, therefore, are not independent. In addition to the ratings on the specific student domains for school, social, and job, it was considered that the residuals among these three indicators were likely to reflect a general rating given by teachers. Thus, these correlated error terms were included to reflect this general factor.

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