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THE INFLUENCE OF FRATERNITY OR SORORITY MEMBERSHIP ON STUDENTS' COLLEGE EXPERIENCES AND COGNITIVE DEVELOPMENT

Gary R. Pike

In recent years, the role of fraternities and sororities on college campuses has come under increasing scrutiny. Results of the National Study of Student Learning (NSSL) indicate that membership in a Greek organization can have a negative effect on students' cognitive development, particularly during the first year of college. The present research sought to assess the generalizability of the NSSL findings to first-year students attending a research university in the Midwest. In contrast to the NSSL findings, results indicated that Greek students had higher levels of involvement and gains in general abilities than did non-Greek students. Moreover, Greeks' gains in cognitive development were the result of their social involvement. Implications for the Greek system, as well as implications for the study of college effects, are discussed.

Over the last four decades, scholars of American higher education have raised important questions about the educational value of fraternities and sororities on college campuses (Clark, 1962; Jakobsen, 1986; Kuh, Pascarella, & Wechsler, 1996; Maisel, 1990; Winston & Saunders, 1987). Critics of the Greek system have pointed to research showing that fraternity or sorority membership is associated with higher levels of alcohol use and abuse (Penn, 1974; Wechsler, Kuh, & Davenport, 1996), lower levels of personal development (Wilder, Hoyt, Doren, Hauck, & Zettle, 1978; Wilder, Hoyt, Surbeck, Wilder, & Carney, 1986), and lower levels of academic achievement (Blimling, 1993; Pike & Askew, 1990). Recently, criticisms of fraternities and sororities have intensified and focused on research results showing that Greek affiliation can have a negative effect on students' cognitive development (Pascarella, Whitt, Nora, Edison, Hagedorn, & Terenzini, 1996). Citing research from the National Study of Stu-

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dent Learning (NSSL), Kuh, Pascarella, and Wechsler (1996, p. A68) concluded that "fraternities are indifferent to academic values and seem to short-change the education of many members." NSSL researchers also recommended that "rush and new-member activities, especially for White men, might be deferred to the second semester—or even the second year—of college" (Pascarella, et al., 1996, p. 189).

Evidence that Greek affiliation hinders cognitive development is surprising. Research has consistently shown that fraternity and sorority members are more involved (Astin, 1977, 1993; Baier & Whipple, 1990; Baird, 1969; Pike & Askew, 1990; Thorson, 1997), and that involvement is positively related to cognitive development (Astin, 1977, 1993; Kuh, Vesper, Conolly, & Pace, 1997; Pascarella & Terenzini, 1991). Thus, it would be reasonable to expect higher, not lower, levels of cognitive development for Greek students compared to independents (Winston & Saunders, 1987).

Relatively few studies have examined the effects of Greek affiliation on cognitive development. In a longitudinal study of more than 6000 seniors at the University of Tennessee, Knoxville (UTK), Pike and Askew (1990) found that Greek students reported higher levels of academic effort, involvement in organizations, and interaction with other students. However, Greeks had significantly lower total scores on the *College Outcome Measures Program (COMP)* objective test (Forrest & Steele, 1982) than did their non-Greek counterparts. This difference persisted after accounting for differences in entering ability (e.g., ACT Assessment composite score) and college experiences (e.g., involvement). The negative effect of Greek affiliation on cognitive development was the same for females and males.

In a longitudinal study of more than 2000 students at 18 colleges and universities in 15 states, Pascarella, et al. (1996) examined the relationship between Greek affiliation and scores on the *Collegiate Assessment of Academic Proficiency (CAAP)* examination (American College Testing Program, 1989). Statistical controls were employed to account for differences in background, ability, and first-year academic experiences. Separate analyses were conducted for men and women. Results indicated that membership in a fraternity was associated with significantly lower scores on the reading comprehension, mathematics, and critical thinking modules of the *CAAP* exam, while sorority membership was associated with significantly lower scores on the reading comprehension module.

The results of at least one study were more in line with theories of involvement and learning. A cross-sectional study of approximately 600 freshmen and 1000 seniors at the University of Missouri—Columbia (MU) found that Greek students reported substantially higher levels of academic and social involvement than did independent students (Student Life Studies, 1997). Greek freshmen also reported making substantially greater gains in interpersonal skill development

than did independent freshmen. Greek seniors reported making significantly greater gains in general education, intellectual development, and interpersonal skills.

Because research using objective tests of student learning found lower levels of cognitive development for Greeks, whereas the study using self-reported gains found higher levels of cognitive development for Greeks, it is tempting to attribute differences in the research findings to differences in measurement methods. Some empirical evidence exists to support this interpretation. For example, Pike (1995) examined the relationships between UTK seniors' scores on the *College Basic Academic Subjects Examination (College BASE)* (Osterlind, 1989) and self reports of learning and development from the *College Student Experiences Questionnaire (CSEQ)* (Pace, 1990). He found that, while both instruments measured the same underlying constructs, scores contained substantial method-specific variance that could affect the nature of relationships between college experiences and educational outcomes. In a subsequent study of more than 1500 students at 10 institutions, Pike (1996) again found evidence that the relationships between self reports and test scores were influenced by uncorrelated method-specific factors. In a study using NSSL data, Whitt et al. (1999) found significant differences in relationships between involvement and outcomes, depending on whether test scores or self-reported gains were used as the outcome measures.

While it is possible that differences in findings are the result of the measurement method employed, an alternative explanation should be considered. That is, differences in research findings may be attributable to the analytic methods employed. In the NSSL research, as well as the study by Pike and Askew (1990), the inclusion of college experiences as controls in regression-based analyses may have masked important relationships between Greek affiliation and cognitive development. In regression analysis, no distinction is made between spurious effects and indirect effects (Cohen & Cohen, 1983; Loehlin, 1992). If the effects of Greek affiliation on cognitive development are mediated by college experiences and those college experiences are entered as control variables in a regression analysis, legitimate indirect effects will be treated as spurious and suppressed. Because path analysis accounts for both direct and indirect effects (Wolfle, 1985), it may be a more appropriate analytical method than traditional multiple regression when involvement is an important mediating factor in students' cognitive development.

The present research examined the relationships among students' backgrounds, membership in a fraternity or sorority, involvement, and cognitive development using a causal model of college effects. Because Pike's (1995, 1996) research found that measurement methods can contaminate relationships among observed variables, latent variable models, which can analyze the effects of educational experiences on cognitive development free of measurement error,

were used in this research (Alwin & Jackson, 1980). This study examined whether differences in reported cognitive development were a direct result of membership in a fraternity or sorority, an indirect result of Greek students' involvement, or a spurious result of differences in students' backgrounds. Three questions were addressed in the research: (1) Can a conceptual model of college effects be used to represent observed relationships between students' background characteristics, college experiences, and gains in cognitive development? (2) Is this conceptual model the same (i.e., invariant) for Greek and non-Greek students? (3) Are observed differences between Greek and non-Greek students' gains in cognitive development direct, indirect, or spurious?

METHODS

Conceptual Model

The conceptual model used in the present study is a variation of Astin's (1970a, 1970b) input-process-output (I-P-O) model of college effects. Unlike Astin's I-P-O model, the model used in this study identified two distinct educational processes: differentiation and integration. Chickering (1975) provided a theoretical foundation for including these processes, arguing that cognitive development requires both differentiation and integration of college experiences. Differentiation is fostered by introducing students to a variety of academic disciplines, supplementing academic content with rich out-of-class experiences, and providing students with an opportunity to interact with people different from themselves. At the same time, differentiation must be paralleled by integration. For significant learning to occur, students must be able to see relationships among diverse experiences and draw on those experiences in different combinations to solve complex and varied problems.

In support of the need for differentiation, research findings have confirmed that a broad range of college experiences influence students' cognitive development. In their reviews of research, Astin (1993), Feldman and Newcomb (1969), Kuh, Vesper, Conolly, and Pace (1997), and Pascarella and Terenzini (1991) concluded that cognitive development is influenced by a variety of factors including coursework, academic effort, involvement in out-of-class activities, and interaction with faculty and peers.

Research on the importance of integrating diverse curricular and co-curricular experiences is less prevalent. However, studies by Davis and Murrell (1993) and Pike (1995, 1999) provide evidence of the importance of integration. In all three studies, the researchers found strong reciprocal relationships between students' in-class and out-of-class experiences. In these studies, the researchers found that both in-and out-of-class experiences were related to reported gains in cognitive development, as well as scores on standardized achievement tests.

Pike (1999) also found that integration was strongly influenced by differentiation and that integration mediated many of the effects of differentiation on cognitive development. As Davis and Murrell (1993, p. 286) noted: "For growth to occur, the work that is done in the classroom must find expression in other aspects of a student's life."

The conceptual model used in this study is presented in Figure 1. Inputs, or students' background characteristics, are represented by two latent constructs, Gender and Entering Ability. Three constructs are included in the model to represent the processes of differentiation and integration. Two of the constructs, Academic Involvement and Social Involvement, represent processes related to differentiation, whereas the remaining construct represents integration. Consistent with the findings of Pike (in press), the two involvement constructs directly influenced Integration. It was believed that higher levels of involvement were related to higher levels of integration, in part because more involved students have more information to integrate. Two categories of outcomes were included in the model to represent cognitive development: Gains in General Abilities and Gains in Math and Science Reasoning. These two outcome dimensions were selected because they comprise many of the core elements of what students should know and be able to do as the result of an undergraduate education (Baird, 1988).

As shown in the model, the two constructs representing cognitive development were assumed to be directly related to students' background characteristics, differentiation, and integration. Background characteristics and differentiation were also assumed to be indirectly related to cognitive development. Acting through differentiation and/or integration, background characteristics could indirectly influence cognitive development. Differentiation could indirectly influence cognitive development through integration. Integration was assumed to be directly related to both background characteristics and differentiation. Background characteristics, acting through differentiation, could also indirectly influence integration. In the model, Gender and Entering Ability were assumed to be correlated. Likewise, the residuals for Academic Involvement and Social Involvement, as well as the residuals for Gains in General Abilities and Gains in Math and Science Reasoning, were assumed to be correlated.

Instruments

The observed measures used in this study came from existing campus data and the 1997 *MU Freshman Survey*. The observed measures and their relationships to the latent constructs in the conceptual model are depicted in Figure 2. Observed measures for the constructs representing students' background characteristics were drawn from existing campus data. As indicated in the figure, the latent construct Gender was perfectly related to a single observed measure, Fe-

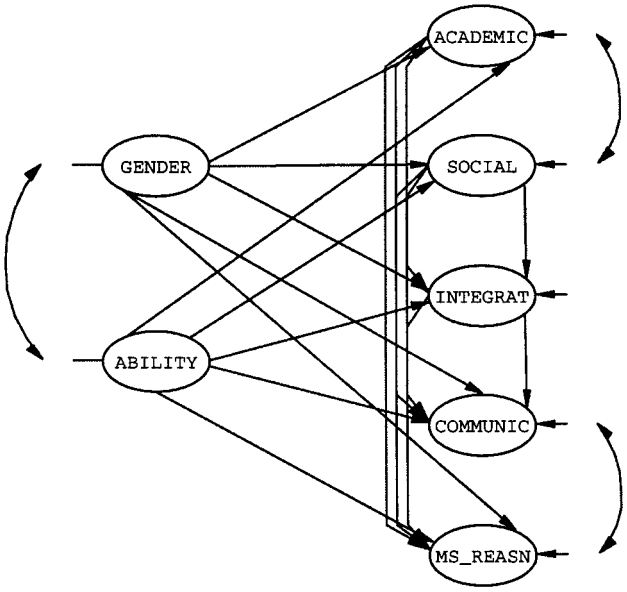

FIG. 1. Relationships among the latent constructs. (ENT_ABIL = Entering Ability; ACADEMIC = Academic Involvement; SOCIAL = Social Involvement; INTEGRAT = Integration; GEN_ABIL = Gains in General Ability; MS_REASN = Gains in Math and Science Reasoning.)

male, that was dichotomously scored as female (1) or male (0). Students' English and Mathematics subscores on the ACT Assessment examination (American College Testing Program, 1998) were directly related to the latent construct Entering Ability. Data on Greek affiliation (not shown in the model) also was obtained from campus information and dichotomously scored as Greek (1) or non-Greek (0).

Students' responses to the *MU Freshman Survey* were used to construct scales that, in turn, represented the constructs Academic Involvement and Social Involvement. Three scales, Use of the Library, Writing Experiences, and Faculty Interaction, were directly related to Academic Involvement. Each scale was comprised of 10 questions, and the items included in these scales were modeled after items on the *College Student Experiences Questionnaire* (Pace, 1990). Like the quality of effort scales in the *CSEQ*, scales from the *MU Freshman Survey* focused on both the quantity and quality of students' academic involvement. Questions in the Use of the Library scale, for example, ranged from studying in the library to looking up primary reference works. Alpha reliability estimates for the library, writing, and faculty scales were 0.87, 0.86, and 0.87, respectively.

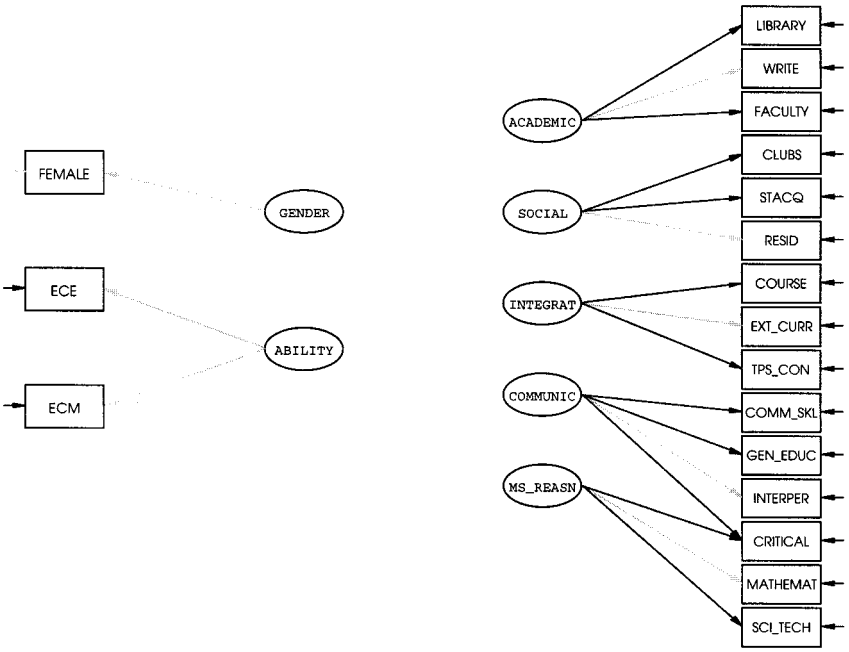

FIG. 2. Relationships between measured variables and latent constructs. (ACTE = ACT English; ACTM = ACT Mathematics; LIBRARY = Use of the Library; WRITING = Writing Experiences; FACULTY = Faculty Interaction; CLUBS = Involvement in Clubs; RESIDEN = Involvement in Campus Residence; PEER = Peer Interaction; COURSE = Integration of Course Information; EXT_CURR = Integration of Extra-Curricular Experiences; CONVER = Integration of Information in Conversations; COMM_SKL = Gains in Communication Skills; GEN_EDUC = Gains in General Education; INTERPER = Gains in Interpersonal Skills; CRITICAL = Gains in Critical Thinking; MATH = Gains in Mathematics; SCI_TECH = Gains in Science and Technology; ENT_ABIL = Entering Ability; ACADEMIC = Academic Involvement; SOCIAL = Social Involvement; INTEGRAT = Integration; GEN_ABIL = Gains in General Ability; MS_REASN = Gains in Math and Science Reasoning.)

Social Involvement also was directly represented by three 10-item scales: Involvement in Clubs, Involvement in Campus Residence, and Peer Interaction. Questions ranged from being a member of a club or attending campus residence meetings to holding leadership positions in clubs or the campus residence. Alpha reliability estimates for these three scales were 0.89 for Involvement in Clubs, 0.90 for Involvement in Campus Residence, and 0.87 for Peer Interaction.

Three scales were used to represent integration of students' college experiences. Integration of Course Information was a 4-item scale with an alpha relia-

bility of 0.78. Items in the scale focused on synthesis of information from different courses, thinking about practical applications of course material, and summarizing information learned in courses. Integration of Extracurricular Experiences was also a 4-item scale. The questions used in the scale focused on students' integration of out-of-class experiences with material learned in class and practical applications of out-of-class experiences. Alpha reliability for this scale was 0.87. The third scale, Integration of Information in Conversations, contained 10 items focusing on the intellectual content of interactions. Alpha reliability for this scale was 0.88.

Six scales derived from students' reports of gains made during the first year of college, were used to represent the cognitive development constructs in this study. The first scale, Gains in Communication Skills included four items focusing on reading, writing, speaking, and listening. Alpha reliability for this scale was 0.85. Gains in General Education also was a 4-item scale. Questions focused on gains in learning about the humanities and social sciences, and produced an alpha reliability coefficient of 0.76. Three questions comprised the Gains in Interpersonal Skills scale. These questions dealt with students' abilities to lead, work in groups, and get along with people from different backgrounds. Alpha reliability for the scale was 0.80. The fourth scale, Gains in Critical Thinking, focused on the abilities of analysis, synthesis, and application. The alpha reliability coefficient for this scale was 0.89. Three questions were included in the fifth outcomes scale, Gains in Mathematics. Alpha reliability for this scale was 0.85. The final outcomes scale, Gains in Understanding Science and Technology included three questions related to understanding new developments in science and technology. Alpha reliability for the scale was 0.91. Gains in Communication Skills, Gains in General Education, and Gains in Interpersonal Skills were directly related to General Learned Abilities, while Gains in Mathematics and Gains in Science and Technology were directly related to Gains in Math and Science Reasoning. Gains in Critical Thinking was related to both cognitive development constructs.

Procedures

During the winter 1997 semester, the *MU Freshman Survey* was mailed to 2664 first time college (FTC) students living on campus or in Greek housing. International students were excluded from the survey process. After an initial mailing, a reminder postcard, and a second complete mailing, 827 students returned completed questionnaires—a 31% response rate. In all mailings, students were told that their responses to the survey would be confidential. No compensation was provided to students for completing the survey.

Participants

An examination of the demographic characteristics of respondents and nonrespondents revealed that respondents were more likely to be female (75.4% versus 60.2%) and were less likely to be minority students (11.5% versus 18.7%). Respondents were more likely to have higher cumulative grade point averages (3.05 versus 2.74), ACT English subscores (26.3 versus 25.2), and ACT Mathematics subscores (24.5 versus 23.7). Although all of these differences were statistically significant, they accounted for only 1% to 3% of the variance in background characteristics. Slightly more than 21% of the respondents were Greeks, compared to 25% of all FTC (first-time college) students.

Table 1 presents Greek and non-Greek participants' means on the observed measures used in this study. Because statistical significance is a function of sample size, estimates of explained variance are included in the table to provide a gauge of the substantive importance of the differences. As can be seen from the data in Table 1, Greek students participating in this study were significantly more likely to be female than were independents. Although no significant differences between Greeks and non-Greeks were found for the ability and academic involvement measures, Greeks were more involved in clubs and in their campus residences than were non-Greeks. No differences were found for interaction with peers, course integration, or extracurricular integration. Greek students reported significantly lower levels of integration of information in conversations, but reported significantly greater gains in communication skills, interpersonal skills, and critical thinking. In all cases, estimates of explained variance were extremely modest, ranging from 0.01 to 0.04. It is also significant to note that when the six reported-gain measures were regressed on fraternity or sorority membership with background, involvement, and integration measures used as control variables, no statistically significant effects were found for Greek affiliation.

Data Analysis

The data analysis was conducted in three phases, corresponding to the three research questions. The first set of analyses focused on whether the conceptual model adequately represented the relationships (i.e., covariances) among the observed variables. Initially, the variance-covariance matrix for the observed variables (excluding Greek affiliation) was calculated and analyzed using the *LISREL 8.30* computer program (Jöreskog & Sörbom, 1999). The program tested whether the covariance matrix implied by the structural equation model (Figure 1) and the measurement model (Figure 2) differed significantly from the observed covariance matrix. Maximum likelihood estimation was used because

TABLE 1. Measured Variable Means for Greek and Non-Greek Students and Effect Sizes

Measured Variable	Greek	Non-Greek	Effect Size
Female***	0.91	0.71	0.04
ACT English	26.15	26.31	0.00
ACT Mathematics	23.93	24.66	0.00
Use of the Library	1.98	2.03	0.00
Writing Experiences	2.58	2.53	0.00
Faculty Interaction	1.84	1.87	0.00
Involvement in Clubs***	2.32	2.07	0.02
Involvement in Campus Residence***	2.75	2.52	0.02
Peer Interaction	2.52	2.46	0.00
Integration of Course Information	3.00	2.96	0.00
Integration Extracurricular Experiences	2.65	2.70	0.00
Integration of Information in Conversations**	2.14	2.29	0.01
Gains in Communication Skills*	2.34	2.20	0.01
Gains in General Education	2.17	2.10	0.00
Gains in Interpersonal Skills***	2.35	2.09	0.01
Gains in Critical Thinking*	2.36	2.20	0.01
Gains in Mathematics	1.69	1.63	0.00
Gains in Science and Technology	1.82	1.84	0.00

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

it provided goodness of fit measures that were robust to departures from multivariate normality (Hu & Bentler, 1998, 1999).

Assessing goodness of fit with the 827 students in this study was problematic because traditional chi-square statistics are influenced by sample size. When the sample size is large, trivial differences can produce significant chi-square values (Marsh, Balla, & McDonald, 1988; Mulaik, James, Van Alstine, Benett, Lind, & Stidwell, 1989). Based on the recommendation of Hu and Bentler (1999), a two-index test was used to assess goodness of model fit. The indices used in this study were the root mean squared error of the approximation (RMSEA) and the standardized root mean square residual (SRMR). Both indices are robust with respect to departures from multivariate normality and are insensitive to the effects of sample size (Hu & Bentler, 1998, 1999). In addition, the RMSEA is sensitive to misspecification of the measurement model and rewards more parsimonious models, whereas the SRMR is sensitive to misspecification of the structural equation model (Hu & Bentler, 1999). Based on their Monte Carlo analyses, Hu and Bentler (1999) recommended that values of RMSEA ≤ 0.06 and SRMR ≤ 0.09 be used as criteria for selecting a suitable model.

Based on the results of the goodness of fit tests, a specification search was planned to identify a model that better represented the observed data. Initially, bivariate relationships between observed variables that were not accounted for by the measurement and structural equation models were tested and included in the model if they improved model fit. Relationships could be between two observed measures underlying the same latent construct (e.g., Use of the Library and Writing Experience) or between two measures underlying different latent constructs (e.g., Faculty Interaction and Integration of Course Information). In addition to including bivariate relationships, the specification search excluded nonsignificant paths between latent variables, such as the relationship between Social Involvement and Gains in Math-Science Reasoning. Modification indices and *t* values (Jöreskog & Sörbom, 1999), along with judgments about the reasonableness of the modifications, were used to identify relationships that should be included or excluded.

The second phase of the analysis examined whether the final model from Phase I provided a satisfactory representation of the observed data for both Greek and non-Greek students. That is, was the model invariant across the two groups? Initially, covariance matrices for Greeks and non-Greeks were calculated and analyzed using a two-group structural equation model (Jöreskog & Sörbom, 1999). Four models were specified and tested. The first (null) model included the variances for the observed variables in both groups, but fixed all covariances to zero (i.e., there were no relationships among the observed variables). This independence model served as a baseline against which all other models were compared. In the second model, the pattern of factor loadings in the measurement model and paths in the structural equation model were the same for both groups, but the values of the parameters in the model were free to vary across groups. This model represented the best possible fit of a "true" invariance model. The third model constrained all of the parameters in the model to be the same for both groups and represented total invariance across groups. The degrees of freedom for the third model were used for the second model so that the second model would represent the best possible fit for the total invariance model. In the final model, three parameters in the total invariance model were allowed to vary across groups. These parameters represented the correlation between Gender and Entering Ability and the correlations between the structural disturbances (i.e., residuals) for Academic and Social Involvement and for Gains in General Abilities and Gains in Math and Science Reasoning. It is important to note that freeing these parameters did not alter any of the structural relationships among latent variables in the model.

In addition to the RMSEA and the SRMR goodness of fit tests, Marsh's (1994) hierarchical Tucker-Lewis index (HTLI) (Tucker & Lewis, 1973) was used to assess model invariance. The HTLI examined goodness of fit for a given model (e.g., the total invariance model) relative to the goodness of fit for the

null model and for the saturated model. Marsh recommended that a criterion of HTLI > 0.90 be used to identify an acceptable model. Hu and Bentler (1999) recommended using a more conservative value of 0.95.

In the third phase of the analysis, means and intercepts for Greek and non-Greek students were included in the two-group model. First, non-Greek students' mean scores for the observed variables were subtracted from the corresponding scores for each student (Jöreskog & Sörbom, 1999). The practical result of this transformation was that the means on all observed variables were zero for non-Greek students, whereas the means for Greek students represented deviations from the means for non-Greek students. Although not required, centering the data around the means for non-Greek students facilitated model specification and the interpretation of results.

Once the data transformations were complete, several models were specified and tested. The first model was a confirmatory factor analysis (i.e., measurement) model that provided means for the latent variables (see Jöreskog & Sörbom, 1999). These means served as a guide for interpreting the intercepts in subsequent models. The second model tested was the final model from Phase II with means and intercepts included. Means and intercepts for Greek students were fixed to zero, the actual values for non-Greek students. This model assumed that Greek affiliation was not related to any of the latent constructs. In subsequent models, modification indices were used to identify means or intercepts that should have been free to vary. Statistically significant intercepts for Greek students would have indicated that Greek affiliation had a significant direct effect on college experiences and/or cognitive development. Nonsignificant intercepts, coupled with statistically significant factor means would have indicated that the effects of Greek affiliation were either indirect or the spurious result of differences in the background characteristics of Greek and independent students. An examination of standardized direct, indirect, and total effects for the latent variables provided an indication of whether the effects for Greek affiliation were indirect or spurious.

RESULTS

Tests of the Conceptual Model

Although the analysis of the full conceptual model indicated that the relationships between observed and latent variables were correctly specified (i.e., statistically significant), overall goodness of fit indices revealed that the full model did not provide an acceptable representation of the observed data ($\chi^2 = 693.67$; $df = 115$; $p < 0.001$; $RMSEA = 0.08$; $SRMR = 0.04$). The fact that the *RMSEA* exceeded its cutoff value also suggested that overall model fit could be improved by including bivariate relationships in the measurement model. Examina-

tion of the modification indices for the full model identified four significant bivariate relationships. Two of the relationships were between the uniquenesses of observed variables representing the same latent constructs. Specifically, the uniquenesses for the measured variables Gains in Communication Skills and Gains in Interpersonal Skills were significantly correlated, as were the uniquenesses for Integration of Course Information and Integration of Information in Conversations. The other bivariate relationships were between uniquenesses of measured variables representing different latent constructs. Specifically, the uniqueness for Peer Interaction was significantly correlated with the uniqueness for Integration of Information in Conversations. Likewise, the uniqueness for Writing Experiences was significantly related to the uniqueness for Gains in Communication Skills. This was not surprising, since the Gains in Communication Skills scale contained an item about gains in writing.

While the inclusion of bivariate relationships among uniquenesses substantially improved model fit ($\Delta\chi^2 = 165.43$; $\Delta(df = 4$; $p < 0.001$), the revised model still did not provide an acceptable representation of the observed data ($\chi^2 = 528.24$; $df = 111$; $p < 0.001$; $RMSEA = 0.07$; $SRMR = 0.04$). In an effort to identify a more parsimonious model that provided a better representation of the data, t values for the effects parameters were examined to identify nonsignificant paths that could be eliminated. Seven paths were not statistically significant. Specifically, Gender was not significantly related to Integration or Gains in General Abilities, whereas Entering Ability was not significantly related to Social Involvement, Gains in General Abilities, or Gains in Math-Science Reasoning. Academic Involvement was not directly related to Gains in Math-Science Reasoning, and Integration was not related to Gains in General Abilities. Excluding these paths from the conceptual model did not substantially increase poorness of fit ($\Delta\chi^2 = 9.87$; $\Delta df = 7$; $p > 0.05$) and produced a final model that provided an acceptable representation of the observed data ($\chi^2 = 538.11$; $df = 118$; $p < 0.001$; $RMSEA = 0.06$; $SRMR = 0.04$). This model is depicted in Figure 3.

Tests of Invariance Across Groups

As expected, the null (independence) model provided an extremely poor representation of the observed data ($\chi^2 = 7654.56$; $df = 306$; $p < 0.001$; $RMSEA = 0.33$; $SRMR = 0.34$). In contrast, the saturated (best fitting) model provided an acceptable representation of the data ($\chi^2 = 704.12$; $df = 289$; $p < 0.001$; $RMSEA = 0.06$; $SRMR = 0.06$). The focus of subsequent analyses was whether a more restrictive invariance model also provided an acceptable representation of the observed data. Goodness of fit tests for the total invariance model revealed that constraining all parameters in the measurement and structural equation models to be the same for Greeks and non-Greeks provided an acceptable representation

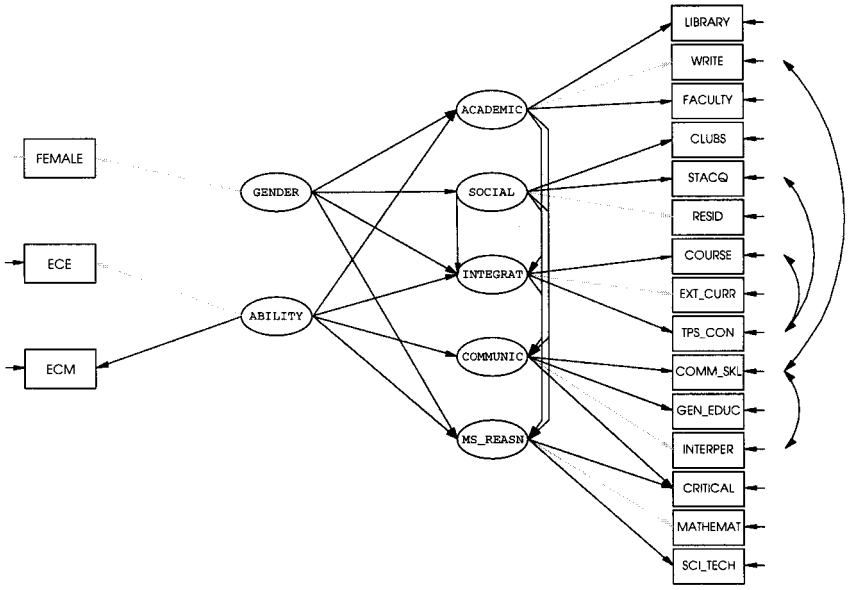

FIG. 3. Final model for the total sample. (ACTE = ACT English; ACTM = ACT Mathematics; LIBRARY = Use of the Library; WRITING = Writing Experiences; FACULTY = Faculty Interaction; CLUBS = Involvement in Clubs; RESIDEN = Involvement in Campus Residence; PEER = Peer Interaction; COURSE = Integration of Course Information; EXT_CURR = Integration of Extra-Curricular Experiences; CONVER = Integration of Information in Conversations; COMM_SKL = Gains in Communication Skills; GEN_EDUC = Gains in General Education; INTERPER = Gains in Interpersonal Skills; CRITICAL = Gains in Critical Thinking; MATH = Gains in Mathematics; SCI_TECH = Gains in Science and Technology; ENT_ABIL = Entering Ability; ACADEMIC = Academic Involvement; SOCIAL = Social Involvement; INTEGRAT = Integration; GEN_ABIL = Gains in General Ability; MS_REASN = Gains in Math and Science Reasoning.)

of the data ($\chi^2 = 838.20$; $df = 289$; $p < 0.001$; $RMSEA = 0.06$; $SRMR = 0.09$; $HTLI = 0.98$). All estimated parameters in the model were statistically significant for both groups. Relaxing the invariance constraints for correlations between latent background characteristics and for correlations between structural disturbances did not result in a substantially better fitting model ($\chi^2 = 823.12$; $df = 286$; $p < 0.001$; $RMSEA = 0.06$; $SRMR = 0.09$; $HTLI = 0.98$). Based on these results, the more parsimonious model, representing total invariance across groups, was used in the analysis of means and intercepts.

Tests of Means and Intercepts

As a preliminary step in the analysis, means were calculated for the seven latent variables. Goodness of fit tests indicated that the confirmatory factor analysis model upon which the means were based provided an acceptable representation of the observed data ($\chi^2 = 889.92$; $df = 312$; $p < 0.001$; $RMSEA = 0.06$; $SRMR = 0.09$). However, when a model including fixed means and intercepts was specified and tested, goodness of fit results indicated that the model provided a relatively poor representation of the observed data ($\chi^2 = 968.43$; $df = 325$; $p < 0.001$; $RMSEA = 0.07$; $SRMR = 0.09$). Thus, significant differences existed between Greek and non-Greek means and/or intercepts. Freeing the mean for Gender and the intercepts for Social Involvement and Integration resulted in a significant improvement in goodness of fit ($\Delta\chi^2 = 68.6$; $\Delta df = 3$; $p < 0.001$) and provided an acceptable representation of the observed data ($\chi^2 = 899.83$; $df = 322$; $p < 0.001$; $RMSEA = 0.06$; $SRMR = 0.09$).

Table 2 presents the means for the latent variables, as well as the intercepts for the structural equations. An examination of the results in Table 2 revealed that Greek students in this study were significantly more likely to be female (0.20), to report higher levels of Social Involvement (0.20), and to report making greater Gains in General Abilities (0.16). No other latent variable means differed significantly for Greeks and independents. Means and intercepts for the final structural equation model also indicated that Greek students were more likely to be female (0.20). Greek affiliation had a direct positive effect on Social Involvement (0.19), but no direct effect on Gains in General Abilities (0.00). Greek affiliation had a significant negative effect on Integration (–0.10).

In order to determine if the effect of Greek affiliation on gains in general abilities was indirect or spurious, common metric standardized effect parameters

TABLE 2. Greek Means and Intercepts for the Latent Constructs

Latent Construct	Factor Means	Means and Intercepts
Gender	0.20***	0.20***
Entering Ability	–0.13	0.00
Academic Involvement	0.00	0.00
Social Involvement	0.20***	0.19***
Integration	–0.04	–0.10**
Gains in General Abilities	0.16***	0.00
Gains in Math and Science Reasoning	0.04	0.00

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

were calculated for the direct, indirect, and total effects in the final model. These parameters, along with squared multiple correlations for the structural equations, are presented in Table 3. An examination of the squared multiple correlations revealed that the model did a poor job of explaining students' Academic Involvement (0.05) and Social Involvement (0.01). In contrast, the model provided extremely good explanations of Integration and Gains in General Abilities (0.64 and 0.43, respectively). The squared multiple correlation for Gains in Math and Science Reasoning was more modest (0.16).

Both Gender (0.10) and Entering Ability (–0.19) were significantly related to Academic Involvement, whereas only Gender (0.11) was significantly related to Social Involvement. The direction of the relationships indicated that females reported higher levels of both Academic and Social Involvement, while students with higher levels of Entering Ability reported lower levels of Academic Involvement. The weak relationships between Social Involvement and latent background variables explained why the intercept for Social Involvement (0.19) was almost identical to the difference between Greek and non-Greek Social Involvement means (0.20).

Consistent with expectations, Academic Involvement and Social Involvement

TABLE 3. Standardized Direct, Indirect, and Total Effects

	ACADEMIC	SOCIAL	INTEGRAT	GEN ABIL	MS REASN
GENDER	0.10**	0.11**	0.00	0.00	–0.09**
	—	—	0.09**	0.08**	0.04
	0.10**	0.11**	0.09**	0.08**	–0.05
ENT ABIL	–0.19***	0.00	0.21***	0.00	0.00
	—	—	–0.10**	–0.05	0.03
	–0.19	0.00	0.11**	–0.05	0.03
ACADEMIC	—	—	0.56***	0.25***	0.00
	—	—	—	0.00	0.16***
	—	—	0.56***	0.25***	0.16***
SOCIAL	—	—	0.33***	0.48***	0.16**
	—	—	—	0.00	0.09**
	—	—	0.33***	0.48***	0.25***
INTEGRAT	—	—	—	0.00	0.28***
	—	—	—	—	—
	——	—	0.00	0.28***	
SMC	0.05	0.01	0.63	0.43	0.16

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

ENT ABIL = Entering Ability; ACADEMIC = Academic Involvement; SOCIAL = Social Involvement; INTEGRAT = Integration; GEN ABIL = Gains in General Abilities; MS REASN = Gains in Math and Science Reasoning; SMC = Squared Multiple Correlation.

were positively related to Integration (0.56 and 0.33, respectively). That is, higher levels of Academic and Social Involvement were associated with higher levels of Integration. The negative intercept for Integration was a product of the fact that Greeks were more involved socially and Social Involvement was positively related to Integration. Although the Integration mean for Greek students was not significantly lower than the mean for independents, it was significantly lower than would be expected given high levels of social involvement by Greeks.

Gender was indirectly related to Integration (0.09), acting through both Academic and Social Involvement. In contrast, Entering Ability was directly and positively related to Integration (0.21), indicating that higher-ability students reported higher levels of integration. However, Entering Ability had a negative indirect relationship with Integration (–0.10), owing to the negative relationship between Entering Ability and Academic Involvement. Due to this negative indirect effect, the total effect of Entering Ability on Integration (0.11), while positive and significant, was substantially smaller than the direct effect.

Gains in General Abilities were most strongly related to Academic Involvement (0.25) and Social Involvement (0.48). Given that the effects of involvement on gains were assumed to be mediated by integration, the absence of a significant relationship between Integration and Gains in General Abilities was surprising. Neither Gender nor Entering Ability was directly related to Gains in General Abilities, although both exerted weak indirect effects on this dimension of cognitive development (0.08 and –0.05, respectively). These findings indicated that the significant difference in Greek and independent means for Gains in General Abilities represented an indirect effect of Greek Affiliation. Higher levels of Gains in General Abilities for Greeks were the result of higher levels of Social Involvement by Greeks and the positive relationship between Social Involvement and Gains in General Abilities.

Gains in Math and Science Reasoning were most strongly related to Integration (0.28), followed by Social Involvement (0.16). Academic Involvement was not directly related to Gains in Math and Science Reasoning, although Academic Involvement was indirectly related to Gains in Math and Science Reasoning (0.16). Social Involvement also was indirectly related to Gains in Math and Science Reasoning (0.09) by virtue of its relationship with Integration.

DISCUSSION

The results of this research indicated that the conceptual model used in this study provided an appropriate representation of the important factors related to students' cognitive development during college. In addition, the relationships among background, college experience, and cognitive development constructs were the same for Greek and independent students. The fact that relationships

among the latent variables in the model were invariant across groups provided an opportunity to compare means and intercepts for Greek and non-Greek students. The intercepts, like least–square means in an ANCOVA, represented the unique effects of Greek affiliation on college experiences and cognitive development. In addition, a comparison of intercepts for the structural equations, along with an examination of parameter estimates in the model, provided an indication of whether observed differences between Greeks and independents were direct, indirect, or spurious.

Three findings emerged from this research. First, Greek and non-Greek students differed significantly in terms of their mean levels of social involvement and gains in general abilities, with Greek students reporting both higher levels of social involvement and gains. Greek students did not report lower levels of academic involvement, integration of college experiences, or gains in math and science reasoning. Second, the unique effects of Greek affiliation were more pronounced for college experiences than for cognitive development. Intercepts for the structural equation model indicated that membership in a Greek organization was directly related to students' social involvement and integration of college experiences, and indirectly related to gains in those general abilities associated with cognitive development. Third, relationships between college experiences and cognitive development varied depending on the dimension of cognitive development being examined. For example, gains in students' general abilities were directly related to their levels of academic and social involvement. These relationships were not mediated by integration. In contrast, the relationships between students' academic and social involvement and gains in mathematical and scientific reasoning tended to be indirect and mediated by students' integration of their college experiences.

Limitations

Care should be taken not to overgeneralize the results of this research. First and foremost, these results do not represent an endorsement of the role of the Greek system in higher education. The results are specific to a single research university and may not hold true for other institutions, even other research universities. Moreover, this research focused on only one of several criticisms of the Greek system.

A second limitation of the present research is that it does not directly contradict the findings of the National Study of Student Learning. Again, results are specific to one institution and may not hold true at other institutions. More important, this research did not directly assess the negative effects of Greek membership on objective measures of cognitive development. Because objective measures of cognitive development, such as the *CAAP* examination, were not included in this study, it was not possible to discount the hypothesis that differ-

ences in results across studies are the product of different measurement methods. The possibility still exists that the positive effects for Greek affiliation identified in the current research were the result of using self-reported measures of gains.

A third limitation of the present research is that the conclusions apply more strongly to sorority membership than fraternity membership. The participants in this study were predominantly female and attempts to generalize the results beyond female students are problematic. The fact that gender was included in the study as a control variable represented a partial solution to the problem, but the relatively small number of males in the study makes obtaining stable estimates for male Greeks and non-Greeks difficult. Moreover, including gender as a latent variable rather than as a classification variable, may understate the magnitude of gender differences due to problems of attenuation. Based on the findings of the NSSL and Pike and Askew (1990), future research should seek to identify differences between Greek and non-Greek students using both Greek affiliation and gender as classification variables.

Implications

Despite its limitations, the present research has important implications for research on cognitive development generally, and research on Greek affiliation in particular. Although the results are not conclusive, the findings of this research suggest that the causal ordering of variables in a model of college outcomes can affect the results of data analyses. Preliminary analysis of the observed variables used in this study indicated that, although Greek and non-Greek students differed significantly in terms of their college experiences and educational outcomes, these differences disappeared when Greek membership and college experiences measures were all entered into a regression model. However, when colleges experiences were viewed as a consequence of Greek affiliation, membership in a fraternity or sorority had a significant indirect impact on the dimension of cognitive development associated with general learned abilities. Although additional research is needed to confirm the results of this study, the finding that the effects of fraternity or sorority membership were mediated by college experiences is consistent with Pascarella and Terenzini's (1991) findings regarding 20 years of research on college students. Consistent with their recommendation, future research on how college affects students needs to examine carefully the contingent and indirect effects of college experiences on educational outcomes.

The results of the present research also have important implications for the roles of differentiation and integration in student learning. Previous research by Pike (in press) found that the effects of differentiation on students' cognitive development were mediated by integration. That is, differentiation of experiences (i.e., involvement) was more strongly related to integration than to cogni-

tive development, while integration was most strongly related to cognitive development. In the present research, involvement in a variety of curricular and co-curricular activities was directly related to gains in one dimension of cognitive development: growth in general abilities. For the other dimension of cognitive development, gains in math and science reasoning, the effects of involvement were largely indirect, acting through the integration of these experiences. A possible explanation for this finding is that the general abilities dimension represents *breadth* of cognitive development, while the math and science reasoning dimension more strongly represents *depth* of cognitive development. In other words, differentiation may lead to greater cognitive development when that development is defined as broad growth in a variety of abilities. When cognitive development is more narrowly defined and focused on higher-order thinking skills, integration may be an essential ingredient in student learning and development.

The findings of the present research potentially have important implications for the Greek system in higher education. Clearly the findings of this research indicate that fraternity or sorority membership need not have a negative effect on students' cognitive development during college. Consistent with theory and previous research, membership in a Greek organization was associated with higher levels of involvement, particularly social involvement. Greater involvement, in turn, was associated with greater gains in general cognitive abilities. Although the effects of being in a Greek organization were greatest for social involvement, the negative effects of fraternity or sorority membership on academic involvement reported by Kuh, Pascarella, and Wechsler (1996) were not found in this study.

One possible reason that Greek affiliation was not negatively related to academic involvement may have been the culture of the institution. At the institution where this research was conducted, many fraternities and sororities stress the importance of academic success. This focus on academic achievement is underscored by a Student Affairs staff that stresses the importance of student success and recognizes those Greek organizations with the highest levels of academic achievement. Anecdotal evidence further suggests that the Greek houses in this study are extremely competitive academically and take seriously their role in promoting student achievement and success.

The finding that Greek affiliation was negatively related to the integration of diverse college experiences is troubling. If, as Chickering (1975) and the present research suggest, integration is an important element in students' cognitive development, then the contributions of membership in a fraternity or sorority to cognitive development are less than optimal. One possible explanation for the negative effect of Greek affiliation on integration is that Greek organizations place too great an emphasis on social involvement. Without a corresponding emphasis on academic involvement, higher levels of integration of in-class and

out-of-class experiences may be impossible. Too great an emphasis on social involvement may actually hamper integration if the social involvement is superficial or if social involvement prevents students from devoting the time needed to integrate diverse curricular and co-curricular experiences.

CONCLUSION

An important assumption of the present research, and many of the studies critical of fraternities and sororities, is that the Greek system is a powerful vehicle for socialization (see Strange, 1986). Whether membership in a Greek organization enhances student involvement and promotes cognitive development, or whether membership in a fraternity or sorority hinders student development by deemphasizing academic experiences/achievement and emphasizing behaviors that are not conducive to learning, may depend on the institutional culture within which fraternities and sororities exist.

As Kuh and Lyons (1990) noted, college and university leaders need to examine carefully the values being promoted by fraternities and sororities on their campuses. At the same time, these leaders need to recognize that the values espoused by fraternities and sororities may have their roots in aspects of the culture of the institution and may simply reflect low campus expectations for the Greek system. Finding that there is a mismatch between campus values and the values of the Greek system may be a call for more intentionally integrating Greek life into the academic life of the institution, rather than a call for abolishing the Greek system or limiting its role on campus.

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