The Relationship Between Student-Faculty Interaction and Cognitive Skills Development: An Examination Using Structural Equation Modeling

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Student-Faculty Interaction

- Linked to higher GPA, increased persistence, greater cognitive/intellectual and personal development, better vocational preparation, higher educational aspiration, greater college satisfaction, self-concepts
- Viewed as integral to the undergraduate socialization process (Astin, 1984; Pascarella, 1980; Pascarella & Terenzini, 1991, 2005; Tinto,1987, 1993; Weidman, 1989)
- Indirectly affects college outcomes
- Still unclear *how* and *why* SFI contributes to student outcomes

Self-Determination Theory

- An explanation of student motivation
- Ryan and Deci's (2000) motivational concepts
  - Autonomy
  - Relatedness
  - Competence
- A hypothesized relationship among SFI, autonomy and relatedness, academic engagement, and gains in cognitive skills

Research Questions

- (1) How do student-faculty interaction, autonomy, relatedness, and academic engagement affect cognitive skills development among college students? What are the direct and indirect relationships between the variables?
- (2) Do autonomy and relatedness mediate the relationship between student-faculty interaction and academic engagement?
- (3) Does academic engagement mediate the relationship between student-faculty interaction and cognitive skills development?

Hypothesized Model for SEM

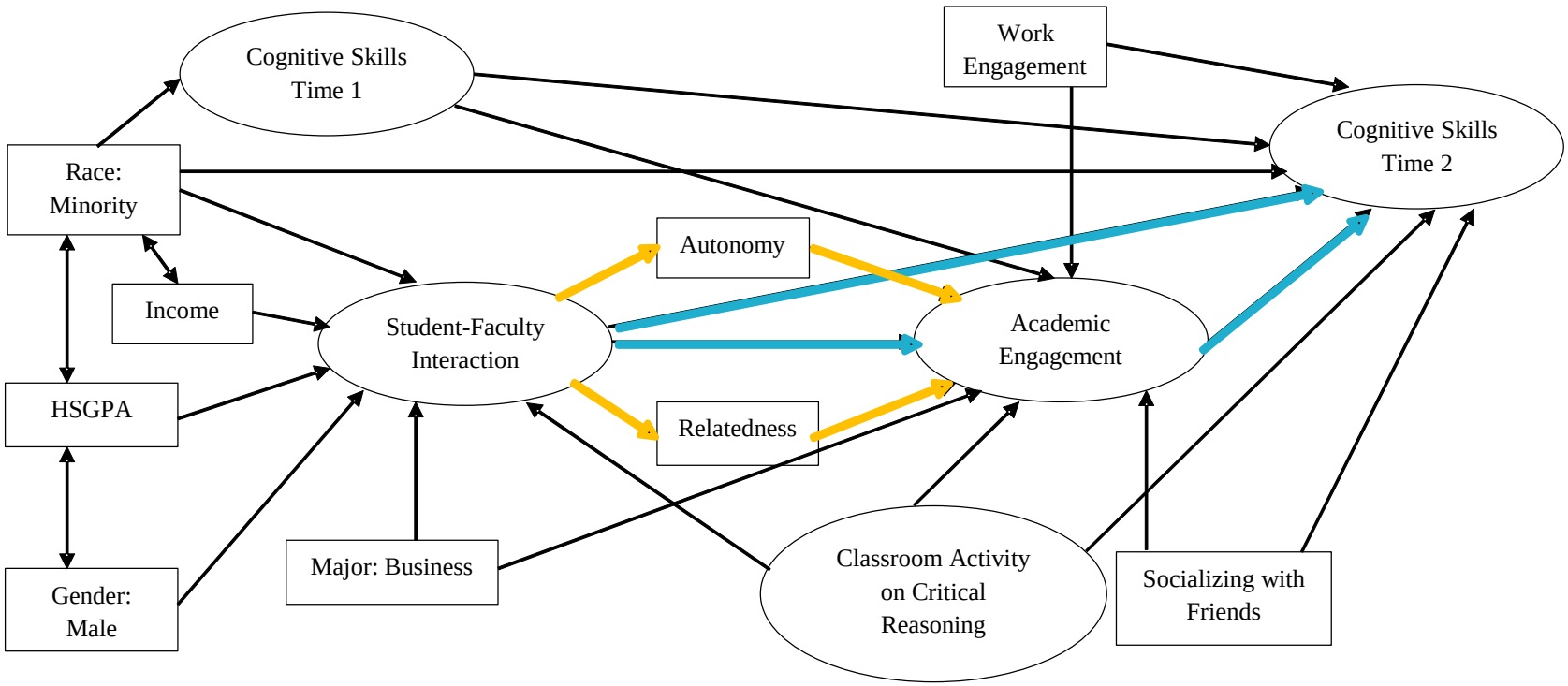

Figure 1. Conceptual model for the relationship between student-faculty interaction and cognitive skills development

Data and Sample

- Data Source
  - The 2010 University of California Undergraduate Experience Survey (UCUES)

- Sample
  - Senior students
  - Data screening to meet the assumptions of SEM
  - Final analytic sample: 5,169 cases
    - 59.9% female; 41.1% male
    - 36.2% White; 1.9% African American; 49.3% Asian American; 12.2% Latino; 0.5% other races

Final Endogenous Variable

- Level of cognitive skills in senior year (latent variable; $\alpha = .84$)
  - Analytical and critical thinking skills
  - Ability to write clearly and effectively
  - Ability to read and comprehend academic material
  - Ability to understand a specific field of study
  - Ability to prepare and make a presentation
  - Other research skills
- Developed via confirmatory factor analysis
- Fit statistics: $\chi^2 = 31.063$, df = 6, CFI = .998, RMSEA = .028

Mediating Endogenous Variables

- Student-Faculty Interaction (latent variable, $\alpha = .80$)
  - Talked with faculty outside of class about course material
  - Communicated with a faculty member by email or in person
  - Interacted with faculty during lecture class sessions
  - Worked with a faculty on an activity other than coursework
  - Fit statistics: $\chi^2 = 20.716$, df = 2, CFI = .997, RMSEA = .043

- Academic Engagement (latent variable, $\alpha = .88$)
  - Asked an insightful question in class
  - Brought up ideas or concepts from different courses during class discussion
  - Contributed to a class discussion
  - Had a class in which the professor knew or learned your name
  - Fit statistics: $\chi^2 = 54.326$, df = 7, CFI = .997, RMSEA = .036

Mediating Endogenous Variables

- Critical Reasoning (latent variable; $\alpha = .88$)
  - Examined and assessed other methods and conclusions
  - Reconsidered own position after assessing other arguments
  - Incorporated ideas from different courses
  - Evaluated methods and conclusions
  - Generated new ideas or products
  - Used facts or examples to support viewpoint
  - Fit statistics: $\chi^2 = 33.078$, df = 4, CFI = .998, RMSEA = .038
- Autonomy (observed variable, $\alpha = .62$)
  - (1) Found a course so interesting that they did more work than was required
  - (2) Chose challenging courses even though they might lower their GPA
- Relatedness (observed variable, $\alpha = .93$)
  - (1) Would choose to enroll at their institution
  - (2) Feel that they belong at their institution

Exogenous Variables

- Pretest of cognitive skills
- Pre-college characteristics
  - Race
  - Gender
  - Income
  - High school GPA
- Academic major (business majors)
- Other college experiences
  - work engagement
  - socializing with friends

Analysis

- Structural Equation Modeling (SEM) using AMOS 22.0
  - Model specification
  - Confirmatory factor analysis
  - Structural regression modeling
  - Model respecification

Results

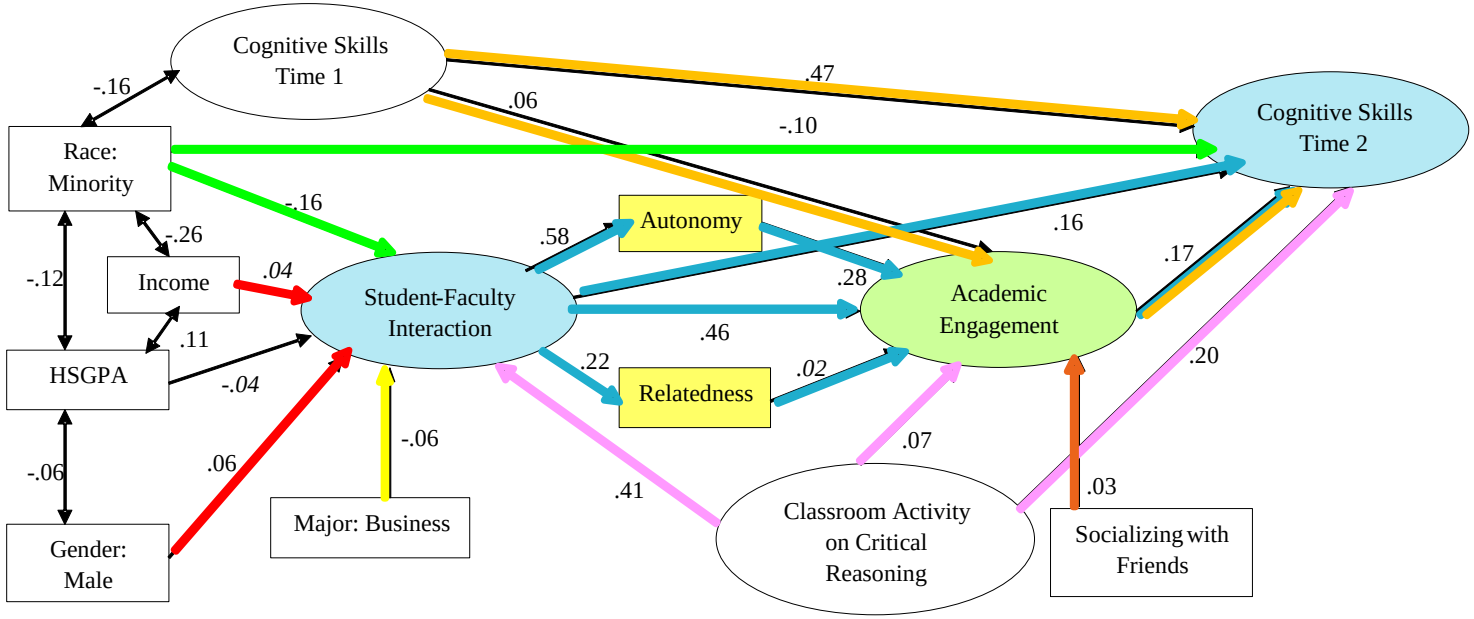

Figure 2. Final structural model for the relationship between student-faculty interaction and cognitive skills development. Structural model (n = 5,169), χ^2/df = 8.967, CFI = .952, TLI = .943, RMSEA = .039. All structural paths and correlations were statistically significant at the .001 level except three structural paths; the three exceptions were statistically significant at the .01 level and indicated with italicized text in the figure. Disturbances, errors, and observed variables used to create latent variables were omitted in the figure.

Discussion and Implications

- Pathways from student-faculty interaction to college outcome: More complex, not simple
- Importance of student-faculty interaction
  - Inform faculty about the beneficial effects
  - Faculty research projects, learning communities, and student organizations
- Role of autonomy
- Student-faculty interaction among minority students
  - lower levels of student-faculty interaction
  - Sociocultural barriers/challenges

Thank you for your participation!

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