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SELF-EFFICACY, STRESS, AND ACADEMIC SUCCESS IN COLLEGE

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This paper investigates the joint effects of academic self-efficacy and stress on the academic performance of 107 nontraditional, largely immigrant and minority, college freshmen at a large urban commuter institution. We developed a survey instrument to measure the level of academic self-efficacy and perceived stress associated with 27 college-related tasks. Both scales have high reliability, and they are moderately negatively correlated. We estimated structural equation models to assess the relative importance of stress and self-efficacy in predicting three academic performance outcomes: first-year college GPA, the number of accumulated credits, and college retention after the first year. The results suggest that academic self-efficacy is a more robust and consistent predictor than stress of academic success.

KEY WORDS: self-efficacy; stress; academic; nontraditional; college; immigrant; minority; retention; performance.

INTRODUCTION

Despite steadily rising enrollment rates in U.S. postsecondary institutions, weak academic performance and high dropout rates remain persistent problems among undergraduates (Lloyd, Tienda, and Zajacova, 2001; Tinto, 1994). For academic institutions, high attrition rates complicate enrollment planning and place added burdens on

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efforts to recruit new students. For students, dropping out before earning a terminal degree represents untapped human potential and a low return on their investment in college (Card and Krueger, 1992; Jaeger and Page, 1996). Poor academic performance is often indicative of difficulties in adjusting to college and makes dropping out more likely (Gillock and Reyes, 1999; Murtaugh, Burns, and Schuster, 1999).

This paper examines the joint effect of two related social cognitive factors—academic self-efficacy and stress—on academic performance and retention for college freshmen. Both of these factors have been examined extensively as predictors of academic adjustment, but we focus explicitly on assessing the relative importance of these two variables in explaining college success. We employ a new instrument that assesses both self-efficacy and stress with regard to identical college-related tasks, allowing for a more direct comparison of these two constructs. We examine three measures of academic success: first-year cumulative grades and credits, and retention in the second year.

We focus on the effect of these social cognitive factors in the context of a nontraditional, immigrant, and minority college-student population. Nontraditional students are defined as students who are older, attend school part-time, and are financially independent (NCES, 2002b). Previous studies of college outcomes have often been conducted with traditional students (Kasworm and Pike, 1994) who now account for fewer than half of all undergraduates in the United States (NCES, 1996, 2002b). Moreover, problems associated with lower academic performance and higher attrition are disproportionately concentrated among nontraditional students (Feldman, 1993; Wlodkowski, Mauldin, and Gahn, 2001) and minority students (Eagle and Carroll, 1988; Smedley, Myers and Harrell, 1993). Thus, although they account for a large percentage of college students in metropolitan areas, nontraditional students are severely understudied. We suggest that it is important to focus attention on exploring the effect of social cognitive factors for this more disadvantaged college population.

BACKGROUND

Self-Efficacy

Self-efficacy is defined as a self-evaluation of one's competence to successfully execute a course of action necessary to reach desired outcomes (Bandura, 1977, 1982, 1986). It is a multidimensional construct that varies according to the domain of demands (Zimmerman, 2000), and therefore it must be evaluated at a level that is specific to the outcome

domain (Bandura, 1986; Pajares, 1996). Thus, in academic settings, one should measure academic self-efficacy rather than generalized self-efficacy, where academic self-efficacy refers to students' confidence in their ability to carry out such academic tasks as preparing for exams and writing term papers. A large meta-analysis of studies of self-efficacy in academic environments concluded that the most specific academic self-efficacy indices had the strongest effect on academic outcomes, while the more generalized measures were less closely associated (Multon, Brown, and Lent, 1991). General self-efficacy measures were not found to be predictive of any college outcomes (Ferrari and Parker, 1992; Lindley and Borgen, 2002), while academic self-efficacy has been consistently shown to predict grades and persistence in college.

An extensive body of research has shown that academic self-efficacy is positively associated with grades in college (Bong, 2001; Brown, Lent, and Larkin, 1989; Hackett, Betz, Casas, and Rocha-Singh, 1992; Lent, Brown, and Larkin, 1984; Multon, Brown, and Lent, 1991) as well as with persistence (Lent et al., 1984, 1986, 1987; Zhang and RiCharde, 1998). Bandura (1993) posits that self-efficacy beliefs affect college outcomes by increasing students' motivation and persistence to master challenging academic tasks and by fostering the efficient use of acquired knowledge and skills. Torres and Solberg (2001) found a positive association between academic self-efficacy and the number of hours students spent studying.

Stress

Generalized stress is defined as a state of psychological arousal that results when external demands tax or exceed a person's adaptive abilities (Lazarus, 1966; Lazarus and Folkman, 1984). Environmental demands are labeled stressors, and they can take the form of an acute event or an ongoing strain (see Pearlin, 1989 in the context of general stress research), while stress refers to the internal perceived emotions and cognitions. Academic stress has been studied extensively as an important factor in college student adjustment (Gall, Evans, and Bellerose, 2000; Mallinckrodt, 1988). In general, college-related stress has been found to be inversely related to academic performance among traditional undergraduates (Felsten and Wilcox, 1992; Pritchard and Wilson, 2003; Russell and Petrie, 1992), for freshmen in particular (Struthers, Perry, and Menec, 2000), for inner-city high school students (Gillock and Reyes, 1999), and for immigrant college students (Buddington, 2002). Stress has also been identified as a factor negatively affecting persistence for college freshmen (Perrine, 1999; Zhang and

RiCharde, 1998) and older nontraditional students (Chartrand, 1992). Some studies, on the other hand, have failed to detect an association between stress and academic outcomes. Petrie and Stoever (1997) found life-events stress not to be a significant predictor of academic performance for college student-athletes, and Sandler (2000a) concluded that perceived stress did not predict the intent to stay in school for adult college students.

Among nontraditional immigrant and minority student populations, stress may be an even more dominant factor influencing academic outcomes than it is for white U.S.-born students. Acculturative stress among immigrants and minorities predisposes them to more social stress, compared to native-born and white students (Moritsugu and Stanley, 1983; Smedley, 1993). Acculturative stress is highest for students who immigrated to the United States shortly before enrolling in college. For example, Mena, Padilla, and Maldonado (1987) found that recent immigrants report more stress than either students who immigrated at an early age or the native born.

Linking Self-Efficacy and Stress

Self-efficacy and stress are closely related concepts. In Lazarus' cognitive model of stress (Lazarus and Folkman, 1984), personal beliefs such as self-efficacy are crucial in evaluating demands from the environment. Each external demand is evaluated as a "threat" or a "challenge," and persons with high self-efficacy beliefs are more likely to evaluate the demands as a challenge (Chemers, Hu, and Garcia, 2001; Lazarus and Folkman, 1984; Pintrich and De Groot, 1990). That is, the extent to which a person feels confident about his or her competence to handle a given situation affects whether a given task is perceived as stressful or threatening, rather than as a challenge. When a task is appraised as a challenge, one is more likely to select an effective coping strategy and to persist at managing the task. Self-efficacy thus affects the perception of external demands and mediates the relation between external stressors and psychological stress (Bandura, 1995). Using a path analytic model, Chemers, Hu, and Garcia (2001) found that the effect of academic self-efficacy on stress was completely mediated by evaluations of demands as threat or challenge. In the other direction, physiological arousal states associated with stress and anxiety offer information affecting self-efficacy judgments (Pajares, 1996; Solberg et al., 1998). Similarly, Hackett et al. (1992) suggested that stress and anxiety may depress self-efficacy judgments of students.

Thus cognitive theory posits a strong negative relationship between self-efficacy and perceived stress, and empirical findings offer support for the theory. In a number of studies, self-efficacy and stress among college students have been consistently shown to have moderate to strong negative correlations (Gigliotti and Huff, 1995; Hackett et al., 1992; Solberg, Hale, Villarreal, and Kavanagh, 1993; Solberg and Villarreal, 1997; Torres and Solberg, 2001).

While social cognitive theory provides a coherent framework linking self-efficacy and stress, most research has explored their independent roles in explaining academic outcomes. Very little work has examined their joint influence as determinants of academic success in college. Hackett et al. (1992) identified both perceived stress and academic self-efficacy as predictors of cumulative grade-point average (GPA) for traditional students enrolled in engineering schools. Good grades were associated with low perceived stress and high self-efficacy. Focusing more specifically on math performance among high school students, Pajares and Kranzler (1995) concluded that mathematics self-efficacy exerted a strong influence on performance, while math anxiety had an effect only through its association with self-efficacy. In a study with even younger students, both stress and self-efficacy were significantly associated with performance in English, but self-efficacy appeared to be a stronger predictor (Pintrich and De Groot, 1990). These studies find self-efficacy is a somewhat better predictor of academic success than stress.

An even smaller number of studies has addressed the joint effect of self-efficacy and stress on persistence for undergraduates. Among adult college students, Sandler (2000a, 2000b) found that career decision making self-efficacy was a more consistent predictor than perceived stress. Torres and Solberg (2001) studied persistence intentions among Hispanic students and concluded that academic self-efficacy predicted the outcome, while college stress did not. We found only one study (Gigliotti and Huff, 1995) that included the same three academic outcomes as we do in this paper: grades, credits and persistence. However, they used generalized measures of stress and self-efficacy and did not find either to be significantly related to any outcome. Finally, an interesting experiment conducted at a community college showed that students who received training on self-efficacy and stress management significantly improved their grades and persistence rates, compared to students who received learning skills training (Barrios, 1997).

These studies suggest that both academic stress and self-efficacy have some effect on academic outcomes, and there is some evidence that self-efficacy may be a better predictor. However, in all the studies we have

reviewed, these two constructs were evaluated with respect to different tasks. They did not evaluate students' reported stress regarding, say, asking questions in class, and also evaluate students' self-efficacy judgment for this task. This, we suggest, makes the direct comparison of their effects problematic. The main contribution of this paper is to examine the effect of academic self-efficacy and perceived stress with regard to identical tasks. This allows us to more closely compare the relative importance of these two concepts for students' academic success than previous research has done.

RESEARCH QUESTIONS

Our analysis is guided by the following research questions. First, what is the relationship between academic self-efficacy and stress? We expect to find a negative correlation, when high academic self-efficacy successfully mediates the college demands and results in lower perceived stress.

Second, how are grades, credits, and persistence related? In previous studies, high school GPA was identified as a strong predictor of college students' academic performance (Feldman, 1993; Garton, Ball, and Dyer, 2002). College GPA is in turn a strong predictor of persistence (Carney and Geis, 1981; Gillock, 1999; Wlodkowski, Mauldin, and Gahn, 2001). There are exceptions to this finding, however. Torres and Solberg (2001) found that GPA did not predict persistence among Hispanic students. One very consistent finding concerns part-time students, who are more likely than their full-time counterparts to drop out of college (Breindel, 1997; Feldman, 1993; Fredda, 2000; King, 2003; Windham, 1994). We expect to find that all three outcomes—grades, credits and persistence—will be positively related to one another.

The third and most important research question concerns the absolute and relative effects of self-efficacy and stress on these academic outcomes. We hypothesize that both academic self-efficacy and stress will have an effect on all outcomes, with higher levels of self-efficacy and lower stress being associated with better grades, more accumulated credits, and greater persistence.

A final question explores the effect of demographic factors on academic success and persistence. Previous research has concluded that sociodemographic characteristics of students are inconsistently related to college outcomes. Older students have been found to earn higher grades than younger, traditional-age students (Sheehan, McMenamin, and McDevitt, 1992; Spitzer, 2000) but also to drop out at higher rates (Feldman, 1993; Liu and Liu, 1999; Wlodkowski et al., 2001). Chartrand (1992) found no relation between age and intent to continue

in college for nontraditional students. In some studies, women have been found to earn higher grades then men (Spitzer, 2000) and to have lower rates of attrition (Feldman, 1993), while other studies have identified no consistent relationship between gender and persistence (Fredda, 2000; Liu and Liu, 1999; Wlodkowski et al., 2001). Regarding race, most research has found that black and Hispanic students are more likely than white students to drop out of college (Eagle and Carroll, 1988; Liu and Liu, 1999). However, some authors have failed to find a significant race difference (Fredda, 2000), and still others have found that full-time Hispanic students have the lowest attrition rates (Breindel, 1997). In sum, the existing research literature suggests that demographic factors are not consistent predictors of college outcomes (Chartrand, 1992; Fredda, 2000; Wlodkowski, Mauldin, and Gahn, 2001). We ask whether any demographic characteristics are related to academic outcomes among immigrant and minority nontraditional freshmen.

DATA

Participants

The participants in our study include 107 first-semester freshmen who enrolled in college in the spring semester of 1997–1998 at one of the City University of New York campuses. This large 4-year institution attracts mainly nontraditional, minority and immigrant students who commute to school and often study part-time. Attrition is a major problem at this school; only one-quarter of students earns a bachelor's degree within 6 years of enrolling. There were 289 new students in the spring 1998 entering cohort (the cohorts starting in the fall semesters are much larger), so our sample includes 37% of all incoming students. We focus on freshmen because studies show that undergraduates are at the highest risk of attrition during their first year in college (NCES, 2002a).[1]

Our sample is representative of the incoming spring cohort. The average age of participants in the study (20.7 years) is not significantly different ($p = 0.13$) from the average age of all entrants in the spring semester of the 1997–1998 academic year (21.3 years)—see Table 1. There is also no significant difference between the proportion of women in the sample (0.73) and the population proportion (0.65). The proportions of whites, blacks, and Asians in the sample are representative of the corresponding proportions in the population. However, the sample proportion of Hispanics (0.35) is significantly higher than the proportion in college (0.17). Perhaps some of the Hispanic students were classified into the "other or missing" category in the reported administrative data.

TABLE 1. Comparison of Sample and Population Characteristics*

	Sample (N = 107)	Population** (N = 289)	Difference
Age	20.7 (3.8)	21.3 (4.5)	n.s.
Sex			n.s.
Male	27.1%	34.6%	
Female	72.9%	65.4%	
Race			
White	30.8%	27.3%	n.s.
Black	17.8%	17.0%	n.s.
Hispanic	35.5%	19.4%	***
Asian	15.9%	19.7%	n.s.
Other/missing	–	16.6%	–

*Population refers to all students who enrolled as first-semester freshmen in the spring semester of 1998.
**Data acquired by personal communication from Rachel Maxwell, Office of Institutional Research, Hunter College. Additional information about the composition of student body is available at http://www.hunter.cuny.edu/ir/.
***$p < 0.01$.

Measures

Students completed a questionnaire that consists of two parts. The first part asks participants to record their age, sex, high school GPA, racial/ethnic identification, language most often spoken at home, country of birth, and age at immigration for the foreign born. Respondents also reported their social security (or college ID) number, which we used a year later to access students' academic records.

The second part includes an instrument to measure academic self-efficacy and stress. In order to study in detail the interrelationship of these two concepts and their effect on academic outcomes, we developed a new instrument that measures self-efficacy and stress with regard to the same college-related tasks. One-third of the tasks are chosen selectively from existing measures of academic self-efficacy such as the Academic Milestones Scale (Lent et al., 1986) or the College Self-Efficacy Inventory (Solberg, O'Brien, Villareal, Kennel, and Davis, 1993). We did not use these scales in their entirety because they are not entirely suited for a nontraditional college population. For example, the CSEI includes items related to dormitory life, which are not relevant for the sample of commuting students. The additional 18 tasks consist of items that students attending our study's college but not participating in this study listed as stressful.

Each scale contains a list of 27 tasks such as "writing term papers," "asking questions in class," and "managing both school and work." For each task, students were asked to rate on an 11-point Likert scale how stressful they found the task, (from 0 = not at all stressful to 10 = extremely stressful). A second scale asks respondents to rate the same tasks according to how confident they are that they could successfully complete them (from 0 = not at all confident to 10 = extremely confident). The list, with each of the 27 tasks, is shown in Appendix Table A.

In the spring of 1999, 1 year after the students enrolled in college, we obtained institutional data for all 107 students on the following outcome variables: (1) cumulative grade-point average for the first two college semesters, (2) total number of credits earned during the first two semesters; and (3) whether the student was enrolled at the beginning of the third semester. Cumulative GPA is measured on a 4-point scale with a maximum of 4.0. Students normally register for up to five courses per semester. Full-time students are those who take at least 12 credit hours per semester.[2]

Procedures

All 289 entering students were expected to register for a one-semester Freshman Orientation Seminar that met one hour each week on a noncredit basis. Permission was obtained from the freshman seminar coordinator and from all except one seminar instructor to distribute questionnaires in 11 of the 12 sections of the course offered that semester. All survey data were obtained during the next-to-last week of classes of the spring semester. In each class, the investigator (one of the authors) explained the general purpose of the study and read aloud the informed consent form, which students signed before they filled out the questionnaires. Students were then asked to answer a two-page instrument that took approximately 12–15 min to complete. Of the 134 students who were present in the 11 sections of the course on the days the survey instrument was distributed, just nine chose not to participate in the study. The resulting survey participation rate is 93.3%. Thirteen students either did not include their social security number or college ID number on the questionnaire or wrote it too illegibly for the completed questionnaire to be useful, and we were not able access their records to record the outcome variables. An additional five students failed to supply any demographic information. These 18 participants were zexcluded from the analysis, leaving a final sample of 107 students.

Sample Description

Average sample characteristics are shown in Table 2. The typical freshman is 20.7 years old, nearly 3 years older than traditional first-year students, but there is considerable variation in students' ages. Almost three-quarters (72.9%) of sample members are female. Hispanics comprise the largest student group (35.5%), followed closely by whites (30.8%), then Blacks and Asians. The average sample member has a 3.2

TABLE 2. Sample Characteristics

Item	Means and Frequencies
Predictor Variables	
Age	20.7 (3.8)*
Sex	
Male	27.1
Female	72.9
Race/ethnicity	
White	30.8
Black	17.8
Hispanic	35.5
Asian	15.9
High school GPA**	3.2 (0.4)
Immigrant status	
U.S. born	41.1
Recent immigrant***	36.5
Experienced immigrant	22.4
Language most spoken at home	
English	45.8
Spanish	19.6
Other	34.6
Outcome Variables	
Cumulative results of the first year	
College GPA**	2.6 (1.0)
Number of credit hours	19.4 (8.8)
Enrollment status in 3rd semester	
Enrolled	70.1
Not enrolled	29.9
Sample size (N = 107)	

*Standard deviation in parentheses.
**GPA in high school and college was measured on a 4-point scale.
***Has been in the United States for four years or less.

high-school GPA, or nearly a B+ average. Three out of every five students are foreign-born, and the majority of these report being recent immigrants—in the United States fewer than 5 years. Not surprisingly, given other sample characteristics, English is the language used at home by fewer than half of all sample members. Spanish is spoken most often at home by nearly one-fifth of these students, and another 35% use one of 21 other languages, including Chinese, Hebrew, French, Russian, Thai, and Korean, among others.

The outcome variables of interest are shown in the lower half of Table 2. The typical student achieved a 2.6 grade point average for their first two semesters of college coursework. Students accumulated an average of 19 credits in the same period. Only 35 percent of students earned enough credits to be considered full-time students (24 credits in two semesters). Other students either attended school part time or dropped out before completing their first year. In fact, 30% of the original sample was not enrolled for the third semester.

Simple bivariate relationships show that older students have slightly higher GPAs than younger students, but there is no difference between men and women in either GPAs or enrollment rates for third semester. Whites have the highest college grades (average GPA of 2.98) and Latinos the lowest (2.38). Black students are the most likely to drop out; 42% were no longer enrolled by the third semester. At the other extreme, Asians have the lowest attrition; just one Asian student among 17 was not enrolled during the third semester. Recent migrants have significantly higher average GPAs (3.1) than either other migrants with more U.S. experience (2.4) or their U.S.-born counterparts (2.3). High-school grades are positively associated with college grades but negatively related to persistence. The number of credits earned is positively correlated with both GPA and with persistence. Finally, grades in college are related to attrition rates; students who were enrolled at the start of their second year had GPAs that were on average 0.4 points higher than those who had dropped out.

In general, students rated their confidence in performing the 27 tasks in Appendix Table A more highly than they rated their stress levels. The mean self-efficacy score is 6.5, with a standard deviation of 1.7, when averaged across all 27 items and 107 students. By contrast, the mean stress score is 4.6 (standard deviation of 1.7). The items that generate the greatest and least amount of stress are shown in Table 3. These rankings are obtained by averaging the stress scores for each task across 107 students. The three most stressful tasks are related to academic performance—writing terms papers, having too many tests in one week, and doing well in demanding courses. The least stressful tasks are more

TABLE 3. The Most and Least Stressful Tasks and Their Rank on the Stress and Self-Efficacy Scales

Task	Stress Rank	Self-Efficacy Rank*
Writing term papers	1 (most stressful)	2
Having more tests in the same week	2	3
Doing well in my toughest class	3	1 (least confident)
Making friends at school	25	19
Talking to college staff	26	16
Understanding college regulations	27 (least stressful)	26 (second most confident)

*The self-efficacy rank is in reverse order to facilitate comparisons.

social in nature—making friends at school, talking with college staff, and understanding rules and regulations.

The third column of Table 3 shows how the same six items rank on the self-efficacy scale. Interestingly, the three tasks students consider most stressful are the same three they feel least confident in performing successfully. And the three least stressful tasks rank near the top in students' evaluations of how confident they feel in doing them well. The inverse association between stress and self-efficacy is also evident at the individual student level. For each of the 27 tasks, we calculated correlation coefficients between students' stress scores and their self-efficacy scores. Each of the correlations is significantly different from zero and ranges between −0.26 and −0.74. In other words, students who express little stress associated with performing particular tasks tend to display greater confidence about doing them well, whereas those students who experience higher stress levels exhibit much less self-confidence.

METHODS

The analyses were conducted in two parts. First, we examined the data via both exploratory and confirmatory factor analysis to determine (1) whether the stress and self-efficacy items in the questionnaire could be reduced to a smaller subset of indexes capturing different dimensions of each, and (2) whether stress and self-efficacy could be considered distinct constructs, given the approach to measuring them in the survey. In the second part of the analysis, we used structural equation modeling to examine the effect of stress and self-efficacy as latent constructs on each of the three outcomes: college GPA at the end of the first year,

credit hours obtained during the year, and enrollment in college at the start of the third semester.

Structural equation modeling is particularly well suited to these analyses, because (1) stress and self-efficacy can be considered latent constructs that are imperfectly measured by questionnaire items (or indexes derived from them) and (2) structural equation modeling, as a multivariate method, allows estimation of cross-equation error correlation (see Bollen, 1989). Allowing such correlations is important in this context, because enrollment, credits, and GPA are expected to be related to each other independent of the effects of stress, self-efficacy, and background variables. Furthermore, stress and self-efficacy are not unrelated constructs, especially as measured in this questionnaire. Ignoring cross-equation error correlation by estimating models separately by outcome thus introduces an omitted variable bias. Finally, estimating models separately would not allow us to assess the relationship among the outcome measures. For these analyses, we used LISREL's maximum likelihood estimator.

Although structural equation modeling is appropriate for these analyses, our small sample size warrants caution in interpreting the results. For example, Bollen (1989), in summarizing the literature, suggests that sample sizes of 100 or more—and preferably 200 or more—are often necessary to ensure the accuracy of the chi-square statistic.

RESULTS

Factor Analysis

Exploratory and confirmatory factor analyses are not discrete approaches to analyzing attitudinal data. Instead, they can be viewed along a continuum with exploratory analyses and confirmatory analyses on opposite ends of the continuum (see Bollen, 1989). Exploratory factor analysis allows the data to "cluster" into factors after imposing certain constraints on the model, including considerations such as the method of rotation and the number of factors allowed. In confirmatory factor analysis, a factor structure is proposed *a priori* and the data are tested against the model to "confirm" the model. Under both approaches, adjustments are generally made on the basis of preliminary results, thereby mixing notions of exploratory and confirmatory.

We approached the factor analyses of the stress and self-efficacy items in several ways. We first conducted exploratory factor analyses, using several methods of rotation, restrictions on numbers of factors, and the

like. We next conducted confirmatory factor analysis to assess the fit of the factors found in the exploratory analyses to the data and made adjustments based on these results. Preliminary exploratory factor analyses of the 27 stress items revealed that the items cluster in four domains, which we label difficulty with interaction at school, difficulty with academic performance outside of class, difficulty with academic performance in class, and difficulty with managing work, family, and school. Confirmatory factor analyses conducted using the results of the exploratory analyses (compared with a second set conducted independently of the results of the exploratory analyses) suggested relatively few changes to these factors, with four items subsequently being dropped from consideration due to poor loading (items regarding understanding professors, parents' expectations of grades, taking good class notes, and having enough money).

We replicated the confirmatory factor analysis results for the 27 self-efficacy items and obtained similar results, indicating that the self-efficacy items cluster into four factors as well. We label these four factors confidence in interaction at school, confidence in academic performance outside of class, confidence in academic performance in class, and confidence in ability to manage work, family, and school. For both stress and self-efficacy, seven items load on the first factor; eight items load on the second factor; and four items load on each of the remaining two factors (see Appendix Table B for details).

Given the wording of the items in the questionnaire and the similarity in loadings on factors, we next sought to determine whether the factors measuring stress were perfectly (and negatively) correlated with their respective factors measuring self-efficacy. That is, especially because the same items were used to assess stress as self-efficacy, it could be the case that the two constructs are simply inverses of one another—those who evidence greater stress evidence less self-efficacy (perhaps in resolving it). For these tests, we conducted confirmatory factor analyses consisting of two factors: one measuring stress and one measuring self-efficacy. In the first model, we allowed the correlation between the two factors to be freely estimated; in the second model, we forced the correlation between the two factors to be fixed at -1. The results of these analyses (not reported in a table) reveal a moderate to strong—but not perfect—negative correlation between each stress and self-efficacy factor (ranging from -0.50 to -0.74). Furthermore, chi-square difference tests show a large and significant difference in model fit between the restricted and unrestricted models, affirming that stress and self-efficacy are not simply inverses. In sum, these results suggest that

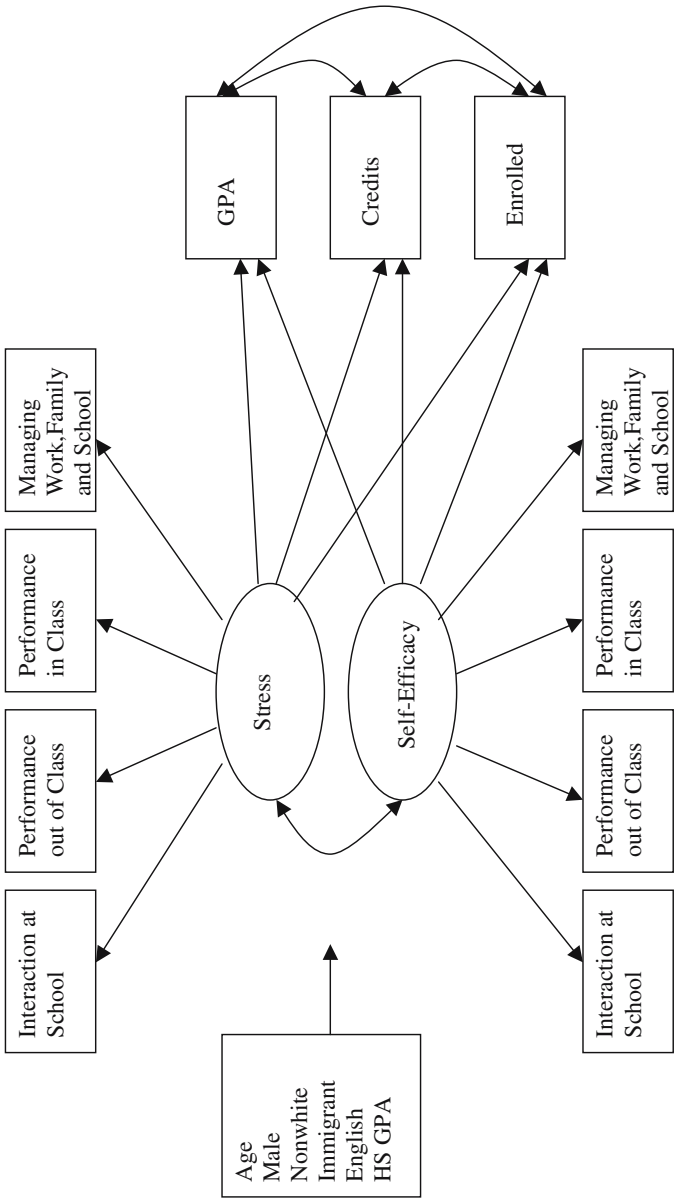
stress and self-efficacy, despite being measured similarly in the survey, are related but distinct constructs.

Structural Equation Modeling

For structural equation modeling purposes, we summed and averaged the items for each factor to produce four indexes for stress and four indexes for self-efficacy.[3] Thus, in the structural equation models, we constructed a general stress factor measured by four indexes and a general self-efficacy factor (also measured by four indexes). We took this approach, rather than keeping the four stress and self-efficacy factors independent, for two reasons. First, the small sample size prohibits us from estimating the model with eight separate factors (the number of parameters exceeds the pieces of information contained in the data). Second, this approach is more parsimonious than estimating a more complex model, and the results we report are completely consistent with all other approaches we employ to test robustness to alternate specifications.[4] Appendix Table C reports the Cronbach's alphas for these indexes. All alphas are very large, ranging from 0.72 to 0.90.

Figure 1 presents a graphic depiction of the full structural equation model we estimated. In this model, age, gender, race, nativity status (recent immigrants versus everyone else), primary language spoken in the home, and high school GPA are entered as background/control variables affecting stress and self-efficacy, as well as each outcome variable.[5] Stress and self-efficacy are treated as latent constructs for which the composite indexes discussed above are indicators. Both stress and self-efficacy are allowed to predict each of the three outcomes. The errors of the outcomes are permitted to correlate, as are the errors of stress and self-efficacy. We also allow the errors between each stress and self-efficacy measure to correlate in order to capture residual effects of similarity in question wording that are not captured in the error correlation between the general stress and self-efficacy factors (not shown in figure).

The results for the structural model can be found in Table 4, while the results for the measurement model, due to space constraints, can be found in Appendix Table C. In brief, the measurement model results show that all four indicators of both stress and self-efficacy load strongly on their respective factors. For both stress and self-efficacy, the loading for the first indicator (interaction at school) is poorest, with reliabilities considerably lower than those of the other indicators. The item reliabilities and factor loadings vary little from the



Notes: Background variables affect stress, self-efficacy, GPA, credits, and enrollment status. Curved arrows indicate error covariances. Measurement errors are excluded from the figure.

FIG. 1. Path Diagram of Full of Stress and Self-Efficiency Affecting GPA, Credits, and Enrollment.

TABLE 4. Results of Structural Equation Models of the Effects of Stress and Self-Efficacy on Continued Enrollment, Credit Hours, and Grade Point Average (N = 107)

	Model 1 (Stress Only)			Model 2 (Self-Efficacy Only)			Model 3 (Stress + Self-Efficacy)		
Variable	Enroll	Credits	GPA	Enroll	Credits	GPA	Enroll	Credits	GPA
Stress (STR)	0.14 (0.09)	−0.27 (1.52)	−0.27 (0.19)				0.15 (0.08)#	0.88 (1.39)	−0.05 (0.14)
Self-Eff. (SE)				0.02 (0.03)	1.26 (0.63)*	0.25 (0.07)***	0.05 (0.04)	1.79 (0.83)*	0.30 (0.09)***
Age	−0.01 (0.01)	−0.20 (0.23)	0.04 (0.02)	−0.01 (0.01)	−0.24 (0.22)	0.02 (0.02)	−0.01 (0.01)	−0.27 (0.22)	0.03 (0.02)
Male	0.08 (0.10)	1.31 (1.96)	−0.29 (0.20)	0.02 (0.10)	1.62 (1.82)	−0.14 (0.18)	0.10 (0.11)	2.09 (1.96)	−0.17 (0.19)
Nonwhite	−0.02 (0.10)	−5.61 (1.84)***	−0.32 (0.19)#	0.01 (0.10)	−4.98 (1.81)**	−0.23 (0.18)	−0.01 (0.10)	−5.17 (1.81)**	−0.24 (0.18)
Immigrant	0.05 (0.11)	0.18 (2.17)	0.40 (0.22)#	−0.06 (0.10)	−0.31 (1.88)	0.45 (0.18)*	0.05 (0.11)	0.25 (2.13)	0.40 (0.21)#
English	−0.14 (0.09)	0.05 (1.78)	0.01 (0.18)	−0.16 (0.09)#	−0.05 (1.73)	0.02 (0.17)	−0.14 (0.09)	0.12 (1.74)	0.02 (0.17)
HS GPA	−0.21 (0.11)#	3.24 (2.12)	0.40 (0.22)#	−0.21 (0.11)#	3.39 (2.08)	0.43 (0.20)*	−0.21 (0.11)#	3.47 (2.07)#	0.44 (0.20)*
Error Correlations†									
ρ(STR/SE)							−.41*		
ρ(EN/CR)	0.50***			0.49***			0.49***		
ρ(EN/GPA)	0.30**			0.25**			0.27**		
ρ(CR/GPA)	0.51***			0.47***			0.48***		
Chi-square(df)	36.45(29)ns			34.64(29)ns			81.64(69)ns		
RMSEA	0.05			0.04			0.04		
IFI	0.98			0.98			0.97		
R^2	0.09	0.10	0.23	0.06	0.14	0.32	0.10	0.15	0.33

†Abbreviations used include Stress (STR), Self-Efficacy (SE), Enrollment status (EN), Credits (CR), and Grade Point Average (GPA).

Note. Measurement portion of the model and covariate effects on stress and self-efficacy are excluded from this table due to space constraints. These results can be found in Appendix Table C. Standard errors are in parentheses.

# $p < 0.10$, *$p < 0.05$, **$p < 0.01$, *** $p < 0.001$.

model with stress only, the model with self-efficacy only, and the full model with both.

In the first structural model (see Table 4), we estimate the effect of only stress and the background variables on each outcome. In the second model, we estimate the effect of self-efficacy only. Finally, in the third model, we estimate the joint effect of stress and self-efficacy as Fig. 1 displays. All three models fit the data well, based on three measures of overall model fit: the model chi-square, the root mean squared error of approximation (RMSEA), and the incremental fit index (IFI). A well-fitting model should have a nonsignificant chi-square (indicating a close fit of the model to the data), an RMSEA of 0.05 or less, and an IFI greater than 0.95. These criteria are met (or exceeded) by all three models.

In the first model, we include only stress and the background variables as predicting the outcome measures. Stress has no association with any of the three outcomes, and very few background demographic variables have any effect. High school GPA has a slight negative effect on enrollment. Nonwhites have significantly fewer credits at the end of the first year and have lower GPAs.[6] Recent immigrants and persons with higher high school GPAs have higher first-year college GPAs. In terms of the predicted variance for each outcome, stress and the background variables explain 9% of the variance in enrollment, 10% of the variance in credits, and 23% of the variance in GPAs. Finally, the error correlations between each pair of outcome measures are significant and positive, but moderate, ranging from 0.30 for the residual correlation between enrollment and GPA to 0.51 for the correlation between credits and GPA. This finding implies that GPA, enrollment, and credits are positively related, even after controlling on factors that may influence each, and that a multivariate model is needed to avoid omitted variable bias. For example, persons with higher GPAs and more credits are more likely to enroll in the third semester, even after adjusting for observed differences in age, race, and other demographic background characteristics.

Model 2 includes only self-efficacy and the background variables. In this model, self-efficacy has a significant and positive effect on credits and GPA but has no effect on enrollment in the third semester. Once again, relatively few background variables are associated with any outcome. Speaking English as the primary language at home and the high school GPA have slightly significant negative relationships with enrollment. Nonwhites accumulate considerably fewer credits than whites. Recent immigrants evidence slightly higher college GPAs, as do persons with higher high school GPAs. In this model, only 6% of the

variance in enrollment is explained by self-efficacy and the background variables. However, considerably more variance in credits and GPA is explained than in Model 1—14% and 32%, respectively. The error correlations between the outcome variables are similar in magnitude to those in Model 1.

In the third model, both stress and self-efficacy are entered in addition to the background variables. In this model, stress has a slightly significant and *positive* effect on enrollment, while self-efficacy has none. On the other hand, self-efficacy has a significant and positive effect on both credits and GPA, while stress has none. As in the previous two models, background variables have little association with any outcome. High school GPA has a slight negative effect on enrollment and a positive effect on credits and college GPA. Once again, nonwhites have fewer credits, and recent immigrants have higher GPAs at the end of the first year. In this model, the error correlation between stress and self-efficacy is estimated to be moderate, at −0.41, a finding consistent with the analyses discussed above. The two are related, but distinct, constructs. The error correlations between the outcomes are similar to those in the previous two models. Finally, stress and self-efficacy together (along with the background variables) explain 10% of the variance in enrollment, 15% of the variance in credits, and one-third (33%) of the variance in GPA. This represents relatively little improvement over the model for self-efficacy alone, except with regard to the enrollment outcome.[7]

DISCUSSION

The main research questions in this paper concern the relationship between academic self-efficacy and perceived college stress and their joint effect on academic success for immigrant and minority students. In order to closely examine the relative influence of these two constructs, we developed a new survey instrument that measures self-efficacy and stress with respect to 27 identical college-related tasks. This measure allows us to explore in detail the effect of these two social cognitive constructs on nontraditional students' grades, accumulated credits, and persistence in college.

The internal reliability of both scales is high. Academic self-efficacy and stress are negatively correlated, as expected, with the correlations between the pairs of tasks from each scale ranging from −0.27 to −0.71. This moderately high inverse association confirms findings from previous studies (Hackett et al., 1992; Torres and Solberg, 2001). Factor analyses were performed independently on each scale, and both scales

factor almost identically into four components: interaction at school, performance in class, performance out of class, and managing work, family and school. This is consistent with the domain-specificity of self-efficacy (Pajares, 1996). That both scales factor into similar components offers further support for the strong relationship of self-efficacy and perceived stress within each of the four domains.

We find that all three measures of academic success—first-year cumulative GPA, number of earned credits, and enrollment at the start of the second year—are positively related to one another, even after controlling on students' demographic background characteristics. Full-time students earn higher grades and are more likely to remain enrolled, compared to part-time students. This finding is consistent with prior research, which has shown that part-time students are at a high risk of attrition (King, 2003; NCES, 2002a; Windham, 1995) and that grades are positively related to persistence (Johnson and Molnar, 1996). We are best able to account for variation in GPA in our models and can explain about a third of its variance using the full model. We do less well in explaining variation in number of credits and persistence. It is possible that these two outcomes are in large part determined by factors unaccounted for in our models, such as the ability to afford tuition or to find time and motivation to remain enrolled. Similarly, Gigliotti and Huff (1995) found persistence among older undergraduates to be more difficult to predict than grades or course load.

The focus of this paper centers on the relative importance of self-efficacy and stress in predicting academic outcomes. We find that academic self-efficacy has a strong positive effect on freshman grades and credits, which is consistent with previous research (Brown et al., 1989; Lent et al., 1984, 1986, 1987). In fact, self-efficacy is the single strongest predictor of GPA in all models, even taking into account high school academic performance and demographic background variables. On the other hand, self-efficacy does not have a significant effect on students' persistence in the second year. This result suggests that students may drop out for reasons unrelated to their beliefs about being able to handle academic demands.

Stress has generally been found to have a negative influence on GPA and on staying enrolled. We expected that because the majority of the student population is immigrant and minority and thus at risk of experiencing a high level of stressful events, perceived stress would be an important predictor of their academic outcomes. In our data, stress has a negative but insignificant association with GPA and no relationship with college credits. On the other hand, we find some evidence that stress is positively, though only marginally, related to persistence. This

is an unexpected finding. Previous studies have either shown no effect of stress on persistence (Pritchard and Wilson, 2003; Sandler, 2000a) or a negative effect (Chartrand, 1992). Perhaps we did not find the expected effect of stress because we do not distinguish between the challenge versus threat appraisals. This is an important and often neglected assessment, because the difference between challenge or threat appraisal can result in different coping behaviors (such as studying harder versus procrastinating) and correspondingly different academic outcomes.

Future studies should investigate more closely the threat or challenge appraisal of stressful college-related tasks. For example, students would rate tasks not only on a ''stressful'' scale as they did in the present study, but they would evaluate the tasks on two scales: ''stressful/threatening'' and ''challenging''. This distinction would more clearly allow us to evaluate the relationship between self-efficacy and stress, as well as the negative effects of stress on college performance. For example, research has shown that high self-efficacy is an important factor in making challenge rather than threat appraisals (Chemers et al., 2001). Another possible explanation for why we find stress to be negatively associated with attrition is that there are various causes for attrition. Zhang and RiCharde (1998) found that students who dropped out of college identified three main reasons for doing so: inability to handle stress, lack of commitment, and mismatch between expectations and college reality. Thus, only some students who dropped out may have done so for reasons connected to stress, while others may have made the decision for other reasons, thereby confounding the results.

Sociodemographic variables have little association with academic outcomes. We find no relationship between age and sex and any outcome, which is not surprising given the inconsistent findings in the literature (Chartrand, 1992; Wlodkowski et al., 2001). The only strong and consistent finding is that nonwhites earn about five fewer college credits than whites by the end of the first year. Recent immigrants have slightly higher GPAs than immigrants with more U.S. experience or native-born students, which perhaps reflects either better academic preparation in high school or a motivational difference. High school GPA is positively related to college GPA, which supports existing literature (Garton, Ball, and Dyer, 2002; House, 1994). However, in contrast to other findings (Fredda, 2000), high school GPA is also weakly and negatively related to persistence in college. This finding could indicate the discrepancy between expectations and college reality for high achievers in high school, increasing their likelihood of attrition.

An important potential limitation of our study, apart from the modest sample size, is the question of representativeness of our sample,

because all participants were students who enrolled in and attended the orientation seminar. If attending the seminar systematically impacted students' grades and persistence, our findings would be biased. However, previous research suggests that there may not be a significant difference in adjustment to college for students who attend the seminar and those who do not (Martin and Dixon, 1994). An additional caveat is that we could not distinguish students who dropped out of college permanently from those who took only a semester off and would return later or from those who transferred to another college. This makes our results a conservative estimate of the effect of academic self-efficacy and stress on college persistence. A longer follow-up period and more information about the reasons for attrition would be desirable to assess the long-term outcomes for students.

In general, our results suggest that academic self-efficacy is more important than perceived stress in predicting the accumulation of college credits and a higher GPA, while perceived stress may be marginally more important in accounting for subsequent enrollment. This conclusion supports a general trend in the literature (Pajares and Kranzler, 1995; Sandler, 2000a, 2000b). The findings underline the importance of academic self-efficacy both in moderating the effect of stressors on perceived stress for college students and also in predicting academic success in college.

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ENDNOTES

1. There were 1,765 new freshmen who enrolled in the fall semester of 1997–1998. *T*-tests and goodness-of-fit chi-square tests were used to examine compositional differences in age, race, and sex between the entering fall and spring cohorts. There are no significant differences even at the 0.1 level.
2. Enrollment status was measured only twice—at the beginning of the first and third semesters. For students who were enrolled at both times, it is impossible to distinguish between those who were enrolled continuously from the start of first semester and those who "stopped out"—that is, they started school, left for a semester, and then returned. More-

over, we cannot tell from our data whether a student who was not enrolled in the third semester transferred to another institution or dropped out permanently or just temporarily.

3. Average sample values for the four indexes for stress and four indexes for self-efficacy are shown in Appendix Table B. The indexes for stress exhibit more variation than those for self-efficacy, as measured both by their respective standard deviations and by the range across the four indexes.
4. One could argue that there is a distinction between causal versus reflective indicators that is being ignored using this approach. Summing items to produce an index treats the items as causal indicators—indicators that produce a composite factor. On the other hand, the structural equation model we estimate then treats these indexes as *reflecting* perceptions of stress and self-efficacy. This is true. However, the implication of this approach is unclear. Structural equation models with causal indicators are difficult (and often impossible) to estimate, due to identification problems. Furthermore, as stated above, we tried various approaches to test the robustness of the results, and all approaches yielded the same conclusions.
5. Definitions for each of the background/control variables are contained in Appendix Table B.
6. The empirical analysis groups Black, Hispanic, and Asian students into one "nonwhite" category. In preliminary analyses, no race/ethnic subgroup was significantly different from whites in OLS models of GPA. However, Asian students were significantly more likely than other student groups to be enrolled in their second year. It is possible that greater differentiation among race groups would emerge with a larger sample. A second reason for grouping nonwhite students together is that we are already close to the number of model parameters we can reasonably estimate. Adding one more dummy variable adds five more covariances. Preserving all four race groups in the analysis would result in unstable covariance estimates. We would be well under the rule of thumb of 10 cases per parameter.
7. We could have included a companion diagram to Figure 1, displaying the path coefficients and omitting the nonsignificant paths. We chose not to do this for several reasons. First, the information would duplicate the estimates contained in our tables. Second, Figure 1 already shows the relationships we tested. Finally, it is not particularly helpful in our judgment to present a path diagram showing only the significant paths. Doing so can confuse readers because such a diagram matches neither the original conceptual model nor the model actually tested in the analyses.

APPENDIX TABLE A. Tasks for Measuring Stress and Self-Efficacy

Task	Not stressful										Very stressful		Not confident										Extremely confident	
	0	1	2	3	4	5	6	7	8	9	10		0	1	2	3	4	5	6	7	8	9	10
Studying																							
Asking questions in class																							
Keeping up with the required readings																							
Understanding my professors																							
Writing term papers																							
My parents' expectations of my grades																							
Making friends at school																							
Doing well on exams																							
Getting papers done on time																							
Having more tests in the same week																							
Taking good class notes																							
Managing both school and work																							
Preparing for exams																							
Managing time efficiently																							
Getting along with family members																							
Improving my reading & writing skills																							
Researching term papers																							
Getting the grades I want																							
Having enough money																							
Talking to my professors																							
Getting help and information at school																							
Doing well in my toughest class																							
Talking to college staff																							
Finding time to study																							
Understanding my textbooks																							
Participating in class discussions																							
Understanding college regulations																							

Directions: On the first scale, please answer how stressful are these tasks for you, **from 0=not at all stressful to 10=extremely stressful**.
On the second scale, please answer how confident you are that you can successfully complete the tasks, **from 0=not at all confident, to 10=extremely confident**.

APPENDIX TABLE B. Descriptive Statistics for Variables Used in Analyses

Variable	Mean	Standard Deviation	Range
Background Variables			
Age	20.75	3.80	17–36
Male (=1)	0.27		
Nonwhite (=1)	0.69		
Recent immigrant (=1)	0.36		
English (=1)	0.46		
HS GPA	3.25	0.40	2–4
Stress Scales			
Interaction at school*	3.22	2.09	0–9
Academic performance out of class**	5.21	2.08	0.13–9.6
Academic performance in class†	6.18	2.37	0–10
Managing work, family, and school††	4.77	2.36	0.5–9.5
Self-Efficacy Scales			
Interaction at school*	6.68	2.09	1.57–10
Academic performance out of class**	6.46	1.90	0.75–10
cademic performance in class†	6.08	2.19	1.25–10
Managing work, family, and school††	6.08	1.92	1.25–10
Outcome Variables			
GPA	2.64	0.97	0–4
Credits	19.45	8.82	0–36
Enrollment status (enrolled = 1)	0.70		
$N = 107$			

*Constructed from the following tasks in Appendix Table A —asking questions in class, making friends at school, talking to professors, getting help and information at school, talking to college staff, participating in class discussions, understanding college regulations.

**Constructed from the following tasks—studying, keeping up with required readings, writing term papers, getting papers done on time, preparing for exams, improving reading and writing skills, researching term papers, understanding my textbooks.

†Constructed from the following tasks—doing well on exams, having more tests in the same week, getting the grades I want, doing well in my toughest class.

††Constructed from the following tasks—managing both school and work, managing time efficiently, getting along with family members, finding time to study.

APPENDIX TABLE C. Results of Structural Equation Models of the Effects of Stress and Self-Efficacy on Continued Enrollment, Credit Hours, and Grade Point Average ($N = 107$): Measurement Model Results

	Factor Loadings (and Item-Reliabilities) for:		
	Model 1: Stress only	Model 2: Self-Efficacy Only	Model 3: Stress + Self-Efficacy
Indicator (*Cronbach's* α)			
Stress Subscales			
Interaction at school (0.83)	1.00***(0.11)		1.00***(0.15)
Performance out of class (0.86)	2.59***(0.76)		2.29***(0.79)
Performance in class (0.83)	2.91***(0.74)		2.39***(0.71)
Managing wrk, fam., and school (0.72)	2.54***(0.57)		2.07***(0.54)
Self-efficacy Subscales			
Interaction at school (0.87)		1.00***(0.46)	1.00***(0.35)
Performance out of class (0.90)		1.28***(0.90)	1.51***(0.86)
Performance in class (0.87)		1.32***(0.74)	1.65***(0.76)
Managing wrk, fam., and school (0.77)		0.87***(0.41)	1.18***(0.47)
R^2			
Stress	0.31	–	0.32
Self-Efficacy	–	0.09	0.08

*** $p < 0.001$.

Note. Item reliabilities are the explained variances of the indicators. Each indicator is a summed index of multiple items (see text); Cronbach's alphas for these indexes are reported in parentheses. Factor loadings are unstandardized.

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