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Psychosocial Factors and Academic Performance: Comparing First- and Continuing-Generation College Students

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Dedication page

We stand on the shoulders of those who came before us

My grandparents Carmen Valenzuela Arroyo (5th grade education)
& Michael Terrazas Arroyo (1st grade education);
my dad Roberto Arroyo (first-generation college graduate)

Thank you for inspiring my work

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Abstract

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First-generation college students experience a disproportionate rate of challenges on college campuses, reflected by lower academic performance (AP). Research has identified psychosocial factors associated with AP: academic self-efficacy, optimism, goal orientation, and academic stress. However, this research has mostly been done on continuing-generation college students, and results may not generalize to first-generation students. We investigated whether established factors associated with AP hold the same relationships for first- and continuing-generation college students. A sample of 143 undergraduate students at a designated Hispanic-serving institution self-reported on several psychosocial factors that were used to predict midterm exam grade as an indicator of AP. We did not find the same association between AP and many of the psychosocial factors commonly identified in the literature. Further, we did not find a significant difference in AP among first- and continuing-generation students. However, there were other notable differences between these groups. None of the psychosocial factors held an independent relationship with AP for first-generation students, while for continuing-generation students, mastery-approach, performance-approach, and academic behavioral stress all significantly predicted AP. Overall, psychosocial factors explained a very small portion of the variance in AP among first-generation students (13.4%) while it explained considerably more for continuing-generation students (60.5%). Our findings suggest that none of the psychosocial factors included in the current study are effective pathways to improving AP among first-generation students. Our findings highlight that we do not understand first-generation students' AP and we suggest future research aim to identify new factors that may influence first-generation students' AP.

Keywords: first-generation college students, psychosocial factors, academic performance

Introduction

Academic performance (AP) is a fundamental component of college for both first-generation and continuing-generation college students. AP is typically the primary outcome of college courses and often the sole criterion used to evaluate students. Strong AP is essential for obtaining a college degree, and low AP is a contributor to a student's decision to drop out of college (Stinebrickner & Stinebrickner, 2009). First-generation students are at greater risk of drop out and less likely to finish college compared to their continuing-generation peers (Choy, 2001; Lohfink & Paulsen 2005; Pascarella et al., 2004). Finishing college is especially important for first-generation students because it is a reliable method of upward economic and social mobility (Garriott, Hudyma, Keene, & Santiago, 2015). We know there are psychosocial factors associated with improvements in AP (Chemers, Hu, & Garcia, 2001; Hsieh, Sullivan, & Guerra, 2007) but most of the research has been done on continuing-generation students.

Despite efforts to target these psychosocial factors to improve college students' AP, first-generation students are still at greatest risk of poor AP. One explanation may be that the majority of research has been done on samples with low numbers of first-generation students who tend to be more disadvantaged in college compared to continuing-generation students (Cataldi et al., 2018). Comparisons between these two groups have found meaningful differences in persistence-related characteristics, behaviors and experiences (Lohfink & Paulsen, 2005). The next step is to investigate whether previously identified psychosocial factors hold the same relationship with AP among first- and continuing-generation students. If a different pattern emerges, this would indicate a need for more appropriate interventions *targeting* at-risk students. Thus, the current paper examines psychosocial factors associated with AP among first- and continuing-generation college students.

Defining Academic Performance

AP is defined as the degree to which a student reaches their academic goals (Ward, Stoker, & Murray-Ward, 1996). There is no consensus of how AP should be measured, but one of the most common metrics is exam performance (Von Stumm, Hell, & Chamorro-Premuzic, 2011; Ward et al., 1996), the operationalization we use in the present paper. In particular, midterm exams predict final course grades across a variety of academic disciplines for majors and non-majors (Jensen & Barron, 2014). The relationship between AP and course grades is strongest in General Education (GE) courses although it holds in upper-division courses as well (Jensen & Barron, 2014). Moreover, GE courses are often taken during the first year of college, a crucial time for establishing patterns of success for students (Reason, Terenzini, & Domingo, 2006). Indeed, most American four-year universities have the highest volume of students drop out during their first year of college (ACT, 2018). Thus, midterm exam grades in a GE course during a student's first year of college function as a critical marker for overall AP. This is especially relevant for first-generation students who experience more difficulty in AP during their first year of college compared to their peers.

First-Generation College Students and Academic Performance

First-generation students are defined as students who do not have a college-educated parent (Cataldi et al., 2018; Choy et al., 2001; Pascarella et al., 2004). Compared to their peers, first-generation students are more likely to leave a four-year institution after their first year (Pascarella et al., 2004) and are at increased risk of dropout during their college career (Choy, 2001; Lohfink and Paulsen 2005; Pascarella et al., 2004). First-generation students experience more difficulties prior to and during college (e.g., less academically prepared, working full time while enrolled, lower socioeconomic status [SES], less familial support, experiences with classism, lack of basic knowledge about postsecondary education; Allan, Garriot, & Keene, 2016; Bui, 2002; Cataldi et al., 2018; Fallon, 1997) which makes them more susceptible to lower AP (Bui, 2002). These barriers in AP are further demonstrated by greater difficulty attending college, succeeding academically in college, and completing a college degree (Cataldi et al., 2018; Choy, 2001; Ishitani, 2006; Pascarella et al., 2004; Stephens et al. 2012; Woosley & Shepler, 2011).

Psychosocial Factors Associated with AP

There have been several psychosocial factors associated with AP among college students. Four factors – academic efficacy, optimism, goal orientation, and academic stress – appear repeatedly in the literature and have been tested among several age groups, cultures, and measures of AP (Chemers et al., 2001; Guay et al., 1999; Hsieh, 2007; Ogunmakin et al., 2013; Solberg et al., 1993). However, explicit comparisons of how they associate with AP among first- and continuing-generation students have not been done.

Academic self-efficacy. Academic self-efficacy is the belief in one's own capabilities to organize and execute courses of action to achieve one's academic goals (Bandura, Barbaranelli, Capara, & Pastorelli, 1996; Bandura, 1997). Academic self-efficacy may be one of the most consistent predictors of AP (Adeyemo, 2007; Bembenutty, 2007; Greene, Miller, Crowson, Duke, & Akey, 2004; Hsieh et al., 2007; Klomegah, 2007; Ogunmakin et al, 2013). It has shown its predictive ability across geographically diverse samples (Adeyemo, 2007), and age groups (Chemers et al., 2001; Greene, 2004; Guay et al., 1999; Klomegah, 2007; Ogunmakin et al., 2013; Pajares, 1995). At the same time, research also suggests that compared to continuing-generation students, first-generation students have lower levels of academic self-efficacy which can lead to worse AP (Khan, 2013). It has been suggested that increasing levels of academic self-efficacy among vulnerable college students could narrow the achievement gap in AP (Arevalo Avalos, 2017).

Optimism. Optimism is the dispositional tendency to expect favorable outcomes in the future (Carver, 2010; Chemers et al., 2001). Research has demonstrated a significant positive relationship between optimism and AP (Chemers et al., 2001; Segerstrom & Nes, 2006). Optimistic students exhibit higher expectations of available resources to deal with academic challenges, which in turn are associated with better AP (Chemers et al., 2001). While there is not much research on optimism and college generational status, we may be able to extrapolate from research on SES and optimism due to the strong association between SES and college generational status (Cataldi et al.,

2018). Specifically, first-generation students are often from a low-SES background, and low-SES independently predicts increased risk of dropout (Cataldi et al., 2018). Optimism has previously been identified as a method to overcome the power of socioeconomic factors that impede students' AP (Hoy et al., 2006) and therefore may also benefit first-generation students' AP.

Goal orientation. In academic contexts, goal orientation is the source of motivation for a student to engage in an academic task (Hsieh et al., 2007). There are four types of goal orientation: mastery-approach (focused on acquiring knowledge), mastery-avoidance (focused on circumventing missed educational opportunities), performance-approach (focused on the appearance of knowledge), and performance-avoidance (focused on avoiding the appearance of educational incompetence; Dweck, 1986; Law, Elliot & Murayama, 2012). Previous research has not found a consistent association between AP and goal orientations (e.g., Darnon, Jury, Aelenei, 2017; Hadsell, 2009; Jury, Smeding, Court, Darnon, 2015; Law et al., 2012). It has been suggested that different types of goal orientation predict students' AP depending on student characteristics (e.g., college generational status, level of AP; Darnon, Jury, Aelenei, 2017; Jury, Smeding, Court, Darnon, 2015). Specifically, performance-approach was associated with AP for continuing-generation students, while mastery-approach was associated with AP for first-generation students (Darnon, Jury, Aelenei, 2017). In addition, for students with high AP, first-generation students use more performance-avoidance goals compared to continuing-generation students (Jury, Smeding, Court, Darnon, 2015). Given the mixed findings, it is unclear what specific goal orientation constructs may be related to AP; however, it is predicted that different goal orientations may be beneficial to AP for first- and continuing-generation students.

Academic stress. Stress is generally defined as the perceived inability to meet environmental demands. Adapting this definition to an academic context, academic stress can be defined as a student's perception of the knowledge required to perform well academically, and the perception of inadequate time to develop this knowledge (Carveth, Geese, & Moss, 1996; Mirsa & Castillo, 2004). Academic stress is negatively associated with a college students' AP (Akgun & Ciarrochi, 2003; Felsten & Wilcox, 1992; Pritchard & Wilson, 2003). Higher levels of academic stress have been associated with lower course grades (Struthers, Perry, & Menec, 2000) and lower grade point averages (GPAs; Van Heyningen, 1997). Unfortunately, poor AP is associated with increased levels of academic stress; thus, continuing a cycle of high academic stress and poor AP (Essandoh, 1995; Mirsa & Castillo, 2004). First-generation students experience more difficulty and disadvantages in college compared to their continuing-generation peers (Pascarella, Pierson, Wolniak, & Terenzini, 2004). These challenges are likely to result in higher levels of academic stress for first-generation college students compared to continuing-generation (Barry, Hudley, Kelly, & Cho, 2009). Due to the adverse effects of academic stress on AP, stress could be a primary contributor to the AP disparity among first- and continuing-generation college students.

Present Study

Despite first-generation students being a vulnerable group, limited research has been dedicated to understanding why these students' AP differs from continuing-generation students. Understanding which psychosocial factors are associated with high AP among first-generation students may help inform future interventions to ameliorate this disparity. As such, the current study has three aims. First, Aim 1 tests if previous findings replicate in this sample. Specifically, we test if there are group differences in AP between first- and continuing-generation college students, and if the factors previously identified as associated with AP are also associated with AP in our entire sample of students. We are also extending prior work by including all factors in the same model, which allows us to examine if each of these factors hold an independent relationship with AP. Aim 2 assesses potential group differences between first- and continuing-generation college students in their mean levels of academic self-efficacy, optimism, goal orientation, and academic stress. Finally, Aim 3 examines whether the association between the psychosocial factors and AP differs across first- and continuing-generation students. These psychosocial factors may play a different role within the college experience of these two groups of students, which would subsequently lead to differences in the relationship between factors and AP among these two groups.

Method

Procedure

All study procedures were approved by the university's Institutional Review Board, and all participants provided written informed consent prior to participating. Participants were enrolled in a section of a GE introduction to psychology course at a designated Hispanic-serving institution located in Central California. Participants were recruited with a listing posted on the campus online research participation system and an announcement during their class lecture. All students enrolled in that section (n = 348) were eligible to participate voluntarily.

Participants completed an online survey during the 48-hour period between the end of their in-class review session and the start of their midterm exam. Additional follow-up surveys were administered after the midterm exam, but are not relevant to the current study.

Participants

Participants were 143 undergraduate students (41.1% of all students enrolled in the course). AP of students who participated in the study did not differ from students that did not participate in the study, t[373.81] = 0.34, p = .732, d = .04, 95% CI [-2.78, 3.96]. Five additional students were excluded from the study because they did not report their college generational status; their grades did not differ significantly from students included in the current study, t[4.56] = -0.59, p = .581, d = .20, 95% CI [-17.02, 10.79]. The average age of the eligible sample was 18.41 (SD = 0.94, range = 17 to 25). There were 95 females, 47 males, and one gender fluid participant. The majority of participants (n = 99) were first-generation college students. The ethnic breakdown of the current sample was similar in composition to the university data were collected. The largest self-identified ethnic group, consisting of 64.3% of the sample, was Hispanic[1] (n = 92). In addition, 12.2% of participants self-identified as Asian or Pacific Islander (n = 18), 9.5% as White (n = 14), 4.1% as African-American (n = 6), 6.1% as Multi-ethnic (n = 9), and 2.7% as Other (n = 4).

Instruments

Academic self-efficacy. The College Self-Efficacy Inventory (CSEI; Solberg, O'Brien, Villareal, Kennel, & Davis, 1993) was used to measure perceptions of academic self-efficacy. The inventory consists of three subscales of academic self-efficacy: course, roommate, social. The current study only used the course self-efficacy subscale (7 items), which asks students to indicate how confident they are in their ability to successfully complete academic tasks such as "research a term paper", "do well on your exams", "manage time effectively" (Solberg et al., 1993). We only used this subscale because it represents the construct of academic self-efficacy related to AP identified in previous research. Items were rated by respondents on an 11-point Likert-type scale ranging from 0 (*not at all confident*) to 10 (*extremely confident*). The CSEI has been validated with

[1] The term "Hispanic" is used based on the NCES NELS 88:2000 race categories, and refers to individuals of Latin-American origin

Hispanic samples and was also deemed valid across genders and class levels in school (Solberg et al., 1993). In the original validation study, Cronbach's alpha for the course self-efficacy subscale was .88 (Solberg et al., 1993).

Optimism. The Life Orientation Test (LOT; Scheier & Carver, 1985) was used to measure levels of optimism. Respondents were asked to rate how much they agreed or disagreed with 8-items on a 4-point Likert-type scale ranging from 1 (*disagree*) to 4 (*strongly agree*). Four items were worded in a positive direction (e.g., "In uncertain times, I usually expect the best"), and four were worded in a negative direction (e.g., "If something can go wrong for me, it will"). Traditionally, positive items and reverse-scored negative items were grouped in one latent factor (Cronbach's alpha = .76; Scheier & Carver, 1985); however, previous research has identified a two-factor structure measuring optimism and pessimism to be a better representation of the underlying constructs (Allan & Giles, 2008; Chang, 1995, Chang & McBride-Chang, 1996; Kubzansky et al., 2004; McPherson & Mohr, 2005). The optimism and pessimism subscales have shown a moderate correlation (Chang, 1995; McPherson & Mohr, 2005). Given this relationship, we will examine both the one-factor and two-factor models in the current study.

Goal orientation. The Achievement Goal Questionnaire (AGQ; Elliot & McGregor, 2001) was used to measure participants' goal orientation for academic achievements. The 12-item scale consisted of four goal orientation subscales: mastery-approach (e.g., "I want to learn as much as possible from this class"), mastery-avoidance (e.g., "I worry that I may not learn all that I possibly could in this class"), performance-approach (e.g., "It is important for me to do better than others in this class"), and performance-avoidance (e.g., "I just want to avoid doing poorly in this class"). Response options were on a 7-point Likert-type scale ranging from 1 (*not at all true of me*) to 7 (*very true of me*). The four-factor model of the AGQ has demonstrated a better fit than alternative models (Elliot & McGregor, 2001). Cronbach's alphas ranged from .83 to .92 for the four subscales (Elliot & McGregor, 2001). In the current study, we will examine both the intended four-factor model and the alternative models to continue with the model best fitting the data.

Academic stress. The 21-item Lakaev Academic Stress Response Scale (LASRS; Lakaev, 2009) was used to measure individual's academic stress response. The academic stress response scale can be divided into four domains: affective (4 items; e.g., "My work built up so much that I felt like crying"), behavioral (8 items; e.g., "I felt lazy when it came to university work"), physiological *(*5 items; e.g., "I had headaches"), and cognitive (4 items; e.g., "I felt overwhelmed by the demands of study"). For each item, respondents rated how often they felt that way about their academic studies in the past 3 days on a 5-point Likert-type scale ranging from 1 (*none of the time*) to 5 (*all of the time*). The 4-factor structure of the LASRS has been empirically validated with a cross-cultural sample and has demonstrated sound psychometric properties (e.g., Cronbach's alphas ranging from .82 to .89) for measuring academic stress (Lakaev, 2009). However, previous research has often used the total LASRS score (e.g., Bernstein, 2016; Van der Werf, 2013; Cronbach's alpha = .87 and .93 respectively). We will examine both the one- and four-factor model in the current study.

Academic performance. Academic performance was measured using total points earned on their second midterm. Exam scores were originally out of 100 points; however,

a 3-point curve was added resulting in a range from 23 to 103 points. The exam consisted of 50 multiple choice questions. This midterm was deemed a valid measure of student AP because previous research has found midterm exams to predict final course grades (Jensen & Barron, 2014) and grades in GE courses often predict overall college success (Reason, Terenzini, & Domingo, 2006).

Data Analytic Plan

All analyses were performed in the R programming environment (R Core Team, 2019). The Lavaan package (Rosseel, 2012) was used to estimate confirmatory factor analyses (CFA) and (multiple-group) regression analyses. Latent factor scores for factors were used for all analyses as opposed to observed scale means to minimize the influence of measurement error. Details related to the creation of these latent factor scores are reported in the first section of the data analytic plan ("Assessing measurement invariance"). Next, we detail the analytic plan for each aim individually.

Assessing measurement invariance. In order to ensure that we could make meaningful comparison between first- and continuing-generation students, we first tested for *measurement invariance* (Putnick & Bornstein, 2016; Vandenberg & Lance, 2000; Widaman & Reise, 1997). If measurement invariance is not assessed, then a mean difference between two groups can reflect differential interpretation of items across groups and not a true difference in the underlying construct. Specifically, for each of the scales, three levels of measurement invariance were assessed before making comparisons between first- and continuing-generation students (as recommended by Vandenberg & Lance, 2000). The three levels of measurement invariance were: configural (Step 1, assesses the factor model), metric (Step 2, examines the individual factor loadings), and scalar (Step 3, assesses the intercepts or thresholds present in the model). These three steps were followed in a conventional manner according to measurement invariance testing (Vandenberg & Lance, 2000).

For configural invariance, the same items were related to the same latent factors across groups, creating an equal CFA structure, but all measurement parameters (i.e., factor loadings, intercepts) were estimated freely. If previous psychometric research was inconclusive about the expected factor structure of a scale, then multiple factor solutions were compared using χ^2 difference tests (Gregorich, 2006). A lower χ^2 statistic implies that the data fit the model better. In addition, we report the comparative fit index (CFI; Bentler, 1990; Cheung & Rensvold, 2002) and root mean squared error of approximation (RMSEA; Steiger, 1990) to assess the fit of each model. The CFI is a goodness-of-fit measure, where higher values (i.e., closer to 1) indicate better model fit. The RMSEA is a badness-of-fit measure, meaning larger values imply worse model fit. For metric invariance, factor loadings were constrained to be equal across groups. In other words, the relationship between each item and the underlying latent factor is the same strength across groups. For scalar invariance, the intercepts and thresholds were constrained to be equal across groups. This implies that for each item, the observed answer value is associated with the same score on the latent factor across groups. After each level was estimated, a χ^2 difference test was used to assess whether the more restrained model (e.g., metric) significantly worsened model fit compared to a less restrained model (e.g., configural). If either the metric or scalar model significantly worsened model fit, then

further group comparison for that measure was discontinued because a significant χ^2 implies that the two groups interpreted the items in the scale in fundamentally different ways. In addition, the CFI was also reported to provide additional information about the fit of each model.

As the sample size of the current study is limited, it is not possible to estimate a model that includes all latent factors representing the various constructs of interest. Instead, latent factor scores will be exported from the invariance models and used for further analyses. Using latent factor scores instead of the more often used sum-scores or averages across all items has several advantages: First, factor scores take into account the weight of each item, instead of weighing all items equally (Brown, 2006). This means that items more strongly related to the underlying latent construct contribute more to the factor score values. Second, CFA separates systematic variations in item responses that are related to the underlying latent factor from unsystematic measurement error (Brown & Moore, 2012). Latent factor scores only reflect the systematic part of the variation in item responses and are thus less noisy than traditional composite scores such as total scores or averages across all items.

In multiple-group CFAs, one group is chosen to be the reference group. For this group, the mean of the latent factor scores is fixed to zero so that the freely estimated means of other groups can be compared to the reference group. In the current study, the group of first-generation students were treated as the reference group.

Aim 1. An independent samples *t*-test using the Welch correction (Welch, 1947) was run to test for group differences in AP between first- and continuing-generation students. Bivariate correlations were computed among all participants to test if psychosocial factors predicted AP. A multivariable regression model was estimated to test if each psychosocial factor had its own independent relationship with AP.

Aim 2. Latent factor means were compared for each group to identify potential group differences in endorsement of psychosocial factors. As stated above the latent means for the first-generation group were fixed to zero, while the latent means for the continuing-generation group were freely estimated. A significant latent mean for the continuing-generation group would indicate that it significantly differed from the mean of the first-generation group. To improve interpretation of the latent mean difference results, we will also report traditional composite scores (either sum- or average-scores) and compare them across groups using independent samples *t*-tests with the Welch correction (Welch, 1947).

Aim 3. To explore each factor's relationship with AP, we first estimated bivariate correlations for each group, then visually compared across groups. A multiple-group regression model was used to test if each factor had its own independent relationship with AP and if the relationship differed across groups. An advantage of multiple-group regression analyses is its ability to explicitly test for significant differences in regression coefficients across groups. To do so, we first freely estimated regression paths for each group. Next, a significance test was computed for each path to assess whether the difference in estimates across groups was significantly different from zero.

Technical implementation of analyses. To maintain full transparency in our analysis methods per recommendations by the American Psychological Association (Appelbaum et al., 2018), we have included several details here. CFAs with continuous

items (including categorical items with at least 7 answer categories) were estimated through robust maximum likelihood (MLR) using full information maximum likelihood (FIML) to handle missing data. Analyses with categorical items were estimated through the mean- and variance-adjusted weighted least squares (WLSMV) estimator with Delta parameterization, using pairwise deletion to handle missing data. Robust or scaled fit indices were reported for all analyses. Specifically, for chi-squared estimates, the Satorra-Bentler approximation (Satorra & Bentler, 2001) was used for models estimated with MLR, and the Satorra approximation (Satorra, 2000) was used for models estimated with WLSMV.

Results

The average midterm grade was 72.68 (*SD* = 15.57, *range* = 23-103). The two lowest midterm grades were flagged as outliers, so all analyses were run with and without them to assess their potential impact on final model results. Upon closer investigation, we determined that results were not affected by the outliers so they were included in the full sample used in all subsequent analyses.

Assessing Measurement Invariance

The results regarding measurement invariance of the included scales are discussed below. Establishing measurement invariance across first- and continuing-generation students is essential for addressing the second and third aim of the current study. For each of the included scales, configural, metric, and scalar invariance was assessed.

Configural model. Establishing how many latent factors underlie a set of scale items and whether this structure is the same across groups is the first step of invariance testing. CFA results of the configural models are discussed below.

Academic self-efficacy. A one-factor model of course self-efficacy, with a residual covariance between two similarly worded items,[2] fit the data well, $\chi^2(13) = 16.44$, $p = .226$, CFI = .986, RMSEA = .043, 95% CI [.000, .093]. Cronbach's alpha for the scale was .82.

Optimism. A two-factor model of optimism and pessimism fit the data significantly better than a one-factor model of general optimism, $\Delta\chi^2(1) = 31.20$, $p < .001$, and fit the data well, $\chi^2(19) = 21.74$, $p = .297$, CFI = .996, RMSEA = .032, 95% CI [.000, .083]. Cronbach's alphas for the optimism and pessimism subscales were .70 and .81, respectively. The subscales were moderately correlated, $r = -0.45$ (*SE* = 0.10), $p < .001$.

Goal orientation. We compared the intended four-factor model of goal orientation to four alternative factor models examined in previous research (Elliot & McGregor, 2001). The expected four-factor model fit the data significantly better than a two-factor approach-avoidance model, $\Delta\chi^2(5) = 118.70$, $p < .001$, a two-factor mastery-performance model, $\Delta\chi^2(5) = 152.03$, $p < .001$, a three-factor specific approach-general avoidance model $\Delta\chi^2(3) = 19.52$, $p < .001$, and a three-factor specific performance-general mastery model, $\Delta\chi^2(3) = 228.41$, $p < .001$. The four-factor model fit the data well, $\chi^2(48) = 86.41$, $p = .001$, CFI = .936, RMSEA = .075, 95% CI [.050, .099]. Cronbach's alphas for the mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance subscales were .82, and .87, .85, .58, respectively. The four subscales were positively correlated with each other, with correlation coefficients ranging from $r = 0.28$ (*SE* =.10), $p = .003$ (mastery-avoidance with performance-approach) to $r = .56$ (*SE* = .12), $p < .001$ (performance-approach with performance-avoidance).

Academic stress. We compared the intended four-factor model to a general one-factor model of academic stress that has been used in previous research (e.g., Bernstein,

[2] After inspection of modification indices, a residual covariance between item 1 ("Research a term paper") and item 2 ("Write course papers") was added to the model to represent the shared item content.

2016; Van der Werf, 2013). The four-factor model, modeling affective, behavioral,[3] physiological, and cognitive stress separately, fit the data significantly better than a one-factor model, $\Delta\chi^2(6) = 58.48$, $p < .001$. The four-factor model fit the data well, $\chi^2(43) = 256.82$, $p < .001$, CFI = .972, RMSEA = .063, 95% CI [.048, .078]. Cronbach's alphas for the affective, behavioral, physiological, and cognitive subscales were .75, .80, .77, and .85, respectively. The four subscales were strongly correlated with each other, with correlation coefficients ranging from $r = 0.72$ (SE =.06), $p < .001$ (physiological with cognitive stress) to $r = .92$ (SE = .04), $p < .001$ (physiological with affective stress).

Metric and scalar models. Results of step 2 and 3 invariance testing are reported in Table 1. For all included measures, we found that scalar invariance did not decrease model fit significantly. In addition, the CFI values for all tested models indicate that good model fit was retained. Due to our relatively small sample size and larger number of items included in the LASRS, it was not computationally possible to examine measurement invariance for all the subscales in one. Instead, each subscale of the LASRS was analyzed separately. These results indicate that first- and continuing-generation students did not differ in how they interpreted and responded to the included scales. This means that we can meaningfully compare latent factor means and correlations between factors across the two groups.

Aim 1

Aim 1 examined group differences in AP between first- and continuing-generation students. Contrary to previous research, we found that AP for first- and continuing-generation students did not differ significantly, $t(82.552) = -0.95$, $p = .347$, $d = -0.17$; 95% CI [-8.32, 2.96]. First-generation students had an average AP of 71.85 (SD = 15.68, range = 23-103), while continuing-generation students had an average of 74.53 (SD = 15.34, range = 45-101).

Bivariate correlations were run to assess each psychosocial factor's association with AP (Table 2, column 1). AP was not associated with optimism ($p = 226$), pessimism ($p = .718$), mastery-avoidance ($p = .222$), performance-approach ($p = .276$), performance-avoidance ($p = .154$), affective stress ($p = .503$), and physiological stress ($p = .753$). AP was positively associated with academic self-efficacy ($p < .001$) and mastery-approach goals ($p = .006$), and negatively associated with academic behavioral stress ($p = .002$) and cognitive stress ($p = .007$). To test if each of the psychosocial factors had an independent relationship with AP, we added all factors into a model together with AP as the outcome. This model revealed that only mastery-approach goal orientation held a significant (positive) association with AP (Table 3, column 1), and the model as whole explained 19.2% of the variance in AP.

Aim 2

To examine if first- and continuing-generation students differed in the endorsement of psychosocial factors, we compared latent mean levels of each factor across groups. In the continuing-generation group, the means of academic affective stress

[3] Item 2 ("I used alcohol or drugs") was removed from the behavioral stress scale as 139 out of 143 participants (97.2%) were under the legal drinking age at the time of the study.

(β = -0.58, *SE* = .22, *p* = .008), behavioral stress (β = -0.64, *SE* = .21, *p* = .002), and physiological stress (β = -0.53, *SE* = .25, *p* = .032) were significantly different from zero. In other words, continuing-generation students reported lower levels of academic affective, behavioral, and physiological stress compared to first-generation students. There were no other significant group differences in mean levels of factors; specifically, for the latent factor means of academic self-efficacy (β = 0.37, *SE* = .21, *p* = .082), optimism (β = -.16, *SE* = .21, *p* = .465), pessimism (β = -.20, *SE* = .20, *p* = .314), mastery-approach (β = -0.04, *SE* = .19, *p* = .851), mastery-avoidance (β = -0.21, *SE* = .20, *p* = .271), performance-approach (β = 0.06, *SE* = .19, *p* = .759), performance-avoidance (β = -0.19, *SE* = .19, *p* = .310), or academic cognitive stress (β = -0.39, *SE* = .20, *p* = .050). Table 5 shows how these latent mean differences translate to traditional composite sum- or average-scores for first- and continuing-generation students. The *t*-statistics reported in the table follow the same pattern of significance as was found when using latent factor scores.

Aim 3

Bivariate correlations were estimated to examine the relationship between factors and AP for each group (Table 2, columns 2 and 3). Academic self-efficacy was positively associated with AP for first- and continuing-generation students (*p* = .031, *p* = .015 respectively). For first-generation students, AP was negatively correlated with academic behavioral (*p* = .016) and cognitive (*p* = .009) stress. In contrast, for continuing-generation students, AP was positively correlated with mastery-approach (*p* < .001) and performance-avoidance (*p* < .001) goals. It should be noted that the negative association between academic behavioral stress and AP had a similar effect size across the two groups (i.e., -.24 and -.27 for first- and continuing-generation students). However, due to the smaller sample size of the continuing-generation group this coefficient did not reach significance (*p* = .076).

A multiple-group regression model was used to test if each factor had its own independent relationship with AP and if the relationship differed across groups (Table 3, columns 2 and 3). For first-generation students, all factors explained 13.4% of the variance in AP, and none of the factors were uniquely associated with AP. In contrast, for continuing-generation students, all factors explained 60.5% of the variance in AP. Further, for continuing-generation students, mastery-approach goals had a significant positive association with AP, while performance-approach goals and academic behavioral stress had a significant negative association with AP. In other words, an increase of one standard deviation on the latent factor score of mastery-approach goals was associated with an average increase of 7.96 in AP. An increase of one standard deviation of the latent factor scores of performance-approach goals and academic behavioral stress was associated with an average decrease of 5.53 and 5.69 in AP, respectively. The negative effect of performance-approach was surprising, given its non-significant bivariate correlation with AP. We examined whether multicollinearity between the predictors might be the cause of this results but found that all variance inflation factors (VIFs) were < 5.0 in both groups. In addition, for both groups, the residuals were homoscedastic and normally distributed. These results verified that violations of assumptions were not confounding the findings.

To assess whether the relationship between factors and AP differed across groups, we compared the regression path estimates, and two paths were found to differ significantly. First, the association between performance-approach and AP was significantly different for first-generation versus continuing-generation students. Inspecting the estimates shows the relationship between performance-approach and AP was non-significant for first-generation students, while it was negative and significant for continuing-generation students. Second, the association between performance-avoidance and AP also significantly differed between first- and continuing-generation students. The estimates showed the relationship between performance-avoidance and AP was non-significant for both groups, although the estimate was negative for first-generation students and positive for continuing-generation students.

Discussion

The aim of this paper was to see how psychosocial factors associated with AP. In the entire sample, AP was only associated with academic self-efficacy, mastery-approach, and academic behavioral and cognitive stress, but not with optimism, pessimism, mastery-avoidance, performance-approach, performance-avoidance, and academic affective and physiological stress. More so, when all psychosocial factors were examined simultaneously in a model predicting AP, only mastery-approach remained significant. These findings suggest potential overlap among the psychosocial factors that may be indicative of a more basic construct, such as general coping ability or resilience. It is also possible that there is something unique about our sample of students resulting in the factors associated with AP diverging from previous research sampled at other universities. Notably, there is a majority of first-generation students on our campus, a group typically underrepresented in research on AP.

One way we explored how our sample may be different was by explicitly comparing first- and continuing-generation students in AP and psychosocial factors. We did not find a significant difference in AP, which was unexpected given previous research suggesting differences in AP between these two groups (Cataldi et al., 2018; Choy, 2001; Ishitani, 2006; Pascarella et al., 2004; Stephens et al., 2012; Stinebrickner & Stinebrickner, 2009; Woosley & Shepler, 2011). As is discussed below, this may be due to programs on our campus designed to help first-generation students succeed. We did find, however, that first-generation college students had significantly higher levels of academic stress (affective, behavioral, physiological, but not cognitive) than continuing-generation students. This finding expands prior work showing first-generation students experience higher levels of financial stress (Lombardi, Murray, Gerdes, 2012; Phinney & Haas, 2003) compared to their continuing-generation peers, demonstrating greater stress in this group across a variety of domains.

In examining the association between psychosocial factors and AP, we did find differences between first- and continuing generation students. For first-generation students, AP was negatively associated with academic behavioral and cognitive stress, while for continuing-generation students, AP was positively associated with two of the four goal orientations (i.e., mastery-approach and performance-avoidance). Thus, these results may suggest that not only do first-generation college students have higher levels of academic stress than continuing-generation students, but it is those first-generation students with the highest stress that have the worst AP. An exception to this pattern of differences was academic self-efficacy, a factor associated with AP for both groups of college students. This finding is in line with previous research that has identified academic self-efficacy as one of the most robust predictors of AP (Adeyemo, 2007; Bembenutty, 2007; Greene, Miller, Crowson, Duke, & Akey, 2004; Hsieh et al., 2007; Klomegah, 2007; Ogunmakin et al, 2013).

In thinking about how psychosocial factors work in concert, there is a dearth of knowledge in what predicts AP for first-generation students. Once all psychosocial factors were examined simultaneously in a model predicting AP, none of the factors were independently associated with AP for first-generation students, and this model only explained 13.4% of the variance in their AP. For continuing-generation students, a different picture emerged. Once all psychosocial factors were examined simultaneously

in a model predicting continuing-generation students' AP, mastery-approach emerged as a positive predictor of their AP, while performance-approach and academic behavioral stress were negative predictors of AP. All psychosocial factors combined were able to explain 60.5% of the individual differences in their AP, a sizeable increase compared to first-generation students. Although the variance explained for continuing-generation students is remarkable, this finding also suggests that the previously found associations between these psychosocial factors and AP are dependent on the generational status of the students included in the sample.

Significance and Implications

Results of the current study have several implications for research, practice, and policy. Our non-significant group differences in AP suggest that although first-generation students may be vulnerable in some college environments, it is not inevitable that they will be disadvantaged. One possible explanation for this null finding may be attributed to the efforts made by the university these data were sampled from. Due to the high number of first-generation students on campus (74%), the administration has put forth several efforts aimed at helping first-generation students succeed. These programs include individualized mentoring and academic support workshops the summer before students start college (Summer Bridge Program, 2019). There are also Living Learning Communities (LLCs) that have specific structures to facilitate student interactions among other students, faculty, and staff through various activities including community outreach, field trips, cluster classes, service learning projects, and social activities (Housing and Residence Education, 2019). University administrators invest in these programs with the hope that they will give first-generation students the resources needed to succeed in college. In fact, the university was recently ranked first in the nation for several student outcomes, including outperforming expected graduation rates and for the percentage of students receiving need-based aid (U.S. News & World Report, 2019). This is a testament to the payoff of efforts universities make to help their underserved students, and that minority serving institutions may be especially equipped to serving underrepresented groups.

Our findings also indicates research has done a disservice to colleges and universities by not fully understanding the factors that contribute to AP for *all* students. Although this study selected factors known to predict AP from previous research, as noted they predicted a minute percentage of the variance in AP for first-generation students. For future research hypothesizing what factors may be more predictive for first-generation students, we can learn from programs such as the LLCs that aim to improve student outcomes through various psychosocial pathways. Indeed, the presence of institutional support can mediate the relationship between stress and perceived academic goal progress among first-generation students (Garriot & Nisle, 2018). Moreover, increased sense of belonging is also associated with high AP (Sánchez, Colón, & Esparza, 2005; Walton & Cohen, 2007, 2011), which is important considering first-generation students tend to have lower levels of sense of belonging on college campuses (Stableton, Soria, & Huesman, 2014). This may partly explain previously found differences in first-generation students' AP. This also provides a promising new area of

research because recent findings suggest LLCs improve sense of belonging in first-generation students (Azmitia, Sumabat-Estrada, Cheong, & Covarrubias, 2018).

This brings into discussion the importance put on policy makers to ensure equal access to programs such as LLCs. In contrast to policies at the campus where the current data were sampled from, some universities have begun piloting LLC programs that cost more than standard dorms. This is of grave concern for educational and social inequities because first-generation students tend to have the least financial resources yet are likely to benefit the most from these programs. On the other hand, some universities have offered financial aid and scholarships to first-generation students. This not only allows students to partake in LLCs but also engage more with other programs and activities on campus (Pascarella et al., 2004; Garriott & Nisle, 2018). Student engagement is directly related to academic success according to both theory (Student Involvement Theory; Astin, 1984) and research (Arsendorf & Naylor-Ticncknell, 2016; Zhao & Kuh, 2004). Equal access to LLCs for first-generation and other economically disadvantaged students should be a chief concern for all policy makers aiming to reduce achievement gaps and educational inequities.

Future research can play a major role in informing policy by discovering new pathways that may be uniquely associated with success for first-generation students. A key focus of this research should be identifying not only whom programs such as LLCs are most beneficial for, but also which aspects and *how* they are beneficial to students. This information is critical to optimize identification of at-risk students and to tailor programs that can effectively help them succeed in college.

Limitations and Future Directions

This study fills a gap in the literature by highlighting the importance of college generational status while examining psychosocial factors associated with AP. However, it is not without limitations. College generational status was highly correlated with student ethnicity (i.e., most first-generation college students were also Hispanic). This was unique in that we had a chance to research a fast-growing but historically understudied group, yet we are limited in our ability to generalize to other racial and ethnic groups that also have historically shown relatively worse AP, including African-American students (Greene, Marti, & McClenney, 2008). There is some evidence to suggest correlates of academic achievement vary across ethnic groups (Valencia, 1994; Walker & Satterwhite, 2002; Yazedjian et al., 2009). Therefore, it is unknown whether our findings reflect something unique for first-generation Hispanic students or if these results would generalize to all first-generation students. Our disparate findings highlight the need to identify and address sample differences while attempting to replicate findings and future research should employ stratified sampling methods to address this question.

The current study is one of the first to examine measurement invariance across first- and continuing-generation students on several scales of psychosocial factors. However, due to sample size restrictions, we did not have enough statistical power to examine a structural equation model that included latent factors for all of the psychosocial factors. To circumvent this issue, we created latent factor scores based on the multiple-group CFA results. A potential limitation is that this approach does not consider correlations between scales. Future research can expand on our study by

examining all latent factors in one model with a larger sample size to determine whether results change when these correlations are taken into account.

Further, the current study is correlational allowing us to identify which students are at risk, but these data do not tell us *why* they are at-risk. Experimental studies in educational settings are generally rare as many administrators do not want to withhold potential resources that could benefit vulnerable students. Yet, additional work is needed to better make causal inferences. For example, future research may wish to track a cohort of students over time measuring both within- and between-person variation in these factors and subsequent changes to AP. Moreover, it would be important to attempt to control for a wide range of third variables that could be confounding effects, including family income, early childhood trauma, and individual differences in professors.

Our measure of AP was well-informed; midterm exams predict final course grades (Jensen & Barron, 2014) and is frequently used as a measure of AP (Von Stumm, Hell, & Chamorro-Premuzic, 2011; Ward et al., 1996). Nevertheless, this measure only represents one type of assessment and AP covers a wider range of possibilities (e.g., standardized assessments, cumulative GPA). It would be interesting to examine whether factors differentially relate to these alternative measures of AP. Another way to look at AP is in a dynamic model, which captures a student's reaction to a poor grade and measures how they are able to respond to it. First-generation students may experience more discouragement after receiving a poor grade which may cause a negative ripple effect on their future AP. Programs discussed earlier such as LLCs may be particularly advantageous for these students because they provide the social capital to be resilient and bounce back from poor grades (Arensdorf & Naylor-Tincknell, 2016; Schwartz et al., 2018). This question could be addressed with the longitudinal design suggested earlier.

Conclusions

Earning a college degree is the most consistent way of improving economic and social mobility in the United States (Garriott, Hudyma, Keene, & Santiago, 2015). Yet, first-generation students drop out of universities at higher rates than their continuing-generation peers (Ishitani & DesJardines, 2002). Investing in targeted interventions to help first-generation students graduate college would not only be beneficial to the individual, but also their future kin and society as a whole. Compared to only high school graduates, college graduates pay approximately 91% more in taxes ($6,900), are less likely to rely on government assistance, are more likely to volunteer, and are more likely to see their own children graduate college (Ma, Pender, & Welch, 2016). Nevertheless, a primary conclusion of this paper is that we do not understand what influences first-generation students' AP, and therefore do not understand what makes them so vulnerable or how to help them. This is a pressing issue given that first-generation students make up one-third of all students enrolled at college campuses in the US (Cataldi, Bennett, & Chen, 2018). Due to the importance of graduating college, especially for first-generation students, we are doing them and ourselves a disservice by not knowing more about them.

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Table 1
Multiple-group CFA Measurement Invariance Results

		χ^2(df)	*p*-value	$\Delta\chi^2$(df)	*p*-value	CFI
Academic Self-Efficacy	Configural	28.65 (26)	.327			.991
	Metric	40.95 (33)	.161	12.43 (7)	.087	.972
	Scalar	46.96 (39)	.178	5.73 (6)	.454	.972
Life Orientation	Configural	46.23 (38)	.169			.989
(Optimism and Pessimism)	Metric	62.87 (46)	.050	12.79 (8)	.119	.977
	Scalar	69.10 (60)	.197	3.71 (14)	.997	.987
Goal Orientation[1]	Configural	166.50 (99)	< .001			.903
	Metric	180.40 (111)	< .001	15.14 (12)	.234	.901
	Scalar	184.37 (119)	< .001	4.54 (8)	.806	.907
Academic Stress:	Configural	6.27 (4)	.180			.995
Affective[2]	Metric	7.22 (8)	.513	2.91 (4)	.573	1.000
	Scalar	14.01 (15)	.525	5.71 (7)	.574	1.000
Academic Stress:	Configural	40.29 (28)	.062			.976
Behavioral[2]	Metric	37.06 (35)	.374	3.16 (7)	.869	.996
	Scalar	55.54 (48)	.212	16.77 (13)	.210	.986
Academic Stress:	Configural	7.28 (10)	.699			1.000
Physiological[2]	Metric	9.44 (15)	.854	3.40 (5)	.639	1.000
	Scalar	21.58 (24)	.605	11.44 (9)	.247	1.000
Academic Stress:	Configural	11.96 (4)	.018			.991
Cognitive[2]	Metric	14.26 (8)	.075	3.62 (4)	.461	.993
	Scalar	25.05 (15)	.049	6.67 (7)	.464	.989

Note. $\Delta\chi^2$ is based on uncorrected χ^2 estimates and may not match up when compared to values in χ^2 column.
[1]Two non-significant negative residual variances (of item 6 and item 9) needed to be constrained to 0 for meaningful comparison. [2]The two highest response categories within this scale had to be collapsed as the highest response option was not chosen in at least one of the groups included

Table 2
Bivariate Correlations of Subscales with Academic Performance

	Total Sample (n = 139)	First-Generation (n = 96)	Continuing-Generation (n = 43)
Academic Self-Efficacy	0.28***	0.22*	0.37*
Life Orientation			
Optimism	0.10	0.09	0.13
Pessimism	-0.03	-0.09	0.09
Goal Orientation			
Mastery-Approach	0.23**	0.08	0.60***
Mastery-Avoidance	-0.10	-0.11	-0.07
Performance-Approach	0.09	0.07	0.14
Performance-Avoidance	0.12	-0.08	0.52***
Academic Stress			
Affective	-0.06	-0.15	0.15
Behavioral	-0.26**	-0.24*	-0.27
Physiological	-0.03	-0.11	0.20
Cognitive	-0.23**	-0.27**	-0.14

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 3
Regression Model Results: All Students

	Total sample (n = 139)		
	b (SE)	95% *CI*	β
Academic Self-Efficacy	2.67 (1.68)	-0.61, 5.96	.16
Life Orientation			
Optimism	-0.73 (1.68)	-4.07, 2.61	-.04
Pessimism	0.70 (1.68)	-2.58, 3.99	.04
Goal Orientation			
Mastery-Approach	4.29 (1.54) **	1.28, 7.31	.27
Mastery-Avoidance	-1.54 (1.43)	-4.34, 1.27	-.10
Performance-Approach	-1.31 (1.59)	-4.43,1.81	-.08
Performance-Avoidance	0.50 (1.39)	-2.23, 3.23	.03
Academic Stress			
Affective	1.50 (2.34)	-3.09, 6.09	.08
Behavioral	-3.57 (1.97)	-7.43, 0.29	-.20
Physiological	2.42 (2.05)	-1.60, 6.45	.13
Cognitive	-3.20 (2.22)	-7.55, 1.15	-.18
F (df1, df2)	2.74**	(11, 127)	
R-squared	0.19		

Note. Estimates with matching superscripts across columns differed significantly at $p < .05$.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 4
Regression Model Results: First- and Continuing-generation Students

	First-generation (n = 96)			Continuing-generation (n = 43)		
	b (SE)	95% *CI*	β	*b (SE)*	95% *CI*	β
Academic Self-Efficacy	3.10 (2.46)	-1.72, 7.92	.18	1.85 (1.80)	-1.68, 5.38	.13
Life Orientation						
Optimism	-1.88 (2.61)	-7.01, 3.24	-.10	-0.32 (1.69)	-3.64, 3.00	-.02
Pessimism	-0.57 (2.36)	-5.19, 4.05	-.03	1.37 (1.91)	-2.37, 5.11	.09
Goal Orientation						
Mastery-Approach	2.61 (1.91)	-1.14, 6.36	.17	7.96 (2.53) **	3.00, 12.93	.49
Mastery-Avoidance	-1.93 (2.04)	-5.93, 2.07	-.11	0.15 (1.78)	-3.34, 3.63	.01
Performance-Approach	1.26 (2.06)[a]	-2.78, 5.31	.07	-5.53 (2.16)[a] *	-9.76, -1.31	-.35
Performance-Avoidance	-2.95 (2.00)[b]	-6.86, 0.97	-.18	3.13 (1.76)[b]	-0.32, 6.57	.24
Academic Stress						
Affective	0.95 (2.96)	-4.85, 6.74	.05	-0.39 (3.20)	-6.65, 5.87	-.02
Behavioral	-1.00 (2.71)	-6.30, 4.31	-.05	-5.69 (2.24) *	-10.07, -1.32	-.35
Physiological	2.97 (2.50)	-2.94, 6.87	.11	6.42 (3.81)	-1.05, 13.88	.33
Cognitive	-4.40 (2.87)	-10.01, 1.22	-.24	-3.28 (2.95)	-9.06, 2.50	-.19
F (df1, df2)	1.19	(11, 84)		4.32***	(11,31)	
R-squared	0.13			0.61		

Note. Estimates with matching superscripts across columns differed significantly at $p < .05$.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 5
Composite Score Means (SDs), and Welch Corrected t-test Statistics

	Possible Range	First-Generation (n = 96)	Continuing-Generation (n = 43)	t (df)
Academic Self-Efficacy	0 – 10	6.35 (1.39)	6.77 (1.42)	-1.65 (80.99)
Life Orientation				
Optimism	4 – 16	10.57 (2.60)	10.16 (2.56)	0.88 (83.72)
Pessimism	4 – 16	9.59 (3.01)	9.02 (2.98)	1.04 (83.41)
Goal Orientation				
Mastery-Approach	1 – 7	5.72 (1.12)	5.68 (1.08)	0.14 (85.37)
Mastery-Avoidance	1 – 7	5.03 (1.24)	4.73 (1.41)	1.21 (73.60)
Performance-Approach	1 – 7	4.90 (1.32)	5.01 (1.32)	-0.45 (82.26)
Performance-Avoidance	1 – 7	5.99 (0.81)	5.83 (0.96)	0.97 (71.54)
Academic Stress				
Affective	4 – 16	9.08 (3.33)	7.43 (3.12)	2.85 (87.78)**
Behavioral	7 – 28	18.67 (4.33)	15.95 (4.70)	3.30 (76.86)**
Physiological	5 – 20	11.78 (4.28)	10.00 (3.85)	2.46 (91.28)*
Cognitive	4 – 16	11.67 (3.34)	10.45 (3.67)	1.67 (76.06)

*p < .05, **p < .01, ***p < .001.