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Research Report
ETS RR-13-34

Investigating 10-Year Trends of Learning Outcomes at Community Colleges

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December 2013

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Investigating Ten-Year Trends of Learning Outcomes at Community Colleges

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Educational Testing Service, Princeton, New Jersey

December 2013

Action Editor: Donald M. Powers

Reviewers: Brigid Finn and Ross Markle

Abstract

Community colleges currently enroll about 44% of the undergraduate students in the United States and are rapidly expanding. It is of critical importance to obtain direct evidence of student learning to see if students receive adequate training at community colleges. This study investigated the 10-year trends of community college students' (n = 46,403) performance in reading, writing, mathematics, and critical thinking, as assessed by the *ETS*® Proficiency Profile (EPP), an assessment of college-level learning outcomes. Results showed that community college students caught up with and significantly outperformed students from liberal arts colleges by the end of the 10-year period and made significant improvement in critical-thinking skills. An increasing gender gap was observed in mathematics at community colleges. Prevalent ethnic minority and English as a second language (ESL) gaps were noted but gaps between ESL and non-ESL students and between Hispanic and White students were decreasing. Additionally, Asian students at community colleges showed an overall decline in performance. Findings from this study provide significant implications for community college leaders, researchers, and policymakers.

Key words**:** community college, ETS Proficiency Profile, EPP, higher education, learning outcomes assessment

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Community colleges enroll about 44% of the undergraduate students in the United States. In 2012 there were 1,132 community colleges in the United States, providing education to about eight million for-credit students and 13 million noncredit students (American Association of Community Colleges [AACC], 2012a). The estimated increase in enrollment was about 2.9% from 2009 to 2011 (AACC, 2012a). Furthermore, to ensure that by 2020 about 60% of Americans hold a higher education degree, the United States needs to educate an additional eight million students with an associate's degree or higher; most will be educated at community colleges (Kelly, 2010). Given the critical role community colleges play in America's strategic plan for higher education, it is of upmost importance to evaluate student learning outcomes to see if community colleges provide adequate support to students as they progress through their educational pathways.

Evaluation of student learning outcomes at community colleges has received national attention for the last several years. For example, AACC initiated the Voluntary Framework of Accountability (VFA; http://vfa.aacc.nche.edu/Pages/default.aspx), the first comprehensive national accountability system created for community colleges (AACC, 2012b). VFA aims to provide a common ground for community colleges to assess learning and ensure quality and to provide a benchmark for national comparison.

Despite the emerging efforts to evaluate learning at community colleges, very few studies have provided direct, empirical results of student learning comparable across community colleges. Furthermore, little is known about how students at community colleges compare to peers at other types of institutions in terms of learning outcomes. Without objective data, it is difficult to evaluate whether specific changes in the curriculum or policy are effective in improving student outcomes. In addition, it is important to understand how community college students stand in terms of core college-level skills among themselves or as compared to peers at 4-year institutions.

This study attempts to fill the void by investigating the performance of students from a relatively small number of community colleges (N = 13) over the course of 10 years in critical thinking, reading, writing, and quantitative skills. Although the findings of this study may not generalize to all community colleges in the United States, we hope that they will provide insight into how students have performed over the last 10 years with regard to necessary skills for the 21st century workforce. We also hope that this study will serve as an impetus for researchers and

practitioners to focus more on demonstrating direct evidence of learning at community colleges. In-depth analyses were conducted for subgroups such as gender, ethnicity, and language. Comparisons were also provided between community colleges and 4-year institutions. Four primary research questions were addressed:

1. How do community college students perform as compared to students at other types of institutions over the last 10 years?
2. What are the trends of 10-year performance by gender, ethnicity, and language groups at community colleges?
3. What factors predict community college students' performance on learning outcomes assessment?
4. What is the relationship between community college students' performance on learning outcomes assessment, their college grade point average (GPA), and credit hours?

Literature Review

Despite the abundant literature on learning outcomes for 4-year college students, such studies are scarce for community college students. When evaluating the success of community college students, most prior studies have focused on indicators such as graduation rates, retention, transfer, or student engagement, rather than on direct student learning outcomes.

When examining graduation at community colleges, a commonly referred to measure is the graduation rate within 150% of the time in which students are expected to complete a degree. Researchers have investigated the factors that are associated with graduation rates. For example, Hyers and Zimmerman (2002) analyzed 7-year data at a community college and found that both high-school rank and first-quarter GPA in college are significant predictors of graduation within 3 years. Realizing the heterogeneity in institutional characteristics such as location, size, expenditure, and student composition, researchers also analyzed the effect of such characteristics on graduation rates. Findings indicated that colleges serving students with better academic preparation, from wealthier families, and with a higher percentage of full-time students had higher graduation rates (Mortenson, 1997; Pascarella & Terenzini, 1991). Large community colleges (i.e., with more than 2,500 full-time students) tended to have lower graduation rates than smaller community colleges (Astin, Tsui, & Avalos, 1996; Bailey, Calcagno, Jenkins, Leinbach, & Kienzl, 2006). In addition, community colleges with larger proportions of part-time faculty

and minority students tended to have lower graduation rates (Bailey, Calcagno, Jenkins, Kienzl, & Leinbach, 2005; Bailey, Jenkins, & Leinbach, 2005). Findings from other studies suggest that graduation rates were also positively affected by academic expenditures (Astin, 1993; Ryan, 2004).

Researchers have used psychological, socio-demographic, situational, and academic preparation factors to predict retention and transferring (Allen, Robbins, Casillas, & Oh, 2008; Fischer, 2007; Napoli & Wortman, 1998; Porchea, Allen, Robbins, & Phelps, 2010; Tinto, 1993). Community colleges have been a pipeline for 4-year institutions. In fact, 36% of students enrolling at community colleges intended to transfer to a 4-year institution (Provasnik & Planty, 2008). In addition, 15% intended to transfer to another 2-year college. Porchea et al. (2010) tracked approximately 4,500 entering students at 21 community colleges for 5 years. The researchers collected data on academic preparation (e.g., high school grades and standardized test scores), psychosocial factors (e.g., motivation), demographic variables, and situational factors (e.g., degree expectations, number of hours working). They also collected information on five types of outcomes, including combinations of earning a degree or certificate, transferring to a 4-year institution, and enrolling at a community college during a fifth year. Through a multinomial logit model (Agresti, 1990), they found that 48% of the students dropped out, without earning a degree, transferring to a 4-year institution, or enrolling at any other institution. Academic preparation and motivation significantly predicted transfer. Academic discipline predicted degree attainment, regardless of transfer. African American students were less likely to obtain a degree than to drop out. Studies also reported that for African American students, high school preparation, college GPA, number of credits hours required for degree, and financial resources were significant predictors of retention (Cofer & Somers, 2000; Hagedorn, Maxwell, & Hampton, 2001). Similarly, for Hawaiian students at community colleges, college cumulative GPA and financial aid also significantly predicted their retention (Makaukane-Drechsel & Hagedorn, 2000). Robbins, Allen, Casillas, Peterson, and Le (2006) found that gender differences in retention tend to be small.

Another frequently used outcome is student self-report engagement. *Engagement* refers to students' involvement in a broad range of educational and social activities on a college campus (Pascarella & Terenzini, 2005). The Community College Survey of Student Engagement (CCSSE) is a survey used widely to elicit students' perceived engagement on five dimensions:

active and collaborative learning, student effort, academic challenge, student-faculty interaction, and support for learners (Marti, 2009; McClenney, 2007). Through a latent analysis with multi-institutional samples, Marti (2009) found that full-time students were more engaged than other students on CCSSE dimensions such as class assignment, collaborative learning, information technology, and student services.

Although outcomes such as student engagement levels and rates of graduation, retention, and transfer are important indicators of the quality of community colleges, they provide little direct information about actual student learning, which is normally demonstrated through assessment. In addition to the pressure from national initiatives, which stress the importance of assessment, accreditors have also begun demanding that colleges demonstrate direct evidence of learning for accountability and transparency purposes. Provezis (2010) reported that the most common deficiency in institutional evaluations lies in the inadequate assessment of student learning outcomes. Evidence from the Commission on Colleges for the Southern Association of Colleges and Schools, a regional accrediting organization, suggests that 70% of colleges in the organization failed to articulate a set of expected learning outcomes and lacked a mechanism to evaluate the achievement of such outcomes (Head & Johnson, 2011; Nunley, Bers, & Manning, 2011). In fact, satisfying accreditation requirements was the number one factor influencing community colleges' decisions to assess learning outcomes, followed by strategic planning (Nunley et al., 2011).

To assess student learning outcomes, many community colleges have turned to standardized measures such as the *ETS® Proficiency Profile* (EPP; previously known as the MAPP), the Collegiate Learning Assessment, and the Collegiate Assessment of Academic Proficiency. A national institutional survey reported that 28% of community colleges used one of the standardized measures for program evaluation or accountability purposes, a figure that was nearly 10% higher than the national higher education average of 19% (Kuh & Ikenberry, 2009). Other colleges used general rubrics or course-specific tests, such as the Major Field Tests (Nunley et al., 2011).

Despite the pervasive use of standardized measures, very few studies have obtained results from these standardized measures that are comparable across community colleges. Lakin, Elliott, and Liu (2012) analyzed the performance of college students who spoke English as a second language (ESL) and non-ESL students on the EPP. They found that the non-ESL students

significantly outperformed the ESL students in all four general domains (critical thinking, reading, writing, and mathematics). The largest performance gap occurred in reading, where the standardized mean difference was 0.44; in contrast, the smallest performance gap was in mathematics (0.18 SD). The Lakin et al. (2012) study included students from both 4-year institutions and community colleges. However, since the analyses were conducted at the aggregate level, it is unknown whether the findings would be upheld if community colleges were considered a stand-alone group. Focusing on critical thinking, communication, and cultural diversity skills, Calhoun Community College (CCC) used the Collegiate Assessment of Academic Proficiency to measure the learning outcomes of its students. The CCC's 2012 report showed that 55% of the students performed below the national mean on the critical-thinking section (Calhoun Community College [CCC], 2012); however, this was an improvement from the 2009/2010 assessment results. Furthermore, the percentage of students who scored above the national mean in writing increased from 2009/2010 to 2012 (CCC, 2012). Such results provide valuable and timely information for the college-level effort to foster student success.

Previous studies have also factored in student demographic variables, such as gender and ethnicity, in evaluating direct or indirect learning outcomes at community colleges (Bailey, Jeong, & Cho, 2010; Bush & Bush, 2010; Lakin et al., 2012). For example, Bush and Bush (2010) found that compared to other ethnic and gender groups in community college, African American males exhibited disproportionately low performances on academic outcome measures, including degree attainment, cumulative GPA, and persistence rates. Bailey et al. (2010) found that female, African American, and Hispanic students tended to need more levels of remedial education than their peers. In addition, compared to their peers, male and African American students were less likely to progress through their full remediation sequences. Miller (2006) found that in community colleges, African American and Hispanic/Latino male students did not make adequate progress through the remedial math courses, even though successful completion of remedial math courses is critical for success in college-level math courses. Greene, Marti, and McClenney (2008) surveyed community college students and found that African American students demonstrated lower academic outcomes than their White peers. Furthermore, although Hispanic students demonstrated higher levels of engagement on the Mental Activities factor, they earned significantly lower grades than their White peers. These findings suggest the importance of taking into account gender and ethnicity when assessing student learning at

community colleges. In addition, as ESL students constitute the fastest growing population in many community colleges (Chisman & Crandall, 2007), it is critical to examine whether students' language status is associated with their learning outcomes.

Method

Instrument

The EPP was used in this study to assess students' general skills at community colleges. It measures four college-level general skills: reading, writing, mathematics, and critical thinking. The EPP has a standard form and a short form. The standard form contains 108 multiple-choice questions with 27 questions in each skill area and can be in administered in about 2 hours. The short form has 36 items and can be completed in 40 minutes. For our study, both forms were used. The scores from both the standard and short forms are equated to ensure that they are comparable. Scaled scores for the total score range from 400–500 and from 100–130 for each of the four skill areas (ETS, 2010). The validity of the EPP is supported by abundant research studies, including research investigating construct validity (Klein et al., 2009; Lakin et al., 2012), predictive validity (Hendel, 1991; Lakin et al., 2012; Marr, 1995), ability to detect learning gain (Liu, 2011a, 2011b; Liu, Bridgeman, & Adler, 2012), suitability for English language learners (Lakin et al., 2012), and the effect of student test-taking motivation on test scores (Liu, 2012; Liu et al., 2012). The reliabilities of the subscales range from .78 to .84 (Liu, 2011a).

Participants

This study involved a 10-year analysis of community/2-year-college students' performance on the EPP. Both the test data and examinee background information were obtained from the ETS data warehouse. Community colleges were defined as institutions offering degrees at the associate's level or degrees at the bachelor's level to less than 10% of all undergraduate students, which was the definition used by the Carnegie Foundation for the Advancement of Teaching (2010). Students from 13 community colleges (n = 46,402) in eight different states were included in the analyses. These institutions were selected as their students took the EPP from 2001 to 2010. The institutions varied in terms of their recruitment methods for the test (Liu, 2011b). In many cases, incentives (e.g., cash, credits) were provided and students signed up for the test voluntarily. Although the students taking the assessment each year within a college were

not necessarily the same group of students, analysis of the same colleges is likely to provide information on the trends of performance among community colleges over the last 10 years.

All but one of the 13 community colleges included in this study were public, with two offering bachelor's degrees in addition to certificates and associate's degrees. Seven of the community colleges were located in small cities/towns and six were located in large cities/towns (as identified by the College Board's college search engine; https://bigfuture.collegeboard.org/find-colleges). Additionally, six community colleges were located in a rural setting, five in a suburban setting, and two in an urban setting. Undergraduate enrollment was mostly of small-to-medium size for 11 of the 13 colleges, with the number of students ranging from around 2,500 to 8,500. The two exceptions were that one institution had approximately 730 enrolled students and the other had 21,000.

Demographic data suggest that the sample is representative of all community college students taking the EPP (Table 1) from 2001 to 2010. For the 13 community colleges in this study, approximately 7% of the students were entering freshmen and therefore had zero credits, 2% had less than 30 credits, 53% had 30–60 credits, 32% had 61–90 credits, and 7% had greater than 90 credits. It is important to note that although most community college degrees only require around 60 credits, it is common for students to have excess credits (Zeidenberg, 2012). A number of factors may explain students' excess credits, including changing majors, transferring in credits, retaking a course for GPA improvement, and a desire for more knowledge through additional coursework (Zeidenberg, 2012). Also, some institutions classified as community colleges may still offer bachelor's degrees, thus requiring additional credits.

For comparison purposes, we also included students from eight research universities (n = 68,045), 13 comprehensive colleges/universities (n = 120,269), and 11 liberal arts colleges (n = 52,245). Thus, in total, 286,961 students were included in this study. Institutions were categorized into the respective institution types based on the basic classification categories defined by the Carnegie Foundation for the Advancement of Teaching. Specifically, research universities, comprehensive colleges, and liberal arts colleges correspond to the definitions of doctorate-granting universities, masters' colleges and universities, and baccalaureate colleges, respectively (Carnegie Foundation for the Advancement of Teaching, 2010).

Table 1

Study Sample Descriptive Statistics Compared to All Community College Data

Descriptive statistics	Sample data	All data
Enrollment		
Part-time	26%	26%
Full-time	74%	74%
Transfer status		
Not a transfer	70%	72%
Transfer	30%	28%
Age		
≤ 21	42%	46%
22–39	47%	43%
40+	11%	11%
Average	27	26
Median	23	22
Gender		
Male	35%	36%
Female	66%	64%
Ethnicity		
White	84%	74%
Hispanic/Latino	4%	7%
African American/Black	6%	11%
Asian/Asian American/Pacific Islander	2%	3%
Native American/Alaskan Native	2%	2%
Other	2%	4%
Language		
English (non-ESL)	93%	90%
Other language (ESL)	4%	6%
Both equal	3%	5%
Enrollment and employment		
Full-time + full-time employment	17%	22%
Full-time + part-time employment	41%	50%
Part-time + full-time employment	15%	18%
Part-time + part-time employment	8%	10%

Note. ESL = English as a second language.

Analyses

Community college students' performance in comparison to students at other types of institutions. Analysis of covariance (ANCOVA) was used to examine mean performance differences between community colleges and the three other institution types, controlling for the number of credit hours received. The number of credit hours was used as an indicator of the amount of college-level instruction. The outcome variables were the EPP total and subscale scores. To examine differences in performance across the 10-year period, separate analyses were conducted at three different time points (2001, 2005, and 2010). Differences in performance from 2001 to 2010 were examined within each institution type to identify trends (i.e., increased, decreased, or stable performance from 2001 to 2010). Cohen's *d* (i.e., standardized mean difference) was used to evaluate the effect size for each comparison.

Trends and gaps. Performance trends within community colleges were investigated for gender, ethnicity, and language groups for the total score and for the subscales. Independent-sample *t*-tests were used to compare mean score differences between males and females and between students who speak English as a second language (ESLs) and English-speaking students (non-ESLs). ANOVA was conducted with regard to ethnicity. White students' performance was compared to that of African American, Hispanic/Latino, and Asian/Asian American/Pacific Islander students. It is important to note that the Hispanic/Latino group combined Hispanic, Latin American, and Black Hispanic ethnic groups.

For all comparisons of performance (e.g., between groups or over time), Cohen's *d* was also used to evaluate the effect size between the comparison and each reference group. Reference groups included males, non-ESLs, and White students.

Factors predicting performance. To investigate factors predicting community college performance, stepwise regression was conducted using total test score as the dependent variable. Predictors included ethnicity, language, transfer status, gender, age, number of hours worked per week, college GPA, and credit hours. Ethnicity, language, transfer status, and gender variables were all dummy coded, with White, non-ESL, nontransfer, and males as the reference groups. Age was a continuous variable from age 14–75. Hours worked per week, GPA, and credit hours were all treated as continuous interval variables.

Prior to running the stepwise regression, a variance components analysis was conducted to evaluate the necessity of a multilevel modeling approach. Compared to the within-institution

variance, the between-institution variance was negligible (i.e., only explaining 2.2% of the variance in test scores), which suggested that a multilevel model was not necessary. This result resonated with other studies reporting small between-institution differences (Blaich & Wise, 2011; Kuh, 2003).

Concurrent validity of the EPP. Since the EPP tends to measure academic achievement, we expect the test scores to reflect variations in college GPA. Namely, students with higher EPP scores should have higher GPAs, and vice versa. EPP scores were conditioned on levels of GPA and illustrated in graphs.

Additionally, as a test of academic outcomes, we also expect test scores to reflect variations in student exposure to college coursework (i.e., credit hours). Specifically, we expect that students exposed to more course work will perform better on the EPP and vice versa. As with GPA, the EPP scores were conditioned on credit hour categories and illustrated in graphs.

Results

Community Colleges' Performance in Comparison to Other Types of Institutions

Figures 1 and 2 show that research universities performed highest in both total and subscale scores when controlling for students' number of college credit hours. Focusing on the total score performance (Figure 1), research universities and comprehensive colleges both significantly outperformed community colleges. Specifically, differences in performance between research universities and community colleges widened from 2001 (d = 0.13) to 2010 (d = 0.43), but differences between comprehensive colleges and community colleges narrowed from 2001 (d = 0.12) to 2010 (d = 0.06). The most noteworthy finding is that community colleges were outperformed by liberal arts colleges in 2001 ($p < .05$, d = 0.05), but performed the same in 2005 and actually outperformed liberal arts colleges in 2010 ($p < .05$, d = -0.04). Figure 1 also shows the trends in performance within each institution type. Research universities improved in performance over the 10-year period (d = 0.29), and both comprehensive and liberal arts colleges decreased slightly in performance (d = -0.06 and d = -0.09, respectively). Community college performance, however, remained stable (d = 0.00).

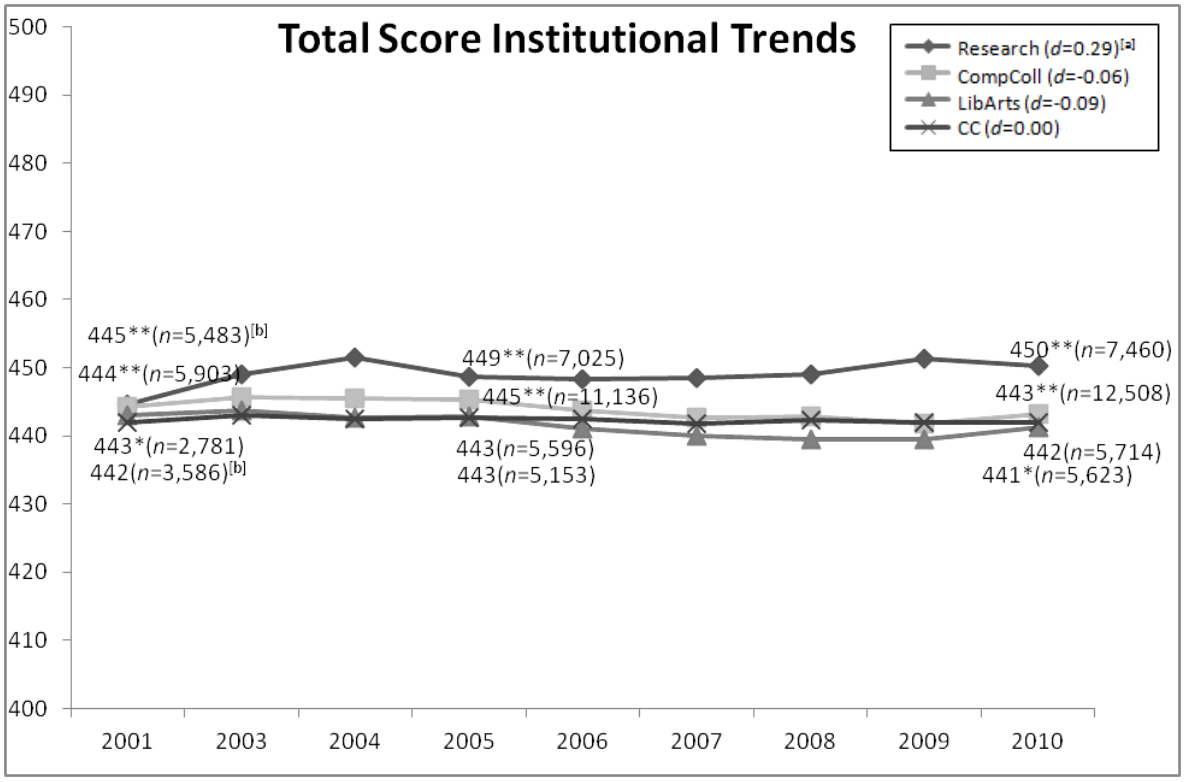

Figure 1. **Institutional performance differences on total score controlling for credit hours. CompColl = comprehensive college; CC = community college; LibArts = liberal arts.** [a] **Effect size calculated between 2001 and 2010 within the same type of institution.** [b] **For four of eight research institutions and 10 of 13 CCs, data were not available in 2001, so 2002 data were used as a substitution. *p < .05. **p < .001 between CC and institution of interest in specified year.**

In relation to performance on the four subscales when controlling for the number of credit hours (Figure 2), research universities significantly outperformed community colleges. Performance differences between research universities and community colleges widened in all four subscales due to increases in performance for research universities, with the largest difference in performance occurring in mathematics from 2001 (d = 0.23) to 2010 (d = 0.50). Alternatively, the trend between comprehensive and community colleges narrowed in all four subscales, and in critical thinking, the gap in performance completely closed in 2010 (p = .50, d = 0.01). Interestingly, in reading, comprehensive and community colleges did not perform significantly differently across the 10 years. Again, community college students performed

equally as well as, and, in some cases, outperformed liberal arts colleges. In both reading and critical thinking, by 2010, community colleges were significantly outperforming liberal arts colleges ($p < .001$, $d = -0.11$ for reading; $p < .001$, $d = -0.09$ for critical thinking). In writing and math in 2010, liberal arts and community colleges performed equally. Only in 2001 writing and 2001 and 2005 math did liberal arts colleges significantly outperform community colleges. In relation to within-institution type trends, research universities were the only institution type to show increasing trends in reading, writing, and math and showed the most increase in math. An interesting finding is that all four types of institutions improved on critical-thinking skills, with research universities showing the largest improvement ($d = 0.36$) from 2001 to 2010, followed by community colleges ($d = 0.19$), comprehensive universities ($d = 0.15$), and liberal arts colleges ($d = 0.07$).

Because of the finding that community colleges outperformed liberal arts colleges in 2010 (Figure 1), we attempted to further understand the performance difference by conditioning the institutional comparison on total score by number of credit hours in 2010. Figure 3 shows that while community college students started at a lower performance level than liberal arts students, they caught up and even exceeded liberal arts students in two of the credit hour categories ($p < .001$, $d = 0.61$ for 30–60 hours; $p < .001$, $d = 0.21$ for the 61–90 hours). Students with greater than 90 hours did not perform significantly differently at the two types of institutions ($p = .06$). The same trend was found across the four subscale areas as well.

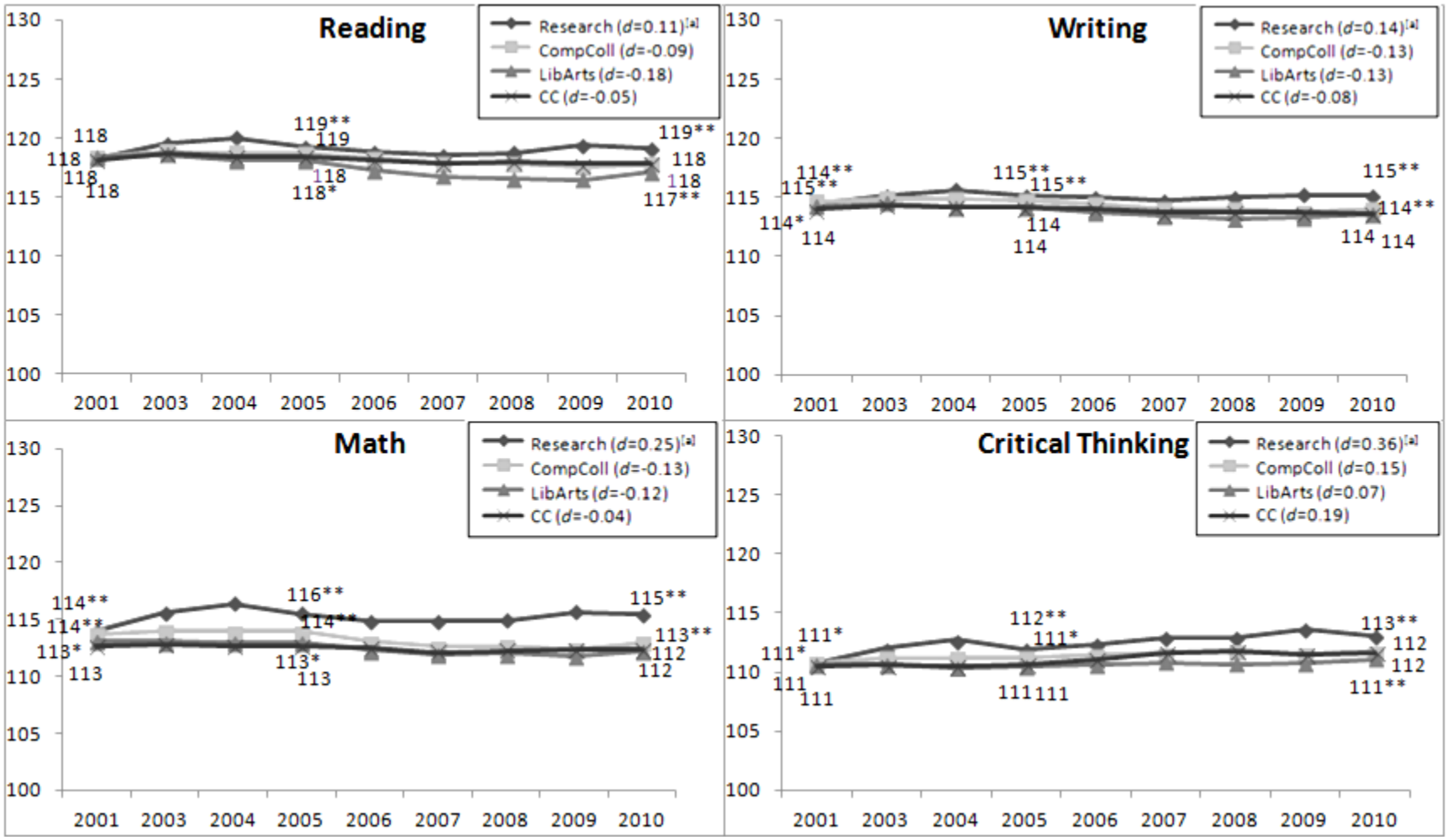

Figure 2. **Institutional performance differences on four subscales controlling for credit hours. CompColl = comprehensive college; CC = community college; LibArts = liberal arts. For four of eight research institutions and 10 of 13 CCs, data were not available in 2001, so 2002 data were used as a substitution. [a]Effect size calculated between 2001 and 2010 within the same type of institution. *$p < .05$. **$p < .001$ between CC and institution of interest in specified year.**

We also attempted to further understand the between-institution-type differences by examining the average ability of incoming students at research universities, comprehensive colleges, and liberal arts colleges over the past 10 years. We looked at the percentage of students admitted, *SAT*® and ACT scores, and high school GPA between 2001 to 2010 for these three types of institutions (Table 2). Such data were not available for community colleges because the community colleges used in this study were all open admission. The percent of students admitted across the three types of institutions decreased over the past 10 years, which was due to the larger number of applicants. At research universities, the average SAT, ACT, and high school GPA of incoming students has remained stable over the past 10 years. For comprehensive colleges, the average SAT and ACT scores remained stable, but schools became more selective with regards to high school GPA. Liberal arts colleges showed inconsistent evidence of ability change for incoming students over the past 10 years. At liberal arts colleges, SAT and ACT score ranges narrowed, with the upper bound being slightly lower but the lower bound higher; however, liberal arts colleges became more selective about the high school GPA of incoming students, with the percentage of higher GPA students increasing and the percentage of lower GPA students decreasing.

Table 2

Ability of Incoming Students Over 10 Years

	Research universities		Comprehensive colleges		Liberal arts colleges	
	2001[a]	2010[b]	2001	2010	2001	2010
% admitted	70	64	79	70	76	73
SAT (Verbal + Math)	986–1205	989–1204	895–1119	898–1115	838–1109	855–1070
ACT	21–26	21–26	18–24	19–24	17–24	18–23
% HS GPA ≥ 3.0	75	73	51	65	52	64
% HS GPA 2.0–2.9	24	26	44	33	46	35

Note. HS = high school; GPA = grade point average.

[a]2001 data from the College Board (2001). [b]2010 data from the College Board (2010).

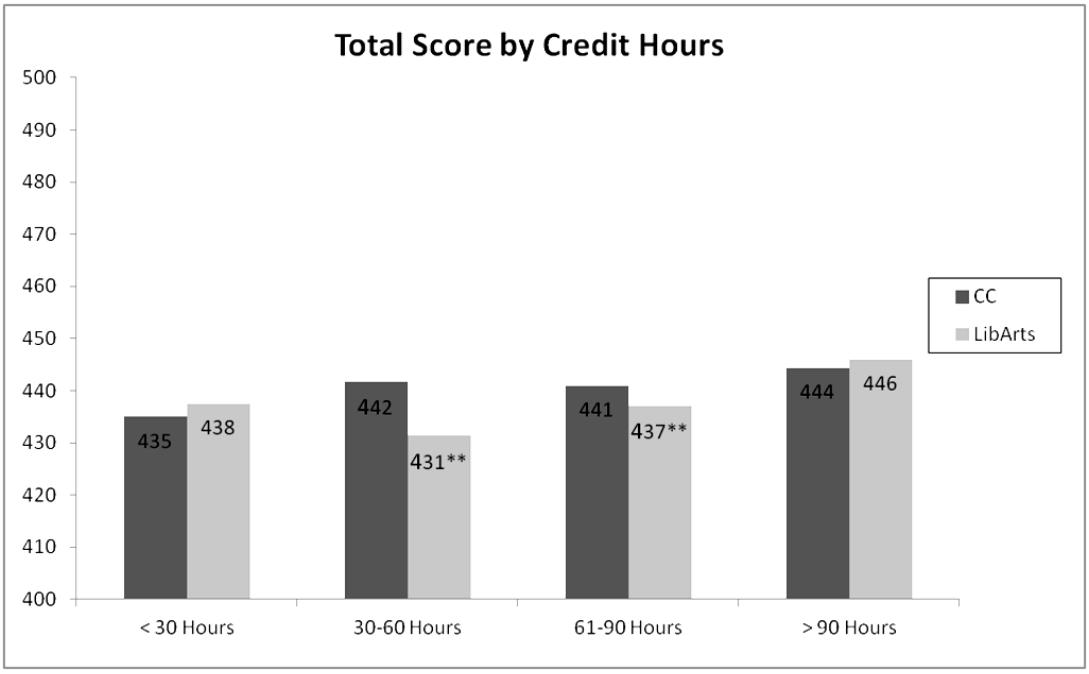

Figure 3. **Credit hours by total score for liberal arts and community colleges. CC = community college; LibArts = liberal arts. **LibArts significantly lower ($p < .001$) than CC.**

Trends and Gaps

Note that all subsequent results only apply to community colleges, as community colleges are the focus of this study.

Changes in the gender gap. Males and females did not perform significantly different in 2001 ($d = -0.01$) and 2005 ($d = 0.01$; Figure 4), but in 2010, male performance increased, resulting in a small gender gap ($p < .001$, $d = 0.12$). Males significantly improved on the total score over the past 10 years, but the effect size was small ($d = 0.09$). Male and female performance trends remained relatively stable in all subscale areas except that both males and females significantly improved on critical thinking ($d = 0.26$ for males and $d = 0.16$ for females; Figure 5). In reading, there was a female advantage in 2001 ($p = .001$, $d = -0.11$) and 2005 ($p < .001$, $d = -0.13$), but not in 2010 ($p = .17$). In writing, women significantly outperformed males across the 10 years. The gender gap was most prominent in mathematics, with a substantial and significant male advantage ($d = 0.33$ in both 2001 and 2005; $d = 0.48$ in 2010). Females' underperformance in mathematics likely contributed to the achievement gap on total score as well (see Figure 4).

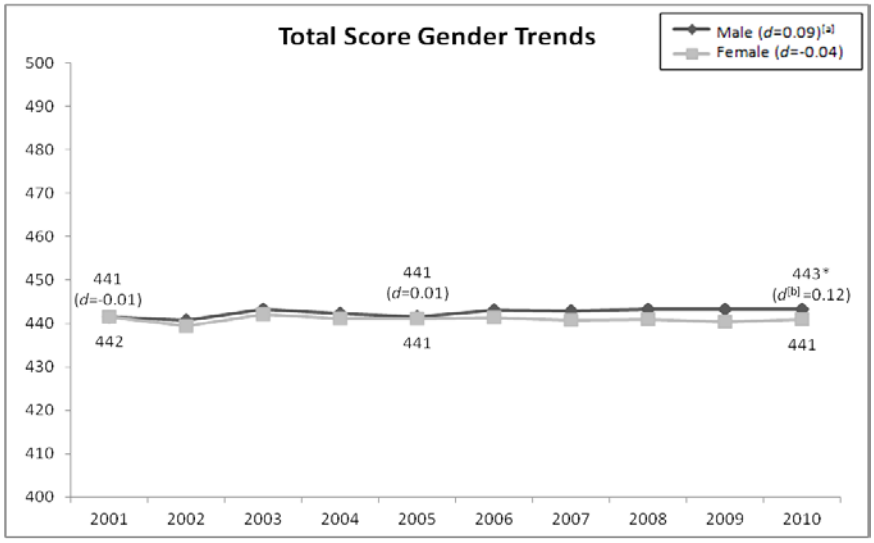

Figure 4. **EPP scores for 2001–2010 by gender. [a]Effect size between 2001 and 2010 within each gender group. [b]Effect size of performance between males and females in 2010. *p < .001 between males and females in specified year.**

Narrowing gap by language status. Our initial analyses comparing ESL and non-ESL performance over the past 10 years indicated a complete closing of the gap on total score and all subscales. To further understand these results, we completed a cross-tabulation of language and ethnicity and found that White ESLs made up the majority of the ESL population (51% in 2001 and 79% in 2010). As White ESLs did not represent the underrepresented ESL population typically studied, analyses were redone without the White ESL students. For a further explanation and description about the group of White ESLs, see Lakin et al. (2012). Examining non-White ESL students, results indicated a very large gap between non-ESLs on total score in 2001 (p < .001, d = 1.05), with the gap significantly narrowing in 2010 (p = .14, d = -0.46; Figure 6). The performance of non-ESLs remained stable over the 10-year period, but ESLs significantly and substantially improved (d = 0.48).

On the four subscales, the same trends were found, with ESLs significantly narrowing the gap by 2010 (Figure 7). The largest initial gap occurred in writing (d = -1.21) and the smallest initial gap occurred in mathematics (d = -0.53). Additionally, ESLs did not perform significantly different from non-ESLs in both 2005 (p = .78) and 2010 (p = .91) on math, although effect size was still small to moderate (d = -0.26 in 2005; d = -0.35 in 2010). Non-ESL performance remained relatively stable on all subscales, except for small progress (d = 0.18) on critical thinking over the 10-year period. ESLs made the largest progress on critical thinking (d = 0.65) and smallest progress on mathematics (d = 0.13).

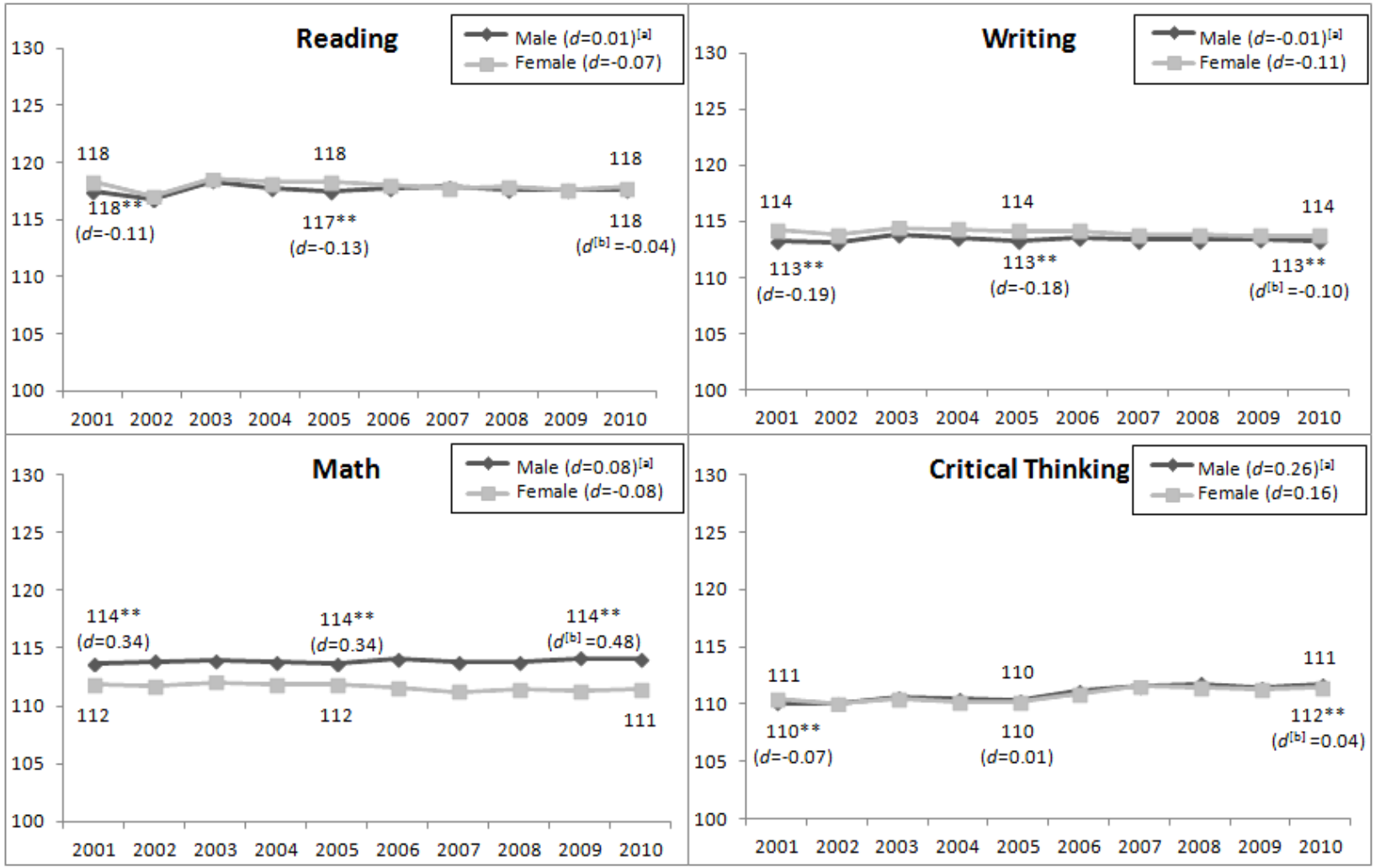

Figure 5. **EPP subscale scores for 2001–2010 by gender. [a]Effect size between 2001 and 2010 within each gender group. [b]Effect size of performance between males and females in 2010. ** $p \leq .001$ between males and females in specified year.**

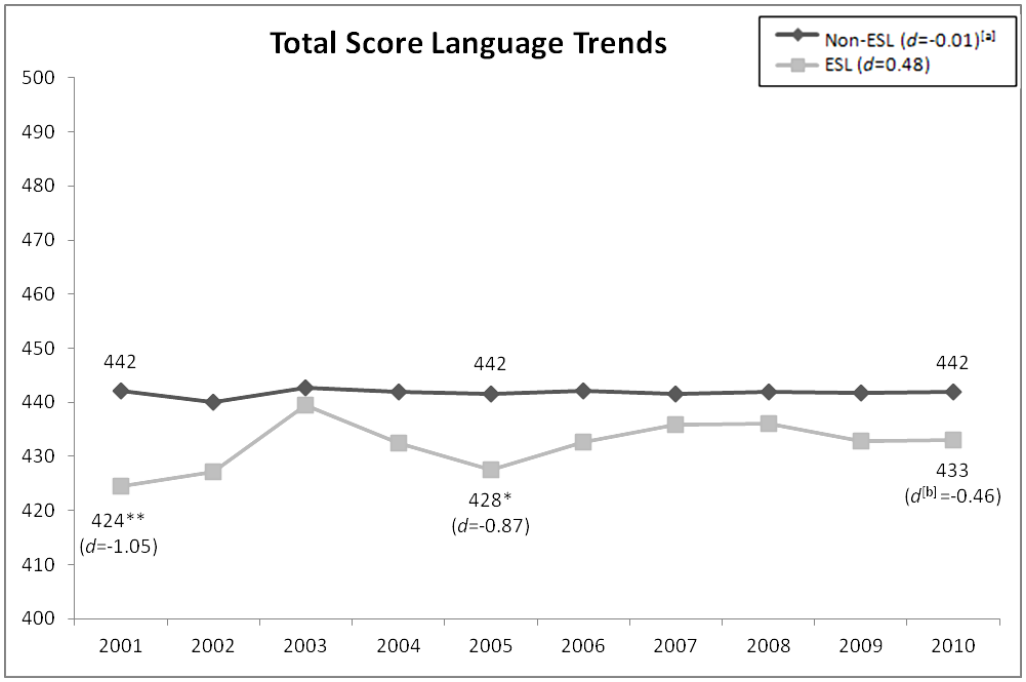

Figure 6. **Total EPP scores for 2001–2010 by language group. ESL = English as a second language. [a]Effect size between 2001 and 2010 within each language group. [b]Effect size between ESL and non-ESL. *p < .05. **p < .001 between ESLs and non-ESLs in specified year.**

Changes in the racial/ethnic gap. Using White students as the reference group, African American students performed the lowest on the total score (Figure 8) and on all four subscales (Figure 9). On total score, both White and African American student performance remained relatively stable, whereas Asian student performance decreased over the 10 years (d = -0.22) and Hispanic/Latino student performance increased (d = 0.27). In 2010, the gap between African American and White students was fairly large (d = -0.78), and the gap between Asian and White, and Hispanic/Latino and White students was moderate (d = -0.41 and d = -0.46, respectively).

White and African American students' performance remained relatively stable over the 10 years on reading and writing (Figure 9). However, White students and African American students both showed small increases in performance on critical thinking (d = 0.18 and d = 0.21, respectively). African American students also declined in performance on mathematics (d = -0.23). Asian student performance declined in reading (d = -0.13), mathematics (d = -0.16), and critical thinking (d = -0.28), but remained stable in writing. Hispanic/Latino students increased in all four subscales, with the largest improvement in critical thinking (d = 0.36).

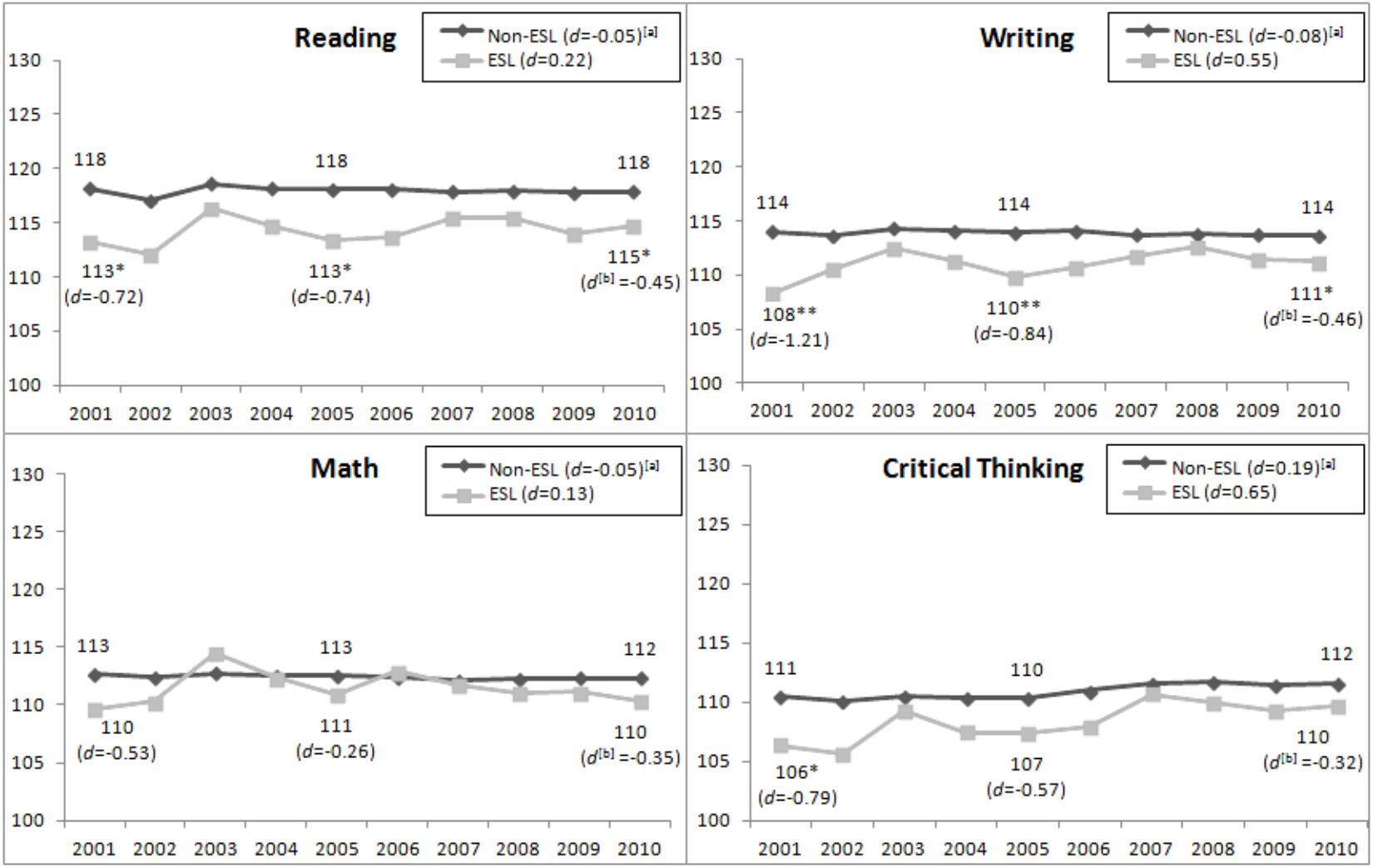

Figure 7. **EPP subscale scores for 2001–2010 by language group. ESL = English as a Second Language.[a] Effect size between 2001 and 2010 within each language group.[b]Effect size between ESL and non-ESL in 2010. *$p < .05$. ** $p < .001$ between ESLs and non-ESLs in specified year.**

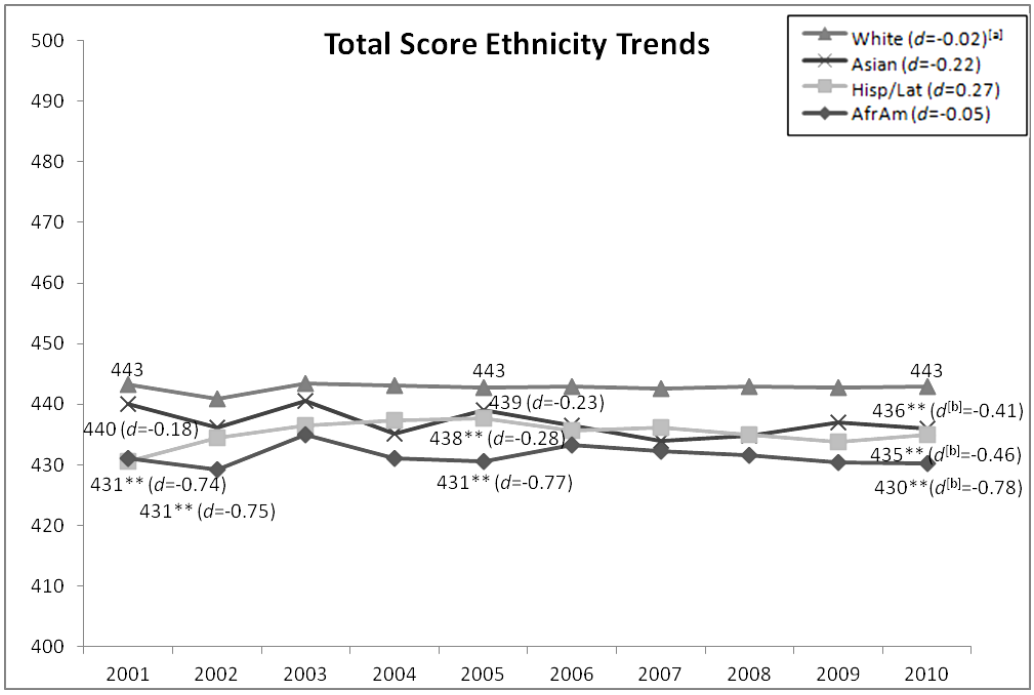

***Figure 8*. Total EPP scores for 2001–2010 by ethnicity. Hisp/Lat = Hispanic/Latino; AfrAm = African American. [a]Effect size between 2001 and 2010 within each ethnic group. [b]Effect size of performance between White students and specified ethnic group in 2010. **$p < .001$ in comparison between White students and specified ethnic group in specified year.**

In relation to the racial/ethnic performance gap on the four subscales, the largest gap between African American and White students occurred in math ($p < .001$, $d = -0.79$). The gap between White and Hispanic/Latino students narrowed in all four subscales due to the increase in performance of the latter student group. The largest gap between Hispanic/Latino and White students for 2010 was in math ($d = -0.39$). In both reading and writing, Asian students performed significantly lower than White students. In math, Asian students outperformed White students in 2005 ($p = .02$, $d = 0.24$), but in 2001 and 2010 there was no significant difference between these two groups. In critical thinking, Asian students and White students performed similarly in 2001 ($p = .46$), with Asian students declining in performance, resulting in a moderate gap in 2010 ($p < .001$, $d = -0.39$).

Factors Predicting Performance

Table 3 shows the regression coefficients for the total score and four subscales. GPA was the strongest positive predictor of the total score, reading, writing, and critical thinking. Across all domains, except math, African American student status was the second largest predictor of performance, in a negative way. Transfer students were more likely to outperform nontransfer students on the total score and all subscale areas except critical thinking. Students working longer hours tended to have higher scores than students working less, on all domains except critical thinking. ESL status negatively predicted total, reading, and writing scores. Female status negatively predicted scores in all domains except reading. Note that gender was the strongest predictor ($\eta^2 = .05$) for mathematics, followed by GPA ($\eta^2 = .04$).

Concurrent Validity of the EPP

We expect students' scores on the EPP to increase with GPA and the number of credits earned. As expected, students with higher GPAs performed higher on the EPP (Figures 10 and 11). The consistent finding provides evidence for the concurrent validity of the EPP

Figure 12 shows the relationship between credit hours and the EPP total score. Students with 30 credit hours or fewer performed the lowest, and students with greater than 90 credit hours scored the highest, which was expected. Interestingly, students with credit hours ranging from 30–60 hours and 61–90 hours scored midrange, but not significantly different from each other. This same trend was found on all subscales, except writing, where students with greater than 90 credit hours performed statistically similar to those in both the 30–60 and 61–90 credit hour ranges (Figure 13).

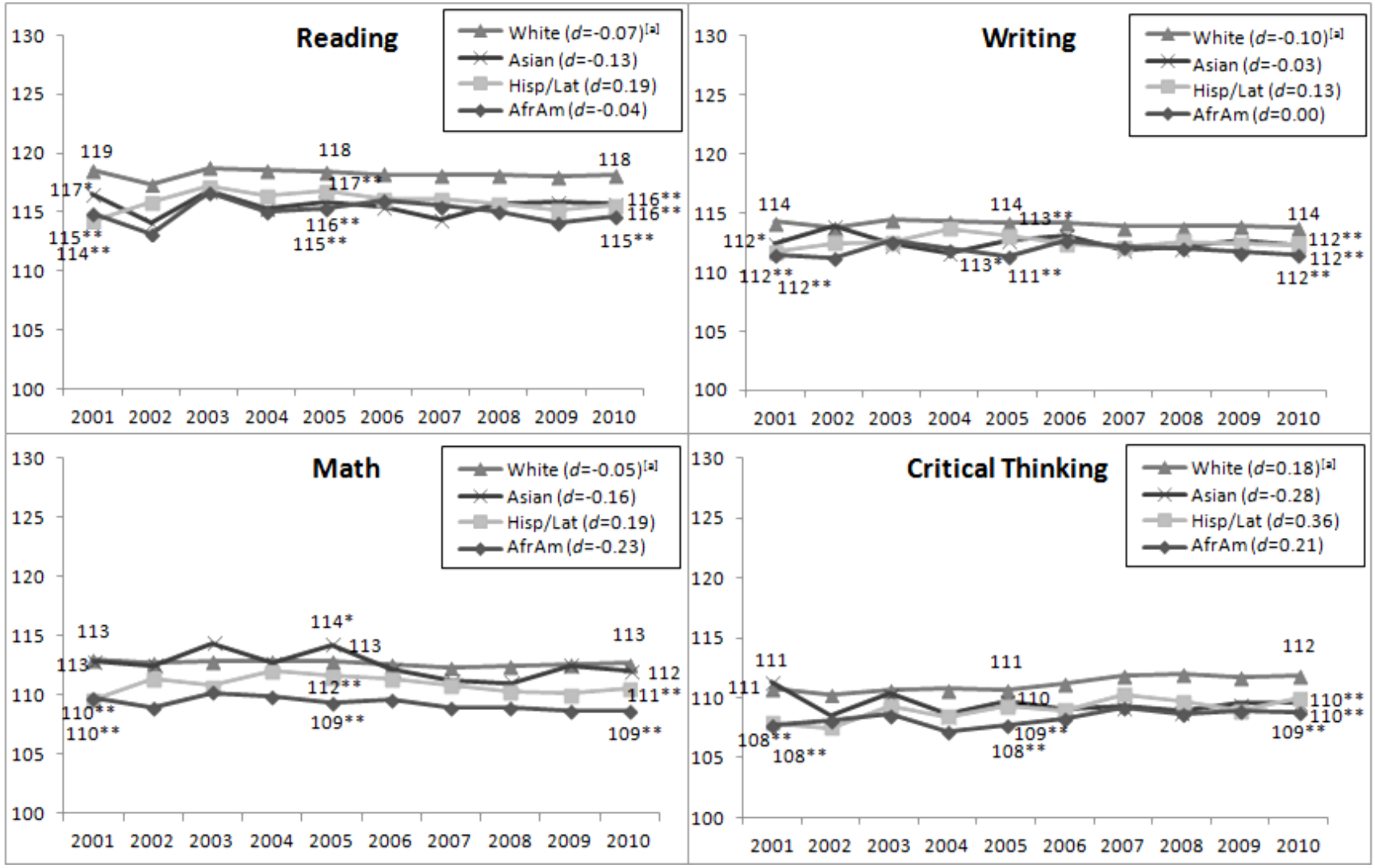

Figure 9. **EPP subscale scores for 2001–2010 by ethnicity. Hisp/Lat = Hispanic/Latino; AfrAm = African American. [a]Effect size between 2001 and 2010 within each ethnic group. *$p < .05$. **$p < .001$ between White students and ethnic group of interest in specified year.**

Table 3

Community College Regression Results

	Total			Reading			Writing			Math			Critical thinking		
	B	β	η^2	B	β	η^2	B	β	η^2	B	β	η^2	B	β	η^2
Intercept	430.83		.94	112.70		.89	111.39		.94	112.36		.92	107.42		.89
GPA	4.90	0.26	.07	1.49	0.21	.04	1.00	0.20	.04	1.18	0.20	.04	1.31	0.21	.04
CredHours	1.15	0.04	.00	0.36	0.04	.00	0.20	0.03	.00	0.28	0.03	.00	0.31	0.03	.00
AfrAmer	-7.91	-0.11	.01	-2.12	-0.08	.01	-1.39	-0.07	.01	-2.44	-0.11	.01	-2.15	-0.09	.01
HispLat	-5.71	-0.06	.00	-1.74	-0.05	.00	-1.26	-0.05	.00	-1.40	-0.04	.00	-1.54	-0.04	.00
Asian	-5.34	-0.03	.00	-2.05	-0.03	.00	-1.47	-0.03	.00				-1.82	-0.03	.00
ESL	-1.59	-0.02	.00	-0.71	-0.02	.00	-0.60	-0.03	.00						
Female	-2.72	-0.07	.01				0.36	0.04	.00	-2.53	-0.22	.05	-0.45	-0.04	.00
Age	-0.06	-0.03	.00	0.03	0.04	.00	-0.03	-0.05	.00	-0.07	-0.12	.01	0.01	0.02	.00
NoTrans	-2.94	-0.08	.01	-0.78	-0.06	.00	-0.45	-0.04	.00	-0.90	-0.08	.01	-0.81	-0.06	.00
HoursWork	0.36	0.02	.00	0.14	0.02	.00	0.09	0.02	.00	0.17	0.03	.00			
R^a	0.32			0.27			0.24			0.35			0.26		
R^{2a}	0.11			0.07			0.06			0.12			0.07		

Note. GPA = grade point average; CredHours = credit hours; AfrAmer = African American; HispLat = Hispanic/Latino; NoTrans = not a transfer; HoursWorked = hours worked per week; ESL = English as a second language. Hours-worked-per-week categories: (a) None, (b) 1–15 hours, (c) 16–30 hours, (d) > 30 hours; GPA categories: (a) < 2.49, (b) 2.50–2.99, (c) 3.00–3.49, (d) 3.50–4.00; credit hour categories: (a) < 30 hours, (b) 30–60 hours, (c) 61–90 hours, (d) > 90 hours.

[a]Nonsignficant coefficients were removed to calculate R and R^2.

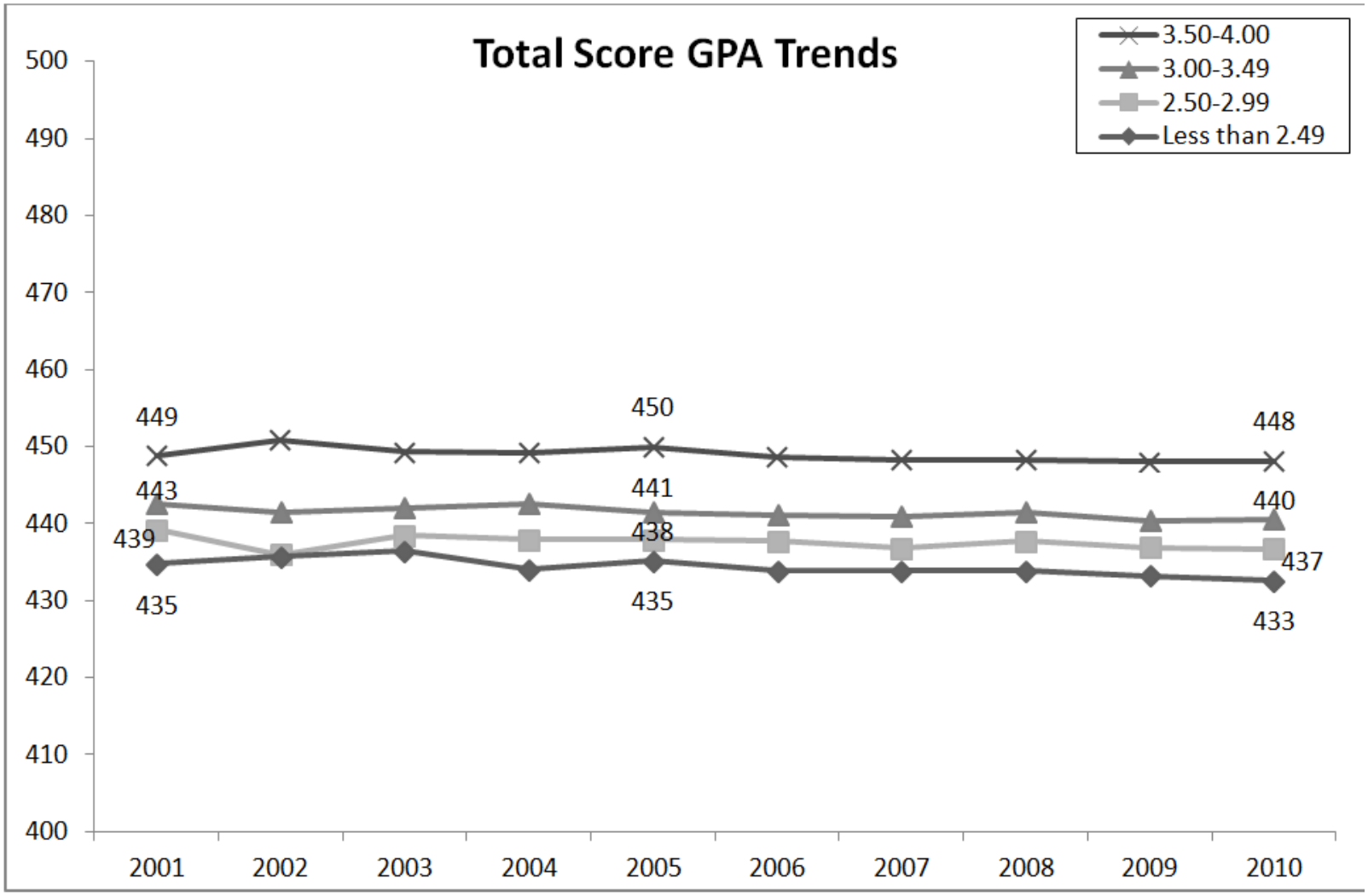

Figure 10. **Total EPP scores for 2001–2010 by GPA. GPA = grade point average.**

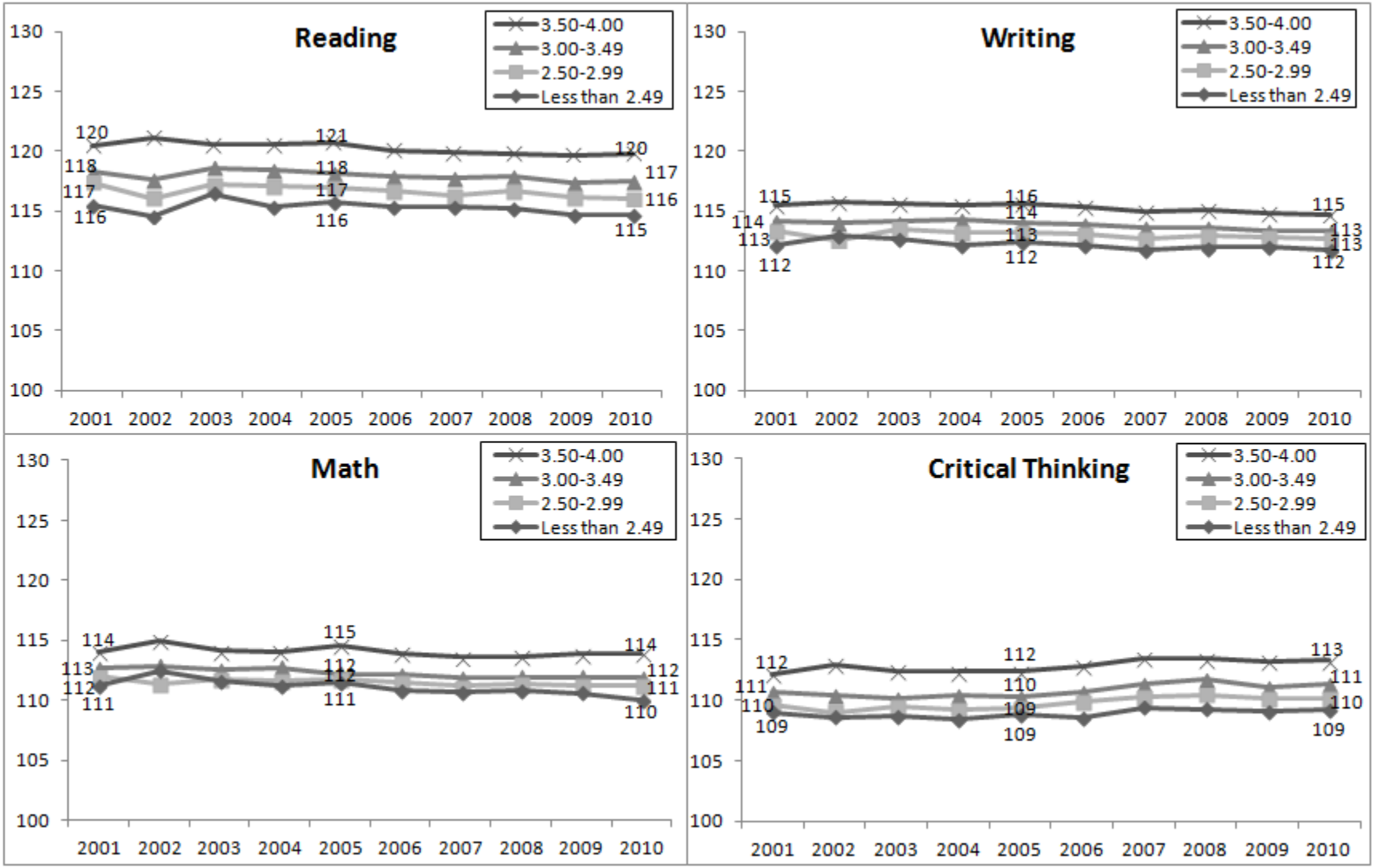

Figure 11. **EPP subscale scores for 2001–2010 by GPA. GPA = grade point average.**

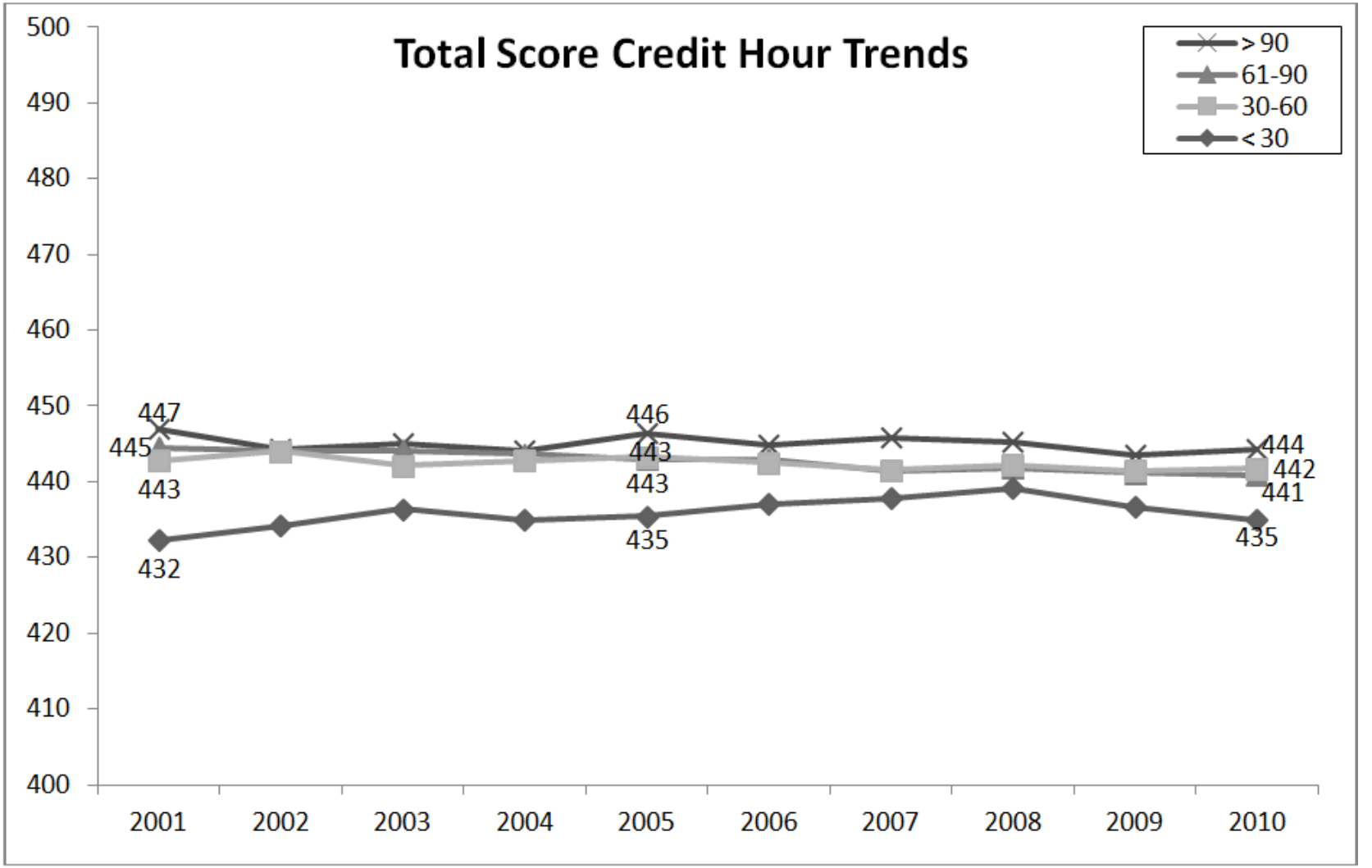

Figure 12. **Total EPP scores for 2001–2010 by credit hours.**

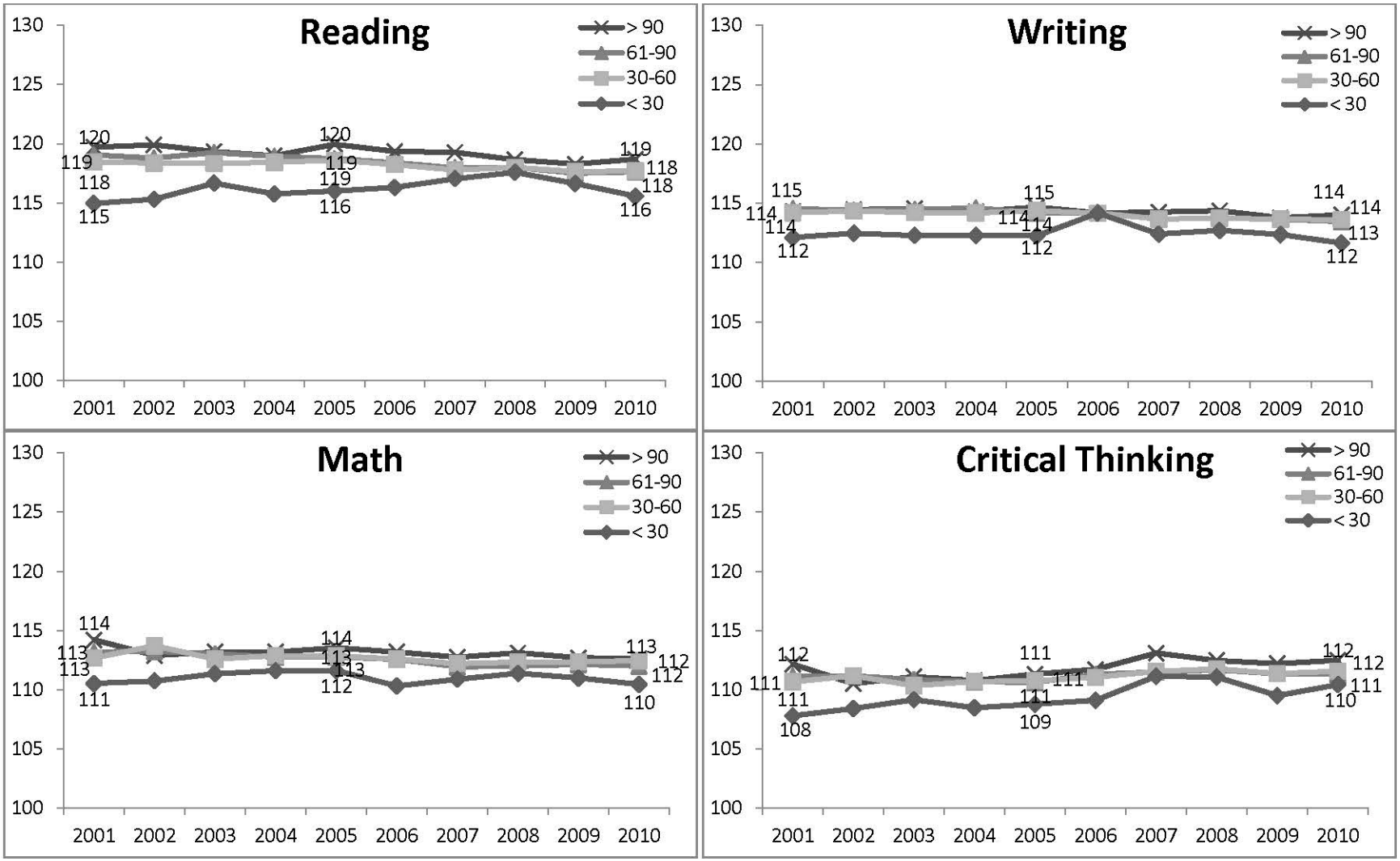

Figure 13. **EPP subscale scores for 2001–2010 by credit hours.**

The above findings suggest that GPA is a better indicator of content knowledge than the number of credit hours, as GPA represents how well students have mastered content knowledge, while the number of credit hours only provides information on whether students complete courses or not. The criticism that the credit hour is an indicator of time, not of learning, was also echoed in the report by Laitinen (2012), *Cracking the Credit Hour*. The author wrote that the credit hour variable "…doesn't actually represent learning in any kind of consistently meaningful or discernible way" (p. 8). The findings from our study show that there was a relationship between learning indicated by the scores on the EPP and an initial number of credit hours (i.e., < 30). However, the relationship between learning and credit hours became blurred once students went beyond the 30-credit-hour threshold, supporting Laitinen's argument.

Discussion and Implications

Ensuring the quality of community college education is of critical importance to achieving the goal set by President Obama that by 2020 America should become a global leader in the concentration of citizens with postsecondary degrees. Through analyses of 10-year data on a learning outcomes assessment, we examined the trends of performance at community colleges, including comparisons to other types of institutions. In the following sections, we discuss the results comparing community college performance to other institution types and the consistent improvement in critical thinking. Specific to community colleges, we discuss the mathematics performance gap between males and females, the overall performance gap disfavoring ethnic minority and ESL students, and the declining trend in Asian student performance. Throughout each of these sections we discuss the implications of these findings for community colleges.

Comparison of Community Colleges to Other Types of Institutions

Research universities had a predominant advantage when compared to institutions of other types, and their advantage became more obvious from 2001 to 2010. Two reasons may explain research universities' superior performance: (a) research universities have done an outstanding job educating their students, and/or (b) research universities have had academically stronger students during the 10-year period. Unfortunately, as acknowledged in the limitations section below, we will not be able to completely separate these two, as we do not have information on the incoming ability of individual students. However, we analyzed the average academic profile for incoming students in 2001 and 2010 (Table 2). While the percentage of

admitted students did decrease (probably due to a large number of applicants), the academic preparation of the students in terms of SAT or ACT scores and high school GPA did not consistently increase, which suggests no clear evidence that research universities' outstanding performance and growth were due to academically stronger students.

The comparison between community colleges and liberal arts colleges also showed some interesting results. While significantly outperformed by liberal arts colleges in 2001, community colleges caught up in 2005, and even outperformed liberal arts colleges in 2010. Community college students' performance had been stable over the 10 years, but liberal arts showed a slight decrease (d = -0.09) in performance. One possible reason that may help explain the relative advantage of community colleges over liberal arts colleges in 2010 was the enrollment surge taken place at community colleges between 2008 and 2009 due to the U.S. economic recession. According to an AACC report (Mullin & Phillippe, 2009), the number of students enrolled at community colleges in 2009 increased by 11% from 2008 and by 24% from 2007. Students enrolled at community colleges to receive further workforce training and to save on costs (Mullin & Phillippe, 2009). It could be that because of the economic downturn, students who may have typically attended liberal arts colleges chose to go to community colleges, and therefore the incoming ability of liberal arts students suffered an overall decline. Figure 14 shows that while the enrollment rates of 18–24-year-olds attending 4-year institutions declined from 29.6% to 28.2% from 2009 to 2010, such rates increased from 11.7% to 12.9% for community colleges (U.S. Department of Education, National Center for Education Statistics, 2011).

Even starting before the recession, there has been a reverse trend of transfer of students transferring from 4-year institutions to community colleges. For example, 14.4% of the students who started at a 4-year college in the fall of 2005 subsequently transferred to a 2-year college (National Student Clearinghouse Research Center, 2012). While no individual data were available, we looked at the institution-level data of incoming students at the liberal arts colleges included in our analysis. Table 2 shows that the range of SAT and ACT scores narrowed from 2001 to 2010, with the lower bound increasing and the upper bound decreasing. The percentage of students with higher GPA increased and the percentage with lower GPA decreased. Overall, there is no consistent evidence suggesting that liberal arts colleges had lower incoming-ability students in 2010 than in 2001.

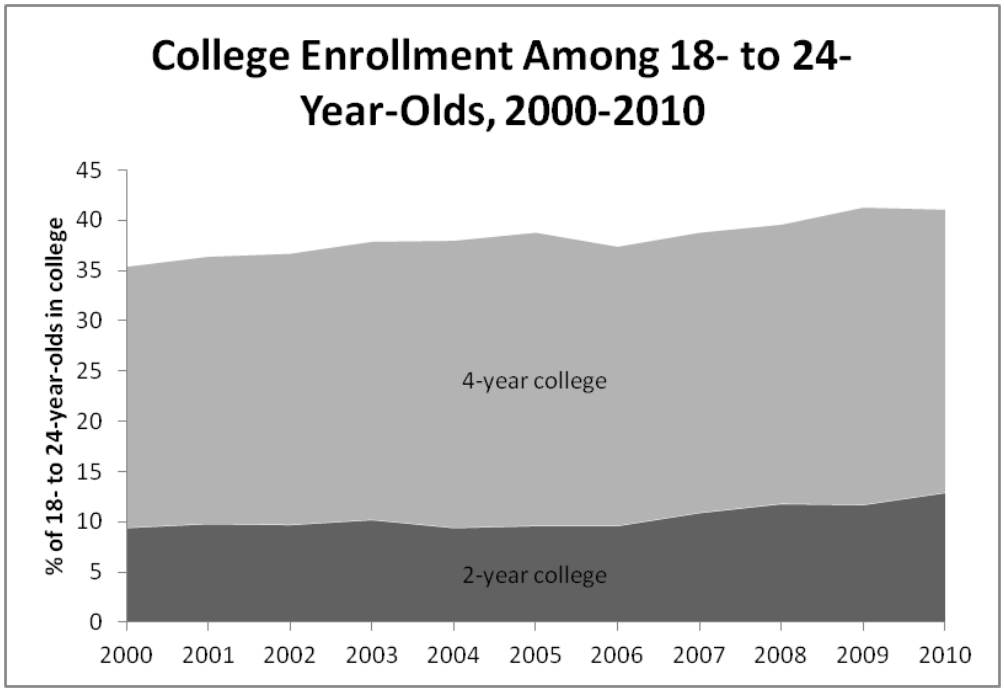

Figure 14. **College enrollment by 2- and 4-year institutions. Adapted from *Total Fall Enrollment in Degree-Granting Institutions, by Control and Level of Institution: 1963 Through 2010,* by U.S. Department of Education, National Center for Education Statistics, 2012.**

The notion that higher costing 4-year institutions may be able to provide more rigorous college education than community colleges is challenged by the findings in this study. While the tuition costs of 4-year public institutions more than doubled, from $6,320 to $14,870 from 1980 to 2010 in constant dollars, the increase in tuition costs of community colleges remained modest from $5,023 to $7,629 (Snyder & Dillow, 2011, Table 245). The average tuition costs were about $6,000 for the community colleges and $22,000 for the liberal arts colleges included in this study. Considering the financial input and learning outcomes, community colleges are demonstrated to be a viable solution for many students pursuing higher education. A new study also found that students who earn an associate's degree at a community college see similar increases in earnings to those of students who go to a private institution. Given the significantly higher cost of a for-profit education as compared to a community college education, students may find that community colleges are better investments for obtaining a degree (Cellini & Chaudhary, 2012).

Consistent Improvement in Critical Thinking

The finding that students made consistent improvement in critical thinking across types of institutions over the last 10 years was also confirmed in the Wabash national study (Blaich & Wise, 2011). The Wabash study was created by researchers from multiple institutions and organizations to develop a longitudinal study that used measures of students' preparation before college entrance, experiences in college, and a range of learning outcomes. While students did not grow on some of the outcomes, they gained 0.44 SD units on the critical thinking measure developed by ACT. Both being a multiple-choice tests, the ACT critical thinking test and the EPP critical thinking test used in this study are correlated at .75 (Klein et al., 2009). The Blaich and Wise (2011) study, however, did not discuss the reasons responsible for the increase in students' critical thinking ability.

We speculate that students' critical-thinking skills benefit from the development of information technology over the last 10 years as students become more critical consumers of information from all kinds of sources and on all types of technological platforms. Research also identified factors that may contribute to students' critical-thinking and problem-solving skills, such as course content and curricula, pedagogical strategies, institutions' hiring practices and tenure requirements, and accountability systems (Saavedra & Saavedra, 2011). Another possible reason could be that among the four skill areas measured by the EPP, critical thinking showed the lowest scale score from 2001 to 2010 (Figure 2), which leaves room for students to improve.

Students' self-reported engagement also supported the improvement in critical thinking. CCSSE raised some questions related to critical-thinking skills under the academic challenge benchmark on topics such as analyzing, synthesizing, making judgments, and applying theories to ideas, theories, or concepts (for specific questions, see CCSSE, 2011). Students answered those questions on a four-point scale from *very little* to *very much*. Examining those specific questions from 2005 (Santa Fe Community College, 2005) to 2011 (CCSSE, 2011), we found that the percent of students answering *quite a bit* or *very much* to these critical-thinking-related questions has increased. Specifically, the percentage of students who answered *quite a bit* or *very much* increased anywhere from 4% to 6%, depending on the question associated with critical-thinking skills. These results also give insight into the improvement of student critical-thinking skills over the past 10 years.

Gender Gap in Mathematics Performance

The female underperformance in mathematics at community colleges revealed in this study is consistent with findings from the Grade 12 National Assessment for Educational Progress (NAEP) in Mathematics. Results on Grade 12 NAEP Math revealed a consistent 3-point (score scale 100–300) gender gap with males outperforming females from 2005 to 2009 (U.S. Department of Education, National Center for Education Statistics, 2010). Female underperformance also resonates with the general underrepresentation of women in STEM (science, technology, engineering, and mathematics) fields at community colleges and in the workforce (Azari, 2004; Lester, 2010). From 1997 to 2007, the percentage of baccalaureate degrees (associate's degrees and occupational certificates) awarded to females in mathematics and science decreased from 53.1% to 49.7%, despite the increase in the proportion of female students in college (Horn & Li, 2010). It is crucial to understand the challenges and barriers females experience in mathematics at community colleges, and to develop strategies to help female students overcome those barriers. Prior research has identified an array of social-psychological, cultural, and institutional factors that may deter women from being successful in the STEM fields at community colleges, including limited interest in STEM disciplines; low confidence and self-efficacy levels in STEM fields; inaccurate perceptions of the usefulness of mathematics and science; lack of support, or even bias, experienced in high school mathematics and science courses; and lower levels of academic preparation in STEM fields (Lent et al., 2001; Lester, 2010; Linn & Hyde, 1989; Liu & Wilson, 2009; Starobin & Laanan, 2005). Previous studies have also revealed that faculty in STEM courses pay less attention to and have lower expectations for female students as compared to their male counterparts (Warrington & Younger, 2000; Zitteman & Sadker, 2002).

As females comprise 57% of the community college population (AACC, 2012a), achieving gender equality in mathematics at community colleges is essential. Going forward, community colleges should focus on providing social and academic support to females, because encouragement from college instructors, counselors, and female role models can significantly influence females' persistence in the STEM fields (Fennema & Peterson, 1985; Schaefers, Epperson, & Nauta, 1997). Community colleges should also create programs to identify at-risk females in mathematics, provide more information to female students about the career prospects for STEM-related fields, and work with local high schools to increase female student college

readiness. Faculty could redesign curricula and instructional methods to accommodate female students' learning style, as research has shown that females benefit from collaboration, teamwork, and real-world applications when learning mathematics and science (Osborne, Miller, & Farabee-Siers, 2008). Community colleges have great potential to facilitate female student transfer to STEM programs at 4-year institutions and to prepare them for high-paying jobs in STEM careers, as the earnings of females in STEM-related jobs are 33% higher than those of females in non-STEM-related jobs (Costello, 2012). The implication for policymakers is that there is a compelling need to strengthen federal investment in community colleges in support of women in the STEM fields. Many female students at community colleges need significant financial support and/or child care services to stay focused and succeed (Costello, 2012).

Performance Gap Disfavoring Ethnic and Language Minority Students

Findings from this study confirmed the importance of attending to the performance of ethnic and language minority students, as these students tend to be concentrated at community colleges (Aud et al., 2010; Leinbach & Bailey, 2006). For example, the proportion of Hispanic high school graduates who attended college increased from 39% to 44% from 2009 to 2010, and 46% of the Hispanic college students attended a community college while only 27% of the White college students did so (Fry, 2011). Although the enrollment numbers surged for minority students, the performance gap remains significant. Hispanic and African American students at community colleges are more likely to take remedial courses than are their White student peers, have a lower transfer rate to 4-year institutions, and have a lower 6-year completion rate (Alexander, Garcia, Gonzalez, Grimes, & O'Brien, 2007; Bailey et al., 2005; Bailey et al., 2010). The low performance of the African American students in the present study (i.e., 0.78 SDs lower than White students) merits particular attention. Prior research has shown that compared to their peers, African American students are less likely to progress through the sequences of remedial courses, and thus they demonstrate disproportionately low performance on a range of outcomes, such as cumulative GPA, retention, and degree attainment at community colleges (Bailey et al., 2010; Bush & Bush, 2010).

Racial/ethnic gaps in performance are not new to the educational literature. On Grade 12 NAEP Reading, the African American-White gap was 27 points in 2009 and the Hispanic-White gap was 22 points. From 2005 to 2009 these gaps remained stable. Similarly, on Grade 12 NAEP Math, the African American-White gap was 30 points in 2009, and the Hispanic-White gap was

23 points. Although both African American and Hispanic students made significant score gains from 2005 to 2009, White students also made significant improvements, thus resulting in a stable gap (U.S. Department of Education, National Center for Education Statistics, 2010). Since gaps in performance were found in Grade 12, it is not surprising that gaps remained in higher education, especially at community colleges where the population of minority students exceeds White students.

Language minority students face dual challenges at community colleges; as they struggle to advance along their academic path, they need to simultaneously increase their English language proficiency. Deficiencies in language proficiency have been shown to prevent students from becoming efficient learners of content knowledge (August & Pease-Alvarez, 1996). Realizing the urgent need to help ESL students, many community colleges have created programs that provide special services to this group of students, which has resulted in the creation of successful models for other colleges to adopt. For example, Chisman and Crandall (2007) evaluated a number of community colleges that developed programs to help ESL learners succeed and identified common effective strategies, such as integrating English language learning with content learning, extending learning outside the classroom and adapting instructional methods and curricula to diverse student needs. Many community college programs also consider students' work schedules and family responsibilities in order to tailor to the diverse population they serve (Center for Applied Linguistics, 2010).

Declining Asian Student Performance

An unexpected finding from the analyses was the declining performance of Asian students at community colleges. Asian students have been described as model minorities and high-achieving students at the most selective institutions (Hagedorn, 2004; Suzuki, 2002; Teranishi, 2002). However, in our analyses, Asian students declined on reading, math, and critical thinking over the last 10 years despite the fact that all other ethnic groups made progress on critical thinking (Figure 9). One possible explanation for the finding in this study is that there have been an increasing number of first-generation Asian immigrants attending community college over the last 10 years. According to a most recent report released by the Pew Research Center (2012), Asians have surpassed Hispanic/Latinos in becoming the largest group of immigrants in 2010. In 2000, about 20% of the immigrants were Asian and 60% were Hispanic/Latino. By 2010, about 36% were Asian and 31% were Hispanic/Latino (Pew Research

Center, 2012). Compared to the second-generation Asian immigrants, the first-generation immigrants face great financial and linguistic obstacles. While 92% and 55% of second-generation Asian immigrants have a high-school diploma and attend 4-year institutions, respectively, such percentages are significantly lower at 75% and 38%, respectively, for the first-generation Asian immigrants (U.S. Department of Education, National Center for Education Statistics, 2012). The increasing proportion of first-generation Asian immigrants may have contributed to the overall decline in the performance of Asian students, as shown in our analysis.

In addition, as Asian students are not a homogeneous group, there could be considerably large variations among students from different parts of Asia (e.g., East, South). For example, Korean Asians were found to have higher GPAs, while Filipino Asians were found to have lower GPAs (Chu, 1991, 1992). County of origin, parental education, and family expectations also have significant impacts on Asian students' academic aspirations and achievements (Wang, Chang, & Lew, 2009). During the 10-year period, the Asian population in U.S. higher education has gone through tremendous changes. In future research, Asian students should be disaggregated for a closer examination of the differences among Asian subgroups. Findings from this study suggest that Asians American students should not be ignored when we study underperforming minority groups in U.S. higher education, as there is emerging evidence that Asian students' performance has been declining. In sum, community college leaders should pay attention to Asian students' performance because the percentage of Asian students in community colleges will likely increase due to the overall increase in the Asian population in the United States.

Limitations

One limitation of this study is that a convenience sample was used for analyses. Students included in the analyses may not represent their institution, as they were likely volunteers to take the test, which is commonly the case when institutions recruit students to take low-stakes learning outcomes assessment (Liu, 2011a). The institutions included in this study may not also be representative of their respective institution type. For example, no large, urban-setting community colleges were included in our analyses. Having said that, based on the decent number of institutions and the large number of students included in our analyses, our findings are able to reveal some trends at community colleges over the last 10 years.

Another limitation of this study is the lack of information on individual students' entering ability. Our data did not include information on students' college admission scores or high school GPAs, which could have been used to determine if incoming students had been more capable during the 10 years analyzed. To alleviate the problem, we included number of credit hours as a control when analyzing the difference among the four types of institutions. In addition, we looked at the average academic profile of the incoming students during the last 10 years for the research, comprehensive, and liberal arts universities/colleges.

Conclusions

Community colleges play an increasingly important role in expanding access in U.S. higher education. Over the past several years, important initiatives such as the Lumina's Degree Qualifications Profile and the Association of American Colleges and Universities Valid Assessment of Learning in Undergraduate Education (VALUE) have developed rubrics that create a common framework for defining and measuring general competencies that students need to master for various degrees, including the associate's degree that community colleges tend to grant. However, progress in translating the knowledge and skills described in such frameworks to valid and reliable assessments has been limited (Ewell, 2013). Very little is known about the psychometric quality of the in-house assessments that some colleges use to measure learning; similarly, little is known about the degree to which these colleges use assessment practices that comply with standardized procedures (Nunley et al., 2011). The lack of continuity of data is another source of concern. In a recent survey conducted by the National Community College Council for Research and Planning, only 55% of the participating faculty indicated *agree* or *strongly agree* for the statement "My college has several years of student learning outcomes assessment data" (Nunley et al., 2011). We hope that as colleges advance their assessment agenda, greater attention will be paid to the quality and continuity of assessment so that endeavors to assess student learning outcomes produce meaningful and sustainable benefits for community colleges.

Through a 10-year analysis of 46,403 community college students' performance on the EPP, this study has produced a number of significant findings, including: (a) compared to community colleges, research universities demonstrated predominant advantages in terms of academic competency; however, students at community colleges significantly outperformed peers at liberal arts colleges; (b) community college students made significant improvements in

critical thinking over the last 10 years; (c) the gender performance gap tended to enlarge at community colleges, particularly in mathematics; (d) there was an overall performance gap disfavoring ethnic minority and ESL students at community colleges; (e) the performance difference between ESL and non-ESL students significantly narrowed at community colleges, mostly due to ESL students' increasing performance; (f) Asian students showed declining performance in multiple domains, including critical thinking; and (g) students' college GPA consistently predicts their scores on learning-outcomes assessments. These findings provide important information about students' current learning at community colleges, provide implications for community college administrators, faculty, researchers, and policymakers on issues related to performance and equity regarding gender and ethnic groups and trends, and point to the need for community colleges to utilize *quality* assessments to produce comparable results for the purposes of program evaluation and improvement.

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