ADVANCING COMMUNITY COLLEGE STUDENT ENGAGEMENT AND SUCCESS:
VALIDATION STUDY OF COMMUNITY COLLEGE SURVEY OF STUDENT
ENGAGEMENT (CCSSE)

by

Yi Wang

A dissertation submitted to the faculty of
The University of North Carolina at Charlotte
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in
Educational Research, Measurement, and Evaluation

Charlotte

2024

Approved by:

_____
Dr. Sandra L. Dika

_____
Dr. Kyle Cox

_____
Dr. Mark D'Amico

_____
Dr. E. Michael Bohlig

_____
Dr. Elizabeth Stearns

ABSTRACT

YI WANG. Advancing Community College Student Engagement and Success: Validation Study of Community College Survey of Student Engagement (CCSSE) (Under the direction of DR. SANDRA L. DIKA)

This three-article format dissertation presents a comprehensive examination of the 2017 Community College Survey of Student Engagement (CCSSE), focusing on its measurement properties across diverse community college student populations. Study 1 centered on the validity of the internal structure of CCSSE. Exploratory and confirmatory factor analyses showed evidence to support an eight-factor model of student engagement. This model encompasses dimensions such as personal development, interactions with faculty and peers, and institutional support. This study marks a methodological and theoretical shift, advocating for a multidimensional perspective on student engagement in community college. Study 2 employed multi-group confirmatory factor analysis to examine the measurement invariance of the CCSSE across gender, age, race/ethnicity, and enrollment intensity. The results affirmed the CCSSE's capacity to consistently measure engagement at configural, metric, scalar, and strict levels measurement invariance. This verification underlined the survey's reliability in capturing authentic group differences. This study also uncovered lower engagement scores among men and part-time students. Study 3 explored the concurrent and predictive evidence of validity of the CCSSE, investigating how engagement indicators correlate with and predict key student success outcomes. It offered new insights into the complex effects of factors such as interaction with faculty and peers and advising services on academic outcomes.

ACKKNOWLEGEMENTS

DEDICATION

I dedicate this dissertation to my grandmother, Suwen Wang, whose courage, kindness to people

and creatures, and unconditional love have deeply inspired me.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BGI	baccalaureate-granting institution
CC	community college
CCCSE	Center for Community College Student Engagement
CCSSE	Community College Survey of Student Engagement
CFA	confirmatory factor analysis
CFI	Comparative Fit Index
EFA	exploratory factor analysis
MGCFA	multigroup confirmatory factor analysis
MI	measurement invariance
NSSE	National Survey of Student Engagement
RMSEA	Root Mean Square Error of Approximation
SRMR	Standardized Root Mean Square Residual
TLI	Tucker-Lewis Index

CHAPTER 1: INTRODUCTION AND PURPOSE

Understanding the role of community colleges (CC) for increasing and diversifying educational attainment is a significant research and policy focus at both the state and federal levels. While much of this attention falls on the effectiveness of educational interventions and practices, conceptual understanding of persistence and attainment designates student engagement as a precursor to persistence, completion, and transfer. Thus, the notion of student engagement as a lever to promote success is a key foundation for higher education practice and policy.

Against a background demand for evidence-based accountability in higher education and institutional improvement based on effective teaching and learning practices, the National Survey of Student Engagement (NSSE) and Community College Survey of Student Engagement (CCSSE) were developed and released in the early 2000s. CCSSE was specially designed to understand the experiences of CC students, and is proposed as a multipurpose tool to help CCs benchmark practice and performance, identify areas of improvement, and monitor their effectiveness (Center for Community College Student Engagement [CCCSE], n.d.). Since its release in 2001, the survey (CCSSE) has undergone two major revisions – the first, in 2005, and the most recent in 2017. While the center (CCCSE) completed a validation study on the instrument administered between 2005 and 2016, no such study has been completed for the version used 2017-present. There is a need to understand the measurement quality of the 2017 CCSSE to ensure that research and assessment efforts produce meaningful results that can be generalized to both broad and specific CC populations. This three-article dissertation will address the gap in validity research on the 2017 CCSSE.

Background of the Problem

To contextualize the focus and approach of this dissertation, it is important to provide background on a) community college (CC) attendance and outcomes; b) the conceptualization and measurement of student engagement including the development of the CCSSE instrument; and c) approaches to validity research.

Community College Attendance and Outcomes

Community colleges have been widely recognized for their essential role in serving historically underrepresented, marginalized students from diverse backgrounds and preparing them to meet the increasing demand of skilled workforce from the labor market (Kolbe & Baker, 2019). Millions of students choose to enroll in CC for its flexibility, open access policy, affordability, convenient location, wide range of courses and programs, and opportunity to transfer into a baccalaureate-granting college or university with lower financial cost (Baum & Kurose, 2013; Chen, 2018); these features are especially appealing to students from low-income households, with dependent children, with work and family responsibilities, from racial/ethnic minority groups, 25 or older, or the first college student in their family (Ching et al., 2020; Ginder et al., 2017; Shapiro et al., 2017).

According to the Community College Research Center from the Teachers College of Columbia University (n.d.), nearly 8.9 million students enrolled at a CC at some point during the 2020-21 academic year, which accounted for 41% of undergraduates. Breaking down the total number of undergraduates in the 2020-21 academic year, 51% of Hispanic students studied at CC, compared to 40% of Black undergraduates, 42% of Asian undergraduates, and 39% of White undergraduates. These estimations were greater than the provisional data from National Center for Education Statistics (NCES) as it adjusted for the fact that some 100 CCs were listed

as baccalaureate-granting institutions as they offer a small number of bachelor's degree programs. About 33% of students who enrolled in public community college colleges in 2019-20 came from families with incomes less than $20,000 a year. These data support the observations that CCs enroll more racial/ethnic minority groups and financially disadvantaged students.

In addition to serving a diverse and underserved student population, CCs hold great promise to transform students into a skilled workforce for a competitive U.S. economy. CCs are at the forefront of efforts to expand postsecondary educational access to historically underrepresented student groups in higher education and have been urged to help increase the human capital of the American labor market (Kolbe & Baker, 2019). Federal and state legislators, together with business leaders and industry stakeholders, strongly support CC's role in workforce education (O'Banion, 2019). Empirical research has found solid evidence that students who attend CC have great gains when they join the labor market. Modestino and Forman (2021) highlighted that women who attain a CC certificate or degree can expect an increase in earnings of 15-25% compared to those with only a high school diploma. Simply by attending CC for two regular semesters, women can earn an extra $1,550 per year, which can rise to as much as $8,000 annually after earning a certificate or an associate's degree. For men, obtaining a certificate or degree leads to a 10-15% boost in earnings compared to high school graduates. Specifically, men who complete an associate's degree or a certificate see their yearly earnings increase by $5,500 to $9,000.

The impact of CC access is particularly pronounced among low-income students. Mountjoy (2023) estimated that 80% of financially disadvantaged students, who were eligible for subsidized meals in high school and enroll in two-year colleges because of better access, would not have pursued any college education otherwise. Further, Mountjoy (2023) posited that two-

year college enrollment extends beyond mere educational attainment for these students. It potentially offers additional labor market benefits, such as enhanced employer network access, targeted short courses delivering immediately employable skills, and improved alignment between individual skill sets and job opportunities. Along with economic gains, there were other benefits of attending CC such as lower unemployment rate, lower welfare reliance, lower involvement in the criminal justice system, higher levels of subjective well-being, and enhanced health status (Cutler & Lleras-Muney, 2010; Torpey, 2018), all of which could be translated into social benefit or community college attendance benefit (Jepsen et al., 2014).

The promise of economic gains and social mobility of attending a CC is based on completion of a credential or transfer. However, national data suggests that the success rates of CC students, measured by various indicators, are disappointingly low. Velasco and colleagues (2024) from the Community College Research Center reported that only about one-third of CC students progress to baccalaureate-granting institutions. Of these, a mere 16% secure a bachelor's degree within a six-year span, significantly lower than the 64% graduation rate of baccalaureate-granting institutions' native students (NCES, 2020). This trend is even more pronounced among specific groups: students from lower-income families, older students, and those identifying as Black or Hispanic.

Conceptualization and Measurement of Student Engagement

Student engagement, as described by Kuh (2009), refers to "the time and effort students devote to activities that are empirically linked to desired outcomes of college *and* what institutions do to induce students to participate in these activities" (p. 683). This definition stresses the participation of both student and institution to facilitate engagement (Wolf-Wendel et al., 2009). Kuh (2009) summarized the impact of student engagement on desirable student

outcomes in such perspectives as cognitive development, psychosocial development, self-esteem, moral and ethical development, and persistence.

Research to understand student engagement has been hugely shaped by the availability of data from popular institutional assessments of student engagement, including the National Survey of Student Engagement (NSSE) and Community College Survey of Student Engagement (CCSSE) developed in the early 2000s. CCSSE was specifically designed to understand the experiences of CC students while its sister survey NSSE, aimed at understanding student engagement in baccalaureate-granting institutions. The 2023 cohorts of the CCSSE and NSSE each included over 500 institutions, with participating institutions across the United States and Canada, as well as a handful of international institutions.

Both CCSSE and NSSE acknowledged four sources of theoretical foundation: student effort and quality (Pace, 1980), student involvement (Astin, 1984), academic and social integration (Tinto, 1975, 1993), and principles of good practice in undergraduate education (Chickering & Gamson, 1987). Pace (1984) stressed the importance of students utilizing the opportunities that their institution offered to achieve academic and intellectual development. Astin (1984) described the critical role of student involvement as the link between educational programs and student success in higher education (Astin, 2005). In the Longitudinal Model of Institutional Departure, Tinto (1975) discussed factors that contributed to student retention and completion: academic and social integration was most essential; other factors such as student characteristics and institutional characteristics were also acknowledged. Chickering and Gamson (1987) explored methods to improve teaching and learning and proposed seven principles of good practice in undergraduate education: (a) encourage contact between students and faculty, (b) develop reciprocity and cooperation among students, (c) encourage active learning, (d) give

prompt feedback, (e) emphasize time on task, (f) communicate high expectations, and (g) respect diverse talents and ways of learning.

CCSSE is currently the most prominent survey and measure of CC engagement across the United States. It is administered annually during spring semester with a stratified random cluster sampling method. Authors of the CCSSE noted that the main purpose of these data was to gain "information about effective educational practice in CCs and assist institutions and policy makers in using that information to promote improvements in student learning and retention" (McClenney, 2007). Currently, the CCSSE website promotes participation as a multipurpose tool to assist with CCs with benchmarking, identifying areas to improve student experiences, and monitoring effectiveness over time (CCCSE, n.d.). The survey (see Appendix) asks students about their college experiences including:

> …how they spend their time; what they feel they have gained from their classes; how they assess their relationships and interactions with faculty, counselors, and peers; what kinds of work they are challenged to do; how the college supports their learning; and so on." (CCSSE, n.d.)

CCSSE published their engagement benchmarks as active and collaborative learning, academic challenge, student effort, student-faculty interaction, and support for learners. The engagement benchmarks are viewed as institutional indicators but have been used in research as student-level measures of engagement since the survey's founding. Marti's (2008) work to examine the reliability and validity of CCSSE benchmark scores (2005-2016 version) concluded that, based on evidence of construct validity, internal and test-retest reliability, and predictive validity, the constructs could be used to conduct research on CC students. After some later studies that found more limited validity evidence, the then-directors of NSSE and CCSSE

(McCormick & McClenney, 2012) stated that the benchmarks were not intended to represent latent constructs. The CCSSE was revised in 2017, proposing the same benchmarks with some differing survey items. One benchmark item was replaced based on results of cognitive interviews. For one benchmark item, a parenthetical was added to clarify a term some students struggled with during cognitive interviews. The phrase "current year" was changed to "current academic year" to clarify the question was not asking about the calendar year. For 5 of the benchmark items, the response scale was changed to try to capture a dose-response relationship. (e.g., "Don't know/N.A", "Rarely/never", "sometimes", and "often" were changed to "Never", "1 time", "2-4 times", "5 or more times"). Large-scale work to understand the reliability and validity of the 2017 CCSSE benchmark scores for use in research on CC student engagement and outcomes has not been conducted prior to this study.

Framework of Validity

The *Standards for Educational and Psychological Testing* developed jointly by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (2014, henceforth cited as the Standards) define validity as the following:

> Validity refers to the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests. … The process of validation involves accumulating relevant evidence to provide a sound scientific basis or the proposed score interpretations. It is the interpretations of test scores for proposed use that are evaluated, not the test itself. (p. 11)

Thus, if an educational test or measure is purported to represent a particular construct and to be used in helping to predict or explain educational outcomes, validity evidence must support those

interpretations. The Standards indicate that sources of validity evidence include evidence based on test content, internal structure, relations to other variables, and evidence for validity of consequences of testing. A thorough validity argument should incorporate different elements of evidence to support the use of scores or measures for specific purposes.

Summary and Statement of the Problem

Community college represents an important on-ramp to higher education in the United States, although there are documented gaps in persistence, completion, and vertical transfer for marginalized groups. Scholarship and policy efforts have emphasized student engagement as an essential precursor to persistence and attainment, and thus large-scale institutional assessments of student engagement (NSSE, CCSSE) have been developed to benchmark, guide institutional improvement efforts, and monitor success. Additionally, scores from these assessments have been used in research on CC and baccalaureate-granting institution (BGI) student experiences and outcomes. It is noteworthy that although the CCSSE has national application and serves as the primary source of information on CC student engagement, validity evidence for the interpretation of CCSSE scores has been limited. Validity evidence on the 2006-2015 CCSSE provided mixed support for use of the five benchmark scores in research studies. However, the CCSSE was revised in 2017 and there is a lack of validity evidence to support the use of CCSSE benchmark scores to represent individual student engagement and explore its connection to persistence, completion, and vertical transfer. There is a need to generate diverse sources of validity evidence to support the use of CCSSE scores to understand CC student experiences and outcomes.

Purpose and Research Questions

The purpose of this dissertation research is to address the lack of validity evidence for interpretation of scores from the 2017 CCSSE through three related studies. The chosen studies were selected based on support needed for proposed score interpretations for use in research on CC student experiences and outcomes. The studies span evidence based on internal structure and evidence based on relationships to other variables. The research questions for each study are as follows:

- Study 1: Using exploratory and confirmatory factor analysis, to what degree do the relationships between CCSSE items conform to the five CCSSE engagement benchmarks? Is there a better fitting factor structure to describe student engagement for this national sample?

- Study 2: Using multiple-group confirmatory factor analysis, what is the extent of measurement invariance in the CCSSE across student gender, race/ethnicity, age, and enrollment intensity? What are the differences in engagement patterns among the aforementioned student subgroups?

- Study 3: Using linear regression analyses, to what degree is there concurrent evidence of the validity of CCSSE's engagement indicators for measures of academic achievement and pace of progress? Using logistic regression analyses, to what degree is there predictive evidence of the validity of CCSSE's engagement indicators for measures of student persistence, credential completion, and vertical transfer?

Dissertation Overview

Following this introductory chapter, the three studies are presented in separate chapters (chapters 2-4). Access to all data used in these studies was provided by the Center (CCCSE). The

national data set of 2017-2019 CCSSE responses used in Studies 1 and 2 was facilitated through

the researcher's role as a Research Affiliate with the center, and Study 1 was completed as a part

of her doctoral research internship course. The access to the North Carolina CCSSE merged data

set was provided through a data sharing agreement between the center and the researcher's

dissertation chair, and via IRB agreements with each of the three participating North Carolina

CCs. The colleges provided their identified institutional data to the center, and it was merged

with survey data by center personnel and deidentified before providing the data set to the

researcher. Chapter 5 provides a synthesis of key findings, a discussion of study limitations,

along with implications for future research and interpretation of CCSSE scores by CC leaders,

policymakers, and researchers. A brief synopsis of each study follows, with a final statement on

the significance of the studies.

Study 1: Evidence of Internal Structure Validity of CCSSE

The first study, presented in Chapter 2, used exploratory and confirmatory factor analysis

to understand how well the interrelationships between CCSSE items conform to the five CCSSE

engagement benchmarks and examine whether other factor structures might represent a better fit

to the data (2017-2019 national data set). The existing CCSSE validity literature mostly analyzed

responses either from a relatively small number of institutions (Angell, 2009) or only analyzed

the former version of CCSSE (McClenney & Marti, 2006; Marti, 2008). Further, because the

benchmarks may be considered as more of an umbrella concept to provide participating

institutions with comprehensible and actionable indicators for improvement, viewing them as

dimensions or subconstructs of engagement may not be appropriate. A second issue is that there

has been no published validity evidence related to the latest 2017 CCSSE version. The

exploratory and confirmatory factor analyses supported a 42-item, eight-factor engagement

construct: a) personal development, b)interaction with faculty and peers, c) higher order thinking, d) institutional support, e)use of advising services, f) writing and critical thinking, g) student effort, and h) extra-curricular activities. These factors and their items are not akin to the five benchmarks, but they are aligned with CCSSE's theoretical founding and more recent indicators of engagement used in the NSSE. The results suggest evidence of validity for the use of CCSSE indicators to measure individual student engagement.

Study 2: Measurement Invariance of the CCSSE

Study 2, presented in Chapter 3, used the eight engagement indicators identified in Study 1 to examine measurement invariance across the subgroups of gender, age, race/ethnicity, and enrollment intensity using the 2017-2019 national data set. This source of validity evidence from internal structure implies that the use of the same questionnaire in different groups measures the same construct in the same way (Davidov et al., 2014). Measurement invariance defines conditions that have to be fulfilled before inferences can be drawn about comparative conclusions and requires that the association between the items and the latent factors should not depend on group membership or measurement occasion (Mellenbergh, 1989). The most common method to test measurement invariance is Multi-Group Confirmatory Factor Analysis (MGCFA), which tests a hypothesis and examines if a given theoretical model fits well to the data across the groups. Most research focuses on four levels of measurement invariance: a) configural, b) metric, c) scalar, and d) strict. Many studies examining measurement invariance of survey scales have shown that the strict invariance rarely hold.

The analyses established measurement invariance at the configural, metric, scalar, and strict levels, thereby reinforcing the robustness of the CCSSE as an effective tool for assessing student engagement across diverse demographic groups. These groups included students of

differing gender, age, race/ethnicity, and enrollment intensity. The evaluation of latent mean differences indicated that the observed differences in latent means among these groups are reflective of true variations in student engagement, rather than being influenced by measurement artifacts.

Study 3: Concurrent and Predictive Evidence of Validity of CCSSE

The third study (Chapter 4) used a merged data set of 2017-2019 CCSSE survey data with institutional enrollment, transcript, and transfer data from three North Carolina CCs to generate validity evidence for the use of CCSSE scores as indicators of student engagement to understand concurrent and longitudinal student outcomes. In research on the 2005-2016 version of CCSSE, there was mixed evidence of validity related to use of CCSSE scores to predict concurrent and longer-term outcomes, leading to a conclusion that engagement was more effective at predicting GPA and credit hour variables than variables related to persistence and enrollment (McClenney & Marti, 2006).

To examine the degree of concurrent evidence of validity, academic achievement and pace of progress at the time of survey completion were regressed on CCSSE engagement indicators. For predictive evidence of validity, logistic regression analyses were used to determine which engagement indicators significantly affected the likelihood of persisting to the next semester, earning a credential, and transferring to a BGI. Given longstanding persistence and transfer gaps for underserved and marginalized populations, these analyses included student background and demographic characteristics as covariates.

The results of this study provided evidence of the validity of engagement indicators for understanding student progress and success, specifically personal development and interaction with faculty and peers. There were some unexpected negative associations for outcomes with

institutional support and advising services, and these are considered in relation to the items comprising those indicators. Additionally, identifying with an underrepresented racial/ethnic minority group (URM) was negatively associated with all outcomes except transfer, reflecting well-documented systemic barriers.

Significance of the Studies

The three related studies presented in this dissertation comprise a comprehensive exploration of the measurement properties of the 2017 version of the Community College Survey of Student Engagement (CCSSE), investigating its application across diverse CC student populations. The overall aim was to substantiate evidence of validity for internal structure of the CCSSE student engagement indicators, to ensure that comparisons made across different demographic groups would be meaningful and robust, and to generate concurrent and predictive evidence of validity to understand how engagement as measured by the survey correlates with and predicts essential student success outcomes. This holistic approach integrated a rigorous examination of the survey's psychometric properties with an analysis of its practical implications for student success in CCs. In pursuit of this aim, the dissertation was structured into three distinct yet interconnected studies, each addressing a unique facet of validity and engagement within the context of CCs.

These studies are the first to utilize large-scale national data from the latest version of CCSSE to keep pace with its development. Validity study is fundamental for any instrument to substantiate its use for further research and practical implications. The findings of this study have promise to provide more accurate information to administrators and practitioners, and thus to identify most effective practices for engagement, especially for different subgroups who have

their unique characteristics and needs. Ultimately, the research can help them make informed

decisions and actionable plans to improve.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (Eds.). (2014). *Standards for educational and psychological testing*. American Educational Research Association. https://www.testingstandards.net/uploads/7/6/6/4/76643089/standards_2014edition.pdf

Baum, S., & Kurose, C. (2013). Community colleges in context: Exploring financing of two- and four-year institutions. In the Century Foundation (Ed.), *Bridging the higher education divide: Strengthening community colleges and restoring the American dream* (p. 73–108). The Century Foundation.

Belfield, C. R., & Bailey, T. (2011). The benefits of attending community college: A review of the evidence. *Community College Review, 39*(1), 46–68. https://doi.org/10.1177/0091552110395575

Center for Community College Student Engagement (CCCSE). (n.d.). *Community College Survey of Student Engagement: About the survey*. https://www.ccsse.org/aboutsurvey/aboutsurvey.cfm

Chen, G. (2021, July 14.). Why more students are choosing community colleges over traditional four-year schools. *Community College Review*. https://www.communitycollegereview.com/blog/why-more-students-are-choosing-community-colleges-over-traditional-four-year-schools

Ching, C. D., Felix, E. R., Fernandez Castro, M., & Trinidad, A. (2020). Achieving racial equity from the bottom-up? The student equity policy in the California community colleges. *Educational Policy,* 34(6), 819–863. https://doi.org/10.1177/0895904818802092

Community College Research Center (n.d.). https://ccrc.tc.columbia.edu/community-college-faqs.html

Cutler, D. M. & Lleras-Muney, A. (2010). Understanding differences in health behaviors by education. *Journal of Health Economics*, *29*(1), 1–28. https://doi.org/10.1016/j.jhealeco.2009.10.003

Davidov, E., Meuleman, B., Cieciuch, J,. Schmidt,P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Annual Review of Sociology, 40* (1): 55–75. https://doi.org/10.1146/annurev-soc-071913-043137.

Ginder, S., Kelly-Reid, J., & Mann, F. (2017). *Postsecondary institutions and cost of attendance in 2016–17; degrees and other awards conferred, 2015–16; and 12-month enrollment, 2015–16: First look (preliminary data).* National Center for Education Statistics. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2017075rev

Heckman, J. & LaFontaine, P. A. (2006). Bias-corrected estimates of GED returns. *Journal of Labor Economics, 24*(3), 661–700. https://doi.org/10.1086/504278

Jepsen, C., Troske, K., & Coomes, P. (2014). The labor-market returns to community college degrees, diplomas, and certificates. *Journal of Labor Economics*, *32*(1), 95–121. https://doi.org/10.1086/671809

Kolbe, T, & Baker, B. D. (2019). Fiscal equity and America's community colleges. *The Journal of Higher Education*, *90*(1), 111–149. https://doi.org/10.1080/00221546.2018.1442984

McClenney, K., & Marti, C. N. (2006). *Exploring relationships between student engagement and student outcomes in community colleges: Report on validation research*. The Community College Survey of Student Engagement, Community College Leadership Program, University of Texas at Austin.

https://www.ccsse.org/aboutsurvey/docs/CCSSE%20Working%20Paper%20on%20Valid
ation%20Research%20December%202006.pdf

McCormick, & McClenney, K. (2012). Will these trees ever bear fruit? A response to the special
issue on student engagement. *Review of Higher Education*, *35*(2), 307–333.
https://doi.org/10.1353/rhe.2012.0010

Marti, C. N. (2008). Dimensions of student engagement in American community colleges: Using
the community college student report in research and practice. *Community College
Journal of Research and Practice, 33*(1), 1–24.
https://doi.org/10.1080/10668920701366867

Modestino, A. S., & Forman, B. (2021). *Pathways to economic mobility: Identifying the labor
market value of community college in Massachusetts*. The Boston Foundation.
https://massinc.org/research/pathways-to-economic-mobility/

Mountjoy, J. (2022). Community colleges and upward mobility. *The American Economic
Review*, *112*(8), 2580–2630. https://doi.org/10.1257/aer.20181756

O'Banion, T. U. (2019). A brief history of workforce education in community colleges.
Community College Journal of Research and Practice, *43*(3), 216-223.
https://doi.org/10.1080/10668926.2018.1547668

Pascarella , E. T. & Terenzini , P. (2005). *How college affects students: A third decade of
research*. Jossey-Bass.

Price, D.V. & Tovar, E. (2014). Student engagement and institutional graduation rates:
Identifying high-impact educational practices for community Colleges. *Community
College Journal of Research and Practice*, *38*(9), 766–782.
https://doi.org/10.1080/10668926.2012.719481

Ritt, E. (2008). Redefining tradition: Adult learners and higher education. *Adult Learning*, *19*(1-2), 12-16.

Shapiro, D., Dundar, A., Huie, F., Wakhungu, P., Yuan, X., Nathan, A., & Hwang, Y. (2017). *A national view of student attainment rates by race and ethnicity—fall 2010 cohort.* National Student Clearinghouse Research Center. https://nscresearchcenter.org/wp-content/uploads/Signature12-RaceEthnicity.pdf

Snyder, T. D., & Dillow, S. A. (2011). *Digest of education statistics 2010* (NCES 2011-015). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubs2011/2011015.pdf

Torpey, E. (2018). *Measuring the value of education*. U.S. Bureau of Labor Statistics. https://www.bls.gov/careeroutlook/2018/data-on-display/education-pays.htm?view_full

CHAPTER 2: MEASURING STUDENT ENGAGEMENT IN COMMUNITY COLLEGE: CONSTRUCT VALIDITY OF CCSSE

The Community College Student Survey of Engagement (CCSSE) is widely implemented across American CCs as a measurement to understand effective educational practices in CCs and promote student learning and retention (McClenney, 2007). Both CCSSE and its counterpart designed for the students in baccalaureate-granting institutions (BGIs), the National Survey of Student Engagement (NSSE), were initiated with the conviction that the quality of higher education should be examined through effective educational practices that foster desired student outcomes rather than reputation and resources the institutions possess (McCormick & McClenney, 2012). According to the Center for Community College Student Engagement, the latest 2019-2021 CCSSE cohort was composed of 411 institutions from 46 states across United States as well as Bermuda, Marshall Islands, and Micronesia (Center for Community College Student Engagement, n.d.). About 55% of them were identified as small sized CCs (<4,500 credit students), 23% as medium (4,500-7,999 credit students), 19% as large (8,000-14,999 credit students), and 8% as extra-large institutions (15,000+ credit students). Institutions use CCSSE reports for institutional planning, accreditation assessment, and identifying the needs and special circumstances of student subgroups (CCCSE, n.d.).

Despite its nationwide application and influence among institutional leaders, faculty and staff, policy makers, and researchers, validation research on CCSSE is scant and their findings mixed. Several validity research studies have examined CCSSE's five benchmarks: active and collaborative learning, academic challenge, student effort, student-faculty interaction, and support for learners (Angell, 2009; Ghazzawi et al., 2021; Nora et al., 2011). However, Pike (2013) studied the intended use of the benchmarks (Kuh et al., 2001) and pointed out, "(t)he benchmarks were not intended to represent underlying theoretical constructs; instead, the

benchmarks were conceived as clusters of student behaviors and institutional actions that represented good educational practices (p. 52)". Thus, taking the benchmarks as a psychometric construct and conducting a construct validity based on them does not appear to be a viable approach, and the resulting low or moderate model fit should not be surprising. Another issue in validity research on CC student engagement is that published academic papers conducted analysis based on an older version of CCSSE, whereas CCSSE underwent an important revision in 2017 (Center for Community College Student Engagement, n.d.).

This study aims at addressing this research gap by utilizing a large-scale national dataset from the 2017, 2018, and 2019 administrations of the survey that adopted the latest version (2017) of the CCSSE. Following the *Standards of Educational and Psychological Testing* (2014), provided by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME); exploratory and confirmatory factor analysis with special attention to methods to minimize the impact of missing data were used to explore the following questions:

- RQ1: To what degree do the relationships between CCSSE items conform to the five CCSSE engagement benchmarks?

- RQ2: Is there a better fitting factor structure to describe student engagement for this national sample?

The findings of this study are discussed in relation to extant literature on CC student engagement. Implications for future research and practice are also discussed.

Literature Review

Empirical and theoretical studies have long established the essential role of engagement in fostering student learning and personal development (Kahu & Nelson, 2018). Research in the

early 2000s found that student engagement in educationally purposeful activities was positively associated with desired student outcomes such as grades and persistence (Braxton et al., 2004; Pascarella & Terenzini, 2005). Studies also identified evidence for the impact of engagement on academic achievement in first year students' experiences as indicated by GPA, after controlling for student characteristics (gender, race and ethnicity, parent education and income, etc.) and pre-college variables (Kuh et al., 2008). More recently, researchers have found that student engagement is positively related to grades and satisfaction (Webber et al., 2013), critical thinking outcomes (Nelson Laird et al., 2014), and degree attainment (Flynn, 2014).

To frame this validity study of the 2017 CCSSE, the researcher reviewed literature on the evolution of the conceptualization of engagement; approaches to determining measurement validity; and extant research specifically on the validity of CCSSE. Research on inputs or outcomes associated with CC student engagement was outside the scope of this review.

Frameworks of Engagement

The authors of CCSSE and its sister version NSSE acknowledged that they developed their instrument based on empirically confirmed effective practices in undergraduate education (McCormick & McClenney, 2012). Their theoretical framework was built upon the synthesis of previous evidence-based research in higher education: college student effort and quality of their experiences (Pace, 1980), student involvement (Astin, 1984), academic and social integration (Tinto, 1975, 1993), and principles of good practice in undergraduate education (Chickering & Gamson, 1987).

Pace (1984) proposed that the quality of student effort was a function of the opportunities that their institution offers, and it entailed students' use of those opportunities in their academic and intellectual development. Findings from Pace's College Student Experiences Questionnaire

served as a founding source and its items were drawn into both NSSE and CCSSE (McCormick & McClenney, 2012). Astin (1984)'s student involvement research examined student involvement as the link between educational programs and student achievement (Kahu & Nelson, 2018). Involvement not only accounted for the time and energy that students spend but also acknowledged the contribution of the environment, which was implied in Astin's Input–Environment–Output (I–E–O) model: The more a student is involved in educational experiences, the higher likelihood that they succeed in their colleges or universities (Astin, 2005). In a 2009 interview, Astin claimed that the framework of student involvement was useful for "thinking about what matters in the lives of students and what interventions we can create to make effective learning environments" (Wolf-Wendel et al., 2009, p. 412).

Tinto's (1975) Longitudinal Model of Institutional Departure identified academic and social integration as critical to student retention and completion while acknowledging both the pre-entry characteristics of students and institutional characteristics. Academic integration referred to students engaging with the faculty, advisors, peers for academic issues, and social integration focused on active participation in college life such as college clubs, sports, and other social activities. Integration within the institutional context was regarded essential to retention while acknowledging students' intrinsic characteristics prior to entering the institution. Tinto (2010) emphasized that integration comprised "value interaction such as arises when one perceives oneself as a valued member of a community" (p. 78). The critiques of this model have mainly rested on its inadequacy to accommodate diverse student subgroups such as commuter students and CC students (Fong et al., 2017).

Among Chickering and Gamson's (1987) "Seven Principles of Good Practice in Undergraduate Education" for improving teaching and learning, student-faculty contact and

student cooperation gained prominent attention from later researchers, and numerous studies confirmed the essential role played by interaction with faculty and peers. This approach shed light on the research in different engagement patterns of diverse student groups. Take Black/African American male students as example. Studies found that they are underrepresented in percentages of degree earned, persistence rate, retention, and average GPA compared to other ethnic and gender groups (Bush & Bush, 2010). Wood (2014) observed from an in-depth interview that many Black/African American male students were reluctant to fully engage in academic activities such as joining discussions, raising and answering questions, participating in group activities and utilizing faculty's office hours, which according to the researcher, could be a protective mechanism against negative perceptions and stereotypes of being academically inferior.

Kuh et al. (2008) further developed the concept of student engagement as "both the time and energy students invest in educationally purposeful activities and the effort institutions devote to using effective educational practices" (p. 542). Student engagement foregrounded the relationship between student behavior and effective educational practices to encourage institutional reflection and action (Wolf-Wendel et al., 2009). Student engagement was deemed as "an important factor in student success and legitimate indicator of educational quality" (Kuh, n.d.).

Contemporary scholarship on student engagement conceives the concept as holistic and multidimensional (Quin, 2017). Braxton et al. (2004) proposed that psychosocial engagement, or the efforts that students commit in social interactions, had positive effects on social integration into college life in general. Kahu (2013) discussed three perspectives to understand engagement: behavioral, psychological, and sociocultural. While the behavioral aspect stressed both student

behaviors and faculty's teaching practices and the psychological aspect emphasized internal processes, the sociocultural aspect focused on institutional bias that favored dominant social groups while alienating non-traditional students, such as older students, working class women, and racial/ethnic minorities who often lacked the social, cultural and academic capital to fit in. Bryson (2014) illustrated the complexity of engagement as the result of the interplay between institutional factors and structural factors at the individual level. An important addition to varied frameworks of engagement has been research dedicated to understanding the experiences of racially or ethnically minoritized students. For example, Harris and Wood (2014) proposed the Social-Ecological Outcomes (SEO) model that structured similarly to the Input–Environment–Output (I–E–O) model (Astin, 2005) but was specifically designed to account for the factors affecting the success of men of color in CCs. The SEO model identified (a) inputs that student have had prior to entering CCs, ranging from background/defining factors (e.g., age, primary language, citizenship status, generation status) to societal factors (e.g., economic status, biased conceptions and stereotype against men of color); (b) socio-ecological domains that encompass nonacademic, academic, environmental, and campus ethos domains; and (c) outcomes such as persistence, attainment, and transfer. Harris and Wood (2014) pointed out that the factors in the socio-ecological domains were fluid and dynamic, representing the interplay between salient sociological and environmental factors. Noteworthy factors posited in this model included faculty-student interaction, academic service use, finances as a mediator, family responsibilities and employment, campus resources, and faculty/stuff as validating agents. The SEO model synthesized promising factors from previous qualitative research as an effort to explain what contributed to or hindered the success of men of color in CC but awaited empirical validation.

Perhaps one of the most prominent recent conceptual developments of engagement is socioacademic integration (Deil-Amen, 2011) which could be regarded as a refined, CC framework based on Tinto's (1975) Theory of Student Departure. Deil-Amen (2011) conducted 238 semi-structured interviews with students, staff, and faculty from both public CCs and private two-year colleges. This comprehensive qualitative research led to the fused socioacademic integration, which according to the researcher, plays a similar role in cultivating the sense of belonging and membership as proposed in Tinto's (1993) model. The two frameworks, socioacademic integration and theory of student departure, shared the importance of understanding students' own perspectives in understanding and promoting integration, both behavioral and psychological. But the traditional forms of integration in BGIs, such as on-campus activities, are limited in the CC setting. Instead, academic integration demonstrated far more significance than social integration in CC students' experiences. However, "compartmentalizing two-year college student experiences into distinct social and academic realms may not be useful" (Deil-Amen, 2011, p.82) as the two forms of integration are tightly interconnected and indistinguishable in CCs. Viewing academic integration and social integration as distinctively separate could undervalue the importance of their connectedness. Another insight Deil-Amen (2011) promoted is the pivotal role of institutional agents for two-year students' integration: faculty/instructors serve as the primary sources of social capital in transmitting valuable information to students, which is especially critical in overcoming the procedural obstacles.

Framework of Validity

The theory and framework of validity has evolved over time. Historically, in the 1950s, validity referred to criterion validity (along with content validity) that examined the extent to

which a measure agrees with a certain standard, or the correlation between the test scores and the 'true' scores: the criterion (Cureton, 1951). However, the validity of the criterion itself could be problematic as the criterion appeals to another separate criterion which indicates infinite regress or circularity (Cronbach, 1971; Kane, 2013). Although expert judgments, as supplement to criterion-content validity framework, do not rely on a criterion measure and work well for testing specific skills of interest, it is challenging to validate broadly defined areas of achievement (Kane, 2013). Another problem is that criterion-content validity framework does not work well with measuring psychological traits. In the 1950s, Cronbach and Meehl (1955) proposed construct validity to validate interpretations in light of theoretical constructs. "The proposed interpretation generates specific testable hypotheses, which are a means of confirming or disconfirming the claim." (p. 290). One of the contributions of this model is that it shifted researchers' attention from the validation of a test where the interpretation is a given to the validation of the interpretation of a test score (Kane, 2013). So far, the construct model, together with the earlier criterion and content models became three major tools that could be chosen and applied when appropriate.

In the 1980s, scholars developed a unified theory of validity that summarized and subsumed different forms of validity into a broader concept, represented by Messick's (1989) unified construct model. Messick emphasized that validity judgments should focus on how data are interpreted and used and based on the accumulation of evidence from a variety of studies. Kane (2013, 2016) sought to simplify the rigorous yet hard-to-fully-meet standards of the unified construct model by proposing an argument-based approach that regards interpretations and uses of test-score as valid when they are both clearly stated and supported by appropriate evidence. Here the proposed interpretation and uses of the test scores are treated as the interpretation/use

argument (IUA) and the validity argument process is summarized as to "state what is being claimed and evaluate the claims being made (Kane, 2013, p451)". Both Messick (1989) and Kane (2013) stressed the critical role of replication and testing plausible rival hypotheses in validation. Pike (2013) observed that Messick's validity framework laid the foundation for the *Standards for Educational and Psychological Testing* (2005, henceforth cited as the Standards) that defined validity as the following:

> Validity refers to the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests. Validity is, therefore, the most fundamental consideration in developing tests and evaluating tests. The process of validation involves accumulating relevant evidence to provide a sound scientific basis or the proposed score interpretations. It is the interpretations of test scores for proposed use that are evaluated, not the test itself. (p.11)

"Validity is a unitary concept. It is the degree to which all the accumulated evidence supports the intended interpretation of test scores for the proposed use" (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014, p. 14). It should be noted that the Standards use the word "test" as an overall term for measurement, and that survey is one form of test.

Validity Research on CCSSE

The first comprehensive validity study of CCSSE utilizing responses from the 2003-2005 cohort was conducted by Marti (2008) in three phases: establishing confirmatory factor analysis (CFA) models, demonstrating reliability, and examining predictive validity with GPA. The CFA section examined two models, respectively. One was for the model of best fit for the construct validity that led to a nine-factor model, the other was for a model of effective educational

practices that led to the five benchmarks. The nine factors were described as: (a) faculty interactions, (b) class assignments, (c) exposure to diversity, (d) collaborative learning, (e) information technology, (f) mental activities, (g) school opinions, (h) student services, and (i) academic preparation. According to Marti's description, CCSSE's advisory panel reviewed the nine-factor model and assigned these items to benchmarks "based on both the conceptual framework and empirical evidence related to student engagement in undergraduate learning" (p. 9). The outcome was the following five benchmarks: (a) active and collaborative learning, (b) academic challenge, (c) student effort, (d) student-faculty interaction, (e) support for learners. After the CFA, the study continued to examine the internal consistency, measurement invariance, test-retest reliability, and then regressed students' self-reported GPA on each of the factors from both the models. Marti concluded that CCSSE effectively measured student engagement and that its constructs were reliable and valid in two-year institutions.

Multiple CCSSE validity studies were conducted following Marti's (2008). One study in Canada found positive evidence for CCSSE's benchmarks. Mandarino and Mattern (2010) used a sample of over 1,000 students from one Canadian college participating the CCSSE survey in 2009 and conducted confirmatory factor analysis. Their results showed good model fit in terms of Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). Multiple-group CFA also demonstrated measurement invariance across male and female students in the participating college. The researchers further pointed out that all the participants in this study were full-time students as part-time student enrollment was extremely low in the Canadian context. They also examined the predictive validity of the benchmarks and reported that Active and Collaborative Learning and Academic Challenge were significantly correlated with academic outcomes (measured by GPA.

Other researchers found partial or little validity evidence (Angell, 2009; Roman et al., 2010; Nora et al., 2011). Schuetz (2008) claimed that student engagement explained approximately 50 to 60% of the variance in student sense of belonging, feelings of self-competence, and sense of autonomy after conducting structural equation modeling (SEM) with over 1,000 students from one Best Practices Community College in California that participated in CCSSE in 2005. One interesting aspect of this study's sample was that over 60% of the participants were defined as adult students by the author: aged over 18, working at least 25 hours per week, and raising a child while attending college.

Angell (2009) utilized data from 450 participants in one southeastern CC and identified a four-factor construct that explained 22.5% of the variance. The reliability (Cronbach's alpha) in this study was all over .79 while two of CCSSE benchmarks were below .60 (Active and Collaborative learning = .59; Student Effort = .53). They reported that the items from CCSSE benchmarks loaded on different factors and some factors included new items not in the benchmarks. This research stressed that local data structures and properties seemed to vary from CCSSE's benchmarks.

Roman et al. (2010) looked at three of the five benchmarks as Retention Index (Active and Collaborative Learning, Student-faculty Interaction, Support for Learners), but they found little evidence of a significant linear relationship between the Retention Index and actual retention rate for the 28 CCs of Florida. Their hierarchical ANOVA analysis did find statistically significant mean difference in student retention regarding gender and race/ethnicity, but the effect size was small (accounting for less than 1% of the variance). Nora et al. (2011) utilized data from a medium-sized CC in southeast Texas and reported five distinct factors to CCSSE's benchmarks. They further examined the predictive validity of original CCSSE benchmarks and

found them accounting for 10.3% of the variance in students' GPA, taking into consideration gender and ethnicity. Theoretically, they proposed to add psychological and emotional aspects into the conceptualization of engagement that were labeled as academic and social integration in their construct model. In a response to this validity research, McCormick and McClenney (2012), the then director of NSSE and CCSSE respectively, stated that assessing the viability of the benchmarks as latent constructs was a misinterpretation. "The benchmarks do not represent latent constructs. They are summative indices of a range of effective educational practices" (p. 324). "They [the benchmarks] were created as a point of entry into an institution's results, one that might initiate campus conversations about the character of undergraduate education, how it compares to the educational efforts of other colleges and universities, what an institution does well, and where improvement is needed. (p. 326)".

The latest relevant research included using CCSSE benchmark for examining the engagement experience of international students in CCs (Ghazzawi et al., 2021) and proposing an alternative seven-factor engagement construct (McCarrell & Selznick, 2020). Ghazzawi and colleagues (2021) identified over 6,000 international students from 2013 to 2015 cohort across the United States. They found poor model fit of the data after utilizing the original 38 items from the five benchmarks for CFA analysis. Their follow-up EFA analysis reported noticeable differences in how items grouped into factors. In the case of student effort, out of the eight original items, only two were confirmed by their analysis, while three items went to the support for learners factor and three items did not load unto any factors in their data. McCarrell and Selznick (2020) utilized CCSSE benchmark items for validating a seven-factor construct based on Chickering and Gamson's theory (McCarrell & Selznick, 2020). They sampled over 1,000 students from two CCs in Virginia between 2012 and 2013. The researchers assigned items to

seven factors based on Chickering and Gamson's seven principles. Many of the items in this study overlapped with those in CCSSE'S five benchmarks with some additions and a few exclusions as the researchers did not consider them to appropriately fit into Chickering and Gamson's theory. CFA analysis (after item correlation based on modification indices) demonstrated good model fit. The researchers drew our attention to such items as support for non-academic responsibilities and support for thriving socially that were grouped under their factor of respect and responsibility. They argued that "such support are essential to approaching CC student engagement with deep respect for context and the nuanced exchanges between the students and institutions" (p. 417).

Summary

A brief review of the student engagement theories, validity approaches, and CCSSE validity research demonstrates both the richness of the theories and the mixed findings of CCSSE's validity. It should be reiterated that the CCSSE/NSSE authors did not intend to present the five benchmarks as a psychometric construct, rather as a heuristic approach to encourage CC administrators and practitioners to identify effective educational practices and areas for improvement (Kuh et al., 2001). As the *Standards* (2014) specify validity as "… the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests" (p.11), the intended or proposed uses of the CCSSE instrument should be given due attention.

Methods

This study utilized a large-scale national dataset from the 2017, 2018, and 2019 administrations of the CCSSE to explore its psychometric properties and construct validity using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), with special attention to methods to minimize the impact of missing data. To enhance reliability, the dataset was

randomly divided into three subsets. The first subset was utilized for EFA, the second for CFA, and the third for a repeated CFA. This rerun was conducted after incorporating modification indices from the second subset and after consultation with the internship supervisor. The researcher obtained the data as a Research Affiliate of the CCCSE and conducted the study as part of a research internship, thus there are references to the internship supervisor, who is also a member of the dissertation committee.

Instrument

The dataset utilized in this study is from the 2017 to 2019 CCSSE nationwide dataset. CCSSE is administered every spring semester and follows a random stratified sampling method. The participants are randomly chosen from a list of credit bearing classes. CCSSE has over 120 items under 47 questions. The body of the survey includes Likert-type scale questions calling for students to report the frequency with which they engage in educational activities (e.g., participating in classroom discussions, interacting with faculty in and out of class), use academic and student support services, and whether they have participated in a variety of learning opportunities (e.g., college orientation programs, internships or clinical placements, developmental education). Besides conventional demographic questions, respondents also report their perceived level of academic challenge and the quality of relationships on campus (CCCSE, n.d.).

Participants

Only students who were enrolled for at least three semesters when they took the survey were included in the final analytic sample (n = 164,594). This criterion was used because students with enrollment in fewer than three semesters did not have enough opportunities to experience all the activities and services provided by their colleges, resulting in a substantial

number of missing values or options like "not applicable." The sample represents students from 562 colleges and 43 states. Of all the participants, 56.3% are women, 34.6% are 25 years or older, 31.3% part-time students, 21.8% having children as dependent, and 36% first generation college students. Complete demographic information are displayed in Table 2.1.

Data Processing

One item asking the frequency of not attending class was reverse coded (very often = 4, never = 1) to align with all other items using this scale where the higher response value is associated with the more engaged behavior. As there were multiple Likert-type scales in the survey (e.g., 0-4, 1-4, 1-5, 1-7), all responses were rescaled to a range of 0 to 1. The research plan was to run EFA (using SPSS 27) and CFA (using R) analysis as a method of construct validity. The data were randomly partitioned into three subgroups: one for EFA, another for CFA, and the third one to re-run CFA after modification should it be necessary.

Missing Data

Missing data are a common issue in survey data of educational research, which can be problematic for the quality of statistical analyses. Generally, three types of missingness can be distinguished: missing completely at random (MCAR), missing at random (MAR), and not missing at random (NMAR; sometimes referred to as missing not at random (MNAR)) (Rubin, 2004). MCAR means that the missingness is unrelated to other variables and is completely based on a random process. Of the three modern methods of dealing with missing data: full-information maximum likelihood (FIML), multiple imputation, and a "two-stage" procedure based on the Expectation-Maximization algorithm (EM), multiple imputation is one of the most widely used procedures (Enders, 2010; Little & Rubin, 2002).

Table 2.1

Demographic Statistics Comparing the Whole Sample and Analyzed Sample

	Total sample % (n = 343,575)	Analyzed sample % (n = 164,594)
Gender		
Man	41.9	41.4
Woman	53.4	56.1
Age		
18-24	70.1	65.3
25+	27.3	34.7
Race & ethnicity		
American Indian/Alaska Native	1.5	1.5
Asian	5.0	5.3
Black/African American	10.3	9.5
Hispanic/Latino	16.7	16.8
Pacific Islander	0.3	0.3
White	49.8	52.1
Year		
2017	25.8	27.1
2018	35.7	35.6
2019	38.5	37.3
Enrollment		
part-time	29.0	31.3
full-time	71.0	68.7
First generation	37.3	36.0
Married	13.3	16.5
Having children as dependent	18.3	21.8
English as first language	78.4	80.4
International student	4.5	5.4
Military service	5.1	5.4

Although these methods provide unbiased estimates with smaller standard errors under the condition of MCAR (Goretzko et al., 2020; Olinsky et al., 2003), MI has two additional advantages: it is considerably less restrictive with regard to distributional assumptions and has greater flexibility in working with different types of data, including categorical item level data (Chung & Cai, 2019). Simulation studies found that imputation methods perform significantly better than traditional complete case analysis in most data conditions as they provide unbiased estimates with smaller standard errors, given the percentage of missingness is less than 50% (Goretzko et al., 2020; Shi et al, 2020). Following the research and recommendations discussed, the researcher utilized multiple imputation as it accounts for the uncertainty surrounding the predicted value of the missing data and its impact on the variance of the parameter estimates.

Findings of the Exploratory Factor Analysis

Considering the nature of exploratory analysis, the researcher and internship supervisor decided to exclude only the following types of items from the survey: (a) demographic information (such as race, gender, age, family background, marriage, children, military service, student athletes, etc.) and (b) items that were not conceptually related to engagement which stressed activities, for instance, goals for attending college, source of college tuition, college and high school GPA, number of face-to-face/online/hybrid class, satisfaction with the services the institution provided. These were important questions to the survey but not related to engagement.

Prior to conducting the exploratory factory analysis, the data were screened to examine EFA assumptions (independence, linearity, absence of outliers and lack of extreme multicollinearity and singularity) using the first of the three random data sets. The assumptions were fairly well met and, given that EFA is relatively robust to violations of assumptions with the exception of tests of inference, it was decided to continue to conduct EFA examining

factorability as the next step. The researcher decided to treat the variables as continuous following common practices with regards to categorical data, and based on a factor analysis using a polychoric correlation matrix by the internship supervisor that showed the results were close enough compared to the continuous variable method. Common criteria were followed: bivariate correlations (above .30), Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.90s = marvelous, .80s = meritorious, .70s = middling), Bartlett's test of sphericity (statistically significant), and communalities. Accordingly, the analysis showed that 38 of the 42 items correlated at least .30 with at least another item. The overall KMO was .930. Bartlett's test of sphericity was statistically significant [$\chi2$ (861) = 3634350.713, p<.001]. After reviewing extracted communalities of the 42 items, 30 items were above the recommended value of .30. However, given other criteria for determining factorability were met, it was determined that it was reasonable to proceed with 42 items for the EFA.

Principal Axis Factoring with Promax Rotation was used to extract the factors from the data. The criteria of Eigenvalues greater than 1 was employed, together with scree plot examination. Both of them supported an eight-factor solution. After consultation with the internship supervisor, an eight-factor solution was determined to be plausible, representing about 50% of the variance explained, and the names for the eight factors were finalized as: (a) personal development (α = .90) , (b) interaction with faculty and peers (α = .81) , (c) higher order thinking (α = .84) , (d) institutional support (α = .81) , (e) use of advising services (α = .62) , (f) writing and critical thinking (α = .69) , (g) student efforts (α = .47), and (h) extracurricular activities (α = .51). All items contributed to this factor structure and had a primary factor loading above the recommended .30. One item, FACPLANS (how often have you talked about career plans with an instructor or advisor), had cross-loading on factor two (interaction with faculty and peers) and

factor five (use of advising services), but loaded slightly stronger on factor two. All other

variables had a strong primary loading with only one of the eight factors in the factor structure.

Table 2.2 provides the factor loading pattern matrix for the final solution. Table 2.3 provides a

detailed description of the latent variables and their items.

Table 2.2

Factor Loading Matrix of the CCSSE Scale: Principal Axis Factoring with Promax Rotation

	Factor								Com-munality
Item	1	2	3	4	5	6	7	8	
GNANALY	**0.811**	0.072	0.112	0.038	0.071	0.006	0.124	0.007	0.698
GNSPEAK	**0.810**	0.081	-0.047	0.001	0.044	0.178	-0.029	0.098	0.710
GNOTHERS	**0.762**	0.157	-0.058	0.031	0.115	0.060	0.019	0.017	0.627
GNWRITE	**0.751**	0.189	-0.030	0.032	0.000	0.268	0.030	0.053	0.677
GNINQ	**0.742**	0.004	0.044	0.035	0.045	0.058	0.067	0.034	0.564
GNCARGOAL	**0.662**	0.119	-0.005	0.006	0.158	0.147	-0.128	0.064	0.519
GNSOLVE	**0.585**	0.057	0.027	0.028	0.006	0.043	0.166	0.044	0.378
GNGAINCAR	**0.550**	0.130	-0.018	0.075	0.183	0.151	-0.176	0.034	0.413
OCCGRP	0.066	**0.601**	-0.103	0.010	0.144	0.069	0.137	0.115	0.434
FACIDEAS	-0.058	**0.597**	0.015	0.004	0.076	0.022	0.030	0.074	0.372
CONVSTUDIFF	-0.078	**0.517**	0.123	0.017	0.099	0.037	0.037	0.054	0.304
CLASSGRP	0.061	**0.516**	-0.044	0.011	0.146	0.117	0.000	0.014	0.307
FACGRADE	-0.031	**0.515**	-0.013	0.029	0.164	0.100	0.085	0.134	0.329
FACOTH	-0.007	**0.501**	0.018	0.004	0.032	0.041	-0.125	0.274	0.344
FACPLANS	-0.004	**0.468**	-0.024	0.022	<u>0.409</u>	0.016	-0.050	0.091	0.398
CLQUEST	-0.031	**0.454**	0.081	0.010	0.041	0.056	0.082	0.087	0.233
OOCIDEAS	-0.007	**0.442**	0.128	0.038	0.058	0.018	0.158	0.087	0.249
TUTOR	-0.019	**0.416**	0.001	0.020	0.097	0.070	0.127	0.247	0.266
APPLYING	0.020	0.062	**0.776**	0.020	0.012	0.068	-0.010	0.037	0.613
NEWIDEAS	0.008	0.033	**0.754**	0.026	0.025	0.046	0.005	0.013	0.573
ANALYZE	-0.002	0.007	**0.684**	0.019	0.009	0.016	0.082	0.010	0.475
PERFORM	0.124	0.163	**0.534**	0.009	0.006	0.107	-0.002	0.014	0.339
ENVSOCAL	0.016	0.018	-0.026	**0.829**	0.031	0.006	-0.056	0.057	0.696
ENVNACAD	-0.065	0.038	-0.007	**0.809**	0.018	0.023	-0.063	0.070	0.670
ENVDIVRS	0.037	0.089	0.053	**0.608**	0.068	0.026	0.035	0.039	0.390

Table 2.2, continued

Factor Loading Matrix of the CCSSE Scale: Principal Axis Factoring with Promax Rotation

	Factor								
Item	1	2	3	4	5	6	7	8	Com-munality
ENVSUPRT	0.136	0.044	0.044	**0.559**	0.040	0.027	0.078	0.114	0.356
FINSUPP	0.030	0.130	-0.013	**0.473**	0.169	0.054	0.016	0.071	0.279
FREQACAD	-0.047	0.114	0.011	0.009	**0.668**	0.105	0.111	0.000	0.485
FREQCACOU	0.004	0.049	-0.003	0.017	**0.560**	0.002	-0.010	0.147	0.338
FREQTRADV	-0.028	0.095	0.062	0.038	**0.464**	0.072	0.047	0.232	0.292
FREQFAADV	-0.018	0.058	-0.017	0.069	**0.450**	0.049	0.099	0.022	0.224
INTEGRAT	-0.014	0.155	0.065	0.012	0.028	**0.661**	-0.054	0.070	0.475
REWROPAP	0.027	0.128	-0.021	0.031	0.100	**0.536**	0.001	0.043	0.318
NUMPAPRRPTS	-0.023	0.021	0.019	0.010	0.106	**0.475**	0.047	0.038	0.242
CLPRESEN	0.043	0.334	-0.050	0.025	0.032	**0.416**	-0.124	0.081	0.312
FREQSTORG	0.055	0.018	0.068	0.016	0.195	0.015	-0.040	**0.535**	0.334
PARTICXCUR	0.022	0.059	0.036	0.012	0.030	0.014	-0.095	**0.518**	0.283
FREQTUTOR	0.028	0.073	-0.093	0.044	0.253	0.053	**0.422**	0.185	0.296
ACADPR01	0.051	0.115	0.067	0.046	0.040	0.054	**0.389**	0.072	0.184
CHALNGXAM	0.123	0.100	0.029	0.030	0.054	0.040	**0.370**	0.166	0.196
PARTICSI	-0.006	0.169	-0.062	0.032	0.112	0.101	**0.300**	0.183	0.179
Eigenvalue	9.244	2.220	1.848	1.263	0.943	0.874	0.511	0.701	17.604
% of variance	22.011	5.285	4.400	3.006	2.246	2.082	1.216	1.668	41.914

Table 2.3

Items and Labels from the Results of Exploratory Factor Analysis

Latent Variables	Item Codes	Items
Personal Development (α = .90)		How much has your experience at this college contributed to your knowledge, skills, and personal development in the following areas?
	GNSPEAK	Speaking clearly and effectively
	GNANALY	Thinking critically and analytically
	GNWRITE	Writing clearly and effectively
	GNOTHERS	Working effectively with others
	GNINQ	Learning effectively on your own
	GNCARGOAL	Developing clearer career goal
	GNSOLVE	Solving numerical problems

Table 2.3, continued

Items and Labels from the Results of Exploratory Factor Analysis

	GNGAINCAR	Gaining information about career opportunities
Interaction with faculty and peers (α = .81)		How often have you…?
	FACIDEAS	Discussed ideas from your readings or classes with instructors outside of class
	OCCGRP	Worked with classmates outside of class to prepare class assignments
	FACGRADE	Discussed grades or assignments with an instructor
	FACOTH	Worked with instructors on activities other than coursework
	CLASSGRP	Worked with other students on projects during class
	FACPLANS	Talked about career plans with an instructor or advisor
	CONVSTUDIFF	Had serious conversations with students who differ from you
	CLQUEST	Asked questions in class or contributed to class discussions
	OOCIDEAS	Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)
	TUTOR	Tutored or taught other students (paid or voluntary
Higher order thinking (α = .84)		How much has your college emphasized…?
	NEWIDEAS	Forming a new idea or understanding from various pieces of information
	APPLYING	Applying theories or concepts to practical problems or in new situations
	ANALYZE	Analyzing the basic elements of an idea, experience, or theory
	AVALUATE	Making judgements about the value or soundness of information, arguments, or methods
	PERFORM	Using information you have read or heard to perform a new skill
Institutional support (α = .81)	ENVSOCAL	Providing the support you need to thrive socially
	ENVNACAD	Helping you cope with your non-academic responsibilities
	ENVDIVRS	Encouraging contact among students from different economic, socia, and racial or ethnic backgrounds
	ENVSUPRT	Providing the support you need to help you succeed at this college
	FINSUPP	Providing the financial support you need to afford your education
Use of advising services (α = .62)		How often have you used the following services?
	FREQACAD	Academic advising/planning
	FREQCACOU	Career counseling
	FREQTRADV	Transfer advising/planning
	FREFAADV	Financial aid advising
Writing and critical	INTEGRAT	How often have you worked on a paper or project that required integrating ideas or information from various sources
	REWROPAP	How often have you prepared two or more drafts of a paper or assignment before turning it in
	CLPRESEN	How often have you made a class presentation
thinking (α = .69)	NUMPAPRRPTS	How much reading and writing have you done: Number of written papers or reports of any length
	FREQSTORG	How often have you used the following services: Student organizations

Table 2.3, continued

Items and Labels from the Results of Exploratory Factor Analysis

Latent Variables	Item Codes	Items
		How often have you used the following service:
Student effort (α = .51)	FREQTUTOR	Peer or other tutoring
	ACADPR01	About how many hours do you spend in a typical 7-day week doing each of the following? Preparing for class (studying, reading, writing, rehearsing, doing homework, etc.)
	PARTICSI	During the current academic year at this college, I have participated in supplemental instruction/supplemental learning (extra class sessions with the instructor or an experienced student)
	CHALNGXAM	Mark the response that best represents the extent to which your examinations during the current academic year have challenged you to do your best work at this college
	ACADPR01	About how many hours do you spend in a typical 7-day week doing each of the following? Preparing for class (studying, reading, writing, rehearsing, doing homework, etc.)
	PARTICSI	During the current academic year at this college, I have participated in supplemental instruction/supplemental learning (extra class sessions with the instructor or an experienced student)
	CHALNGXAM	Mark the response that best represents the extent to which your examinations during the current academic year have challenged you to do your best work at this college

Findings of the Confirmatory Factor Analysis

For the CFA, R software was chosen for its capacity in processing large-scale datasets and handling missing values with multiple imputation. The MICE package for multiple imputation and the semTools package for confirmatory factor analysis were used. It should be noted that LAVAAN, which is embedded in semTools, provides a solution for ordered categorical data which is the nature of CCSSE data. Numerous discussions and practices on handling missing values have recommended multiple imputation as a best approach to reduce bias and enhance the reliability of the analysis (Cox et al., 2014; Royston, 2004; Rubin, 2004). Most of the recent research literature suggests 20 iterations as sufficient. Before conducting multiple imputation, the pattern of missing data was checked for Little's MCAR and confirmed that items had fewer than 8% of missing data and that they were missing completely at random. As a result, MICE was able to run 20 iterations and the results were used for further CFA in semTools.

This study adopted four global fit indices based on widely used criteria reported in peer-reviewed journal articles (Beauducel & Wittmann, 2005; Bentler, 1990; Hu & Bentler, 1999). For the chi-square goodness-of-fit test, non-significant chi-square values would indicate that the model fit as good as a just-identified model. For the Root Mean Square Error of Approximation (RMSEA), strong scores are below .05, whereas scores above .90 for the Comparative Fit Index (CFI) CFI and Tucker-Lewis Index (TLI) are desirable.

As mentioned earlier, the second subset of data was utilized at this stage of the analysis to test the final EFA model with semTools package after 20 multiple imputation iterations with MICE package. The global fitness indices were: $\chi2(791) = 120149.765$, CFI = 0.847, TLI = 0.833, RMSEA = 0.052 (CI [0.052, 0.053]). This showed evidence of misspecification. Further examination of the modification indices, together with the input of a content and methodology

expert, several modifications were made to correlate some indicators and factors accordingly. The added item correlations were GNSPEARK (student's development in speaking clearly and effectively) with GNWRITE (student's development in writing), OCCGRP (frequency of working with classmates outside of class to prepare class assignments) with CLASSGRP (frequency of working with other students on projects during class), APPLYING (college emphasized applying theories to practical problems) with PERFORM (college emphasized using information to perform a new skill), ENVSOCAL (college emphasized providing the support to thrive socially) with ENVNACAD (college emphasized the helping you cope with your non-academic responsibilities); FINSUPP (college emphasized providing the financial support you need to afford your education) with FREQFAADV (frequency of using financial aid advising); and lastly, the item FACPLANS (frequency of talking about career plans with an instructor or advisor) with factor UAS (use of advising service).

The goodness of fit indices after model modification are as the following: CFI = .910, TLI = .901, RMSEA = .040 (CI [.040, .041]), which was in alignment of the commonly accepted global fitness indices standards. Lastly, the third subset of data was utilized to rerun the CFA model obtained from the second subset. The output of these two CFAs was close, thus further confirming the reliability of the model.

Final Eight Factor Model

The exploratory and confirmatory factor analysis resulted in an eight-factor construct of student engagement in CC settings. It should be noted that several factors are consistent with the findings of CC researchers, especially about the importance of student faculty interaction, peer interaction, institutional supports, and advising service. Figure 2.1 is based on the results of the CFA analysis and model.
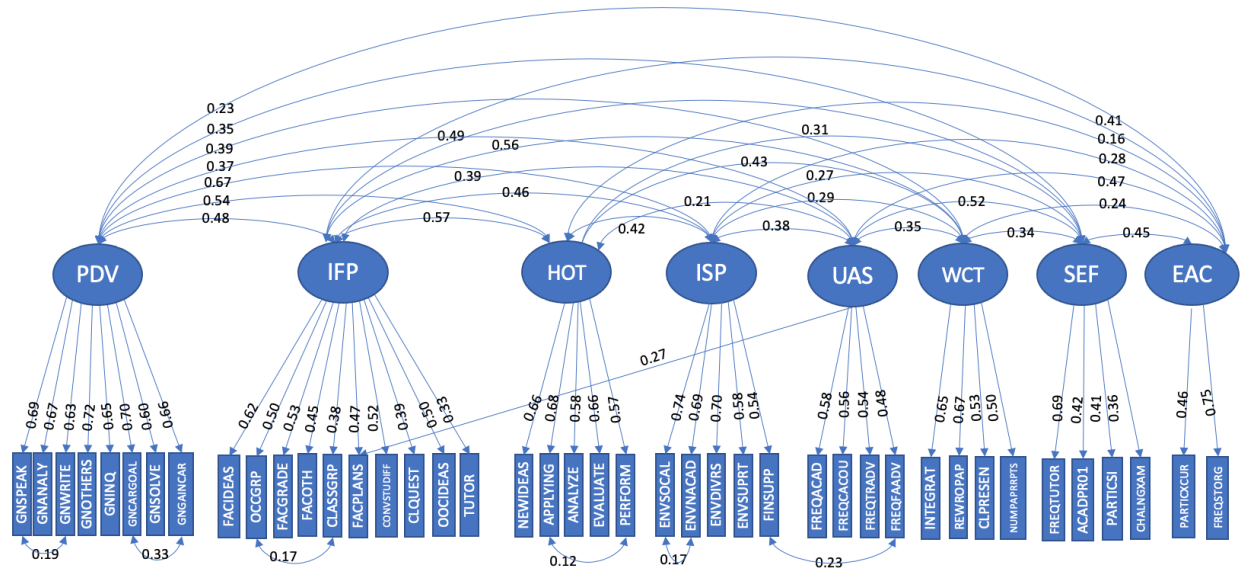
Figure 2.1

Eight Factor Construct of Student Engagement as Measured by CCSSE

The structure is consistent with the EFA analysis, and correlated several items based on the CFA modification:

- Personal Development (PDV): items GNSPEAK (speaking clearly and effectively) and GNWRITE (writing clearly and effectively), items GNCARGOAL and GNGAINCAR are correlated based on expert input and modification indices.

- Interaction with Faculty and Peers (IFP): items OCCGRP (working with classmates outside of class to prepare class assignments) and CLASSGRP (working with other students on projects during class) are correlated. Item FACPLANS (talking about career plans with an instructor or advisor) is correlated with another factor, Use of Advising Service.

- Higher Order Thinking (HOT): Items APPLYING (applying theories or concepts to practical problems or in new situations) and PERFORM (using information you have read or heard to perform a new skill) are correlated.

- Institutional Support (ISP): items ENVSOCAL (providing the support needed to thrive socially) and ENVNACAD (helping cope with non-academic responsibilities (work, family, etc.)) are correlated. Item FINSUPP (providing the financial support needed to afford your education) is correlated with item from the next factor, Use of Advising Services.

- Use of Advising Services (UAS): the last item, FREQFAADV, frequency of financial aid advising, is correlated with providing financial support from the institutional support factor. An item from interaction with faculty and peers, talking about career plans with an instructor or advisor, is also correlated with this factor.

Summary

Of the total 38 items from the benchmarks, 28 (73.7%) of them appeared in the engagement factors. However, benchmark items often fell into different factors. Of the total 42 items in the engagement factors, 14 (33.3%) were non-benchmark items. Two factors were comprised of all new items: eight new items constituted the personal development factor, and two new items constituted the extracurricular activities factor. Figure 2.2 summarizes the overlapping and different items between the benchmarks and the engagement factors.

CFA Validity Study Engagement Factors	2017 CCSSE Engagement Benchmarks					
	Non-benchmark	ACL	SE	AC	SFI	SL
Personal Development	GNSPEAK GNANALY GNWRITE GNOTHERS GNINQ GNCARGOAL GNSOLVE GNGAINCAR					
Interaction with faculty and peers	CONVSTU-DIFF	OCCGRP CLASSG-RP CLQUEST OOCID-EAS TUTOR			FACIDEAS FACGRA-DE FACOTH FACPLANS	
Higher order thinking				NEWIDEAS APPLYING ANALYZE EVALUATE PERFORM		
Institutional support						ENVSOC-AL ENVNAC-AD ENVDIVRS ENVSUPRT FINSUPP
Use of advising services	FREQTRADV FREFAADV					FREQAC-AD FREQCA-COU
Writing and critical thinking		CLPRES-EN	INTEGRAT REWROPAP	NUMPAPR-RPTS		
Extracurricular activities	PARTICXCUR FREQSTORG					
Student effort	PARTICSI		FREQTUT-OR ACADPR01	CHALNGX-AM		

Figure 2.2

Item Comparison between the Engagement Factors and Engagement Benchmarks

Discussion and Implications

CCSSE is the major national survey specifically designed to understand CC student experiences. Given its wide application to identify effective educational practices and areas for improvement at the institutional level, validity research on the most recent 2017 version is necessary to ensure the accuracy of research findings that utilize data from the survey. Most existing studies treated the five benchmarks as the object of their construct validity research, which is not appropriate as the benchmarks were not intended for such a use, nor were they based on psychometric properties (McCormick & McClenney, 2012). Further, the theoretical founding of CCSSE was mainly built upon the experiences of undergraduate students from four-year institutions. It warrants further study to examine if these theories still hold to the experiences of CC students, given research that demonstrates more fused academic and social integration for this population (Deil-Amen, 2011; Gilani et al., 2020; Hurtado, 2002).

This study aimed to address the research gap and provide construct validity evidence for the 2017 CCSSE version. Exploratory and confirmatory factor analysis indicated eight engagement factors: personal development, interaction with faculty and peers, higher order thinking, institutional support, use of advising services, writing and critical thinking, student effort, and extracurricular activities. Examining these factors and their items against CCSSE's theoretical founding leads to a deeper understanding of student engagement with new perspectives. The structure and components of engagement resonates with multiple studies that explored the proactive practices that enhance CC student outcome and success. It also can serve as a starting point to explore more nuance in both the student individual level and CC organizational level as researchers have agreed that there are stark differences between CCs student experiences and their baccalaureate-granting counterpart experiences.

To be more specific, the evidence of CCSSE's construct validity can shed light on the recent theoretical development of socioacademic integration (Deil-Amen, 2011). The fusion of socioacademic integration not only acknowledges the insight of Tinto's theory of social and academic integration but also considers the critics that this theory was based on baccalaureate-granting residential student experiences which can be vastly different with how CC students expect and perceive their own experiences. It is not surprising to detect some degree of overlap between the engagement factors and the vehicles for socioacademic integration summarized by Deil-Amen (2011). Perhaps the most striking is that they both have a prominent place for interactions and mentor relationships with faculty and staff. Empirical research also suggests that interactions between faculty and students have multiple positive influences on student outcomes such as college experience, grades, worldview, and academic and personal development (Cox, 2011; Grantham et al., 2015; Pascarella & Terenzini, 2005). This process is significantly enhanced when faculty create environments that encourage student engagement and impact learning outcomes, in both formal and informal contexts (Cotten & Wilson, 2006; Umbach & Wawrzynski, 2005).

Engagement encompasses at least two sources of effort: student and college. In this study, the factors of institutional support (ISP) and use of advising services (UAS) demonstrate that the two parties share the responsibility. While students have pre-entry characteristics and have to negotiate their work, family, and study responsibilities, the institution needs to understand and respond to their needs and commit to promoting student success. Among various interventions and practices, researchers have proposed academic advising as one of the most effective methods for retention and graduation (Ensign, 2010). Academic advisors are the primary source of CC's social capital as they provide important information that students need to

know in order to persist or transfer (Packard & Jeffers, 2013). Students reported interaction with faculty as pivotal for social capital transmission, especially as an agency to assist them surmount procedural obstacles (Deil-Amen, 2011). Given the fact that many CC students come from backgrounds with insufficient information on how to navigate college, the role of institutional agents (faculty, advisor, etc.) and social capital is even more critical.

Recommendations for Future Research

For future research, a measurement invariance test is warranted to examine if the construct holds stable across different student subgroups based on demographic factors such as race, gender, enrollment intensity, and age group. Only by establishing measurement invariance of the engagement construct can the engagement experiences and performances of student subgroups be compared. This can serve and inform CC personnel when designing targeted initiatives to underserved, underrepresented subgroups. Another important area that needs research attention is the psychological aspect of student engagement. There has been some academic discussion on this topic, but more work needs to be done to incorporate and measure this element.

Recommendations for Practice

CC administrators should consider utilizing the engagement factors to have a better grasp of their institution's engagement performance and adopt more effective institutional improvement. While the benchmarks are suitable for comparison at institutional level to some degree, the engagement factors make it possible to estimate each student's engagement experience and correlate or predict multiple outcome variables at student level. Just as the engagement factors confirm that students and institutions own their respective responsibilities to

engage and succeed, administrators and practitioners will gain a more nuanced understanding on how to serve CC students.

Conclusion

This paper examined the 2017-2019 CCSSE national data and methodologically utilized multiple imputation to account for missing data in the survey to enhance the accuracy of the findings. The findings demonstrate evidence to support an eight-factor engagement construct for CC students. Compared to the five benchmarks which have been widely used to evaluate the institutional level of student engagement, this construct is more methodologically rigorous and accurate, and resonating with the more recent findings that focus on the specific experiences of CC students in their institutional context.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (Eds.). (2014). *Standards for educational and psychological testing*. American Educational Research Association. https://www.testingstandards.net/uploads/7/6/6/4/76643089/standards_2014edition.pdf

Angell, L. (2009). Construct validity of the Community College Survey of Student Engagement (CCSSE). *Community College Journal of Research and Practice*, *33*, 564-570.

Astin, A. W. (1984). Student involvement: a developmental theory in higher education. *Journal of College Student Development Personnel, 25(4), 297–308.*

Astin, A. W. (2005). Making sense out of degree completion rates. *Journal of College Student Retention: Research, Theory & Practice,* 7(1), 5–17. https://doi.org/10.2190/7PV9-KHR7-C2F6-UPK5

Beauducel, A., & Wittmann, W. W. (2005). simulation study on fit indexes in CFA based on data with slightly distorted simple structure. *Structural Equation Modeling: A Multidisciplinary Journal, 12*(1), 41–75. https://doi.org/10.1207/s15328007sem1201_3

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238–246. https://doi.org/10.1037/0033-2909.107.2.238

Braxton, J. M., Hirschy, A. S., & McClendon, S. A. (2004). *Understanding and Reducing College Student Departure*. Jossey-Bass.

Bryson, C. (2014). Clarifying the concept of student engagement. In C. Bryson (Ed.), *Understanding and developing student engagement* (pp. 1–22). Routledge.

Bush, E. C., & Bush, V. L. (2010). Calling out the elephant: An examination of African American male achievement in community colleges. *Journal of African American Males in Education*, *1*(1), 40–62.

Center for Community College Student Engagement. (2015). *Engagement rising: A decade of CCSSE data shows improvements across the board*. The University of Texas at Austin, Program in Higher Education Leadership. https://www.ccsse.org/docs/Engagement_Rising.pdf

Center for Community College Student Engagement. (n.d.) https://www.ccsse.org/survey/reports/2021/overview.cfm

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin, 39*(7), 3-7.

Chung, S. & Cai, L. (2019). Alternative multiple imputation inference for categorical structural equation modeling. *Multivariate Behavioral Research*, 54(3), 323–337. https://doi.org/10.1080/00273171.2018.1523000

Cotten, S. R., & Wilson, B. (2006). Student-faculty interactions: Dynamics and determinants. Higher Education, 51(4), 487–519. https://doi.org/10.1007/s10734-004-1705-4

Cox, B. E. (2011). A developmental typology of faculty–student interaction outside the classroom. In Hu, S. & Li, S. (Eds.), *New Directions for Institutional Research*: *2011*(S1). *Using typological approaches to understand college student experiences and outcomes* (pp. 49–66). Jossey-Bass. http://doi:10.1002/ir.416

Cox, B. E., McIntosh, K. L., Reason, R. D., & Terenzini, P. T. (2014). Working with missing data in higher education research: A primer and real-world example. *Review of Higher Education*, *37*(3), 377-402.

Cronbach, L. J. (1971). Test validation. In R. L. Thorndike (Ed.), *Educational measurement* (2nd ed., pp. 443-507). American Council on Education.

Cureton, E. E. (1951). Validity. In E. F. Lindquist (Ed.), *Educational measurement* (pp. 621-694). American Council on Education.

Deil-Amen, R. (2011). Socio-academic integrative moments: Rethinking academic and social integration among two-year college students in career-related programs. *The Journal of Higher Education, 82*(1), 54–91. https://doi.org/10.1080/00221546.2011.11779085

Ensign, R.L. (2010). Fast gainers: 4 ways that colleges have raised graduation rates. *Chronicle of Higher Education, 57*(16), A15. https://www.chronicle.com/article/fast-gainers-4-ways-that-colleges-have-raised-graduation-rates/

Flynn, D. (2014). Baccalaureate attainment of college students at 4-year institutions as a function of student engagement behaviors: Social and academic student engagement behaviors matter. *Research in Higher Education*, *55*(5), 467–493. https://doi.org/10.1007/s11162-013-9321-8

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). Psychosocial factors and community college student success: A meta-analytic investigation. *Review of Educational Research*, *87*(2), 388–424. https://doi.org/10.3102/0034654316653479

Ghazzawi, D., McKinney, L., Horn, C., Burridge, A. B., & Carales, V. (2021). Reconceptualizing student engagement: Investigating the validity of CCSSE benchmarks as indicators of international student engagement. *Journal of International Students*, *11*(2), 436–458. https://doi.org/10.32674/jis.v11i2.2215

Goretzko, D., Heumann, C., & Bühner, M. (2020). Investigating parallel analysis in the context

of missing data: A simulation study comparing six missing data methods. *Educational

and Psychological Measurement*, 80(4), 756–774.

https://doi.org/10.1177/0013164419893413

Grantham, A., Robinson, E. E., & Chapman, D. (2015). "That truly meant a lot to me": A

qualitative examination of meaningful faculty–student interactions. *College Teaching*, 63,

125–132. http://doi:10.1080/87567555.2014.985285

Harris III, F. & Wood, J. L. (2016). Applying the socio-ecological outcomes model to the student

experiences of men of color. *New Directions for Community Colleges, 2016*(174), 35–46.

https://doi.org/10.1002/cc.20201

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:

Conventional criteria versus new alternatives. *Structural Equation Modeling: A

Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher

Education*, 38(5), 758-773.

Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface:

understanding the mechanisms of student success. *Higher Education Research and

Development*, *37*(1), 58–71. https://doi.org/10.1080/07294360.2017.1344197

Kane, M. T. (2013). Validating the interpretations and uses of test scores. *Journal of Educational

Measurement, 50*(1), 1–73. https://doi.org/10.1111/jedm.12000

Kane, M. T. (2016). Explicating validity. *Assessment in Education: Principles, Policy &

Practice, 23*(2), 198–211. https://doi.org/10.1080/0969594X.2015.1060192

Kuh, G. D. (2001). *The national survey of student engagement: Conceptual framework and overview of psychometric properties*. Indiana University Center for Postsecondary Research. https://hdl.handle.net/2022/24268

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *The Journal of Higher Education*, *79*(5), 540–563. https://doi.org/10.1353/jhe.0.0019

Mandarino, C., & Mattern, M. Y. (2010). *Assessing the validity of CCSSE in an Ontario college*. Higher Education Quality Council of Ontario. https://heqco.ca/wp-content/uploads/2020/03/CCSSE_ENG.pdf

Marti, C. N. (2008). Dimensions of student engagement in American community colleges: Using the community college student report in research and practice. *Community College Journal of Research and Practice*, *33*(1), 1–24. https://doi.org/10.1080/10668920701366867

McCarrell, K., & Selznick, B. (2020). (Re)Measuring community college student engagement: Testing a seven-factor CCSSE model. *Community College Review*, *48*(4), 400–422. https://doi.org/10.1177/0091552120936345

McClenney, K. L. (2007). The community college survey of student engagement. (Research Update). *Community College Review, 35*(2), 137–.

McCormick, & McClenney, K. (2012). Will these trees ever bear fruit? A response to the special issue on student engagement. *Review of Higher Education*, *35*(2), 307–333. https://doi.org/10.1353/rhe.2012.0010

Messick, S. (1989). Validity. In R. L. Linn (Ed.), *Educational measurement* (3rd ed., pp. 13-103). American Council on Education & Macmillan.

Nelson Laird, T. F., Seifert, T.A., Pascarella, E. T., Mayhew, M. J., & Blaich, C. F. (2014). Deeply affecting first-year students' thinking: Deep approaches to learning and three dimensions of cognitive development. *The Journal of Higher Education, 85*(3), 402–432. https://doi.org/10.1080/00221546.2014.11777333

Nora, A., Crisp, G., & Matthews, C. (2011). A reconceptualization of CCSSE's benchmarks of student engagement. *The Review of Higher Education*, *35*(1), 105–130. https://doi.org/10.1353/rhe.2011.0036

Olinsky, A., Chen, S., & Harlow, L. (2003). The comparative efficacy of imputation methods for missing data in structural equation modeling. *European Journal of Operational Research*, *151*(1), 53–79. https://doi.org/10.1016/S0377-2217(02)00578-7

Pace, C. R. (1984). *Measuring the quality of college student experiences*. University of California, Higher Education Research Institute. https://files.eric.ed.gov/fulltext/ED255099.pdf

Packard, B. W. L., Jeffers, K. C. (2013). Advising and progress in the Community College STEM transfer pathway. *NACADA Journal*, *33*(2), 65-75. https://doi.org/10.12930/NACADA-13-015

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (2nd ed.). Jossey-Bass.

Pike, G. R. (2013). NSSE benchmarks and institutional outcomes: A note on the importance of considering the intended uses of a measure in validity studies. *Research in Higher Education*, *54*(2), 149–170. https://doi.org/10.1007/s11162-012-9279-y

Quin, D. (2017). Longitudinal and contextual associations between teacher-student relationships

    and student engagement: A systematic review. *Review of Educational Research*, *87*(2),

    345–387. https://doi.org/10.3102/0034654316669434

Roman, M. A., Taylor, R. T., & Hahs-Vaughn, D. (2010). The retention index of the Community

    College Survey of Student Engagement (CCSSE): How meaningful is it? *Community*

    College Journal of Research and Practice, *34*(5), 386–401.

Royston, P. (2004). Multiple imputation of missing values. *The Stata Journal, 4*(3), 227-241.

    https://doi.org/10.1177/1536867X0400400301

Rubin. (2004). *Multiple imputation for nonresponse in surveys.* Wiley-Interscience.

Schuetz, P. (2008). A theory-driven model of community college student engagement.

    Community College Journal of Research and Practice, *32*, 305-324.

Shi, D., Lee, T., Fairchild, A. J., & Maydeu-Olivares, A. (2020). Fitting ordinal factor analysis

    models with missing data: A comparison between pairwise deletion and multiple

    imputation. *Educational and Psychological Measurement*, *80*(1), 41–66.

    https://doi.org/10.1177/0013164419845039

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research.

    Review of Educational Research, 45(1), 89–125.

    https://doi.org/10.3102/00346543045001089

Umbach, P. D., & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in

    student learning and engagement. *Research in Higher Education*, 46, 153–184.

    http://doi:10.1007/s11162-004-1598-1

Webber, K. L., Nelson Laird, T. F., & BrckaLorenz, A. M. (2013). Student and faculty member engagement in undergraduate research. *Research in Higher Education, 54*(2), 227–249. https://doi.org/10.1007/s11162-012-9280-5

Wolf-Wendel, L., Ward, K., Kelly, A., & Kinzie, J. (2009). A tangled web of terms: The overlap and unique contribution of involvement, engagement, and integration to understanding college student success. *Journal of College Student Development*, *50*(4), 407–428. https://doi.org/10.1353/csd.0.0077

Wood, J. L. (2014). Apprehension to engagement in the classroom: Perceptions of Black males in the community college. *International Journal of Qualitative Studies in Education*, 27(6), 785–803. https://doi.org/10.1080/09518398.2014.901575

CHAPTER 3: MEASUREMENT INVARIANCE OF THE COMMUNITY COLLEGE SURVEY OF STUDENT ENGAGEMENT

In the dynamic landscape of higher education, the success of community college (CC) students stands as a barometer of broader societal progress and educational equity. Research consistently demonstrates a strong correlation between student engagement and key academic outcomes, such as retention, completion, and transfer rates from CCs to baccalaureate-granting institutions (e.g., Kahu & Nelson, 2018; Öz & Boyaci, 2021; Zilvinskis et al., 2017). The CCSSE has become a pivotal national survey, highlighting the unique educational experiences and engagement levels of CC students. While extensive research has explored student engagement within baccalaureate-granting universities, predominantly focusing on White students (e.g., Deil-Amen, 2011; Fong et al., 2017), recent scholarly attention has shifted to the distinctive environment of CCs and their diverse student body (Ali-Coleman, 2019; Goldrick-Rab, 2010). These institutions traditionally serve a broad spectrum of students, including those underrepresented in higher education, from underserved communities, belonging to minoritized racial groups, and facing economic challenges (Crisp & Nuñez, 2014; Mullin, 2012).

CC students often enter higher education with varied academic preparation, balancing studies with employment, household responsibilities, and for many, being the first in their family to attend college (Goldrick-Rab, 2010; Morest, 2013). Such unique circumstances correlate with notable disparities in educational outcomes among different student groups. For instance, the three-year graduation rate for first-time, full-time CC students who began in 2016 was 28%, an improvement from previous years but still indicative of persistent challenges within American higher education (Flores et al., 2017). Disparities in completion rates are particularly evident among students of color. Hispanic and Black students, for example, have college completion rates substantially lower than their White counterparts, underscoring systemic issues that require

attention (Ortagus et al., 2023; Flores et al., 2017). Furthermore, the 'model minority' myth surrounding Asian students has been debunked, revealing that Asian American and Pacific Islander students face unique educational hurdles (Pang et al., 2011). Adult learners, defined as those aged 25 or older, also confront distinct challenges, leading to lower graduation and program completion rates compared to younger students (Tennant, 2014). The educational gender gap is also widening in CCs, with a notable trend of women outshining men. Women generally move through their educational journey quicker than males, exhibit lower dropout rates, generally have a higher GPA, and have a lesser tendency to leave their courses unfinished. In addition, males tend to have a higher rate of not completing their courses (Sontam & Gabriel, 2012). Recognizing and addressing these challenges is vital for CCs committed to providing accessible and equitable education. This commitment involves not only acknowledging the barriers faced by non-traditional student populations but also actively working to dismantle them.

Given the critical role of student engagement in predicting desirable student outcomes, two survey instruments have been developed to capture student experiences in higher education: the National Survey of Student Engagement (NSSE) for undergraduates in baccalaureate-granting institutions and CCSSE for CC students. These surveys, developed by the University of Indiana (for NSSE) and the University of Texas at Austin (for CCSSE) offer valuable insights into student engagement patterns. CCSSE, launched in 2001 and last updated in 2017, has undergone several revisions to improve its reliability and validity of scores based on feedback from participating colleges and advisory panels.

Despite CCSSE's prominence, there has been limited research on its validity, particularly regarding its 2017 version. This study, building on the findings from Study 1 that established

CCSSE's construct validity through exploratory and confirmatory factor analysis, aims to further validate the instrument. Study 1 identified an eight-factor, 42-item structure for the CCSSE, encompassing various dimensions of student engagement:

- Personal Development (8 items)

- Interaction with Faculty and Peers (10 items)

- Higher Order Thinking (5 items)

- Institutional Support (5 items)

- Use of Advising Services (4 items)

- Writing and Critical Thinking (4 items)

- Extracurricular Activities (4 items)

- Student Efforts (2 items)

Building on this foundation, this study utilizes the national 2017-2019 CCSSE dataset to continue the validation process, focusing on measurement invariance. Measurement invariance assesses whether a construct maintains its meaning across different conditions, such as time, administration methods, or population groups (Meade & Lautenschlager, 2004; Kline, 2016). Recognized as a prerequisite for meaningful group comparisons, measurement invariance ensures that observed differences across groups reflect true variations in the underlying constructs (Thompson et al., 2020). This study, therefore, examines the measurement invariance of the eight CCSSE engagement factors, setting the stage for subsequent analyses of group differences based on gender, age, race, and enrollment intensity.

By undertaking this comprehensive analysis, this study aims to contribute significantly to the field of educational research, particularly in understanding and enhancing student engagement in CCs. This commitment involves not only acknowledging the varied barriers faced

by non-traditional student populations but also actively working to dismantle them, ensuring that

CCs can continue to serve as effective and equitable pathways to higher education.

Literature Review

Measurement invariance, also known as measurement equivalence, is a foundational

statistical concept in psychometrics, essential for ensuring the consistency and reliability of

measurement instruments across diverse groups, populations, or over time (Putnick & Bornstein,

2016). This concept is pivotal in determining whether observed differences or similarities in

research outcomes reflect the actual constructs being measured, rather than being artifacts of the

measurement instrument or its administration (Meredith, 1993).

Despite the recognition of Measurement Invariance (MI) for over three decades

(Meredith, 1993), its integration into comparative studies, especially those examining theoretical

constructs and their measurement parameters, remains limited (Davidov et al., 2014). The

neglect of MI analysis can lead to misleading conclusions, posing a threat to the reliability and

validity of study results (Vandenberg & Lance, 2000). Identical scores across groups might mask

true differences due to methodological artifacts, while variations in scores might be

misinterpreted as differences in constructs, rather than being a result of methodological biases

(Leitgöb et al., 2023; Millsap, 2011; Davidov et al., 2019).

This literature review is structured to first delve into the development and significance of

measurement invariance, followed by its specific application in educational research, with a

particular focus on the CCSSE. It then transitions to a review of the relevant literature on student

engagement, emphasizing the differential experiences of engagement among various student sub-

groups. This approach aims to provide an understanding of how engagement varies across

different demographics and the methodological importance of ensuring measurement invariance

in such comparative studies. Through this exploration, the review sets the stage for subsequent analysis and discussion of the CCSSE and its application in assessing diverse student experiences in CCs.

Measurement Invariance in Progress

The development of measurement invariance, a key concept in psychometric research, is closely linked with both traditional test theory and item response theory with the latter providing a robust framework for evaluating how individual test items function across different populations. Traditional test theory primarily focuses on the reliability and validity of test scores without considering the potential variability of these properties across diverse groups. However, a significant methodological and conceptual leap was made with the advent of factor analysis. In the factorial invariance literature, scholars point out that measures might not be uniformly comparable across diverse groups or populations in psychological and educational research (Vandenberg & Lance, 2000). In particular, confirmatory factor analysis (CFA) allows for a detailed examination of whether the same constructs are being measured equivalently across groups. The extension of CFA into Multiple Group Confirmatory Factor Analysis (MGCFA) marked a pivotal development in measurement invariance analyses. MGCFA enables researchers to systematically test for measurement invariance across multiple groups by comparing the factor structure, factor loadings, and item intercepts across these groups, thus providing a more nuanced understanding of how different populations interpret and respond to survey items (Byrne, 2004). This progression from simple factor analysis to MGCFA underscores the importance of equivalence in measurement across diverse groups—a critical consideration in modern psychological and educational research. Due to the purpose and scope of this paper, the focus is on the measurement invariance research methodology involving MGCFA. This approach is the

most prevalent (Jöreskog, 1971; Sörbom, 1974) and is suitable for the CCSSE instrument and subgroups of interest.

Measurement invariance emerged as an indispensable prerequisite for conducting meaningful latent group mean comparisons (Vandenberg & Lance, 2000). Key questions in this area include the consistency of measure interpretation across cultures, the similarity in performance ratings for the same targets, and the influence of individual differences like gender and ethnicity on responses. Another significant aspect is whether an intervention or experimental manipulation alters the group's conceptual framework over time, impacting how they respond to a measure. However, it's important to note that comparability does not necessarily mean that the scores are identical. It merely ensures that the scores can be meaningfully compared across different groups. Therefore, while scores might be comparable, they could still be unequal. (Leitgöb & Seddig, 2023). Measurement Invariance (MI) indicates that the comparisons made are valid and appropriate, essentially confirming that researchers are not making comparisons between fundamentally different things, like comparing "chopsticks with forks." (Leitgöb & Seddig, 2023). Particularly in the realm of education, such as in student surveys, ensuring measurement invariance is critical to ascertain that the results genuinely reflect students' experiences and perceptions. This principle is a critical concept in education research, as it lays the foundation for valid and reliable comparisons between different student groups, where equitable and accurate measurement across diverse student demographics is essential (Millsap, 2011; Visser et al., 2023). As Millsap (2011) put it, "decisions based on biased test results could unfairly penalize or stigmatize an entire group of people (p. 7)".

Although MI literature can be traced back to seismic work of Meredith (1993), up until Vandenberg and Lance's (2000) review of measurement invariance, the operationalization and

applications still varied. The recommended tests for MI lacked uniformity, and their use in empirical research was not consistently applied. With the advancements of MI's conceptualization and methodology at the turn of the century, most researchers now adopt the ladder-like, increasingly restrictive steps to testing measurement invariance: (1) configural, (2) metric (weak) invariance, (3) scalar (strong) invariance, and (4) residual (strict) invariance (Byrne, 2004; Leitgöb, & Seddig, 2023; Putnick & Bornstein, 2016). Each step imposes a stronger constraint than the previous one. Except for the first step of configural invariance which serves as a baseline model, each step's model fit is compared to the previous less constrained model (metric vs. configural, scalar vs. metric, and strict vs scalar). The following gives a brief account of each of the steps.

Steps for Testing Measurement Invariance

Firstly, configural invariance pertains to the consistency of the factor structure across groups. To test for configural invariance, researchers fit the same factor model across different groups without imposing any parameter constraints. This involves examining whether the number of factors and the pattern of factor loadings are consistent across the groups. This foundational step is crucial for verifying that the factor patterns are uniformly held across the groups, thereby confirming that the constructs are conceptually similar across distinct groups.

Next, metric invariance, also known as weak invariance, involves constraining the factor loadings to be equal across groups. The primary objective of metric invariance is to determine if the construct operates uniformly across all groups. To establish metric invariance, one must compare the fit of the metric invariance model with the configural model's fit. If the comparison does not show a significant decline in the model's fit, it can be generally assumed that the data

supports metric invariance. This step is essential for allowing the comparison of the relationships among factors and the unstandardized regression coefficients (Leitgöb, 2023).

Then, scalar invariance is considered. Scalar invariance involves equating the intercepts of the items across groups, in addition to the factor loadings (Millsap & Yun-Tein, 2004). Scalar invariance is established if the fit of this more constrained model remains relatively stable when compared to the fit of the metric model. If the fit of this model does not significantly worsen compared to that of metric invariance, one can assume scalar invariance. This assumption suggests that comparisons of latent construct means across groups are meaningful.

Finally, strict invariance is tested by imposing equality constraints on the item residuals while maintaining the constraints set in the previous steps. Strict invariance implies that measurement errors are consistent across different groups. However, it is important to note that strict invariance does not directly impact the comparability of structural parameters between groups. Additionally, due to its challenging nature in the context of social science research, it is observed that most applied studies opt to conduct group mean comparisons after establishing scalar (strong) measurement invariance.

Goodness of Fit Indices

When assessing MI model fit, it is essential to evaluate both the overall fit of the model and the differences between constrained and less constrained models (Leitgöb, 2023).

Overall Model Fit. Multiple indices are recommended to evaluate overall model fit because the traditional chi-square test is sensitive to sample size and model complexity (Cheung & Rensvold, 2002). These indices include:

- **Root Mean Square Error of Approximation (RMSEA):** It assesses the model's fit per degree of freedom, ideally being below .06 and acceptable below .08.

- **Standardized Root Mean-square Residual (SRMR):** This index evaluates the standard difference between observed and predicted correlations, with values below .08 considered excellent and below .10 good.

- **Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI):** Both measure the model fit relative to a null model, where values above .90 are good and above .95 are ideal (Hu & Bentler, 1999).

Comparing Differences Between Models. This involves examining whether a model with more constraints fits the data comparably to a model with fewer constraints. The primary criteria used here include a non-significant chi-square difference test ($\Delta\chi^2$) or a change in CFI less than or equal to .01 (Cheung & Rensvold, 2002). For metric invariance, ΔCFI should be ≤.01, paired with ΔRMSEA ≤.015 or ΔSRMR ≤.030; for scalar invariance, the criteria are ΔCFI ≤.01 with ΔRMSEA ≤.015 or ΔSRMR ≤.010 (Chen, 2007). Chen (2007) also notes that CFI is often the main criterion since RMSEA and SRMR might overreject an invariant model in cases of small sample sizes, especially when testing loading or residual variance.

Measurement Invariance in Survey Research

From the early stages of factor analysis to the advent of MGCFA, the field has consistently strived to enhance the precision and fairness of psychological and educational measurements. Researchers must ensure that instruments function consistently across various groups such as gender, ethnicity, socioeconomic status, academic major, or within diverse educational contexts (Parra-Pérez et al, 2023, Byrne & Watkins, 2003; Tadesse et al., 2018; Luk et al., 2016). Measurement invariance has been widely applied in educational research to scrutinize constructs like motivation, self-esteem, and attitudes towards learning among various demographic segments, including gender, race/ethnicity, and socioeconomic status.

Measurement invariance is also pivotal in evaluating the effectiveness of educational interventions across heterogeneous groups. For instance, it is employed to determine if an educational program impacts students' academic achievement uniformly across different backgrounds (Rohm et al., 2021). In longitudinal studies, measurement invariance is crucial for investigating the stability of constructs over time. A significant application of measurement invariance testing is in the examination of the fairness of educational assessments, where it is used to ensure that these assessments are free from bias against specific groups, thereby upholding the principles of equity and inclusion in educational settings. Moreover, measurement invariance enables researchers to delve into the nuanced differences in survey responses between student groups, allowing for a deeper understanding of the underlying factors that may contribute to these variations. By verifying measurement invariance, researchers can confidently explore differential relationships or associations between constructs across different student groups, thus providing valuable insights into the unique experiences and perspectives of diverse student populations (Graham et al., 2023; Jones et al., 2022; Lau & Yuen, 2015).

Measurement Invariance Research on CCSSE

There is limited research involving measurement invariance and CCSSE. Marti (2008), considered the construct validity of CCSSE. This study utilized national data collected from the administrations of earlier version of CCSSE from 2003 (n=*53,358)*, 2004 (n = *92,301*) and 2005 (n = *129,035)*. Marti (2008) claimed to have two goals in this validity research. One was to examine the latent construct of student engagement, which was referred to as the model of best fit (MBF). The other was to examine the benchmarks of effective educational practices, which was referred to as the model of effective educational practices (MEEP). After conducting CFA for both the models (ΔRMSEA = .050, ΔSRMR = .054 for MBF; and RMSEA = .060, SRMR

= .062 for MEEP), the researcher moved on to multiple group confirmatory factor analysis (MGCFA) to examine the measurement invariance for both models across three subgroups: administration time (2003, 2004, 2005), gender (men and women), and enrollment intensity (full-time students and part-time students). Configural invariance and metric invariance were examined, but not scalar invariance (p.10). A cutoff value of .015 for RMSE was adopted as the goodness of fit indices following the recommendation of Cheung and Rensvold (2002). The research reported evidence of measurement invariance of ΔRMSEA = .000 across administration years, ΔRMSEA = -.001 across gender, and ΔRMSEA = -.008 across part- and full-time students in MFB factors. As for the MEEP, the ΔRMSEA = .000 across administration years, ΔRMSEA = .000 across gender, and ΔRMSEA = -.001 across enrollment intensity groups. The author went on to conclude that measurement invariance was established based on those evidence. Given what most researchers agree on the criteria now, it would be more accurate to say that these examination and evidence supported configural and metric invariance but not scalar invariance. In other words, it would be viable to conduct regression analysis to examine the relationship between engagement factors and outcome variables which was conducted in the next step in that research, but not enough evidence for comparing latent group means.

Disparate Experiences of Engagement

The preceding section explored measurement invariance and its pivotal role in educational research, establishing its essential role in ensuring accurate and reliable comparisons across distinct groups. This groundwork is particularly crucial as the paper now transitions to examining the diverse engagement experiences across various demographic groups, such as race, gender, age, and enrollment intensity. As the following section delves into how different student groups experience some key engagement factors, the importance of confirming measurement

invariance becomes evident. Ensuring that the construct for measuring engagement is consistent across groups is fundamental for making meaningful comparisons and understanding the true nature of engagement in diverse educational settings.

Student-Faculty Interaction

For at least the past three decades, the study of student-faculty interaction has been of interest to higher education researchers (Astin, 1993; Kuh & Hu, 2001; Strauss & Terenzini, 2007). Scholars concur that interactions between faculty and students exert a multitude of positive influences on student outcomes. These outcomes include enhancements to students' college experiences, grades, worldviews, as well as academic and personal development (Cox, 2011; Grantham, et al., 2015; Pascarella & Terenzini, 2005). To realize these desirable outcomes, it is essential for faculty to foster environments that actively encourage student engagement. Such environments can significantly impact learning outcomes, not only in formal educational settings but also in informal contexts (Cotton & Wilson, 2006; Umbach & Wawrzynski, 2005). Earlier research found positive correlations between student-faculty interaction and student outcomes in five categories: career plans and educational aspirations, satisfaction, intellectual and personal development, academic achievement, and persistence after controlling for student characteristics (Pascarella, 1980). These positive correlations were expanded by Pascarella and Terenzini (2005) to include more student outcomes such as cognitive skills and intellectual growth, attitudes and values, and career choice and development. Positive student-faculty interactions were particularly beneficial to students at risk in the first year of their college experience, which fostered active learning and positive perception of academic experiences (Beckowski & Gebauer, 2018).

Recent developments in the field of student-faculty interaction revealed that the interaction could be conditional, which indicates that the same intervention or experience could work differently (Pascarella, 2006) by student gender and race (Kim & Sax, 2009). For example, Kim (2006) found significant positive effects from student-faculty interactions on White students' educational aspiration, but not on African American students or students of Asian or Latino decent. Sax et al. (2005) found that female students were more likely to be positively affected in terms of physical, emotional, and academic growth while male students benefited more from political engagement, social activism, and liberalism out of student-faculty interaction. Kim and Sax (2009) explored the student-faculty interaction experiences of over 11,000 undergraduate students from nine University of California campuses and confirmed the conditional effects of such interaction, which varied by student's gender, race, social class, and first-generation status.

Specifically, male students benefited more by interacting with faculty about course-related issues and gained higher degree of aspiration compared with female students. African American students' research experience with faculty were more significantly and positively associated with their college GPA compared to Latino and Asian American students. Students from high income families were more likely to have high overall satisfaction with college experience from course-related interactions with faculty. Lastly, first-generation students tended to have less interaction with faculty during class sessions or outside of class, compared with non-first-generation students. However, most research on student-faculty interaction was based on the experience of students at baccalaureate-granting institutions, and very few studies explicitly probe this topic in the CC settings (Chang, 2005). This dearth of literature makes any inferences about the effects of student-faculty interactions in CC settings tenuous at best.

Peer Interaction

Interaction with peers is the second strongest indicator of student outcomes after student-faculty interaction. Taking on different forms of interaction such as study groups, collaboration and interaction, peer teaching (Lundberg, 2003 & 2014), peer interaction was a strong indicator of social integration and learning, intellectual skills, career preparation, personal development, social ability, and cultural awareness (Antonio, 2001; Braxton et al., 2004; Butler-paisley & Clemetsen, 2019; Johnson et al., 2007; Lundberg, 2014; Umbach & Kuh, 2006). It should be noted that as many CC students are commuters and spend little time on campus other than attending classes, their experiences of peer interaction most often take place in class (Ethington, 2000). This is consistent with the findings that CC students demonstrated low level of involvement in campus organizations, formal events, or extra-curricular activities (Maxwell, 2000).

Schudde (2019) utilized a large-scale national dataset from the Beginning Post-secondary Students (BPS) Longitudinal Study 2004/2009 to explore the impact of student-faculty interaction and peer interaction on first-time students' academic achievement, retention, associate degree completion, and transfer rate. The findings indicated that interaction with peers had modest impacts on student outcomes in CCs. In particular, study group participation had positive impacts on student retention and degree attainment. Specifically, it increased the likelihood of remaining enrolled by the second year of college, controlling for demographic background, academic preparation, and college context.

While peer interaction generally yields positive effects on student outcomes, its impact is not uniform across all student groups. Notably, different racial and gender groups experience and benefit from peer interaction in varied ways. For instance, interactions with ethnic minority peers

were found to be positively correlated with Latino students' GPA in baccalaureate-granting institutions (Cerezo & Chang, 2013). For male college students, peers are reference points to measure their achievement, status, as well as masculine identities (Harper, 2004; Hong, 2000). Sáenz and colleges (2015) conducted qualitative research to document the influence of peers in the educational experiences of Latino men in Texas CCs. In this study, students reported pressure to drop out of college as they wished to (a) maintain their status among male friends who found employment after graduating from high school, and (b) conform to traditional masculine roles such as dominance, self-reliance, and avoidance of the feminine. In essence, the value of peer interaction is clear, but its application and effectiveness are influenced significantly by the diverse backgrounds and experiences of students.

Academic Advising

The National Academic Advising Association (NACADA) (2006) stated that "academic advising is integral to fulfilling the teaching and learning mission of higher education". Research has proposed academic advising as an intervention to enhance student outcomes (Pascarella & Terenzini, 2005) such as retention and graduation (Ensign, 2010). Academic advisors are great source of CCs social capital as they provide important information that students need to know in order to persist or transfer (Packard & Jeffers, 2013). Students who took advantage of advising service were more likely to perform well in developmental math course and had a higher rate of transfer into baccalaureate-granting universities (Bahr, 2008). Packard and Jeffers (2013) interviewed 82 CC students who intended to transfer to a baccalaureate-granting institution and pursue a STEM degree. They reported that both advisor's knowledge and personal relationship with the students were critical to student success. Other benefits of academic advising include the increase of self-efficacy, integration into their colleges, and self-regulated learning strategy in

academic planning (Donaldson, et al., 2016, Erlich & Russ-Eft, 2013). Roessger and colleagues (2019) reported curvilinear predictive relationships between CC student age and their utilizing advising service: adult learners were less likely to use these services compared to their younger counterparts. This was determined even after accounting for factors like gender, work status, and family status. For instance, while 25% of students in the 18-22 age group and 12.8% in the 23-27 age group attended advising sessions, the rate of participation dropped significantly with age. It reached as low as 4.6% among those in the 43-47 age group and remained about the same for older students.

Research Questions and Purpose of the Study

The review of literature establishes measurement invariance as a crucial component in validating educational assessments. Despite its extensive use in evaluating student engagement, the CC Survey of Student Engagement (CCSSE) has not undergone a thorough examination for measurement invariance, particularly for its latest 2017 version. Moreover, the literature points to significant differences in engagement patterns across various demographic groups. Understanding these variations is critical, as engagement directly influences student outcomes and experiences in CCs. Given the pivotal role of the CCSSE in assessing student engagement, the absence of measurement invariance testing necessitates focused research in this area. This study aims to address this gap by examining the CCSSE's measurement invariance across different sub-groups, thereby providing a more nuanced understanding of engagement patterns. The following research questions will guide this research:

- RQ1: Using multiple-group confirmatory factor analysis, what is the extent of measurement invariance in the CCSSE across student gender, race/ethnicity, age, and enrollment intensity?

- RQ2: What are the differences in engagement patterns among the aforementioned student subgroups?

Methods

Participants

For the 2017-2019 cohort of CC students who participated in the CCSSE, the total number was 343,575 CC students nationwide from 562 colleges and 43 states. Of all the participants, 56.3% are women, 34.6% are 25 years or older, 31.3% part-time students, 36% first generation, 21.8% having children as dependent, and 36% first generation. The demographic information can be found in Table 3.1. Compared to the national IPEDS data, these categories were representative of the national CC students except for part-time students who accounted for over 60%. And there were no significant changes over the three years.

Instrument

CCSSE was developed to measure CC students' learning experiences to help colleges identify effective teaching practices, areas for improvement, and enhance student success. This paper utilized the 2017 version of the CCSSE, which comprised 47 core items along with demographic questions. These items were associated with multiple questions, culminating in a total of 124 questions. Most of the survey uses a Likert-type scale ranging from 1 to 4, designed to measure respondents' agreement with certain statements or the frequency of specific behaviors or experiences. However, the survey also employed a variety of other scales, including 0-3, 0-4, 0-5, and 1-7, reflecting the diverse nature of the questions and responses. The body of the survey called for students to report the frequency with which they engage in educational activities (e.g., participating in classroom discussions, interacting with faculty in and out of class, etc.), use the academic and student support services, and whether they have participated in a variety of

learning opportunities (college orientation programs, internships or clinical placements, developmental education, etc.). Besides conventional demographic questions, respondents also report their perceived level of academic challenge and the quality of relationships on campus (CCCSE, n.d.). Historically, CCSSE has made several modifications and revisions since its first launch in 2001.

Table 3.1

Demographic Information for 2017-2019 Cohort CCSSE Participants (n=343,575)

	Frequency	Percent
gender		
men	144,030	41.9
women	183,525	53.4
other	2,073	0.6
missing	13,947	4.1
age		
18-24	240,811	70.1
25+	93,766	27.3
missing	8,998	2.6
race/ethnicity		
American Indian	5,232	1.5
Asian	17,266	5.0
Black	35,416	10.3
Hispanic	57,458	16.7
Hawaiian	370	0.1
Pacific Islander	1,009	0.3
White	170,997	49.8
Other	5,181	1.5

Table 3.1, continued

Demographic Information for 2017-2019 Cohort CCSSE Participants (n=343,575)

	Frequency	Percent
2 or more	29,883	8.7
missing	9,712	2.8
enrollment		
part-time	99,471	29.0
full-time	244,101	71.0
institution size		
small	112,151	32.6
medium	83,938	20.4
large	93,942	27.3
extra-large	53,544	15.6
institution location		
urban	76,239	22.2
suburban	86,615	25.2
rural	173,029	50.4
missing	7,692	2.2
first generation	128,153	37.3
married	45,829	13.7
having children	62,989	18.9
first language not English	63,928	18.6
international students	15,438	4.5
served in the military	17,354	5.2
student athletes	14,107	4.1

In the study examining validity of the internal structure of the 2017 CCSSE presented in Chapter 2, the exploratory and confirmatory factor analysis supported an eight-factor structure of the student engagement construct, representing about 50% of the variance explained: (a) personal development ($\alpha = .90$), (b) interaction with faculty and peers ($\alpha = .81$), (c) higher order thinking ($\alpha = .84$), (d) institutional support ($\alpha = .81$), (e) use of advising services ($\alpha = .62$), (f) writing and critical thinking ($\alpha = .69$), (g) student efforts ($\alpha = .47$), and (h) extracurricular activities ($\alpha = .51$). All the 42 items contributed to this factor structure and had a primary factor loading above the recommended .30. The global fitness indices were: $\chi 2(791) = 120149.765$, CFI = 0.90, TLI = 0.91, RMSEA = 0.052 (CI [0.052, 0.053]). Information about individual items associated with each factor, along with the results of their factor loadings can be found in Chapter 2 in Table 2.2.

Data Collection

CCSSE is administered as a pencil-and-paper survey to students with a stratified random cluster sampling method during the spring academic term (February through May). Samples were pulled from a list of all credit bearing classes at three time slots: 11:59 a.m. and earlier; 12:00 p.m. to 4:59 p.m.; and 5:00 p.m. to 12:00 a.m. Historically, the survey has taken students up to 45 minutes to complete. Full-time students were slightly oversampled as they were enrolled in more courses and thus had a greater probability of being sampled.

Data Analysis

Building upon the work of Dimitrov (2010), Leitgöb (2023), and Putnick and Bornstein (2016), this research explored the measurement invariance of CCSSE engagement factors across various demographic dimensions: gender (men and women), race (white vs. URM students), age (18-24 vs. 25 and older), and enrollment status (part-time vs. full-time).

To achieve this, multiple-group confirmatory factor analysis (MGCFA; Millsap, 2011; Van de Schoot et al., 2012) was employed, utilizing R (R Core Team, 2023) with the lavaan (Rosseel, 2012) and semTools (Jorgensen et al., 2021) packages.

For each subgroup, MGCFA was conducted to examine configural, metric, and scalar invariance. This involved an iterative process where each level of invariance was tested, starting with configural (establishing the same factor structure across groups), followed by metric (equal factor loadings), and finally scalar (equal intercepts), providing a comprehensive analysis of the engagement factors' consistency across different demographics. Detailed steps and statistics of this analysis process are outlined in Table 3.2, which presents the sequence and specifics of the tests conducted for each subgroup. Both universal model fit indices and model comparison indices are considered to evaluate the MI model fit. CFI ≥ .90, TLI ≥ .90, RMSEA ≤ .06, SRMR ≤ .08 are the cut-off values for universal model fit (Hu & Bentler, 1999). And ΔCFI ≤ .010, ΔRMSEA ≤ 0.015, and Δ SRMR ≤ 0.03 for model comparison (Chen, 2007). A summary of these is presented in Table 3.2.

After establishing scalar invariance, latent mean comparisons were undertaken. In this analysis, the reference group for each comparison had its factor mean constrained to zero. Doing this established a common baseline or 'zero point' against which other groups can be compared. This allows for the meaningful estimation of latent mean differences across groups: Gender (comparing men to women), Age (comparing those 25 years and older to those aged 18-24), Race/Ethnicity (comparing Underrepresented Minorities (URM) to White), and Enrollment Intensity (comparing part-time students to full-time students). Essentially, this approach normalizes the starting point for each group, making it possible to quantify how much higher or lower the latent means of the other groups are in relation to this fixed point.

By using the zero-intercept as a reference point, we can then interpret the estimated latent means for other groups as the extent to which they deviate from this baseline. This provides a clear and standardized way to assess and understand the differences in latent traits between the various demographic groups under study.

Table 3.2

A Summary of Measurement Invariance Steps and Criteria

Steps	Description	Model Fit Indices	Model comparison Indices
1. Configural invariance	Fitting a baseline model for each group separately without any constraints	CFI ≥ .90 TLI ≥ .90 RMSEA ≤ .06 SRMR ≤ .08	
2. Metric (weak) invariance	Constraining the factor loadings to be the same across the groups	CFI ≥ .90 TLI ≥ .90 RMSEA ≤ .06 SRMR ≤ .08	ΔCFI ≤ .010 ΔRMSEA ≤ 0.015 Δ SRMR ≤ 0.03
3. Scalar (strong) invariance	Constraining both the factor loadings and item intercepts to be the same across the groups	CFI ≥ .90 TLI ≥ .90 RMSEA ≤ .06 SRMR ≤ .08	ΔCFI ≤ .010 ΔRMSEA ≤ 0.015 Δ SRMR ≤ 0.01

Results

Measurement Invariance (RQ1)

Measurement Invariance across Gender

Measurement invariance testing across gender revealed that both configural and metric invariance were supported, indicating a consistent factor structure and measurement of constructs across men and women (configural: CFI = .902, TLI = .893, RMSEA = .042, SRMR = .040;

metric: CFI = .902, TLI = .894, RMSEA = .042, SRMR = .040). The chi-square difference test confirmed the metric invariance with negligible changes in fit indices (ΔCFI = -.001, ΔTLI = .002).

Scalar invariance was also achieved, allowing for latent mean comparisons across genders (CFI = .894, TLI = .889, RMSEA = .043, SRMR = .041), with only minor deviations from the metric model (ΔCFI = -.008, ΔTLI = -.006). Although the CFI and TLI are slightly below .90, the consistency of the other indices, such as the CFI and RMSEA, reinforces the overall satisfactory model fit. This decision is also in accordance with previous researchers' advocate of employing multiple fit statistics to assess model fit (Kline, 2015; Putnick & Bornstein, 2016). The minor deviations from the metric model (ΔCFI = -.008, ΔTLI = -.006) are within acceptable ranges, suggesting that the instrument measures the constructs similarly across gender.

Strict invariance testing further showed equivalence in loadings, intercepts, and residuals between gender groups (CFI = .892, TLI = .889, RMSEA = .043, SRMR = .042). Despite the CFI and TLI values being marginally below the .90 threshold, the overall pattern of fit indices, particularly the stability of the CFI and the low RMSEA, indicate a robust model fit. This is further supported by the minimal index changes from the scalar model (ΔCFI = -.003, ΔTLI = .000). Thus, while CFI and TLI fall short of conventional cut-offs, the aggregate evidence from multiple indices supports the conclusion of a satisfactory fit. This comprehensive analysis affirms the CCSSE instrument's strong measurement invariance across gender, providing a solid foundation for the subsequent analyses of latent mean differences. Statistics are reported in Table 3.3.

The same steps of hierarchical measurement invariance testing were conducted across age groups (18-24 years old and 25 years and older), underrepresented minorities (URM vs. white), and enrollment intensity (full-time vs. part-time students).

Table 3.3

Measurement Invariance Model Fit Indices Across Gender

	Model Fit Indices						Differences in Fit Indices			
	χ^2	df	RMSEA	CFI	TLI	SRMR	Δ RMSEA	Δ CFI	Δ TLI	Δ SRMR
configural	345681***	1568	0.042	0.902	0.893	0.04	--	--	--	--
metric	347828***	1603	0.042	0.902	0.894	0.04	0	-0.001	0.002	.000
scalar	374638***	1637	0.043	0.894	0.889	0.041	0.001	-0.008	-0.006	0.00
strict	384092***	1679	0.043	0.892	0.889	0.042	0	-0.003	0	0.001

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

Measurement Invariance across Age

For the age group, the configural model shows good fit (RMSEA = 0.042, CFI = 0.903, TLI = 0.894, SRMR = 0.040). As we progress to more restrictive models, such as the metric (factor loadings equality) and scalar (item intercepts equality), the fit indices slightly decrease. The metric model (ΔCF I= -0.001, ΔTLI = 0.002, Δ RMSEA = 0, and Δ SRMR = 0.001) and the scalar model (ΔCF I= -0.009, ΔTLI = -0.008, Δ RMSEA = .002, and Δ SRMR = 0.001) were still within acceptable changes. The strict model (error variances equality) demonstrates a further decrease in CFI and TLI, yet the changes remain minimal (ΔCFI = -0.004, ΔTLI = -0.002, ΔRMSEA = 0.000, and Δ SRMR = 0.002). Statistics are reported in Table 3.4.

Table 3.4

Measurement Invariance Model Fit Indices Across Age

	Model Fit Indices						Differences in Fit Indices			
	χ^2	df	RMSEA	CFI	TLI	SRMR	Δ RMSEA	Δ CFI	Δ TLI	Δ SRMR
configural	351339***	1568	0.042	0.903	0.894	0.04	--	--	--	--
metric	353364***	1603	0.042	0.903	0.894	0.041	0	-0.001	0.002	.001
scalar	387219***	1637	0.043	0.893	0.888	0.041	0.002	-0.009	-0.008	0.001
strict	403499***	1679	0.044	0.889	0.886	0.043	0	-0.004	-0.002	0.002

Note: * p<.05, ** p<.01, *p<.0

Measurement Invariance across Race

In the case of URM students, the configural model fit is good (CFI = 0.901, TLI = 0.892, RMSEA = 0.043, SRMR = 0.040), indicating a consistent factor structure. As we move to the metric and scalar invariance, the changes in CFI and TLI are negligible, suggesting that the factor structure and item meaning remain consistent across URM and White groups. The strict invariance model has ΔCFI = -0.003 and ΔTLI = 0.000, Δ RMSEA = 0.000, and Δ SRMR = 0.001, which suggests a strong level of invariance across these groups. Statistics are reported in Table 3.5.

Table 3.5

Measurement Invariance Model Fit Indices Across Race

	Model Fit Indices						Differences in Fit Indices			
	χ^2	df	RMSEA	CFI	TLI	SRMR	Δ RMSEA	Δ CFI	Δ TLI	Δ SRMR
configural	356020***	1568	0.043	0.9	0.89	0.04	--	--	--	--
metric	358263***	1603	0.042	0.9	0.89	0.041	0	-0	0.002	0.001
scalar	372230***	1637	0.043	0.9	0.89	0.042	0	-0	-0.002	0.001
strict	382015***	1679	0.043	0.89	0.89	0.042	0	-0	0	0.001

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

Measurement Invariance across Enrollment Status

Regarding enrollment intensity, the configural model fit was acceptable (CFI = 0.900, TLI = 0.890, RMSEA = 0.043, SRMR = 0.041). In the following more constrained models, the changes of the model fit were the following, the metric model shows ΔCFI = -.001 ΔTLI = 0.002, Δ RMSEA = 0, and Δ SRMR = 0.001 and scalar model displays ΔCFI = -.004 ΔTLI = -0.002, Δ RMSEA = 0, and Δ SRMR = 0, indicating that the measurement holds across full-time and part-time students. The strict model also shows an acceptable small level of change (ΔCFI = -.007, ΔTLI = -0.004, Δ RMSEA = .001, and Δ SRMR = .003). Statistics are reported in Table 3.6.

Table 3.6

Measurement Invariance Model Fit Indices Across Enrollment Intensity

	Model Fit Indices						Differences in Fit Indices			
	$\chi 2$	df	RMSEA	CFI	TLI	SRMR	Δ RMSEA	Δ CFI	Δ TLI	Δ SRMR
configural	358137***	1568	0.043	0.9	0.89	0.041	--	--	--	--
metric	360602***	1603	0.042	0.899	0.892	0.041	0	-0.001	0.002	0.001
scalar	373434***	1637	0.043	0.896	0.89	0.042	0	-0.004	-0.002	0
strict	397110***	1679	0.043	0.889	0.886	0.044	0.001	-0.007	-0.004	0.003

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

Comparison of Latent Group Means Across Groups (RQ2)

Based on the above analysis and outcomes, I concluded that the CCSSE's engagement constructs demonstrated viable evidence to support measurement invariance at the metric, scalar, and strict levels across gender, age, race, and enrollment intensity. It is assured that each group interprets the scales in the same way, and thus any observed differences in the latent means are not due to differential item functioning (Meredith, 1993). Also recall that it is sufficient to have scalar invariance to have meaningful latent mean comparison, we can now confidently compare latent group means. This comparison is done by setting the reference group's mean (or intercept) to zero and freely estimating the intercepts for the other groups (Dimitrov, 2010). In this manner, we obtain an estimation of the difference in the latent means between groups. And these mean differences can be interpreted as reflecting true differences in the latent construct rather than measurement bias (Millsap, 2011).

Gender Differences

Men exhibited slightly, yet consistently lower levels of engagement compared to women across all evaluated factors. This gender disparity was most evident in Personal Development Value (PDV), where men scored 0.173 points lower than their women counterparts. Similar patterns were apparent in Student Effort (SEF), with men trailing by 0.172 points, and in Writing and Critical Thinking (WCT), where the gap was 0.151 points. These results indicate that men might experience or perceive aspects of their educational engagement differently from women students, which could potentially affect their overall educational outcomes. Detailed statistical data supporting these findings can be found in Table 3.7.

Table 3.7

Latent Group Mean Difference: Gender as Men Compared to Women

	ESTIMATE	SE	95% CI
PDV	-0.173	0.003	-0.179, -0.167
IFP	-0.052	0.003	-0.058, -0.047
HOT	-0.099	0.003	-0.105, -0.093
ISP	-0.064	0.003	-0.071, -0.058
UAS	-0.095	0.003	-0.101, -0.09
WCT	-0.151	0.003	-0.157, -0.145
SEF	-0.172	0.004	-0.179, -0.165
ECA	-0.009	0.002	-0.014, -0.005

Age Differences

Compared with students who are 18-24 years old, neo-traditional students who are 25 years or older demonstrated higher levels of engagement with 0.236 points higher in student efforts (SEF), 0.114 higher in higher order thinking (HOT), and marginally higher in IFP and PDV. However, their writing and critical thinking (WCT), extra curricula activity (ECA) were lower. Institutional support (ISP) and use of advising service (UAS) were marginally lower. Results are reported in Table 3.8.

Table 3.8

Latent Group Mean Difference: Age as 25 Years + Compared to 18-24 Years Old

	ESTIMATE	SE	95% CI
PDV	0.017	0.003	0.010, 0.023
IFP	0.078	0.003	0.072, 0.084
HOT	0.114	0.003	0.108, 0.121
ISP	-0.020	0.004	-0.027, -0.013
UAS	-0.059	0.003	-0.065, -0.053
WCT	-0.134	0.004	-0.142, -0.127
SEF	0.236	0.004	0.228, 0.244
ECA	-0.095	0.002	-0.099, -0.090

Race/Ethnicity Differences

Historically underrepresented minority (URM) students had higher mean scores than White peers except for institutional support (IFP). Among the more engaged factors, the most significant were use of advising service (UAS), student efforts (SEF), and personal development (PDV). Results are reported in Table 3.9.

Table 3.9

Latent Group Mean Difference: Race/Ethnicity as URM Compared to White

	ESTIMATE	SE	95% CI
PDV	0.131	0.003	0.125, 0.137
IFP	-0.007	0.003	-0.012, -0.002
HOT	0.037	0.003	0.031, 0.042
ISP	0.105	0.003	0.098, 0.111
UAS	0.184	0.003	0.179, 0.190
WCT	0.126	0.003	0.120, 0.132
SEF	0.166	0.004	0.159, 0.173
ECA	0.064	0.002	0.060, 0.069

Enrollment Intensity Differences

Part-time students consistently show lower levels of engagement across all evaluated factors when compared to their full-time counterparts. The most significant discrepancies were observed in Writing and Critical Thinking (WCT), Institutional Support (IFP), Student Efforts (SEF), and Use of Advising Services (UAS). These findings underline the challenges part-time students may face in accessing and benefiting from various academic resources and supports. The comprehensive data detailing these differences is thoroughly documented in Table 3.10.

Table 3.10

Latent Group Mean Difference: Enrolment Intensity as Part-Time Compared to Full-Time

	ESTIMATE	SE	95% CI
PDV	-0.172	0.003	-0.166, -0.179
IFP	-0.215	0.003	-0.210, -0.221
HOT	-0.133	0.003	-0.127, -0.139
ISP	-0.128	0.004	-0.121, -0.135
UAS	-0.19	0.003	-0.184, -0.196
WCT	-0.331	0.004	-0.324, -0.338
SEF	-0.199	0.004	-0.191, -0.206
ECA	-0.171	0.002	-0.166, -0.175

Discussion

Before studying the latent mean differences across various demographic groups, a foundational step was undertaken to address the measurement invariance of the CCSSE instrument. This step was pivotal to ensure that the CCSSE survey consistently measures the same constructs across distinct groups. Establishing measurement invariance is a prerequisite for meaningful and accurate comparisons. Our analysis methodically established measurement invariance at the configural, metric, scalar, and strict levels, thereby reinforcing the robustness of the CCSSE as an effective tool for assessing student engagement across diverse demographic groups. These groups included students of differing gender, age, race/ethnicity, and enrollment intensity. Significantly, the attainment of strict invariance underscores the validity of the subsequent analysis, particularly in evaluating latent mean differences. This validation is crucial as it asserts that the observed differences in latent means among these groups are reflective of true variations in student engagement, rather than being influenced by measurement artifacts.

Such a confirmation provides a solid foundation for the discussion that follows, where we explore the implications of these differences in student engagement across demographic lines.

After establishing the robustness of the CCSSE through achieving strict measurement invariance, it becomes clear that this tool is not just reliable, but also extremely valuable for a range of stakeholders in the educational field. Educational institutions, for instance, can leverage these findings to develop more targeted and effective engagement strategies. Knowing that the CCSSE provides accurate measures across diverse demographic groups, colleges can confidently use this data to identify areas where specific student groups may need additional support or resources.

Furthermore, policymakers can use these insights to make informed decisions about resource allocation and to craft policies that are attuned to the needs of diverse student populations. This can lead to more equitable educational environments and better outcomes for all students.

Gender Differences in Engagement

The analysis revealed that men were consistently less engaged than women in our national sample, particularly in areas of personal development and student effort. This could suggest that men are not as actively involved in academic activities as women, which resonates with findings from previous research (Gülşen & Şahin, 2023; Sontam & Gabriel, 2012). Research also indicates that male students may have different learning (Slater et al., 2007) and engagement styles (Kessels, 2014), possibly influencing their participation in academic and extracurricular activities. Another factor could be the tendency of men to seek advice or help less actively than women as a result of their conformity to the traditional masculine ideology (Wimer & Levant, 2011), impacting their engagement and academic success. There were also discussions

on how stereotype and racial micro-aggressions exacerbated Black male student's negative self-concept and led to disengagement (Wood, 2014). Societal norms and expectations likely play a crucial role in shaping these differences. The lower engagement levels observed among male students could be reflective of broader social constructs around masculinity, where academic engagement might conflict with traditional masculine norms. This suggests that internalized gender roles significantly influence behavior and attitudes in educational environments. Given these findings, institutions should consider developing effective strategies to engage male students. Successful programs and initiatives need to be tailored to their unique experiences and needs. Evidence from empirical research seemed to support initiatives such as first year seminar (Swanson et al., 2017) and male student success initiative (Johnson et al., 2015) can have positive effects to promote male student's long-term engagement and success.

Engagement Among Neo-Traditional Students

Neo-traditional students, typically older and more likely to be found in CCs, showed higher scores in personal development, faculty and peer interaction, higher-order thinking, and self-efforts. These findings align with the notion that adult learners often bring a wealth of life experience and motivation to their academic pursuits (Fairchild, 2003). However, their lower scores in writing and critical thinking could be attributed to various factors, including potentially less systematic educational preparation or previous incomplete educational experiences (Goddu, 2012). Moreover, our analysis revealed lower engagement in institutional support among neo-traditional students. This could be explained by the competing demands of employment and family responsibilities, which are more prevalent in this demographic (Cercone, 2008; Sogunro, 2015). Adult learners may feel disconnected from the campus community due to age and life experience differences with traditional students, compounded by their often-limited campus

presence outside class hours (Ross-Gordon, 2011). Financial constraints are another critical factor, as the cost of education adds to their existing financial responsibilities (Yang & Carney, 2011). To enhance the engagement and success of adult learners, CCs need to adapt their support systems, potentially including flexible scheduling, online courses, targeted financial aid, and specialized advising services tailored to adult learners' needs (Compton, Cox, & Laanan, 2006). By acknowledging and addressing these challenges, CCs can foster a more inclusive and supportive educational environment, thus enhancing engagement and success for this crucial student demographic.

Racial/Ethnic Differences in Engagement

Interestingly, URM students scored higher than White students in almost all engagement factors, with a slight exception in interaction with faculty and peers. Their higher scores in utilizing advising services, student efforts, and personal development suggest a strong commitment to achieving educational aspirations. Their active engagement resonates with the idea of community cultural wealth (Yosso, 2006) that acknowledges the rich array of knowledge, skills, abilities, and contacts possessed by culturally diverse students. This engagement reflects their aspirational capital, where despite systemic barriers, these students maintain a resilient commitment to their educational goals. URM students' higher level of engagement aligns with Yosso's assertion that students of color possess unique cultural assets that, when recognized and nurtured within educational settings, can lead to higher levels of academic success and personal growth. In other words, the higher engagement levels of URM students in these areas are an indication of the rich cultural wealth they bring to the college experience. By understanding and leveraging this community cultural wealth, educational institutions can create more inclusive and supportive environments that acknowledge and celebrate the diverse strengths of all students.

Engagement Among Part-Time Students

Of the four groups analyzed, part-time students appeared to be the least engaged, scoring consistently lower than full-time students in all factors. While gender differences were mostly marginal, the disparity between part-time and full-time students was more pronounced, which resonates with the existing research on the unique challenges faced by part-time students. This significant gap in areas like writing and critical thinking, faculty and peer interaction, extracurricular activities, and institutional support could be attributed to the part-time students' commitments to jobs or family responsibilities (Swain & Hammond, 2011). These external obligations can limit their availability for on-campus activities and interactions, subsequently impacting their overall academic experience. Furthermore, part-time students might also face challenges in integrating into the campus community, often missing out on opportunities that enhance the college experience, such as networking with peers or developing mentorship relationships with faculty.

The data indicate a pressing need for CCs to recalibrate their support strategies to be more inclusive and accommodating of part-time students' unique circumstances. Potential interventions could include offering more flexible course scheduling to accommodate diverse time commitments, which might involve expanding evening or weekend class options. Online resources and learning opportunities can also play a pivotal role in bridging the engagement gap. Virtual platforms can facilitate more accessible and convenient interactions with faculty, peer collaboration, and participation in academic and extracurricular activities. Furthermore, the development of targeted support services, such as personalized academic advising or career counseling, can provide part-time students with more tailored assistance aligned with their specific needs and constraints (Callender, 2008; Triventi, 2014). These adaptations are not

merely about convenience; they reflect a deeper commitment to equity and inclusion within the educational system. By acknowledging and addressing the unique challenges faced by part-time students, CCs can enhance the quality and impact of their educational offerings, ensuring that all students have equitable opportunities to engage, succeed, and achieve their academic and personal goals.

Limitations

This study, while providing valuable insights into student engagement across various demographic groups in CCs, has certain limitations that should be acknowledged. The classification of students based on enrollment intensity (part-time vs. full-time) was determined at the time of their response to the CCSSE survey. This categorization does not account for the possibility that students' enrollment status may have changed over time.

The study's exploration of gender differences was limited to a binary classification (men and women). This approach does not capture the experiences of non-binary or transgender students, whose engagement patterns might differ significantly. Similarly, the categorization of race/ethnicity primarily focused on underrepresented minority (URM) students in comparison with White students. This broad categorization may obscure nuanced differences in engagement among specific racial or ethnic groups, such as African American, Hispanic, Asian, and others. More detailed subgroup analysis could provide deeper insights into the unique experiences of these populations.

<div align="center">**Conclusion**</div>

This study contributes to the measurement invariance research on CCSSE and the understanding of student engagement in CCs. The successful establishment of measurement invariance for the CCSSE survey lends credibility to these findings, ensuring that the observed

differences are reflective of true variations in student experiences rather than measurement artifacts. It sheds light on the varied engagement experiences of different demographic groups in CCs, highlighting notable differences across gender, age, race/ethnicity, and enrollment intensity.

The patterns of engagement identified in this study underscore the importance of tailoring educational strategies and support services to the diverse needs of the student body. Specifically, the lower engagement levels among men and part-time students point to a need for targeted interventions. Additionally, the unique engagement patterns of neo-traditional and URM students highlight the richness and complexity of the CC landscape.

References

Ali-Coleman, K. Z. (2019). Essential pathways: An examination of how community college compromise their unique contribution to American higher education. *Higher Education Politics & Economics*, *5*(1), 54-. https://doi.org/10.32674/hepe.v5i1.1141

Antonio, A. L. (2001). Diversity and the influence of friendship groups in college. *The Review of Higher Education*, 25, 63-89. https://doi.org/10.1353/rhe.2001.0013

Astin, A. W. (1993). What matters in college? *Liberal Education*, *79*(4), 4–16.

Beckowski, C. P., & Gebauer, R. (2018). Cultivating deeper life interactions: Faculty–student relationships in a nonresidential learning community. *Journal of College Student Development*, *59*(6), 752–755. https://doi.org/10.1353/csd.2018.0070

Braxton, J. P., Hirschy, A. S., & McClendon, S. A. (2004). *Understanding and reducing college student departure*. Jossey-Bass.

Butler-Paisley, W., & Clemetsen, B. (2019). The value of peer interaction in the first-term community college classroom: A faculty perspective. *Community College Journal of Research and Practice, 43*(5), 327–340. https://doi.org/10.1080/10668926.2018.1478344

Callender, C. (2008). The impact of term-time employment on higher education students' academic attainment and achievement. *Journal of Education Policy*, *23*(4), 359-377.

Cercone, K. (2008). Characteristics of adult learners with implications for online learning design. *AACE Review*, *16*(2), 137-159.

Cerezo, A., & Chang, T. (2013). Latina/o achievement at predominantly White universities: The importance of culture and ethnic community. *Journal of Hispanic Higher Education*, *12*(1), 72–85.

Chang, J. C. (2005). Faculty-student interaction at the community college: A focus on students of color. *Research in Higher Education*, 46(7), 769–802. https://doi.org/10.1007/s11162-004-6225-7

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*(2), 233-255.

Compton, J. I., Cox, E., & Laanan, F. S. (2006). Adult learners in transition. *New Directions for Student Services, 2006*(114), 73-80.

Cotten, S. R., & Wilson, B. (2006). Student–faculty interactions: Dynamics and determinants. *Higher Education*, *51*, 487–519. http://doi:10.1007/s10734-004-1705-4

Cox, B. E. (2011). A developmental typology of faculty–student interaction outside the classroom. In Hu, S. & Li, S. (Eds.), *New Directions for Institutional Research*: Vol. 2011(S1). *Using typological approaches to understand college student experiences and outcomes* (pp. 49–66). Jossey-Bass. http://doi:10.1002/ir.416

Crisp, G., & Nuñez, A. M. (2014). Understanding the racial transfer gap: Modeling underrepresented minority and nonminority students' pathways from two-to four-year institutions. *The Review of Higher Education*, *37*(3), 291-320.

Davidov, E. Meuleman, B. Cieciuch, J. Schmidt, P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Annual Review of Sociology, 40* (1), 55–75. https://doi.org/10.1146/annurev-soc-071913-043137.

Davidov, E., Meuleman, B., Van de Vijver, F. J., Avvisati, F., Eid, M., Le Donné, N., ... & van de Schoot, R. (2019). Measurement invariance analysis using multiple group confirmatory factor analysis and alignment optimisation. *OECD Education Working Papers,* (201), 15-22.

Deil-Amen, R. (2011). Socio-academic integrative moments: Rethinking academic and social integration among two-year college students in career-related programs. *The Journal of Higher Education*, *82*(1), 54-91.

Donaldson, J. F., & Townsend, B. K. (2007). Higher education journals' discourse about adult undergraduate students. *The Journal of Higher Education, 78*(1), 27-50.

Donaldson, P., McKinney, L., Lee, M., & Pino, D. (2016). First year community college students' perceptions of and attitudes toward intrusive academic advising. *NACADA Journal,* 36, 30–42. doi:10.12930/NACADA-15-012

Ensign, R. L. (2010). Fast gainers: 4 ways that colleges have raised graduation rates. *Chronicle of Higher Education,* 57(16), A15.

Erlich, R. J., Russ-Eft, D. F. (2013). Assessing student learning in academic advising using social cognitive theory. *NACADA Journal*, 33(1), 16-33.

Ethington, C. A. (2000). Influences of the normative environment of peer groups on community college students' perceptions of growth and development. *Research in Higher Education, 41*(6), 703–722. https://doi.org/10.1023/A:1007068604692

Fairchild, E. E. (2003). Multiple roles of adult learners. *New Directions for Student Services*, *2003*(102), 11-16.

Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J. J. (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, *68*, 441-449.

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). Psychosocial factors and community college student success: A meta-analytic investigation. *Review of Educational Research, 87*(2), 388–424. https://doi.org/10.3102/0034654316653479

Goddu, K. (2012). Meeting the challenge: Teaching strategies for adult learners. *Kappa Delta Pi Record*, *48*(4), 169-173.

Goldrick-Rab, S. (2010). Challenges and opportunities for improving community college student success. *Review of Educational Research, 80*(3), 437-469. https://doi.org/10.3102/0034654310370163

Grantham, A., Robinson, E. E., & Chapman, D. (2015). "That truly meant a lot to me": A qualitative examination of meaningful faculty–student interactions. *College Teaching*, 63, 125–132. http://doi:10.1080/87567555.2014.985285

Graham, S., Harbaugh-Schattenkirk, A. G., Aitken, A. A., Harris, K. R., Ng, C., Wilson, J. M., & Wdowin, J. (2023). Writing Motivation Questionnaire: Factorial and Construct Validity with Middle School Students. Educational Psychology Review, 35(1), 5-28. https://doi.org/10.1007/s10648-023-09742-4

Greene, T. G., Marti, C. N., & McClenney, K. (2008). The effort—outcome gap: Differences for African American and Hispanic community college students in student engagement and academic achievement. *The Journal of Higher Education*, *79*(5), 513-539.

Gülşen, F. U., & Şahin, E. E. (2023). Gender difference in the relationship between academic self-efficacy, personal growth initiative, and engagement among Turkish undergraduates: A multigroup modeling. *Psychology in the Schools, 60*(10), 3840-3857.

Harper, S. R. (2004). The measure of a man: Conceptualizations of masculinity among high-achieving African American male college students. *Berkeley Journal of Sociology*, 48(1), 89–107.

Hong, L. (2000). Toward a transformed approach to prevention: Breaking the link between masculinity and violence. *Journal of American College Health*, *48*(6), 269–279.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55.

Johnson, M., Williams, M., & Wood, J. L. (2015). Male student success initiative: Creating alignment across college communities. *Peer Review*, *17*(4), 23-27.

Johnson, D. R., Soldner, M., Leonard, J. B., Alvarez, P., Inkelas, K. K., Rowan-Kenyon, H., & Longerbeam, S. (2007). Examining sense of belonging among first-year undergraduates from different racial/ethnic groups. *Journal of College Student Development*, *48*, 525-542. doi:10.1353/csd.2007.0054

Jones, M. G., Chesnutt, K., Ennes, M., Macher, D., & Paechter, M. (2022). Measuring science capital, science attitudes, and science experiences in elementary and middle school students. *Studies in Educational Evaluation, 74*, 101180.

Jöreskog, K. G. (1971). Simultaneous factor analysis in several populations. *Psychometrika, 36*(4), 409-426.

Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., & Rosseel, Y. (2022). *semTools: Useful tools for structural equation modeling. R package version 0.5-6.* https://CRAN.R-project.org/package=semTools

Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: understanding the mechanisms of student success. *Higher Education Research and Development, 37*(1), 58–71. https://doi.org/10.1080/07294360.2017.1344197

Kasworm, C. E. (2010). Adult learners in a research university: Negotiating undergraduate student identity. *Adult Education Quarterly, 60*(2), 143-160.

Kessels, U., Heyder, A., Latsch, M., & Hannover, B. (2014). How gender differences in academic engagement relate to students' gender identity. *Educational Research, 56*(2), 220–229. https://doi.org/10.1080/00131881.2014.898916.

Kim, Y. K. & Sax, L. J. (2009). Student-faculty interaction in research universities: differences by student gender, race, social class, and first-generation status. *Research in Higher Education, 50*(5), 437–459. https://doi.org/10.1007/s11162-009-9127-x

Kim, E. S., Yoon,M. & Lee, L. (2012). Testing measurement invariance using MIMIC. *Educational and Psychological Measurement 72*(3), 469 – 492. https://doi.org/10.1177/0013164411427395

Kim, Y. K. (2006). *Student-faculty interaction in college: Examining its causalities, predictors, and racial differences* (Publication No. 3251520). [Doctoral dissertation, University of California, Los Angeles.]. ProQuest Dissertations Publishing.

Kuh, G. D., & Hu, S. (2001). The effects of student–faculty interaction in the 1990s. *Review of Higher Education*, *24*, 309–332. http://doi:10.1353/rhe.2001.0005

Lau, W. W. F., & Yuen, A. H. K. (2015). Factorial invariance across gender of a perceived ICT literacy scale. Learning and Individual Differences, 41, 79–85. https://doi.org/10.1016/j.lindif.2015.06.001

Leitgöb, H., Seddig, D., Asparouhov, T., Behr, D., Davidov, E., De Roover, K., Jak, S., Meitinger, K., Menold, N., Muthén, B., Rudnev, M., Schmidt, P., & van de Schoot, R. (2023). Measurement invariance in the social sciences: Historical development, methodological challenges, state of the art, and future perspectives. *Social Science Research*, *110*, 102805–102805. https://doi.org/10.1016/j.ssresearch.2022.102805

Luk, J. W., King, K. M., McCarty, C. A., Vander Stoep, A., & McCauley, E. (2016). Measurement invariance testing of a three-factor model of parental warmth, psychological control, and knowledge across European and Asian/Pacific Islander American youth. *Asian American journal of psychology, 7*(2), 97.

Lundberg, C. A. (2003). The influence of time-limitations, faculty, and peer relationships on adult student learning: A causal model. *Journal of Higher Education*, *74*, 665-688. doi.10.1353/jhe.2003.0045

Lundberg, C.A. (2014). Peers and faculty as predictors of learning for community college students. *Community College Review*, *42*(2), 79–98. https://doi.org/10.1177/0091552113517931

Maxwell, W. E. (2000). Student peer relations at a community college. *Community College Journal of Research and Practice*, *24*(3), 207–217. https://doi.org/10.1080/106689200264169

Meade, A.W., & Lautenschlager, G. J. (2004). A comparison of item response theory and confirmatory factor analytic methodologies for establishing measurement equivalence/invariance. *Organizational Research Methods*, *7*, 361-388.

Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika, 58*, 525-543.

Millsap, R. Ellis. (2011). *Statistical approaches to measurement invariance*. Routledge.

Morest, V. S. (2013). From Access to Opportunity: The evolving social roles of community colleges. *The American Sociologist, 44*(4), 319–328. https://doi.org/10.1007/s12108-013-9194-5

Mullin, C. M. (2012, February). *Why access matters: The community college student body* (Policy Brief 2012-01PBL). American Association of Community Colleges.

Ortagus, J. C., Rosinger, K., Kelchen, R., Voorhees, N., Chu, G., & Allchin, H. (2023). A national analysis of the impact of performance-based funding on completion outcomes among underserved Students. *Review of Higher Education, 46*(4), 415–452. https://doi.org/10.1353/rhe.2023.a900568

Öz, Y., & Boyacı, A. (2021). The role of student engagement in student outcomes in higher education: implications from a developing country. *International Journal of Educational Research*, *110*, 101880. https://doi.org/10.1016/j.ijer.2021.101880

Packard, B. W. L., & Jeffers, K. C. (2013). Advising and progress in the Community College STEM transfer pathway. *NACADA Journal*, 33(2), 65-75. https://doi.org/10.12930/NACADA-13-015

Pang, V. O., Han, P. P., & Pang, J. M. (2011). Asian American and Pacific Islander students: Equity and the achievement gap. *Educational Researcher, 40*(8), 378–389. https://doi.org/10.3102/0013189X11424222

Parra-Pérez, L. G., Valdés-Cuervo, A. A., Urías-Murrieta, M., Addo, R., Cota-Valenzuela, L. V., & García-Vázquez, F. I. (2023). Development and psychometric evidence of the Academic Engagement Scale (USAES) in Mexican college students. *PloS One, 18*(12), e0288012–e0288012. https://doi.org/10.1371/journal.pone.0288012

Pascarella, E. T. (1980). Student-faculty informal contact and college outcomes. *Review of Educational Research, 50*(4), 545-595

Pascarella, E. T. (2006). How college affects students: Ten directions for future research. *Journal of College Student Development, 47*(5), 508-520.

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research*. Volume 2. Jossey-Bass.

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review, 41*, 71–90. https://doi.org/10.1016/j.dr.2016.06.004

R Core Team. (2023*). R: A language and environment for statistical computing* [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/

Roessger, K. M., Eisentrout, K., & Hevel, M. S. (2019). Age and academic advising in community colleges: Examining the assumption of self-directed learning. *Community College Journal of Research and Practice*, *43*(6), 441–454. https://doi.org/10.1080/10668926.2018.1490669

Rohm, T., Carstensen, C. H., Fischer, L., et al. (2021). The achievement gap in reading competence: The effect of measurement non-invariance across school types. *Large-scale Assessments in Education, 9*(23). https://doi.org/10.1186/s40536-021-00116-2

Ross-Gordon, J. M. (2011). Research on adult learners: Supporting the needs of a student population that is no longer nontraditional. *Peer Review, 13*(1), 26-29.

Sáenz, V., Mayo, J. R., Miller, R. A., & Rodriguez, S. L. (2015). (Re)defining masculinity through peer interactions: Latino men in Texas community colleges. *Journal of Student Affairs Research and Practice, 52*(2), 164–175. https://doi.org/10.1080/19496591.2015.1018269

Sax, L. J., Bryant, A. N., & Harper, C. E. (2005). The differential effects of student-faculty interaction on college outcomes for women and men. *Journal of College Student Development, 46*(6), 642-659.

Sörbom, D. (1974). A general method for studying differences in factor means and factor

    structure between groups. *British Journal of Mathematical and Statistical Psychology,*

    27(2), 229-239.

van de Schoot, R., Schmidt, P. Beuckelaer, A., Lek, K., Zondervan-Zwijnenburg, M., &

    Beuckelaer, A. (2015). Editorial: Measurement invariance. *Frontiers in Psychology*, *6*,

    1064–1064. https://doi.org/10.3389/fpsyg.2015.01064

Schudde, L. (2019). Short- and long-term impacts of engagement experiences with faculty and

    peers at community colleges. *Review of Higher Education*, *42*(2), 385–426.

    https://doi.org/10.1353/rhe.2019.0001

Slater, J. A., Lujan, H. L., & DiCarlo, S. E. (2007). Does gender influence learning style

    preferences of first-year medical students? *Advances in physiology education*, *31*(4),

    336–342. https://doi.org/10.1152/advan.00010.2007

Sogunro, O. A. (2015). Motivating factors for adult learners in higher education. *International*

    Journal of Higher Education, *4*(1), 22-37.

Sontam, V., & Gabriel, G. (2012). Student Engagement at a large suburban community college:

    Gender and race differences. *Community College Journal of Research and Practice,*

    36(10), 808–820. https://doi.org/10.1080/10668926.2010.491998

Strauss, L. C, & Terenzini, P. T. (2007). The effects of students in- and out-of-class experiences

    on their analytical and group skills: A study of engineering education. *Research in*

    Higher Education, *48 (8),* 967-992.

Swain, J., & Hammond, C. (2011). The motivations and outcomes of studying for part-time

    mature students in higher education. *International Journal of Lifelong Education*, *30*(5),

    591-612.

Swanson, N. M., Vaughan, A. L., & Wilkinson, B. D. (2017). First-year seminars: Supporting male college students' long-term academic success. *Journal of College Student Retention: Research, Theory & Practice*, *18*(4), 386-400.

Tadesse, T., Gillies, R. M., & Campbell, C. (2018). Assessing the dimensionality and educational impacts of integrated ICT literacy in the higher education context. *Australasian Journal of Educational Technology, 34*(1).

Tennant, A. (2014). The effect of mathematics on the college graduation rates of adult students. *The Journal of Continuing Higher Education, 62*(1), 17-28. https:/doi.org/10.1080/ 07377363.2014.872004

Thompson, Y. T., Song, H., Shi, D., & Liu, Z. (2021). It matters: Reference indicator selection in measurement invariance tests. *Educational and Psychological Measurement*, *81*(1), 5–38. https://doi.org/10.1177/0013164420926565

Triventi, M. (2014). Does working during higher education affect students' academic progression? *Economics of Education Review*, *41*, 1-13.

Umbach, P. D., & Kuh, G. D. (2006). Student experiences with diversity at liberal arts colleges: Another claim for distinctiveness. *The Journal of Higher Education*, *77*, 169-192. https://doi.org/10.1353/jhe.2006.0008

Umbach, P. D., & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in student learning and engagement. *Research in Higher Education*, 46, 153–184. https://doi.org/10.1007/s11162-004-1598-1

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational research methods, 3*(1), 4-70.

Van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance. *European journal of developmental psychology, 9*(4), 486-492.

Visser, L., Cartschau, F., von Goldammer, A., Brandenburg, J., Timmerman, M., Hasselhorn, M., & Mähler, C. (2023). Measurement invariance in relation to first language: An evaluation of German reading and spelling tests. *Applied Measurement in Education*, 36(2), 115-131. https://doi.org/10.1080/08957347.2023.2201701

Wimer, D. J., & Levant, R. F. (2011). The relation of masculinity and help-seeking style with the academic help-seeking behavior of college men. *The Journal of Men's Studies, 19*(3), 256-274. https://doi.org/10.3149/jms.1903.256

Wood, J. L. (2014) Apprehension to engagement in the classroom: perceptions of Black males in the community college, International Journal of Qualitative Studies in Education, 27:6, 785-803, https://doi.org/10.1080/09518398.2014.901575

Yang, B., & Carney, C. (2011). The role of community colleges in adult education and lifelong learning. *New Directions for Adult and Continuing Education, 2011*(150), 15-25.

Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education, 8*(1), 69–91. https://doi.org/10.1080/1361332052000341006

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*(2), 1-36. https://doi.org/10.18637/jss.v048.i02

Zhang, Y. (Leaf). (2016). An overlooked population in community college: International students' (in)validation experiences with academic advising. *Community College Review*, 44(2), 153–170. https://doi.org/10.1177/0091552116633293

Zilvinskis, J., Masseria, A. A., & Pike, G. R. (2017). Student engagement and student learning: Examining the convergent and discriminant validity of the revised National Survey of Student Engagement. *Research in Higher Education, 58*(8), 880–903. https://doi.org/10.1007/s11162-017-9450-6

CHAPTER 4: CONCURRENT AND PREDICTIVE VALIDITY OF CCSSE

CC has become an integral part of post-secondary education in the United States. The reputation and status of CC is closely related to its unique characteristics: open access policy, working with local communities through technical and career education and collaboration with local business, and serving more underrepresented, underserved, and marginalized students compared to baccalaureate-granting institutions (See Pham et al., 2020; Porchea et al., 2010; Rabitoy et al., 2015; Smith Morest, 2013; Sublett & Tovar, 2021; Wang, 2013). Together with its diverse students and their unique needs, CCs are faced with challenges in student achievement gaps demonstrated in their lower rate of persistence, completion, and transfer compared to baccalaureate-granting institution (Nora et al., 2011). According to a recent TacklingTransfer research report (Velasco et al., 2023), although 80% of CC students aspire to earn a bachelor's degree, only 33% of CC students who enrolled in the fall of 2015 transferred into BGI. And only 48% of those who transferred earned a bachelor's degree in six years. In recent years, CC researchers and practitioners also actively participated in the national conversation on student success and equity with regards to education policies and practices (Baber et al., 2015; Felix, 2021; Gonzalez et al., 2021; Rodriguez, 2015). In efforts to improve CC student persistence and completion, numerous research studies consistently highlight the pivotal role of student engagement as a key predictor of these outcomes. The CCSSE stands out in this regard. This survey is specifically tailored to capture the distinctive educational experiences of students across CCs nationwide. By leveraging the insights from the CCSSE, educators and policymakers can develop more effective strategies to foster student success in these institutions.

The purpose of this study is to establish concurrent and predictive validity evidence for CCSSE engagement indicators (identified in the construct validity study in chapter 2) using data from three CCs in North Carolina. The main research questions are as follows:

- RQ1: Using linear regression analyses, to what degree is there concurrent evidence of the validity of CCSSE's engagement indicators for measures of academic achievement and pace of progress?

- RQ2: Using logistic regression analyses, to what degree is there predictive evidence of the validity of CCSSE's engagement indicators for measures of student persistence, credential completion, and vertical transfer?

Given longstanding persistence and transfer gaps for underserved and marginalized populations, these analyses will include student background and demographic characteristics as covariates. In addition to validity evidence, the findings of the analyses will be interpreted considering the needs of CC and higher education stakeholders to better understand the role of engagement in CC student success.

Background and Literature Review

As discussed in greater detail in chapter 2, the CCSSE was developed to provide CCs with crucial insights into the quality and intensity of the student engagement experience. Established with the primary purpose of assessing the level of student engagement and its correlation with learning outcomes, the CCSSE serves as a vital tool for institutional improvement and policy formulation. This instrument gathers data on institutional practices and student behaviors that are highly correlated with student learning and retention. The development of CCSSE was grounded in extensive research on student engagement as a critical factor in successful learning outcomes at CCs. It offers a comprehensive framework to evaluate and

enhance the educational experience and institutional effectiveness in these settings. While the key focus of this study is on establishing concurrent and predictive validity evidence of CCSSE's engagement indicators for measures of student success, it is also important to understand the role of engagement in the context of completion and transfer gaps for underserved and marginalized CC students. Thus, this literature review will be divided into two sections. The first is focused on studies that link engagement during CC with student success to substantiate the indicators selected to examine concurrent and predictive validity evidence. The majority of the studies utilized CCSSE to measure engagement. The second section is focused on studies that examine the role of engagement, particularly interaction with faculty, for success among underserved and marginalized CC student groups.

The Relationship of Engagement to Community College Student Success

Academic Achievement

Scholars have found positive links between engagement (measured by the 2005-2016 version of CCSSE) and student achievement measures (GPA and course grades). Two studies used national or state data sets. Marti (2008) examined whether engagement factors and benchmarks could predict student self-reported GPA, using 2003-2005 CCSSE data from a large national sample of CC students (nearly 275,000). At the student-level, the regression showed that eight of the nine factors were statistically significant positive predictors of GPA. At the institutional level, faculty interaction was the only significant positive predictor while exposure to diversity, information technology, and academic preparation were significant negative predictors. Grenne et al. (2008) used a 2002-2004 CCSSE data set from Florida CCs (n=3,142) to examine if students of color (African American, Hispanic, and Asian American) were more engaged than White students and if their engagement was positively associated with their

academic outcomes. They found that while all three subgroups had higher levels of engagement, they all had lower course grades and possibility of passing courses compared to White students. In addition to race, the authors reported other student characteristics that were negatively correlated to grades, such as hours employed, being single parent, having kids, and parent education level.

Other authors have conducted single institution studies to examine predictive validity of CCSSE benchmarks and factors. Mandarino and Mattern (2010) tried to replicate Marti's (2008) research at a single institution in Canada (N = 1030), focused only on the five CCSSE benchmarks. They examined five academic outcomes: self-reported GPA, semester GPA, cumulative GPA, cumulative credit completion ratio, and percentage of courses completed with a grade of 70% or higher. These authors found that active and collaborative learning was a significant predictor of all GPA related outcomes, and academic challenge was a significant predictor of credit completion ratio and two GPA related outcomes. The other three CCSSE benchmarks were not predictive of academic outcomes.

Nora and colleagues (2011) conducted predictive validity research at one medium sized CC in southeast Texas (N=393) with data collected as part of a two-year Achieving the Dream project. Their analysis produced a five-factor latent structure. After the factor analysis, they regressed student GPA on two blocks of variables: gender and ethnicity, and the five factors found in their study. They reported that gender and academic challenge were significant positive predictors, but student effort was a significant negative predictor. The authors observed that engagement appeared to be more effective in predicting GPA-related and credit hours variables than persistence-related and enrollment variables (e.g., McClenney & Marti, 2006).

While this earlier research provided some predictive validity evidence of CCSSE engagement scores for grades and GPA, all of the studies utilized the previous version of the CCSSE (2005-2016). Additionally, the only national study (Marti, 2008) utilized self-reported grades rather than institutionally reported grades.

Persistence, Completion, and Transfer

Student engagement in educationally purposeful activities has long been positively associated with persistence along with other desired student outcomes (Braxton et al., 2004; Flynn, 2014; Pascarella & Terenzini, 2005), and provides the conceptual basis for the CCSSE. Some research has specified the impact of aspects of engagement, emphasizing the proactive role of faculty and institution. Barnett (2011) discovered that students not only appreciated but also benefitted academically from instructors who took a holistic interest in them. This approach involved understanding and supporting students' individual needs, career goals, and classroom performance, indicating a significant correlation between instructor engagement and improved student academic success. In Chang's (2005) study involving 5,000 CC students in Los Angeles, it was observed that ethnic minority students, particularly African Americans, showed a greater interest in academic integration, which includes having meaningful interactions with faculty, over social integration. This preference for academic integration suggests that such interactions may play a crucial role in the overall academic success and engagement of these students, potentially leading to higher achievement and persistence rates within their educational journey. Qualitative research by Butler-Paisley et al. (2019) suggested that first term CC students benefited from social interaction with peers, citing enhanced learning, student success, and student development and growth. Lundberg (2014) found that frequent interaction with faculty

was the strongest predictor for student gains in general education, intellectual skills, science and technology, personal development, and career preparation.

Wang (2016) examined the determinants of student persistence and the drive to transfer from CCs using CCSSE data combined with the academic records of a group of 979 students from a public CC in the Midwest. Factor analysis and structural equation modeling were employed to explore the effects of academic service, student-faculty, and student-peer interaction on completion and transfer. Wang noted that different factors were at play for each set of expectations. In the case of students' expectations to transfer, the perception of the college's focus on transfer opportunities and the interactions within their coursework played a significant role. Through regular use of academic support services and active participation in course-related activities, students' ambitions to pursue a baccalaureate degree after their time at CC grew stronger. When it came to students' expectations about completing their degrees, the informal interactions with faculty and the feeling of being connected to college officials stood out as stronger indicators. The sense of community and strong interpersonal relationships with faculty members, peers, and college staff were found to be more influential than the academic environment in shaping students' confidence in obtaining their qualifications promptly.

This body of literature establishes a strong connection between student engagement and key educational outcomes in CCs, such as persistence, academic success, and the intention to transfer. These studies highlight the critical roles of both faculty engagement and peer interaction in fostering student success although these studies utilized data either from one college or colleges within one state.

The Role of Engagement for Success of Underserved and Marginalized CC Students

While CCs are critical for social mobility, the benefits are not equally realized by all student demographics, notably first-generation, low-income, and non-traditional minority students (Ebanks & Francois, 2023). Students who enroll in CC are more likely to come from minoritized racial and ethnic groups, lower income backgrounds, work at least part-time, have families to support, and be the first college student in their family (LaSota & Zumeta, 2016; Natale & Jones, 2018). They hold multiple personal roles and responsibilities that compete for their time and efforts (Ozaki, 2016), and many of them depart without obtaining a degree or credential (Barnett, 2011).

The research on the role of engagement in academic success for CC students with marginalized identities indicates some commonalities across groups. For instance, interaction with faculty is consistently highlighted as a crucial factor in student success. Studies show that these interactions can have a profound impact on academic outcomes, particularly for students from underrepresented backgrounds (Domínguez-Rebollar & Acevedo-Polakovich, 2022; Rodriguez et al., 2019). For instance, Latinx students benefit significantly from connections with faculty members who share similar backgrounds and experiences, which aids in their retention and success (Domínguez-Rebollar & Acevedo-Polakovich, 2022). Similarly, African American female students' persistence in CCs is heavily influenced by academic support and the financial strain they experience, with older students facing additional challenges (Ebanks & Francois, 2023).

The unique challenges and barriers for different groups are also underscored in these studies. Latinx students, for example, often struggle with being first-generation students, which hinders their ability to transfer and persist in their education. The ethnic composition of faculty

and students at an institution significantly influences their success, emphasizing the need for supportive institutional frameworks (Domínguez-Rebollar & Acevedo-Polakovich, 2022). Meanwhile, African American female students at a southeastern Louisiana CC reported experiencing issues like reduced academic support and financial strain, impacting their college persistence (Ebanks & Francois, 2023).

Furthermore, the research on men of color (MOC) in CCs identifies specific factors influencing their success. These include pre-college factors and five interconnected domains during their college experience – academic, environmental, noncognitive, institutional, and social (Harris & Wood, 2013). Particularly in the institutional domain, the emphasis is on the need for colleges to proactively design and implement programs and practices tailored to the needs and strengths of MOC, including academic advising and accessible counseling services.

Combined with the research linking engagement and academic success more broadly, the literature highlighted in this section illustrates the importance of examining marginalized student identities when aiming to understand the relationship between engagement and student outcomes.

Summary

In summary, the literature review underscores the crucial role of student engagement in the academic success of CC students, with a particular focus on the experiences of underserved groups. The review established a clear correlation between engagement and essential success metrics such as academic achievement, persistence, and transfer rates. This section also delved into the unique challenges and needs of underserved students, highlighting the pivotal role of faculty interaction in their educational outcomes. Transitioning from these findings, this study will now detail the methodology used to further investigate these relationships empirically. The

methods section is set to describe the study's design and the analytical strategies employed for data analysis. This approach is intended to provide a comprehensive understanding of how engagement influences the success of CC students, thereby addressing the study's central research questions.

Methods

The purpose of this study is to establish concurrent and predictive evidence of the validity of CCSSE engagement indicators for measures of academic success of CC students. This study utilized an integrated dataset, merging student survey responses with transcript data from three participating institutions. The final merged dataset made it possible to link an individual student's engagement experiences and their institutional records including demographic records, GPA, credential completion, transfer outcomes, and total credit hours. Engagement scores, estimated by the eight engagement factors presented in chapter 2, were used as independent variables. While validity research from the previous version of the CCSSE (Marti, 2008) used student self-reported GPA (ordered categorical variables from A to D), this study utilized numeric GPA from institutional data to generate more accurate information on the relationship between engagement and GPA.

Sample

The original dataset provided by the Center for CC Student Engagement included CCSSE respondents between 2010 to 2019. For this study, the sample was restricted to students who took the 2017 onwards administration of CCSSE survey, resulting 1,227 participants from three colleges. Demographic characteristics reported here are those indicated on the survey at the time of survey administration. The gender distribution was nearly equal, with 49% men and 51% women. Nearly three-quarters of participants were aged 24 years or younger (73%), with the remainder being 25 years or older (27%). For the traditional age group, the age distribution was

slightly skewed toward younger ages (48% between 18-19 years; 34% between 20-21 years; 18% between 22-24 years). Within the 25 years or older groups, there was wider range of age differences, with the largest subgroup being the 25-29 years olds (38%), followed by 30-39 years old (33%), and 40-49 years old (18%). Approximately 20% participants had dependent children and 13% were married. Over one-quarter of the sample identified as first-generation college students (28%) and nearly 15% indicated their first language is not English (14%). Enrollment status was primarily full-time (72%) as self-identified by students on the survey, with almost one-fifth having transferred to baccalaureate-granting institution. Detailed information can be found in Table 4.1.

Table 4.1

Demographic Table of The Three CCs in North Carolina

	total N = 1,227	college 001 n = 493	college 002 n = 217	college 003 n = 517
Gender				
men	605 (49%)	229 (46%)	117 (54%)	259 (50%)
woman	622 (51%)	264 (54%)	100 (46%)	258 (50%)
Age				
18-24	884 (73%)	350 (71%)	145 (68%)	389 (76%)
25+	332 (27%)	140 (29%)	69 (32%)	123 (24%)
Race/ethnicity				
American Indian	9 (0.7%)	3 (0.6%)	2 (0.9%)	4 (0.8%)
Asian	45 (3.7%)	11 (2.2%)	5 (2.3%)	29 (5.6%)
Black	202 (16%)	78 (16%)	38 (18%)	86 (17%)
Hispanic	169 (14%)	67 (14%)	33 (15%)	69 (13%)
Hawaiian	1 (<0.1%)	0 (0%)	0 (0%)	1 (0.2%)
Pacific Islander	30 (2.4%)	13 (2.6%)	2 (0.9%)	15 (2.9%)
White	735 (60%)	316 (64%)	127 (59%)	292 (56%)
Other	16 (1.3%)	5 (1.0%)	5 (2.3%)	6 (1.2%)
2 or more	20 (1.6%)	0 (0%)	5 (2.3%)	15 (2.9%)
Enrollment intensity				
part-time	347 (28%)	141 (29%)	61 (28%)	145 (28%)
full-time	880 (72%)	352 (71%)	156 (72%)	372 (72%)
Vertical transfer students	223 (18%)	113 (23%)	71 (33%)	39 (7.8%)
Married	156 (13%)	74 (15%)	39 (18%)	43 (8.4%)
Having dependent children	210 (17%)	102 (21%)	48 (22%)	60 (12%)
First generation students	344 (28%)	154 (31%)	75 (35%)	115 (22%)
Non-English first language	175 (14%)	63 (13%)	36 (17%)	76 (15%)
Military service	69 (5.7%)	29 (5.9%)	15 (7.0%)	25 (4.9%)
International students	41 (3.4%)	19 (3.9%)	10 (4.7%)	12 (2.3%)
Athlete students	9 (0.7%)	1 (0.2%)	1 (0.5%)	7 (1.4%)

Independent Variables

The independent variables were consistent across both the concurrent and predictive validity studies: engagement scores and demographic covariates.

Engagement Scores and Handling Missing Values

The predictive variables in this study encompassed eight student engagement scores, each representing a specific engagement factor. These factors included personal development (PDV), interaction with faculty and peers (IFP), higher order thinking (HOT), institutional support (ISU), writing and critical thinking (WCT), use of advising services (UAS), student effort (SEF), and extracurricular activities (ECA). Each engagement factor score was computed as the mean of the items scores under each factor, reflecting a comprehensive measure of each aspect of student engagement (Fredricks et al., 2004). Multiple imputation was implemented in this process to address the challenge of missing values within the dataset.

Missing values are a common challenge in survey research, often leading to biased results and reduced statistical power (Little & Rubin, 2002). Compared to traditional methods for handling missing data, such as listwise or case wise deletion and mean substitution, multiple imputation (MI) offers a more sophisticated and statistically sound approach (Rubin, 1987). MI involves creating several imputed datasets by replacing missing values with plausible estimates based on the observed data. These datasets are then analyzed separately, and the results are pooled to produce overall estimates. This process accounts for the uncertainty associated with the imputation, providing more accurate standard errors and confidence intervals (van Buuren, 2018). The advantages of MI are particularly evident when the data is missing at random (MAR) or missing not at random (MNAR), allowing for a more flexible and realistic approach to handling missing data compared to traditional methods. Moreover, MI has been shown to yield

estimates with lower bias and higher efficiency, especially in cases where the proportion of missing data is substantial (Schafer, 1999).

This study utilized multiple imputation by employing the Amelia package in R (Honaker et al., 2011). This process resulted in the generation of 20 complete datasets, each reflecting a plausible estimation of the missing values. Next was the calculation of the engagement factor scores within each of these 20 datasets. Then regression analysis was conducted on each dataset separately. This approach allowed for an in-depth examination of the relationship between the engagement factors and the dependent variables, ensuring that the analysis accounted for the variability introduced by the imputation process. Finally, the results from these separate analyses were pooled together using Rubin's Rules (Rubin, 1987), a statistical method that combines estimates from multiple imputed datasets to produce a single, more accurate, and reliable estimate. In essence, the implementation of multiple imputation via the Amelia package and the subsequent pooling of results via Rubin's Rules represent a rigorous and statistically sound approach to handling missing data, which is critical in acknowledging the uncertainty inherent in imputed data and in drawing valid and generalizable conclusions from the analysis (Schafer, 1999).

Covariates

This study incorporated demographic variables as covariates, grounded in national statistics and empirical literature on persistence and transfer gaps for CC students. The demographic variables included gender, age, underrepresented minority status, first-generation college status, marital status, and whether students have dependent children. All covariates are binary variables. Due to the use of institutional records for demographic data, gender was categorized into two groups: men and women. Age was divided into two categories to

distinguish between traditional college-age students (18-24 years old) and non-traditional or neo-traditional age students (25 years old and older). Underrepresented minority status was defined as identifying within specific racial/ethnic categories (American Indian, Asian, Black, Hispanic, Hawaiian Pacific Islander, 2 or more races, Other) compared to White. The incorporation of these covariates offers insights into the diverse experiences and challenges faced by CC students, contributing to a more nuanced understanding of elements that influence student success and engagement.

Enrollment intensity, defined as part-time or full-time student status, was derived from students' responses in the Community College Survey of Student Engagement (CCSSE). Although students' enrollment intensity may vary over the course of their studies, this covariate was included for the concurrent validity study for two reasons. First, enrollment intensity has consistently emerged as a significant factor in prior research, which indicates that part-time students often encounter more challenges in their academic progress and life circumstances compared to their full-time counterparts. Second, if enrollment intensity was supported by the finding of this study to be significant, then it could add new evidence to emphasize the necessity of developing targeted strategies to support the unique needs of part-time students, a demographic notably prevalent in CC settings.

Dependent Variables and Analytic Approach

The dependent variables were selected as measures expected to be related to engagement indicators based on existing conceptual and empirical literature. The analysis approach for each research question is listed after naming the dependent variables.

Research Question 1: Concurrent Evidence of Validity

- **Academic Achievement:** This is measured by the student's grade point average (GPA) during the semester in which they participated in the CCSSE survey, with values ranging from 1 to 4.

- **Pace of Progress:** Defined as the ratio of credits earned to credits attempted in the same semester of the CCSSE survey. This proportion ranges from 0 to 1, where a score of 1 indicates that a student earned all attempted credits.

Linear regression analysis was conducted to examine the association between student engagement scores and both term GPA and pace of progress, respectively. These analyses controlled for demographic characteristics including gender, traditional age, underrepresented minority (URM) status, enrollment intensity at the time of the survey, marital status, and having dependent children.

Research Question 2: Predictive Evidence of Validity

- **Persistence:** A binary variable (0, 1) indicating whether a student enrolled in the subsequent semester. A value of 1 denotes enrollment in the summer or fall semester following the spring CCSSE administration.

- **Completion:** A binary variable (0, 1) representing whether a student earned a credential from their institution.

- **Vertical Transfer:** A binary variable (0, 1) denoting whether a student transferred to a baccalaureate-granting institution, as derived from institutional records.

A series of logistic regressions were conducted to estimate the predictive capability of engagement factors on student's long-term success, as measured by persistence, completion, and vertical transfer. These models also included demographic covariates. The results are interpreted

using odds ratios, with values above one indicating a positive predictor and values below one a negative predictor. Odds ratios in logistic regression describe the odds of an event occurring given a particular predictor, relative to the odds without the predictor (Hosmer et al., 2013). Additionally, pseudo R-squared measures such as McFadden, CoxSnell, and Nagelkerke were used to assess the variance explained by the models and serve as indicators of model fit. However, pseudo R-squared should be interpreted with caution and is not directly comparable to R-squared in linear regression. In logistic regression, pseudo R-squared measures offer insights into model fit but have limitations and are influenced by factors like the strength of predictors and sample size (Long, 1997).

All analyses were conducted using R, a free software environment for statistical computing and graphics (R Core Team, 2021). Specific packages utilized for this research include 'Amelia' (Honaker et al., 2011) for multiple imputation, 'mitools' (Lumley, 2019) for combining results from multiply imputed datasets.

Results

First, the researcher undertook concurrent validity analyses to examine the associations of student engagement factors with students' term GPA and pace of progress, also considering demographic variables. Subsequently, predictive validity studies were conducted to explore the predictive power of engagement factors on the likelihood of persistence, completion, and vertical transfer, including demographic variables as covariates. The analyses utilized 20 imputed datasets to assess these relationships.

Research Question 1: Concurrent Evidence of Validity

Model 1: Association of Engagement Factors with Term GPA

Of all the demographic variables, underrepresented minority status (URM), enrollment status (ENRLMENT), and marital status (MARRIED) were statistically significant in predicting term GPA. While marital status was positively associated with term GPA (b = 0.399, 95% CI [0.172, 0.625], p = .001), underrepresented minority status showed a significant negative association with term GPA (b = -0.430, 95% CI [-0.549, -0.310], p < .001), indicating that underrepresented minority students, on average, have a 0.430-point lower term GPA compared to their non-minority counterparts when holding other covariates constant. Furthermore, enrollment status also demonstrated a statistically significant relationship with term GPA (b = 0.139, 95% CI [0.011, 0.267], p = .033). Part-time students had a 0.139-point lower term GPA compared to full-time students.

Beyond demographic factors, the model revealed that various engagement factors were related to academic performance. Specifically, personal development (ENG_PDV) emerged as a significant positive predictor of term GPA, with a coefficient of 0.248 (95% CI [0.139, 0.357], p < .001). This suggests that with each one-point increase in personal development, there is an associated increase of 0.248 points in term GPA. Similarly, interaction with faculty and peers (ENG_IFP) was positively associated with term GPA (b = 0.240, 95% CI [0.101, 0.379], p = .001). Conversely, institutional support (ENG_ISP) showed a negative association with term GPA (b = -0.104, 95% CI [-0.206, -0.003], p = .044). Each one-point increase in institutional support is associated with 0.104 points of decrease in term GPA. Overall, this model accounted for 11.97% of the variance in term GPA (R^2 = 0.1305, adjusted R^2 = 0.1197). See table 4.2 for details.

Table 4.2

Engagement Factors' Association with term GPA

	estimate	95% CI		se	p_value	
(Intercept)	2.518	2.095	2.942	0.216	0.000	***
women	0.119	0.003	0.235	0.059	0.044	
18-24 years old	-0.313	-0.475	-0.152	0.082	0.000	***
URM	-0.405	-0.525	-0.285	0.061	0.000	***
MARRIED	0.400	0.177	0.622	0.114	0.000	***
CHILDREN	-0.096	-0.286	0.095	0.097	0.324	
ENRLMENT	0.122	-0.007	0.251	0.066	0.065	
firstgen	-0.088	-0.217	0.041	0.066	0.182	
ENG_PDV	0.248	0.139	0.356	0.056	0.000	***
ENG_IFP	0.240	0.101	0.379	0.071	0.001	**
ENG_ISP	-0.104	-0.206	-0.003	0.052	0.044	
ENG_HOT	0.024	-0.077	0.125	0.052	0.642	
ENG_UAS	-0.213	-0.316	-0.109	0.053	0.000	***
ENG_WCT	-0.029	-0.121	0.063	0.047	0.534	
ENG_SEF	-0.168	-0.267	-0.069	0.050	0.001	**
ENG_ECA	0.044	-0.052	0.140	0.049	0.368	

Note: $R^2 = 0.1305$, adjusted $R^2 = 0.1197$

Model 2: Association between Engagement Factors and Pace of Progress

Model 2 incorporated engagement factors alongside demographic variables, demonstrating their collective influence on students' pace of progress (P3_POP), a ratio of credits earned to credits attempted. The coefficients represent the change in the probability of completing credits as a proportion of attempted credits. Notably, personal development (ENG_PDV) was a significant predictor, with each point increase associated with an average 6.22 percentage point rise in the pace of progress (b = 0.0622, 95% CI [0.0365, 0.0879], p < .001). Interaction with faculty and peers (ENG_IFP) also showed a positive association, each point increase correlating with a 4.04 percentage point increase in pace of progress (b = 0.0404, 95% CI [0.0076, 0.0732], p = .016). Conversely, institutional support (ENG_ISP) was negatively associated (b = -0.0299, 95% CI [-0.0539, -0.0060], p = .014), indicating a 2.99 percentage point

decrease in pace of progress with one-point increase in ISP. The associations for use of advising

services (ENG_UAS) (b = -0.0575, 95% CI [-0.0821, -0.0329], p < .001) and self-effort

(ENG_SEF) (b = -0.0269, 95% CI [-0.0504, -0.0035], p = .024) were also negative.

Demographic covariates such as traditional age (b = 0-0.0538, 95% CI [-0.0923, 0.015284, p =

0.006], URM (b = -0.0624, 95% CI [-0.0906, -0.0342], p < .001) and part-time student status

were negative predictors of pace of progress. The model accounted for 7.24% of variance in

P3_POP (R^2 = 0.083, adjusted R^2 = 0.0724). See Table 4.3 for details.

Table 4.3

Engagement Factors' Association with Pace of Progress

	estimate	95% CI		se	p value
(Intercept)	0.765	0.665	0.865	0.051	0.000***
women	0.018	-0.009	0.045	0.014	0.194
18-24 years old	-0.054	-0.092	-0.015	0.02	0.006**
URM	-0.062	-0.091	-0.034	0.014	0.000***
MARRIED	0.036	-0.018	0.089	0.027	0.19
CHILDREN	-0.008	-0.054	0.037	0.023	0.721
ENRLMENT	0.042	0.012	0.072	0.016	0.007**
first generation	0.007	-0.024	0.037	0.016	0.662
ENG_PDV	0.062	0.037	0.088	0.013	0.000***
ENG_IFP	0.04	0.008	0.073	0.017	0.016*
ENG_ISP	-0.03	-0.054	-0.006	0.012	0.014*
ENG_HOT	0.005	-0.018	0.029	0.012	0.661
ENG_UAS	-0.057	-0.082	-0.033	0.013	0.000***
ENG_WCT	-0.006	-0.027	0.016	0.011	0.604
ENG_SEF	-0.027	-0.05	-0.004	0.012	0.024*
ENG_ECA	0.016	-0.006	0.039	0.011	0.157

Note: R^2 = 0.083, adjusted R^2 = 0.0724

Research Question 2: Predictive Evidence of Validity

Logistic regression analyses assessed the impact of student engagement factors on

persistence, completion, and vertical transfer.

Model 1: Engagement Factors Predicting Persistence

In Model 1, engagement with faculty (ENG_IFP) was a significant positive predictor of persistence (OR = 1.7665, 95% CI [1.3237, 2.3575], p < .001). For a one-unit increase in this factor's score, there was about a 76.65% increase in the odds of continuous enrollment into the consecutive semester, holding all other variables constant. However, writing and critical thinking (ENG_WCT) was negatively associated with persistence (OR = 0.7341, 95% CI [0.6074, 0.8872], p = .001). This indicates that for every one-unit increase in the ENG_WCT score, the odds of a student persisting decreased by 26.59%, holding other variables constant. No demographic variables were statistically significant in predicting persistence into the next semester. The model's Nagelkerke R-squared was 0.055 (McFadden = 0.031, CoxSnell = 0.041) suggesting modest predictive validity. See table 4.4 for details.

Table 4.4

Engagement Factors' Predictive Power to Persistence

	odds ratios	95% CI		se	p values	
(Intercept)	0.697	0.334	1.455	0.376	0.336	
women	1.057	0.833	1.340	0.121	0.650	
18-24 years old	0.753	0.546	1.037	0.164	0.083	
URM	0.879	0.690	1.121	0.124	0.300	
MARRIED	1.009	0.652	1.562	0.223	0.966	
CHILDREN	1.365	0.934	1.996	0.194	0.108	
ENG_PDV	1.015	0.813	1.267	0.113	0.896	
ENG_IFP	1.767	1.324	2.357	0.147	0.000	***
ENG_HOT	1.092	0.888	1.342	0.105	0.404	
ENG_ISP	0.976	0.793	1.203	0.106	0.822	

Table 4.4, continued

Engagement Factors' Predictive Power to Persistence

	odds ratios	95% CI		se	p values	
ENG_WCT	0.734	0.607	0.887	0.097	0.001	**
ENG_SEF	0.829	0.676	1.015	0.104	0.070	
ENG_ECA	1.175	0.968	1.426	0.099	0.102	

Note: Nagelkerke R^2 = 0.055, McFadden R^2 = 0.031, CoxSnell R^2 = 0.041

Model 2: Engagement Factor Predicting the Likelihood of Earning a Credential

Underrepresented minority (URM) status was negatively associated with completion (OR = 0.6807, 95% CI [0.5303, 0.8737], p = .002), indicating that students from underrepresented minority groups had 32% lower odds of earning a credential, compared to White students and holding other variables constant. Interaction with faculty and peers (ENG_IFP) was a positive predictor (OR = 1.4375, 95% CI [1.0615, 1.9467], p = .019), with one-unit of increase in IFP score increased the odds of persistence by 43.75%, holding all other variables constant. Writing and critical thinking (ENG_WCT) demonstrated a marginal negative association (OR = 0.8180, 95% CI [0.6706, 0.9978], p = .046). The model's Nagelkerke R-squared was 0.0428 (McFadden = 0.024, CoxSnell = 0.031). See Table 4.5 for details.

Table 4.5

Engagement Factors' Predictive Power to Completion

	odds ratios	95% CI		se	p values	
(Intercept)	1.675	0.772	3.635	0.395	0.192	
women	0.978	0.764	1.252	0.126	0.858	
18-24 years old	0.739	0.523	1.045	0.177	0.087	
URM	0.681	0.530	0.874	0.127	0.003	**
MARRIED	1.004	0.627	1.609	0.241	0.986	
CHILDREN	1.076	0.718	1.613	0.207	0.723	
ENG_PDV	1.222	0.970	1.539	0.118	0.089	

Table 4.5, continued

Engagement Factors' Predictive Power to Completion

	odds ratios	95% CI		se	p values	
ENG_HOT	1.050	0.847	1.301	0.109	0.657	
ENG_ISP	0.844	0.680	1.048	0.110	0.124	
ENG_UAS	0.857	0.688	1.067	0.112	0.167	
ENG_WCT	0.818	0.671	0.998	0.101	0.048	*
ENG_SEF	1.013	0.819	1.253	0.109	0.906	
ENG_ECA	1.190	0.965	1.467	0.107	0.104	

Note: Nagelkerke $R^2 = 0.0428$, McFadden $R^2 = 0.024$, CoxSnell $R^2 = 0.031$

Model 3: Engagement Factors Predicting the Likelihood of Vertical Transfer

Model 3 incorporated engagement metrics alongside demographic factors to examine their predictive power to the likelihood of student transferring into a baccalaureate-granting institution. Traditional age was a significant predictor in this model (OR = 2.1692, 95% CI [1.3263, 3.5480], p = .002). Traditional-age students were approximately 2.17 times more likely to transfer compared to non-traditional-age students, holding all other variables constant. In other words, for non-traditional-age students, the odds of transferring are approximately decreased by 54% (1 - 1/2.1692 = 0.54 or 54%). Writing and critical thinking (ENG_WCT) emerged as a strong positive predictor (OR = 1.9809, 95% CI [1.5202, 2.5814], p < .001). This indicates that for a one-unit increase in WCT score, there was about a 98.09% increase in the odds of vertical transfer, holding all other variables constant. Use of advising services (ENG_UAS) was also a significant positive predictor, increasing the odds of transfer (OR = 1.3296, 95% CI [1.0157, 1.7404], p = .038). Other variables, such as underrepresented minority status (URM1), marital status (MARRIED1), and the other engagement factors did not reach statistical significance in this model. The model's Nagelkerke R^2 was 0.090 (McFadden's $R^2 = 0.059$, Cox and Snell $R^2 = 0.055$,), indicating moderate explanatory power for transfer likelihood. See Table 4.6 for details.

Table 4.6

Engagement Factors' Predictive Power to Transfer

	odds ratios	95% CI		se	p values	
(Intercept)	0.024	0.009	0.069	0.533	0.000	
women	0.950	0.697	1.295	0.158	0.747	
18-24 years old	2.169	1.326	3.548	0.251	0.002	***
URM	0.765	0.555	1.054	0.164	0.101	
MARRIED	1.058	0.549	2.041	0.335	0.866	
CHILDREN	1.239	0.730	2.104	0.270	0.427	
ENG_PDV	1.079	0.801	1.455	0.152	0.617	
ENG_IFP	0.808	0.557	1.174	0.190	0.264	
ENG_HOT	0.942	0.716	1.238	0.140	0.666	
ENG_ISP	1.017	0.772	1.341	0.141	0.902	
ENG_UAS	1.330	1.016	1.740	0.137	0.038	*
ENG_WCT	1.981	1.520	2.581	0.135	0.000	***
ENG_SEF	0.977	0.753	1.268	0.133	0.863	
ENG_ECA	1.180	0.935	1.489	0.119	0.163	

Note: Nagelkerke $R^2 = 0.090$, McFadden's $R^2 = 0.059$, Cox and Snell $R^2 = 0.055$

Discussion and Conclusions

Utilizing merged survey and institutional data from three North Carolina CCs, this study examined concurrent and predictive validity of CCSSE engagement factors for multiple student success measures. Further, the models included demographic and background factors related to known gaps in CC attainment and transfer to paint a more comprehensive picture to inform higher education practice.

Concurrent and Predictive Evidence of Validity

The concurrent and predictive evidence gathered in this study, highlighting the validity of CCSSE engagement factors for multiple student success measures, aligns well with and extends upon the findings discussed in the literature review. Prior studies have consistently emphasized the significance of student engagement, especially for underserved and marginalized groups in CCs (e.g., Domínguez-Rebollar & Acevedo-Polakovich, 2022; Ebanks & Francois, 2023;

Rodriguez et al., 2019). This study contributes to that body of literature by not only corroborating the established correlation between engagement and key metrics such as academic achievement, persistence, and transfer rates but also by incorporating demographic and background factors that shed light on attainment and transfer gaps. By merging survey data with institutional records from three North Carolina CCs, this research offers a more nuanced understanding of how engagement factors operate in diverse educational settings and impact a wide range of student success indicators. This comprehensive approach underscores the complexity of student engagement and its multifaceted role in CC students' academic journeys, particularly highlighting the need for tailored support and interventions for various student demographics.

Complex Nature of Engagement Factors

While this study was focused on establishing concurrent and predictive validity evidence for CCSSE engagement indicators, the findings shed light on the intricate nature of student engagement as both a concept and a construct. The results align with certain aspects of the existing literature, offer new perspectives on others, and, in some cases, present challenges to established understandings.

The findings from this study echo and substantiate the findings of extensive existing literature, particularly evident in the factor of interaction with faculty and peers. Interaction with faculty evidenced positive impact across various aspects of academic performance in this study: term GPA, pace of progress, persistence, and completion. These are in line with the current body of research, which emphasizes the critical role of faculty and peers in enhancing student engagement and academic achievement (Cejda & Hoover, 2010; Lancaster & Lundberg, 2019; Vang, 2018; Wood et al., 2014). This finding especially points to the need to encourage

underrepresented minority students to leverage the beneficial influence of student-faculty interaction. As these students often encounter unique barriers in higher education (Strayhorn, 2019), meaningful interactions with faculty and peers can mitigate these barriers, fostering a sense of inclusion and belonging critical for academic persistence and success. Such interactions provide essential social and academic support, helping URM students to navigate the complexities of higher education and feel connected to their academic community.

The unexpected negative associations between institutional support, use of advising services, and academic outcomes such as GPA and pace of progress merit a thorough investigation. Closer examination of the institutional support factor reveals that it encompasses aspects like assisting students in managing non-academic responsibilities, including work and family commitments, as well as offering financial support for their education. Similarly, the use of advising services factor includes elements related to the frequency of utilizing financial aid advising. These findings might suggest that students who reported higher engagement in these areas are also those experiencing significant financial strain and competing external responsibilities. This is a plausible explanation, as existing literature robustly documents the impact of financial burdens and non-academic commitments as risk factors in student achievement (Goldrick-Rab, 2016). Students grappling with financial difficulties and balancing multiple roles often face heightened stress and limited time for academic endeavors, which can detrimentally affect their academic performance (Jones, 2013). Thus, this finding highlights the need for institutions to re-evaluate their support structures. While providing financial aid counseling and support for managing life responsibilities is crucial, these services alone may not suffice to enhance academic performance. Institutions might need to integrate these services more holistically with academic support, ensuring that students receive support that addresses

both academic and non-academic needs effectively (Schudde & Goldrick-Rab, 2015). This nuanced understanding calls for further research to explore the dynamics between non-academic challenges and academic engagement.

The multifaceted nature of student engagement is exemplified by the factor of use of advising services, which exhibited varying associations across different academic outcomes. This factor demonstrated a negative correlation with GPA and pace of progress, yet its influence was not significant in predicting completion and persistence. Intriguingly, it emerged as a positive predictor for vertical transfer. On one hand, the positive association between this factor and transfer can be explained with specific survey questions under this construct, inquiring about students' utilization of transfer advising and academic planning services. This finding provides empirical evidence to support published qualitative research that confirmed the positive relationship between advising and vertical transfer (Berhane et al., 2023; Fay et al., 2022; Grote et al., 2022; Packard & Jeffers, 2013). These cited studies focused on student groups such as Black male students or engineering students in CCs. On the other hand, the differential impact of use of advising services suggests that the effectiveness of engagement factors may vary depending on students' specific academic goals. This divergence prompts a deeper exploration of how engagement factors can influence different educational pathways. For instance, the positive association with vertical transfer may reflect the targeted and goal-oriented nature of advising services in facilitating transfer processes. Conversely, the negative correlation with GPA and pace of progress might indicate that students who frequently seek advising services could be encountering academic challenges or complexities requiring intervention, which might temporarily impede their academic performance. Furthermore, this pattern underscores the need to consider individual student circumstances and objectives when evaluating the impact of

engagement factors. Institutions might need to tailor their advising services to address the diverse needs of students, recognizing that the same service may support some goals (like transfer readiness) while potentially correlating with challenges in other areas (such as immediate academic performance).

Overall, these findings contribute to a nuanced understanding of student engagement, emphasizing that its impact is not uniform across different academic outcomes. They highlight the importance of contextualizing engagement within students' unique educational trajectories and goals. This insight has significant implications for higher education institutions, calling for a more tailored approach in providing student support services.

Intersectionality and the Impact on Underrepresented Minorities

The intersectionality of student identities, particularly in the context of URM status, adds complex dynamics in the relation between engagement influences and outcomes. In this study, URM status consistently emerged as a factor negatively associated with critical academic metrics, including term GPA, pace of progression, and the likelihood of completion. This pattern speaks to the systemic barriers and unique challenges URM students face, such as limited access to resources, cultural and social capital disparities (Yosso, 2005), and potential biases within educational systems (Harper, 2012).

The study results regarding neo-traditional students, typically those aged 25 and older, were intriguing to consider. These students experienced higher term GPA and pace of progress, suggesting resilience and a strong academic orientation. However, they were less likely to transfer to baccalaureate-granting institutions, a finding that may reflect complex life circumstances such as work commitments, family responsibilities, or limited access to transfer-related resources and guidance (Kasworm, 2003; Taniguchi & Kaufman, 2005). This disparity

warrants more nuanced support strategies and policies tailored to their distinct needs. These insights shed light on the nuanced realities of intersectionality within higher education. They call for an increased focus on holistic support systems that address the diverse challenges and strengths of URM and neo-traditional students. Such an approach would not only validate their experiences but also enhance their educational journey and outcomes, ultimately contributing to a more equitable and inclusive academic environment (Hurtado et al., 2012).

Limitations and Future Research

While the study provided valuable insights to establish validity evidence and incorporated multiple imputation to strengthen the robustness of the findings, it is not without limitations. The reliance on cross-sectional data on engagement limited the ability to make causal inferences. Future research could employ a longitudinal design to track changes in engagement and outcomes over time and utilize mixed methods to capture the depth and context of student experiences. Moreover, the "completion" variable in the data might have been influenced by the fact that many colleges did not automatically grant credentials to students who fulfilled all the requirements. Instead, students were required to actively apply for graduation. This procedural nuance could impact how credential awards are documented institutionally. Future researchers should note this if they work with transcript data. Additionally, the negative associations found with some engagement metrics, such as with coursework in predicting persistence, were unexpected. Further research should explore the nature of these engagements and how they contribute to or detract from student success. Future research could also continue to investigate the complex dynamics of engagement factors, exploring how they intersect with students' varying academic objectives and personal circumstances.

Conclusion

In conclusion, this study contributes to the literature on the validity of engagement factors in predicting educational outcomes. Taken together, the analyses provide valuable insights into the complex nature of student engagement and its impact on various academic outcomes. Moreover, the findings enhance understanding of student engagement within the context of CCs, highlighting the intertwined effects of student engagement and individual characteristics on educational outcomes. The findings highlight the need for higher education policies and practices that are responsive to the diverse needs of students and that promote meaningful engagement to support their educational journeys.

References

Agresti, A. (2007). *An introduction to categorical data analysis* (2nd ed.). John Wiley. https://doi.org/10.1002/0470114754

Baber, L., Fletcher, R., & Graham, E. (2015). Black men attending community colleges: Examining an institutional approach toward equity. *New Directions for Community Colleges*, 2015(172), 97–107. https://doi.org/10.1002/cc.20167

Barnett, E.A. (2011). Validation experiences and persistence among community college students. *Review of Higher Education*, *34*(2), 193–230. https://doi.org/10.1353/rhe.2010.0019

Butler-Paisley, W., & Clemetsen, B. (2019). The value of peer interaction in the first-term community college classroom: A faculty perspective. *Community College Journal of Research and Practice, 43*(5), 327–340. https://doi.org/10.1080/10668926.2018.1478344

Chang, J. C. (2005). Faculty-student interaction at the community college: A focus on students of color. *Research in Higher Education, 46*(7), 769–802. https://doi.org/10.1007/s11162-004-6225-7

Clark, L. (2012). When nontraditional is traditional: A faculty dialogue with graduating community college students about persistence. *Community College Journal of Research and Practice*, 36(7), 511–519. https://doi.org/10.1080/10668926.2012.664090

Felix, E. R. (2021). Improving racial equity in community college: Developing a plan, implementing the vision. *Educational Evaluation and Policy Analysis*, *43*(3), 419–444. https://doi.org/10.3102/0162373721996729

Gonzalez, Á. J., Burgos-López, L., Felix, E. R., & Nienhusser, H. K. (2021). Policy implementation as a tool for advancing equity in community college. *Education Policy Analysis Archives*, *29*(January - July), 25. https://doi.org/10.14507/epaa.29.6689

Guiffrida, D. A., Lynch, M. F., Wall, A. F., & Abel, D. S. (2013). Do reasons for attending college affect academic outcomes? A test of a motivational model from a self-determination theory perspective. *Journal of College Student Development*, *54*(2), 121–139. https: //doi.org/10.1353/csd.2013.0019

Kinzie, J., Gonyea, R., Shoup, R., & Kuh, G. D. (2008). Promoting persistence and success of underrepresented students: Lessons for teaching and learning. *New Directions for Teaching and Learning*, *115*, 21–37. https://doi.org/10.1002/tl.323

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *The Journal of Higher Education*, *79*(5), 540–563. https://doi.org/10.1353/jhe.0.0019

Laird, T. F. N., & Cruce, T. M. (2009). Individual and environmental effects of part-time enrollment status on student-faculty interaction and self-reported gains. *The Journal of Higher Education*, *80*(3), 290–314. Https://doi.org/10.1080/00221546.2009.11779014

LaSota, R. R., & Zumeta, W. (2016). What matters in increasing community college students' upward transfer to the baccalaureate degree: Findings from the beginning postsecondary study 2003-2009. *Research in Higher Education*, *57*(2), 152–189. https://doi.org/10.1007/s11162-015-9381-z

Lavinson, R., & LaViolet, T. (2021). *Transfer advising: Sharpening a powerful tool for college success and equity*. https://tacklingtransfer.org/wp-content/uploads/2021/09/TT-Transfer-Advising-Report.pdf

Maggio, C., & Attewell, P. (2020). The surprising labor market success of part-time community college students. *Community College Journal of Research and Practice*, *44*(7), 528–543. https://doi.org/10.1080/10668926.2019.1616634

Natale, V. C., & Jones, S. J. (2018). Impact of institutional and student characteristics on Texas community colleges under the state's performance funding model. *Community College Journal of Research and Practice, 42*(10), 660–677. https://doi.org/10.1080/10668926.2017.1352543

Ozaki, C.C. (2016). Possible selves, possible futures: The dynamic influence of changes in the possible selves on community college returnees' persistence decisions. *Journal of College Student Retention: Research, Theory & Practice*, *17*(4), 413–436. https://doi.org/10.1177/1521025115579248

Peterson, S. (2016). Community college student-parents: Priorities for persistence. *Community College Journal of Research and Practice*, *40*(5), 370–384. https://doi.org/10.1080/10668926.2015.1065210

Pham, M., Greaney, K. C., & Abel, L. (2020). California community colleges produce positive employment outcomes: Results from the career technical education outcomes survey. *Community College Journal of Research and Practice, 44*(1), 52–60. https://doi.org/10.1080/10668926.2019.1650843

Porchea, S. F., Allen, J., Robbins, S., & Phelps, R. P. (2010). Predictors of long-term enrollment and degree outcomes for community college students: Integrating academic, psychosocial, socio-demographic, and situational factors. *The Journal of Higher Education, 81*(6), 680–708. https://doi.org/10.1080/00221546.2010.11779077

Rabitoy, E. R., Hoffman, J. L., & Person, D. R. (2015). Supplemental instruction: The effect of demographic and academic preparation variables on community college student academic achievement in stem-related fields. *Journal of Hispanic Higher Education, 14*(3), 240–255. https://doi.org/10.1177/1538192714568808

Rodriguez, F. C. (2015). Why diversity and equity matter: Reflections from a community college president: Why diversity and equity matter. *New Directions for Community Colleges, 2015*(172), 15–24. https://doi.org/10.1002/cc.20160

Shapiro, D., Dundar, A., Wakhungu, P. K, Yuan, X., & Harrell, A. (2015). *Transfer and mobility: A national view of student movement in postsecondary institutions, Fall 2008 cohort* (Signature Report No. 9). National Student Clearinghouse Research Center. https://nscresearchcenter.org/wp-content/uploads/SignatureReport9.pdf

Smith Morest, V. (2013). From access to opportunity: The evolving social roles of community colleges. *The American Sociologist, 44*(4), 319–328. https://doi.org/10.1007/s12108-013-9194-5

Strauss, L. C., & Volkwein, J. F. (2004). Predictors of student commitment at two-year and four-year institutions. *The Journal of Higher Education, 75*(2), 203–227. https://doi.org/10.1353/jhe.2004.0007

Sublett, C., & Tovar, J. (2021). Community college career and technical education and labor market projections: A national study of alignment. *Community College Review, 49*(2), 177–201. https://doi.org/10.1177/0091552120982008

Wang, X. (2012). Academic performance of community college transfers: Psychological, sociodemographic, and educational correlates. *Community College Journal of Research and Practice, 36*(11), 872–883. https://doi.org/10.1080/10668920903504976

Wang, X. (2013). Baccalaureate expectations of community college students: Socio-demographic, motivational, and contextual influences. *Teachers College Record*, *115*(4), 1–39. https://doi.org/10.1177/016146811311500402

Wang, X. (2016). Educational expectations and progress of community college students: Does socialization matter? *Teachers College Record, 118*(5), 1-32. https://doi.org/10.1177/016146811611800504

Williams, L. A. (2021). Identifying the common characteristics of low SES minority community college students who successfully persisted to achieve graduation (Publication No. 28314839) [Doctoral dissertation, Robert Morris University]. ProQuest Dissertations & Theses Global. https://www.proquest.com/dissertations-theses/identifying-common-characteristics-low-ses/docview/2487161974/se-2

Wirt, L. G., & Jaeger, A. J. (2014). Seeking to understand faculty-student interaction at community colleges. *Community College Journal of Research and Practice*, *38*(11), 980–994. https: //doi.org/10.1080/10668926.2012.725388

CHAPTER 5: SYNTHESIS AND IMPLICATIONS

The three related studies presented in this dissertation comprise a comprehensive exploration of the measurement properties of the 2017 version of the CCSSE (CCCSE, n.d.), investigating its application across diverse CC student populations. The overall aim was to substantiate the CCSSE's construct validity to ensure that comparisons made across different demographic groups would be meaningful and robust, and to generate evidence of concurrent and predictive validity to understand how engagement as measured by the survey correlates with and predicts essential student success outcomes. This holistic approach integrated a rigorous examination of the survey's psychometric properties with an analysis of its practical implications for student success in CCs. In pursuit of this aim, the dissertation was structured into three distinct yet interconnected studies, each addressing a unique facet of validity and engagement within the context of CCs.

The overarching objectives of the dissertation were to: (a) Establish the evidence of internal structure validity of the CCSSE, ensuring that the survey accurately measures the constructs it intends to across the CC student body; (b) Examine measurement invariance across gender, age, race/ethnicity, and enrollment intensity, thereby validating the survey's reliability in reflecting true group differences rather than methodological bias; and (c) Investigate the concurrent and predictive evidence of validity of CCSSE, focusing on how engagement as measured by the CCSSE survey predicts essential student success outcomes, such as persistence, completion, and transfer. The culmination of these objectives sought not only to advance the methodological rigor of student engagement research but also to provide actionable insights for CC administrators and policymakers. By emphasizing historically underserved,

underrepresented, and marginalized student groups, there was a conscious focus to illuminate the pathways through which engagement fosters educational equity and success.

This final dissertation chapter is organized to provide a synthesis of key findings within and across the three studies, discuss strengths and limitations of the approach, and provide implications for future research and practice using the CCSSE to examine CC student engagement.

Synthesis of Key Findings

Study 1: Construct Validity of CCSSE

Study 1 focused on establishing evidence of internal structure validity for the latest 2017 version of the CCSSE, using data from the entire three-year cohort spanning 2017 to 2019. This study employed exploratory and confirmatory factor analyses, filling a critical research gap since no comprehensive construct validity analysis had been done on this CCSSE version. Undertaking this study was particularly important, as previous studies have often relied on CCSSE's five benchmarks for construct validity. Applying the guidelines of the American Educational Research Association (AERA) Standards (American Educational Research Association et al. 2014), however, these benchmarks do not fully represent psychometric constructs and are not ideal for validity studies. The standards challenge the methodological base of earlier CCSSE-related research and prompts a rethinking of how construct validity is approached.

Breaking away from the traditional five-benchmark approach, Study 1 supported an eight-factor model for student engagement, offering a more detailed and psychometrically sound understanding of student engagement in CCs. The eight factors encompass areas such as personal development, interactions with faculty and peers, and institutional supports. These factors align well with recent theories and frameworks, notably Deil-Amen's (2011) concept of socioacademic

integrative moments. Socioacademic integration highlights the importance of blending social and academic experiences to foster student success, redefining the traditional view of student-faculty interactions, the role of educational institutions, and academic participation in CC settings.

Thus, Study 1 represents both a methodological step forward along with a theoretical shift. The study promotes a broader, multidimensional approach to studying and measuring student engagement, based on strong psychometric principles and in line with current theoretical perspectives. The findings suggest a more layered or nuanced understanding of CC student engagement. This study emphasizes combining theoretical insight with empirical accuracy, vital for guiding future research and practices in CC education.

Study 2: Measurement Invariance of CCSSE

The second study shifted focus to examine the measurement invariance of the CCSSE across various demographic groups, using data from a comprehensive three-year cohort (2017-2019) with a national sample size of 343,575. Utilizing multi-group confirmatory factor analysis, the results confirmed the configural, metric, and scalar invariance of the CCSSE. This finding underscores the CCSSE's consistent measurement of engagement across gender, age, race/ethnicity, and enrollment intensity groups. This validation assures the CCSSE's reliability in capturing authentic group differences and highlights its efficacy in cross-group comparisons within CC environments.

The demonstration of measurement invariance across diverse demographics has both theoretical and practical significance. The results affirmed the CCSSE's capability to measure student engagement uniformly across different student groups, reinforcing the idea that engagement is a universally relevant concept among CC students. Further, comparisons across

various demographic categories would be based on a robust and consistent measurement framework.

The measurement invariance study also uncovered intriguing within-group differences. Men exhibited marginally lower engagement scores across all eight factors compared to women. Part-time students, defined by their status at the time of survey-taking, scored lower than full-time students in all engagement factors, particularly in areas involving interaction with faculty, peers, and in writing and critical thinking. Adult students, or neo-traditional students, showed slightly lower engagement in using advising services and participating in extracurricular activities, but were notably higher in self-effort and higher-order thinking. Contrary to many previous studies, the latent group mean comparison revealed that underrepresented students scored higher than White students in engagement, except for the factor involving faculty and peer engagement, where the difference was marginal. These results highlight the complex and multifaceted nature of both engagement itself and of diverse student groups, underscoring the need for tailored, student-centered approaches by educational institutions and stakeholders.

Study 3: Concurrent and Predictive Validity of CCSSE

This study examined the concurrent and predictive evidence of validity CCSSE engagement indicators, revealing the complex nature of student engagement as both a concept and a construct. While aligning with existing literature, particularly in aspects like interaction with faculty and peers, the results also offered new insights and occasionally challenged conventional understandings. The positive impact of faculty and peer interactions on various academic aspects underscore the need to foster increased engagement, especially for underrepresented minority students, to lead to inclusivity and academic success.

An unexpected finding was the negative association between GPA and both institutional support and use of advising services. This suggests that engagement in these areas might often stem from academic or personal challenges, which could adversely affect academic performance. Alternatively, it may indicate that students tend to increase their use of these services when they are experiencing lower academic performance. Furthermore, the study uncovered complex effects of advising services on various academic outcomes: while there was a positive correlation with vertical transfer, a contrasting negative correlation was observed with both GPA and the pace of academic progress. This particular finding extends beyond the earlier discussion of GPA, highlighting how the effectiveness of engagement factors like advising services can vary depending on students' distinct academic objectives. This underscores the need for more personalized advising services tailored to individual academic goals.

The examination of intersectionality, especially in the context of underrepresented minority (URM) status, revealed contrasts between engagement levels and academic outcomes. In the findings for the measurement invariance study (Study 2), URM students exhibited higher engagement scores compared to White students, yet consistently displayed lower academic metrics such as term GPA and pace of progression, which could highlight a significant engagement-outcome gap. This disparity suggests that while URM students are highly engaged, systemic barriers and unequal access to resources may impede their academic success, calling for a deeper investigation into how high engagement can translate into improved outcomes for these students. In contrast, neo-traditional students, typically aged 25 and older, demonstrated a unique engagement pattern: they were less engaged in advising services and extracurricular activities, but showed higher levels of self-effort and higher-order thinking. This indicates a potentially more independent and self-directed approach to their education. However, their lower likelihood

of transfer to baccalaureate-granting institutions, as noted in the broader findings, points to possible challenges in navigating transfer processes or balancing complex life responsibilities. These insights underscore the necessity for institutions to develop targeted support strategies that acknowledge the diverse engagement styles and needs of different student groups, particularly focusing on how to effectively support their distinct paths towards academic achievement and advancement in higher education.

Integrated Findings

This dissertation represents a significant progression in the understanding of student engagement and the construct validity of CCSSE, extending and refining the foundation laid by Marti's (2008) seminal study. Marti's work, utilizing the CCSSE data from 2003-2005, was pivotal in establishing construct validity and examining measurement invariance. However, that study was restricted to configural and metric levels of measurement invariance, and relied on self-reported student GPA data, which, while valuable, raised concerns regarding accuracy and reliability.

In contrast, the present dissertation utilized the 2017 iteration of the CCSSE, a dataset previously unexplored in comprehensive construct validity research. This more recent version offers updated insights, crucial for a current understanding of student engagement. This dissertation not only brings fresh data to the forefront but also addresses the research gaps left by prior studies. It advances the field in several critical dimensions.

Primarily, the analysis of the latest CCSSE data supports a refined eight-factor engagement construct, offering a more nuanced understanding of student engagement. It expands the scope of measurement invariance analysis to include all four levels—configural, metric, scalar, and strict—thereby providing a more comprehensive insight into the engagement

construct's consistency across various demographics. This approach facilitates more meaningful comparisons of student engagement across diverse student populations. Furthermore, the study integrates CCSSE survey responses with institutional data, incorporating actual student GPAs, persistence into subsequent semesters, degree completion, and transfer rates. Utilizing this institutional data is a significant improvement over relying on self-reported, categorical measures of student GPA. The use of this data not only enhances the precision of GPA measurements but also allows for a more nuanced analysis of how student engagement influences academic success, persistence, and transfer rates, offering a more comprehensive gauge of student success than GPA alone.

While Marti's (2008) study laid the groundwork in examining the internal structure validity and initial aspects of measurement invariance of the CCSSE, this dissertation takes a leap forward. It achieves this by completing the spectrum of measurement invariance tests and by leveraging institutional data for a more accurate and insightful understanding of the relationship between student engagement and key academic outcomes. Building upon these insights, the collective examination of this dissertation's three studies presents a comprehensive and nuanced view of student engagement within CC settings. The progression from validating the construct of student engagement in the CCSSE (Study 1) to assessing the measurement invariance across diverse demographic groups (Study 2), and finally, to understanding the concurrent and predictive validity of engagement factors for student outcomes (Study 3), illustrates the multifaceted nature of student engagement and the importance of contextually-driven approaches.

The validation of the CCSSE's constructs in Study 1 underscored the need for robust and nuanced tools in assessing student engagement, setting the stage for more accurate and

meaningful analyses. The findings of Study 2 demonstrated CCSSE's consistent measurement across different demographic groups, notably revealing higher engagement scores of URM students compared to White students. This not only emphasizes the instrument's reliability but also brings to light engagement-outcome gaps. Significantly, these findings intersect with those of Study 3, which established concurrent and predictive validity evidence. Study 3 further explored these gaps by revealing the contrasting outcomes of higher engagement among underrepresented minority (URM) students and the distinct engagement patterns and academic challenges faced by neo-traditional students. The juxtaposition of these studies presents a crucial understanding: while engagement can be consistently measured, its impact on educational outcomes varies significantly across student demographics, influenced by factors such as institutional support, socio-economic challenges, and systemic barriers.

These integrated findings underscore the necessity for educational institutions to adopt a more individualized, student-centered approach in supporting engagement. Taken together, they suggest the need for a re-evaluation of support structures and policymaking in CCs, ensuring they are responsive to the diverse needs and experiences of their student populations. This holistic view of student engagement, informed by rigorous empirical research, paves the way for more equitable and effective educational practices, fostering environments where all students can thrive irrespective of their backgrounds.

Implications for Future Conceptual Development

The synthesized insights from these studies have significant implications for the conceptual and theoretical development in the study of CC student success. Firstly, the rigorous validation of the CCSSE's constructs and its proven reliability across diverse demographics challenge and expand existing theories of student engagement. The findings advocate for a more

holistic conceptualization of engagement, one that integrates socio-academic dynamics and acknowledges the varied experiences of different student populations. This suggests a future theoretical development towards models that not only measure engagement but also consider the contextual and intersectional factors affecting students' academic journeys.

Secondly, the disparity observed in engagement-outcome relationships, especially among URM and neo-traditional students, underscores the need to examine engagement in the context of other frameworks like validation (Barber, 2018; Barnett, 2011), community cultural wealth (Smith, 2022; Whitehead, 2019; Yosso, 2005), self-efficacy (Chen & Starobin, 2018; Thompson & Verdino, 2019), and intersectionality (Cho et al., 2013; Crenshaw, 1991; Levine-Rasky, 2011). Scholars should aim to examine these complex interactions, providing insights into how student engagement can be effectively utilized to improve educational outcomes for all student groups, particularly those historically marginalized or underserved.

Additionally, the diverse impacts of engagement factors highlighted in these studies call for theories that go beyond one-size-fits-all approaches. Theoretical developments should focus on creating adaptable, flexible frameworks that can be tailored to the specific needs and contexts of individual students, recognizing that engagement strategies effective for one group may not yield the same results for another. This approach would contribute to more inclusive and effective learning environments.

Strengths and Limitations

There are three main strengths to highlight when examining the three studies.

- Methodological Rigor: This dissertation stands out for its methodological rigor, particularly in employing advanced statistical techniques such as confirmatory factor

analysis, multiple imputation, multi-group analysis. These methods provide a robust foundation for the study's conclusions.

- Comprehensive Approach: The research comprehensively addresses various aspects of student engagement in CCs, from construct validity to measurement invariance and predictive validity. This approach offers a holistic view of the CCSSE's utility.

- Diverse Perspectives: By focusing on different demographic groups, the study contributes valuable insights into the engagement experiences of diverse student populations, highlighting areas where CCs can enhance support and equity.

Two primary limitations can be noted:

- Cross-Sectional Design: The reliance on cross-sectional engagement data in this research limits the ability to make causal inferences. Future research could benefit from employing longitudinal designs to track changes in engagement and outcomes over time.

- Limited Scope in Demographic Categories: The exploration of gender differences was restricted to a binary classification, not capturing the experiences of non-binary or other gender students. Similarly, the categorization of race/ethnicity focused predominantly on under-represented minorities compared to White students, potentially obscuring nuanced differences within specific racial or ethnic groups.

Future Research Suggestions

The findings from these studies open several avenues for future research, each calling for a more refined and comprehensive exploration of student engagement in CCs.

- **In-depth Analysis of Engagement-Outcome Gaps**: Future studies should delve deeper into the engagement-outcome disparities, particularly among URM and neo-traditional student populations. Research could focus on identifying specific institutional practices

or policies that mitigate these gaps. For instance, qualitative studies might explore the lived experiences of underrepresented student groups and shed light on personal narratives behind the statistical trends.

- **Longitudinal Studies on Engagement Impact**: Longitudinal research can track the long-term effects of student engagement on academic and career outcomes. Such studies could employ mixed methods to follow student trajectories over several years, and track student perceptions and experiences as they progress through their educational journey. This would provide richer insights into how initial engagement in CC settings translates into long-term educational and professional success.

- **Cross-Institutional Comparative Studies**: Utilizing cross-institutional studies can help us grasp how student engagement shifts across various CC settings.

  o By conducting comparative analyses, researchers can evaluate how factors such as institutional size, location, funding levels, and student demographics play into engagement outcomes. This approach can assess the broader applicability of CCSSE findings. Furthermore, it can provide valuable insights for policy makers and practitioners to devise engagement strategies that are responsive to the unique needs of different institutions. This way could further lead to a more inclusive and effective educational landscape.

- **Expanding Theoretical Frameworks**: Future research should also consider the application of diverse theoretical frameworks to understand student engagement. Frameworks like validation, community cultural wealth, or cultural capital could provide deeper insights into the complex dynamics of student engagement. Incorporating these frameworks could reveal how aspects like social integration, student motivation, and

cultural assets influence engagement and academic success, particularly for marginalized groups.

- **Technology and Engagement**: Technology has become increasingly pivotal in education. This context presents a timely opportunity to investigate the impact of digital platforms and online learning environments on student engagement. We could examine the effectiveness of technological tools and relevant pedagogical strategies, particularly within remote or hybrid learning settings. This exploration is essential for understanding how technology can enhance or hinder educational experiences and outcomes. Investigating these topics could provide valuable insights into optimizing digital learning environments for maximum student engagement and educational efficacy.

Conclusion

This dissertation, presented in a three-article format, undertook extensive validation research of the 2017 CCSSE. The studies thoroughly examined evidence supporting the survey's internal structure validity, measurement invariance, and both concurrent and predictive evidence of validity. The studies included a specific focus on the historically underserved and underrepresented student groups in CCs. The findings are interpreted to suggest how the CCSSE can be effectively utilized by policy makers, practitioners, and researchers in these educational institutions to better understand and enhance student engagement and success.

References

American Educational Research Association, American Psychological Association, & National

      Council on Measurement in Education. (Eds.). (2014). *Standards for educational and*

      psychological testing. American Educational Research Association.

      https://www.testingstandards.net/uploads/7/6/6/4/76643089/standards_2014edition.pdf

Baber, L. D. (2018). "Living in the along": Validating experiences among urban community

      college students in a college transition program. *Community College Review, 46*(3), 316-

      340. https://doi.org/10.1177/0091552118775813

Barnett, E. A. (2011). Validation experiences and persistence among community college

      students. *Review of Higher Education, 34*(2), 193–230. https://doi.org/10.1353/

      rhe.2010.0019

Chen, Y. (April), & Starobin, S. S. (2018). Measuring and examining general self-efficacy

      among community college students: A structural equation modeling approach.

      Community College Journal of Research and Practice, 42(3), 171–189.

      https://doi.org/10.1080/ 10668926.2017.1281178

Cho, S., Crenshaw, K. W., & McCall, L. (2013). Toward a field of intersectionality studies:

      Theory, applications, and praxis. *Signs: Journal of Women in Culture and Society, 38*(4),

      785–810. https://doi.org/10.1086/669608

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence

      against women of color. *Stanford Law Review, 43*(6), 1241–1299. https://doi.org/10.2307

      /1229039

Deil-Amen, R. (2011). Socio-academic integrative moments: Rethinking academic and social integration among two-year college students in career-related programs. *The Journal of Higher Education, 82*(1), 54–91. https://doi.org/10.1080/00221546.2011.11779085

Levine-Rasky, C. (2011). Intersectionality theory applied to whiteness and middle-classness. *Social Identities, 17*(2), 239–253. https://doi.org/10.1080/13504630.2011.558377

Marti, C. N. (2008). Dimensions of student engagement in American community colleges: Using the community college student report in research and practice. *Community College Journal of Research and Practice, 33*(1), 1–24. https://doi.org/10.1080/106689207013 66867

Smith, D. T. (2022). "They are here to support me": Community cultural wealth assets and precollege experiences of undergraduate Black men in engineering. *Journal of Engineering Education (Washington, D.C.), 111*(4), 750–769. https://doi.org/10.1002 /jee.20480

Thompson, K. V., & Verdino, J. (2019). An exploratory study of self-efficacy in community college students. *Community College Journal of Research and Practice, 43*(6), 476–479. https://doi.org/10.1080/10668926.2018.1504701

Whitehead, M. A. (2019). "Where are my people at?": A community cultural wealth analysis of how lesbian, gay, and bisexual community college students of color access community and support. *Community College Journal of Research and Practice, 43*(10–11), 730–742. https://doi.org/10.1080/10668926.2019.1600611

Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education, 8*(1), 69–91. https://doi.org/10.1080/1361 332052000341006

APPENDIX: 2017 Version of CCSSE[1]

CCSSE Community College Survey of Student Engagement

THE COMMUNITY COLLEGE

SURVEY OF STUDENT ENGAGEMENT

Instructions: It is essential that you use a No. 2 pencil to complete this survey. Mark your answers as shown in the following example:

Correct Mark ●
Incorrect Marks ⊘ ⊗ ◔ ◑

1. Did you begin college <u>at this college</u> or elsewhere? ○ Started here ○ Started elsewhere

2. Thinking about this current academic term, how would you characterize your enrollment <u>at this college</u>? ○ Full-time ○ Less than full-time

3. Have you taken this survey in another class this academic term? ○ Yes ○ No

4. In your experiences <u>at this college</u> during the current academic year, about how often have you done each of the following? *(Please respond to each item)*

	Very often	Often	Some-times	Never
a. Asked questions in class or contributed to class discussions	○	○	○	○
b. Made a class presentation	○	○	○	○
c. Prepared two or more drafts of a paper or assignment before turning it in	○	○	○	○
d. Worked on a paper or project that required integrating ideas or information from various sources	○	○	○	○
e. Come to class without completing readings or assignments	○	○	○	○
f. Worked with other students on projects during class	○	○	○	○
g. Worked with classmates outside of class to prepare class assignments	○	○	○	○
h. Tutored or taught other students (paid or voluntary)	○	○	○	○
i. Participated in a community-based project (service-learning activity) as a part of a regular course	○	○	○	○
j. Used e-mail to communicate with an instructor	○	○	○	○
k. Discussed grades or assignments with an instructor	○	○	○	○
l. Talked about career plans with an instructor or advisor	○	○	○	○
m. Discussed ideas from your readings or classes with instructors outside of class	○	○	○	○
n. Received prompt feedback (written or oral) from instructors on your performance	○	○	○	○
o. Worked harder than you thought you could to meet an instructor's standards or expectations	○	○	○	○
p. Worked with instructors on activities other than coursework	○	○	○	○
q. Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)	○	○	○	○
r. Had serious conversations with students who differ from you	○	○	○	○
s. Skipped class	○	○	○	○

SAMPLE

5. During the current academic year, how much has your coursework <u>at this college</u> emphasized the following mental activities? *(Please respond to each item)*

	Very much	Quite a bit	Some	Very little
a. Memorizing facts, ideas, or methods from your courses and readings so you can repeat them in pretty much the same form	○	○	○	○
b. Analyzing the basic elements of an idea, experience, or theory	○	○	○	○
c. Forming a new idea or understanding from various pieces of information	○	○	○	○
d. Making judgments about the value or soundness of information, arguments, or methods	○	○	○	○
e. Applying theories or concepts to practical problems or in new situations	○	○	○	○
f. Using information you have read or heard to perform a new skill	○	○	○	○

SCANTRON. Mark Reflex® EM-252416-3:654321 ED99

© 2017 *CCSSE*, The University of Texas at Austin, All Rights Reserved

PLEASE DO NOT MARK IN THIS AREA

SERIAL #

1

---

[1] The survey is included with permission from CCSSE.

6. During the current academic year, how much reading and writing have you done <u>at this college?</u> *(Please respond to each item)*

	None	1–4	5–10	11–20	More than 20
a. Number of assigned textbooks, manuals, books, or packets of course readings	○	○	○	○	○
b. Number of books read on your own (not assigned) for personal enjoyment or academic enrichment	○	○	○	○	○
c. Number of written papers or reports of any length	○	○	○	○	○

7. Mark the response that best represents the extent to which your examinations during the current academic year have challenged you to do your best work <u>at this college</u>.

Extremely challenging ⑦ ⑥ ⑤ ④ ③ ② ① Extremely easy

8. Which of the following have you done, or are you currently doing <u>at this college</u>? *(Please respond to each item)*

	Yes	No
a. Internship, field experience, co-op experience, or clinical assignment	○	○
b. An English course taught specifically for students whose first language is not English (ESL, ESOL)	○	○
c. Developmental/remedial reading course (also referred to as Basic Skills, College Prep, etc.)	○	○
d. Developmental/remedial writing course (also referred to as Basic Skills, College Prep, etc.)	○	○
e. Developmental/remedial math course (also referred to as Basic Skills, College Prep, etc.)	○	○
f. Honors course	○	○

9. How much does <u>this college</u> emphasize the following? *(Please respond to each item)*

	Very much	Quite a bit	Some	Very little
a. Encouraging you to spend significant amounts of time studying	○	○	○	○
b. Providing the support you need to help you succeed at this college	○	○	○	○
c. Encouraging contact among students from different economic, social, and racial or ethnic backgrounds	○	○	○	○
d. Helping you cope with your non-academic responsibilities (work, family, etc.)	○	○	○	○
e. Providing the support you need to thrive socially	○	○	○	○
f. Providing the financial support you need to afford your education	○	○	○	○

10. About how many hours do you spend in a typical 7-day week doing each of the following? *(Please respond to each item)*

	None	1–5	6–10	11–20	21–30	More than 30
a. Preparing for class (studying, reading, writing, rehearsing, doing homework, etc.)	○	○	○	○	○	○
b. Working for pay	○	○	○	○	○	○
c. Participating in college-sponsored activities (organizations, campus publications, student government, intramural sports, etc.)	○	○	○	○	○	○
d. Providing care for dependents living with you (parents, children, spouse, etc.)	○	○	○	○	○	○
e. Commuting to and from classes	○	○	○	○	○	○

11. How much has your experience <u>at this college</u> contributed to your knowledge, skills, and personal development in the following areas? *(Please respond to each item)*

	Very much	Quite a bit	Some	Very little
a. Acquiring job- or work-related knowledge and skills	○	○	○	○
b. Writing clearly and effectively	○	○	○	○
c. Speaking clearly and effectively	○	○	○	○
d. Thinking critically and analytically	○	○	○	○
e. Solving numerical problems	○	○	○	○
f. Working effectively with others	○	○	○	○
g. Learning effectively on your own	○	○	○	○
h. Developing clearer career goals	○	○	○	○
i. Gaining information about career opportunities	○	○	○	○

3/8" PERF

SAMPLE

FOLD

12. **This section has three parts. Please answer all three parts, indicating (1) <u>how often</u> you have used the following services during the current academic year, (2) <u>how satisfied</u> you are with the services, and (3) <u>how important</u> the services are to you <u>at this college</u>.** *(Please respond to each item)*

	(1) Frequency of Use				(2) Satisfaction				(3) Importance		
	5 or more times	2–4 times	1 time	Never	Very	Some-what	Not at all	N.A.	Very	Some-what	Not at all
a. Academic advising/planning	○	○	○	○	○	○	○	○	○	○	○
b. Career counseling	○	○	○	○	○	○	○	○	○	○	○
c. Job placement assistance	○	○	○	○	○	○	○	○	○	○	○
d. Peer or other tutoring	○	○	○	○	○	○	○	○	○	○	○
e. Skill labs (writing, math, etc.)	○	○	○	○	○	○	○	○	○	○	○
f. Child care	○	○	○	○	○	○	○	○	○	○	○
g. Financial aid advising	○	○	○	○	○	○	○	○	○	○	○
h. Computer lab	○	○	○	○	○	○	○	○	○	○	○
i. Student organizations	○	○	○	○	○	○	○	○	○	○	○
j. Transfer advising/planning	○	○	○	○	○	○	○	○	○	○	○
k. Library resources and services	○	○	○	○	○	○	○	○	○	○	○
l. Services for students with disabilities	○	○	○	○	○	○	○	○	○	○	○
m. Services for active military and veterans	○	○	○	○	○	○	○	○	○	○	○

SAMPLE

13. **During the current academic term <u>at this college</u>, I completed registration before the first class session(s).**
   - ○ Yes; I was registered for <u>all</u> of my courses before the first class session(s)
   - ○ Mostly; I was registered for <u>most</u> of my courses before the first class session(s)
   - ○ Partly; I was registered for <u>some</u> of my courses before the first class session(s)
   - ○ No; I was <u>not</u> registered for <u>any</u> of my courses before the first class session(s)

14. **The one response that best describes my experience with <u>orientation</u> when I first came to <u>this college</u> is:**
   - ○ I took part in an online orientation prior to the beginning of classes
   - ○ I attended an on-campus orientation prior to the beginning of classes
   - ○ I enrolled in an orientation course as part of my course schedule during my first academic term
   - ○ I was not aware of a college orientation
   - ○ I was unable to participate in orientation due to scheduling or other issues

15. **During my first academic year <u>at this college</u>, I participated in a <u>first-year experience</u> program.**
   - ○ Yes
   - ○ No

16. **During my first academic term <u>at this college</u>, I participated in an <u>organized learning community</u> (a formal program in which groups of students take two or more classes together).**
   - ○ Yes
   - ○ No

17. **During my first academic term <u>at this college</u>, I participated in a <u>student success course</u> (a course that teaches the skills needed to succeed in college).**
   - ○ Yes
   - ○ No

18. **I was told that I should enroll in a developmental/remedial course (also referred to as Basic Skills, College Prep, etc.) in my first academic term <u>at this college</u>, and I...**
   - ○ Did enroll in <u>more than one</u> of these courses
   - ○ Did enroll in <u>one</u> of these courses
   - ○ Did not enroll in any of these courses
   - ○ Not applicable

3/8" PERF

SERIAL #

PLEASE DO NOT MARK IN THIS AREA

○○○○○○○○○○○○○○○○○○○○○○○○ ⬚

19. **During the current academic term <u>at this college</u>, my instructors clearly explained a class attendance policy that specified how many classes I could miss without a penalty.**
   - ○ <u>All</u> of my instructors explained a class attendance policy
   - ○ <u>Most</u> of my instructors explained a class attendance policy
   - ○ <u>Some</u> of my instructors explained a class attendance policy
   - ○ <u>None</u> of my instructors explained a class attendance policy

20. **Before the end of my first academic term <u>at this college</u>, an advisor helped me develop an academic plan (a personalized plan with a defined sequence of courses for completing a college certificate or degree and/or for transferring to a 4-year college or university).**
   - ○ Yes
   - ○ No
   - ○ I'm still in my first academic term; I have not yet developed an academic plan

21. **Someone <u>at this college</u> contacts me if I am struggling with my studies to help me get the assistance I need.**
   - ○ Yes
   - ○ No
   - ○ Not applicable

22. **During the current academic year <u>at this college</u>, I have participated in supplemental instruction/supplemental learning (extra class sessions with the instructor or an experienced student).**
   - ○ Never
   - ○ Less than 1 time a week
   - ○ 1–2 times a week
   - ○ 3–4 times a week
   - ○ More than 4 times a week

23. **How likely is it that the following issues would cause you to withdraw from class or from <u>this college</u>?** *(Please respond to each item)*

	Very likely	Likely	Somewhat likely	Not likely
a. Working full-time	○	○	○	○
b. Caring for dependents	○	○	○	○
c. Academically unprepared	○	○	○	○
d. Lack of finances	○	○	○	○
e. Transfer to a 4-year college or university	○	○	○	○

	Extremely	Quite a bit	Somewhat	Not very
24. **How supportive are your friends of your attending <u>this college</u>?**	○	○	○	○
25. **How supportive is your immediate family of your attending <u>this college</u>?**	○	○	○	○

26. **Indicate which of the following are your reasons/goals for attending <u>this college</u>.** *(Please respond to each item)*

	Yes	No
a. Complete a certificate program	○	○
b. Obtain an associate degree	○	○
c. Transfer to a 4-year college or university	○	○
d. Obtain or update job-related skills	○	○
e. Change careers	○	○
f. Self-improvement/personal enjoyment	○	○

3/8" PERF

SERIAL #

○○○○○○○○○○○○○○○○○○○○○○ ▣

27. Indicate which of the following are sources you use to pay for your tuition <u>at this college</u>. *(Please respond to each item)*

	Major source	Minor source	Not a source
a. My own income/savings	○	○	○
b. Income/savings from family	○	○	○
c. Employer contributions	○	○	○
d. Active military or veteran benefits	○	○	○
e. Grants	○	○	○
f. Scholarships	○	○	○
g. Student loans (bank, etc.)	○	○	○
h. Public assistance	○	○	○

28. When do you plan to take classes <u>at this college</u> again?
○ I will accomplish my goal(s) during this academic term and will not be returning
○ I have no current plan to return
○ Within the next 12 months
○ Uncertain

29. <u>At this college</u>, in what range is your overall <u>college</u> grade point average (GPA)?
○ A
○ B
○ C
○ D or lower
○ I do not have a GPA at this college

30. In what range was your overall <u>high school</u> grade point average (GPA)?
○ A
○ B
○ C
○ D or lower
○ I do not remember

31. When do you most frequently take classes <u>at this college</u>? *(Mark only one)*
○ Day classes (morning or afternoon)
○ Evening classes
○ Weekend classes

32. During the current academic term, how many classes are you taking... *(Please respond to each item)*

	None	1	2	3	4	5 or more
a. Face-to-face (a class in which all instruction is face-to-face in a classroom)	○	○	○	○	○	○
b. Online (a class in which all instruction is online)	○	○	○	○	○	○
c. Hybrid (a class that is a mixture of face-to-face and online instruction)	○	○	○	○	○	○

33. How many <u>total</u> credit hours have you earned <u>at this college</u>, not counting the courses you are currently taking this academic term?
○ None
○ 1–14 credits
○ 15–29 credits
○ 30–44 credits
○ 45–60 credits
○ Over 60 credits

3/8" PERF

34. How many <u>total</u> academic terms have you been enrolled <u>at this college</u>?
- ○ This is my first academic term
- ○ This is my second academic term
- ○ This is my third or fourth academic term
- ○ This is my fifth or sixth academic term
- ○ I have been enrolled more than six academic terms

35. Would you recommend <u>this college</u> to a friend or family member?
- ○ Yes
- ○ No

36. How would you evaluate your overall educational experience <u>at this college</u>?
- ○ Excellent
- ○ Good
- ○ Fair
- ○ Poor

37. Do you have children who live with you and depend on you for their care?
- ○ Yes
- ○ No

38. Mark your age group.
- ○ Under 18
- ○ 18–19
- ○ 20–21
- ○ 22–24
- ○ 25–29
- ○ 30–39
- ○ 40–49
- ○ 50–64
- ○ 65+

39. Your gender identity:
- ○ Man
- ○ Woman
- ○ Other
- ○ I prefer not to respond

	Yes	No
40. Are you married?	○	○
41. Is English your native (first) language?	○	○
42. Are you a current or former member of the U.S. Armed Forces, Reserves, or National Guard?	○	○
43. Are you an international student or non-resident alien?	○	○
44. Are you a student-athlete on a team sponsored by <u>this college's</u> athletics department?	○	○

45. What is your racial or ethnic identification? *(Mark all that apply)*
- ○ American Indian or Alaska Native
- ○ Asian
- ○ Black or African American
- ○ Hispanic or Latino
- ○ Native Hawaiian
- ○ Pacific Islander (non–Native Hawaiian)
- ○ White
- ○ Other
- ○ I prefer not to respond

3/8" PERF

46. What is the highest academic credential you have earned? *(Mark only one)*
- ○ None
- ○ GED
- ○ High school diploma
- ○ Vocational/technical certificate
- ○ Associate degree
- ○ Bachelor's degree
- ○ Master's/doctoral/professional degree

47. Who in your family has attended at least some college? *(Mark all that apply)*
- ○ Mother
- ○ Father
- ○ Brother/Sister
- ○ Child
- ○ Spouse/Partner
- ○ Legal Guardian
- ○ No one

Additional Items
(Please respond to these items if requested)

1. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   11. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   12. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   13. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   14. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   15. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
6. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   16. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
7. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   17. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
8. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   18. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
9. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   19. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
10. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   20. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

SAMPLE

Using the list provided, please fill in the bubbles that correspond to the code indicating your program, major, or pathway of study. In the top row, indicate the first number in the program code. In the bottom row, indicate the second number in the program code.

Ⓞ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
Ⓞ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

3/8" PERF

Please provide your student identification number by filling in the corresponding bubbles. For example, in the first column, indicate the first number or letter in your student ID number, and so forth. Please do not enter your social security number. (OPTIONAL)

(Please begin here)

SAMPLE

Thank you for sharing your views.

PLEASE DO NOT MARK IN THIS AREA

SERIAL #

3/8" PERF