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Research Article

Structural Conditions, Student Success, and Five-Year IPEDS Panel Analysis

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Abstract

Observable institutional decisions, staffing investment, resource allocation, and the demographic alignment between faculty and student populations are measurable predictors of whether students return for a second year. This study uses the Student Success Capacity Index (SSCI), a formative composite built from publicly available Integrated Postsecondary Education Data System (IPEDS) records, to examine whether structural institutional conditions predict first-year to second-year retention across 1,284 public and private non-profit four-year institutions over a five-year panel (2020–2024). Operating from a QuantCrit framework that repositions institutions as the primary unit of quantitative accountability, the study applies OLS regression with robust and clustered standard errors. SSCI is associated with retention at $\beta = 0.215$ ($p < .001$, full sample), $\beta = 0.093$ ($p < .001$, selectivity-controlled), and $\beta = 0.064$ ($p < .001$, five-year panel, $N = 4,266$). A robustness model removing the Outcomes dimension retains roughly 70% of the panel effect ($p < .001$), addressing concerns about circularity between predictor and outcome. These findings suggest structural institutional capacity deserves standing as an accountability metric.

Keywords:

Student Retention, Equity Infrastructure, IPEDS, QuantCrit, Student Success Capacity Index, anti-DEI legislation, Formative Composite, Higher Education Policy

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Introduction

Higher education has organized its institutional performance framework around student success for nearly two decades. Retention, completion, and equity gap closure have become the primary metrics through which accreditors evaluate institutional effectiveness, states distribute performance funding, and governing boards hold presidents accountable. The infrastructure through which institutions pursue those outcomes, staffing investment, faculty composition, advising capacity, programmatic reach, has been treated as an organizational strategy question: which structural conditions most reliably predict whether students return?

That question has a new urgency. Since 2023, state legislatures have moved from rhetorical opposition to enforceable prohibition of diversity, equity, and inclusion programs in public higher education. Florida's Senate Bill 266 banned diversity-related expenditures at public colleges outright (Florida Senate, 2023). Oklahoma required decade-long financial audits of every dollar spent on diversity programming (Brown, 2023). That inquiry subsequently was followed by Executive Order 2023-31 (Oklahoma Executive Order No. 2023-31, 2023) which sought to reduce DEI which was later codified into law via Senate Bill 796 (Oklahoma Senate, 2025). Mississippi subjected DEIA offices to hostile performance reviews framed as managerial accountability (Kearns, 2023). At the federal level, executive orders issued in early 2025 directed agencies to eliminate diversity programs and threatened funding consequences for noncompliant institutions. Journalistic tracking projects have documented that the scale of DEI rollback is not isolated but patterned, defunding, restructuring, renaming, and elimination of DEIA staff roles are occurring simultaneously across states and institution types (Gretzinger et al., 2025). The ideological rationale is consistent across contexts: that these structures are values-driven expenditures without demonstrable evidence of institutional effectiveness.

This paper tests that claim directly, and tests it on the student success terms that policymakers have already accepted as the appropriate evidence standard.

Using the Student Success Capacity Index (SSCI), a formative composite instrument built entirely from publicly available Integrated Postsecondary Education Data System (IPEDS) records (NCES, 2024), this study examines whether structural institutional conditions, including equity-oriented dimensions of faculty representation and graduation equity, predict first-year retention outcomes across 1,284 public and private non-profit four-year institutions over a five-year panel. Composite construction matters because DEI-oriented institutional spaces do not operate as isolated, single-variable interventions. They function as an ecosystem, staffing capacity, faculty representation, and outcome equity working together to retain marginalized students, and no single structural variable captures that interdependence on its own. A composite measure is the closest this study can come to approximating the actual structural conditions those spaces provide, conditions that have been eliminated or banned across multiple states without ever being evaluated at the national or state level for their structural effectiveness. Decades of qualitative scholarship document the value of these spaces for student belonging and persistence, but that evidence has been argued on ethical and values grounds rather than structural ones, precisely the terrain anti-DEI legislation has claimed for itself (Patton, 2006; Stewart, 2009; Museus & Quaye, 2009). The composite responds to that gap directly: it is the quantitative structure needed to test, on the legislature's own terms, what qualitative research has already established. The composite does not measure DEI commitment as a value. It measures structural institutional capacity as an organizational condition: staffing investment, the alignment between who teaches and who learns, and whether graduation outcomes are equitable across student populations. The finding is that these structural conditions, taken together, are significant predictors of whether students return, and that the equity-oriented dimensions of that bundle are not peripheral to the student success effect. They are part of what produces it.

This matters for the policy argument being made against these structures. The case for eliminating DEI-related infrastructure has rested on the assertion that such structures lack evidence of effectiveness. That assertion has been evaluated on ideological terms rather than empirical ones, in part because the field has not consistently produced population-level, federally sourced, quantitative evidence linking equity-oriented institutional conditions to the student success metrics that policy discourse already accepts as legitimate (Hinton & Lambert, 2022). This paper produces that evidence. Across 1,284 institutions, over five years, controlling directly for state-level anti-DEI legislative activity: structural conditions that include equity-oriented dimensions are significantly associated with retention at $\beta = 0.214$ ($p < .001$). The finding holds even in states where binding legislation has moved against these structures. The structures being eliminated are measurable components of what produces student success outcomes, and this paper documents the magnitude of that association.

Theoretical Framework

The qualitative case for equity infrastructure in higher education is theoretically rigorous and empirically well-supported. Literature Review

Research consistently demonstrates that campus racial climate, identity-affirming support structures, and faculty representation shape the conditions under which students of color persist, not as peripheral amenities, but as organizational conditions under which belonging and retention become possible (Harper & Hurtado, 2007; Hurtado et al., 2012; Palmer et al., 2014). Hurtado (2013) et al. (2012) argued that diverse learning environments are constitutive of institutional quality, not supplemental to it. The field knows what equity infrastructure does. What it has not produced at sufficient scale and in a form legible to policy discourse is quantitative, federally sourced evidence linking that infrastructure directly to measurable student outcomes. That evidentiary absence has become a political opening, one that the current wave of anti-DEIA legislation has moved quickly to occupy. This study is a methodological response to that absence.

Quantitative Critical Race Theory

Quantitative Critical Race Theory (QuantCrit) provides the epistemological foundation. QuantCrit holds that numbers are not neutral, that statistical methods, data systems, and measurement instruments reflect the racial order of the society that produced them, and that quantitative researchers bear explicit responsibility for interrogating whose interests their knowledge serves (Covarrubias & Vélez, 2013; García et al., 2018; López et al., 2018; Tate, 1997). Applied to higher education, this critique has a specific target: systems like IPEDS simultaneously expose and conceal structural inequity. They capture enrollment and retention rates while leaving largely invisible the organizational conditions, staffing investment, faculty composition, graduation equity gaps, that produce differential outcomes. QuantCrit names this as a political arrangement. What institutions are required to count reflects what the system has decided matters.

The present policy moment requires that the same federal data infrastructure be turned toward a different question, not where quantitative methods fail students of color, but how they can be deliberately designed to produce structural knowledge that is actionable toward institutional accountability. This study operationalizes QuantCrit's critical lens toward a specific methodological end. Rather than using IPEDS data to describe who attends or who completes, it uses that same data to measure what institutions structurally provide and then tests whether that structural provision is associated with whether students return. The unit of analysis is institutional behavior. The question is whether resource investment, faculty alignment, and equity outcomes, dimensions an institution control, explain variation in retention after accounting for who the institution enrolls and what political environment it operates in.

That reorientation requires a measurement approach capable of holding structurally distinct conditions without collapsing them. Staffing capacity, faculty-student racial alignment, and graduation equity gaps do not covary reliably, nor should they. An institution can invest heavily in student services while maintaining severe racial misalignment in faculty representation. A measurement model that treats these as interchangeable expressions of a single underlying trait would obscure exactly the structural variation the analysis needs to detect. This

study therefore operationalizes student success capacity as a formative weighted composite following Diamantopoulos and Winklhofer (2001), in which the observed indicators collectively constitute the construct rather than being caused by it (Bollen & Bauldry, 2011). The appropriate evaluative standard for such a composite is not internal consistency but predictive validity against theoretically meaningful external outcomes, which this study tests directly.

Composite Validation Methodology

Composite instrument validation for institutional variables is uniquely different than validating a psychometric scale. There is no agreed-upon procedure, comparable to established test-validity standards, for confirming that an institutional indicator measures the construct it claims to represent (Schmitz, 1993). When attempting to construct an institutional composite instrument developers typically proceed from construct definition and literature-grounded indicator selection toward empirical testing rather than beginning from a pre-validated instrument (Schmitz, 1993; Diamantopoulos and Winklhofer, 2001).

Institutional-level composite indices in higher education have followed this same path, using content-validity and expert-weighting approaches (Vituri & Tronchin, 2019) or normalized, dimension-based aggregation (Lamarão et al., 2026) rather than the reflective factor-analytic validation appropriate to individual-level survey scales. The present study's validation strategy, exploratory factor analysis confirming the theorized dimensional structure, followed by predictive validity testing against retention, sits within this institutional-index tradition rather than the psychometric-scale tradition its formative specification deliberately departs from.

The result is a methodological architecture built to produce a specific kind of evidence: population-level, federally sourced, quantitatively unimpeachable, and directly responsive to the policy claim that equity-oriented institutional conditions lack proof of effectiveness. This study is especially relevant given the recent surge in anti-DEI legislation. Hinton and Lambert (2022) called for moving DEI from opinion to evidence., and Cumming et al. (2023) identified the absence of systematic approaches for assessing whether equity is genuinely embedded in institutional practice. The method employed here answers both calls, across 1,284 institutions, over five years, controlling explicitly for the political environment the current policy moment centers on. The framework does not defend equity-oriented investment as a value. It documents the association between structural conditions and the student success outcomes institutions are held accountable for producing.

Research Questions and Hypotheses

Research Question 1: To what extent does the Student Success Capacity Index, a formative weighted composite of institutional staffing investment, faculty-student demographic alignment, and graduation equity outcomes, predict first-year to second-year retention across public and private non-profit four-year institutions?

Research Question 2: Do the three structural dimensions of the SSCI, Capacity, Representation, and Outcomes, each independently predict first-year retention above and beyond institutional selectivity, Carnegie classification, enrollment composition, and sector?

Research Question 3: Does the relationship between student success capacity and first-year retention remain stable across a five-year panel spanning 2020 through 2024, and does that relationship hold in the presence of a control for state-level anti-DEI legislative activity?

H1: Institutions with higher SSCI composite scores will demonstrate significantly higher first-year retention rates after controlling for institutional selectivity, Carnegie classification, enrollment composition, and sector.

H2: Each structural dimension of the SSCI, Capacity, Representation, and Outcomes, will independently predict first-year retention when entered as the sole structural predictor against full controls.

H3: The SSCI composite will remain a significant positive predictor of first-year retention across five years of panel data with institution-clustered standard errors and year fixed effects, and will remain significant in the presence of a binary control for state-level anti-DEI legislative restrictions.

Method

Data Source and Sample

All data are drawn from the Integrated Postsecondary Education Data System (IPEDS), the federally mandated institutional reporting system administered by the National Center for Education Statistics (NCES, 2024). IPEDS data are publicly available, institution-disclosed, and collected under statutory reporting requirements, a data provenance that matters for the argument this paper makes. The findings reported here are produced from the same data infrastructure institutions use to justify resource requests, benchmark against peers, and satisfy accreditation requirements.

Table 1. Sample Construction: From IPEDS Universe to Analytical Samples

Sample Stage	Exclusion Criterion	N Institutions
Full IPEDS Universe	All degree-granting institutions	2,580
Remove two-year and less-than-four-year institutions	Scope restricted to four-year degree-granting institutions	2,348
Remove for-profit institutions	Public and private non-profit only	2,043
Remove HBCUs	Structural logic category error; dedicated instrument required	1,958
Primary Analytical Sample	Listwise deletion applied for regression models	1,284

Selectivity-Controlled Specification	Restricted to institutions reporting ACT 25th percentile; post-test-optional missing rate = 66.1%	800
Five-Year Panel	800 unique institutions observed 2020–2024; unbalanced due to missing data in some institution-years	4,266 institution-years

Note. IPEDS universe reflects 2024 data release. N values for the universe stages reflect the maximum reporting institutions per variable; final analytical N (1,284) reflects listwise deletion across all primary structural predictors. Selectivity-controlled specification (n = 800) skews toward larger, more selective, and less demographically diverse institutions relative to the primary sample: mean retention 79.2% vs. 70.1%; URM student percentage 23% vs. 38%; Pell-eligible percentage 29% vs. 41%. The structural findings hold across both specifications. HSIs are retained in both samples.

The analytical sample consists of public and private non-profit four-year degree-granting institutions in the United States. HBCUs are excluded from the analytical sample. This exclusion reflects a categorical distinction in structural logic: HBCUs were founded as deliberate responses to a racially exclusionary higher education system built on the legal fiction of separate but equal, institutions created not to retrofit an existing system but to replace one that had denied access entirely (Conrad & Gasman, 2015). Their equity infrastructure was not built onto a predominantly white institutional frame; it is the frame. Applying a benchmarking model calibrated against predominantly white institutional norms to an HBCU would be a category error and measurement limitation, but a theoretical misapplication that would produce meaningless comparisons.

Hispanic-Serving Institutions (HSIs) are retained in the sample, and their inclusion is theoretically consequential. HSIs are predominantly white institutions that transformed in response to shifting enrollment demand and the demographic realities of the student populations they serve (Garcia, 2019; Núñez et al., 2016). They operate within the same structural frame the instrument is built to measure: a PWI logic that has been made responsive through deliberate investment in equity infrastructure, programmatic expansion, and faculty representation. HSIs represent what the model's central argument implies is possible, that when institutions treat equity-oriented conditions as organizational strategy rather than symbolic compliance, it produces measurable student success outcomes. Including HSIs strengthens the finding.

The primary analytical sample includes 1,284 institutions. A secondary selectivity-controlled specification restricted to institutions still reporting standardized test score data yields n = 800 and is reported as a conservative lower bound. The panel validation covers 2020–2024 IPEDS data releases, producing 4,266 institution-year observations with standard errors clustered at the institution level.

Measures

Dependent Variable

The outcome of interest is first-year to second-year retention of full-time students, drawn from IPEDS Fall Enrollment data. Retention captures whether students return, a decision made annually and shaped by the full institutional environment a student encountered in their first year (Tinto, 2012).

Student Success Capacity Composite

Student success capacity is operationalized as a formative weighted composite constituted by five IPEDS-derived variables across three structural dimensions: Capacity, Representation, and Outcomes. Following Diamantopoulos and Winklhofer (2001), the formative specification treats the observed indicators as collectively constituting the construct rather than being caused by an underlying latent variable, a design choice that reflects the structural reality that Capacity, Representation, and Outcomes are distinct organizational conditions with distinct causes and distinct remedies, not interchangeable expressions of a single underlying trait (Bollen & Bauldry, 2011). The validation of these constructs as a meaningful composite score is established in the companion paper.

The three-dimensional structure was validated empirically rather than assumed. Because no prior literature establishes this specific structure of institutional student success capacity, an exploratory factor analysis was conducted on seven structural indicators drawn from IPEDS Finance, Human Resources, and Fall Enrollment data, allowing the data to reveal whether the theorized structure exists without imposing it (Field, 2018). Principal axis factoring with promax rotation produced three factors aligned with the theorized Capacity, Representation, and Outcomes dimensions (KMO = .738; Bartlett's test of sphericity, $\chi^2(21) = 2,183.84$, $p < .001$). Three factors met the eigenvalue > 1.0 retention criterion, together explaining 79.1% of total variance, with clean loadings (REP_RATIO = .853, SS_RATIO = .876, SOC_FTE_DENSITY = .930) and no cross-loading above .40. This factor structure, not a separate companion analysis, is the empirical basis for the 40/35/25 weighting reported below. For the theoretical case that these three dimensions constitute rather than reflect the construct, see the Composite Validation Methodology discussion in the Literature Review.

Independent Variables

Capacity is measured by two variables: the density of full-time student affairs and services staff per 1,000 undergraduate students, and student services expenditures as a proportion of total institutional expenditures (Ryan, 2004; Webber & Ehrenberg, 2010). Together these variables capture the quantity of student-facing professional infrastructure and the revealed budgetary priority an institution assigns to it. Representation is measured by a single variable: the ratio of URM faculty share to URM student share, operationalizing the structural alignment, or misalignment, between who teaches and who learns (Fincher, et al., 2010; Harper & Hurtado, 2007). Outcomes are measured by two inverted

variables: the White-to-URM six-year graduation gap and the non-Pell-to-Pell six-year graduation gap. Larger gaps produce lower composite scores, treating graduation equity gaps as evidence of structural underperformance rather than student deficiency (Yosso, 2005).

The Outcomes dimension of the SSCI is constructed from two inverted gap variables, the White-to-URM six-year graduation gap and the non-Pell-to-Pell six-year graduation gap, which present potential circularity concerns. The primary validation outcome, first-year to second-year retention, is a distinct measure, separated from graduation by four to five years of institutional experience and driven by different proximate mechanisms. Exploratory models testing the SSCI as a predictor of graduation gap outcomes were examined during instrument development. Because the Outcomes dimension is partly constructed from those same gap variables, those models carry partial circularity and are not reported as primary findings. This distinction matters for the circularity concerns. Retention and graduation share genuine mechanical variance: graduation cannot occur without prior retention, and that relationship holds identically for every student regardless of race or socioeconomic status. Disaggregating the outcome by race and SES does not remove that mechanical floor. What it does for the sake of the SSCI is to isolate whether the retention-to-completion pathway runs at different rates across subgroups, a differential the institution-wide retention variable cannot see, since RET_PCF is not disaggregated by race. Given the current limited data available via IPEDS related to race and socioeconomic the White-to-URM and the non-Pell-to-Pell graduation gap give the best estimation of the potential structural indicators around equity and supporting marginalized students.

A nonzero, racially and socio-economic patterned gap is evidence that something beyond the shared retention mechanism, structural conditions operating unequally on marginalized students after the point retention is measured, continues to compound across the remaining years to completion. The two measures are also not attributionally identical: standard graduation-rate methodology tracks a cohort's completion at its original institution over six years, so a student retained at one institution who later transfers and completes elsewhere is counted as retained but not as a graduate there, a population invisible to that institution's own graduation-gap figure. The Outcomes dimension is therefore better understood as a measure of differential structural harm than as a restatement of retention under a different name, though the two remain related rather than independent. The robustness test reported below, which removes the Outcomes dimension from the composite entirely, is the empirical test of what this conceptual distinction cannot resolve on its own.

Composite Structure

All five variables are scored using within-Carnegie-classification percentile ranking for each data year, producing 0–100 scores robust to distributional outliers. The composite is computed as: $SSCI = 0.40 \times \text{Capacity} + 0.35 \times \text{Representation} + 0.25 \times \text{Outcomes}$. The 40/35/25 weight configuration follows from two reinforcing sources of evidence: the theoretical logic of variable selection and the factor structure confirmed through the exploratory factor

analysis in the companion manuscript (Paper 1, this submission).reported above. Capacity carries the highest weight because its two component variables, student services expenditure ratio and student affairs and services staffing density, are most directly tied to the units institutionally responsible for retaining students. These are the offices, the staff, and the budgets that touch students before they leave. Representation carries the second weight because faculty-student demographic alignment operates as an upstream environmental condition rather than a direct retention intervention. Who teaches shapes the environment in which students decide whether they belong. That effect is real and the data confirm it, but it works through climate and identity conditions that precede the retention decision rather than responding to it in real time. Outcomes carry the lowest weight for a reason that is both methodological and theoretical. The Outcomes dimension measures graduation equity gaps, the difference in six-year graduation rates between URM and white students and between Pell and non-Pell students. Those gaps are downstream of retention. An institution with a large racial or socioeconomic graduation gap almost certainly has an upstream retention and persistence problem compounding over years. The gap is a lagging structural signal. Weighting it on par with Capacity or Representation would overstate the degree to which institutions can act directly on graduation equity in the short term and would collapse the temporal logic the instrument is built to capture.

Weight stability was tested across five alternative configurations. Table 32 reports the SSCI coefficient, standard error, confidence interval, and R^2 for each scheme against the primary outcome of first-year retention ($n = 800$, selectivity-controlled specification with full covariate set). The beta coefficient ranges from 0.073 to 0.095 across all five schemes, a range of 0.022. The R^2 range is 0.003. All five schemes are significant at $p < .001$. The predictive validity of the composite is not an artifact of the 40/35/25 weight configuration. Any theoretically defensible weighting of these three dimensions produces the same substantive finding. The Outcomes dimension of the SSCI is constructed from two inverted gap variables: the White-to-URM six-year graduation gap and the non-Pell-to-Pell six-year graduation gap present potential circularity concerns.

A direct empirical test of this concern was conducted by removing the Outcomes dimension from the composite entirely and renormalizing the remaining weights ($SSCI-NO = .533 \times \text{Capacity} + .467 \times \text{Representation}$), run on samples identical to the three primary specifications. The structural association survives: SSCI-NO remains significant at $p < .001$ in the full sample ($b = .154$ vs. $.217$ baseline), the selectivity-controlled specification ($b = .061$ vs. $.094$), and the five-year panel ($b = .046$ vs. $.066$), retaining roughly 70% of the original effect in each case. The association is not an artifact of the Outcomes dimension or the graduation-gap variables it contains. The primary validation outcome, first-year to second-year retention, is a distinct measure, separated from graduation by four to five years of institutional experience and driven by different proximate mechanisms. Using graduation equity gap variables as components of a composite that predicts retention introduces no circularity. The two outcomes do not share a measurement source. Exploratory models testing the SSCI as a predictor of graduation gap outcomes were examined during instrument development.

Because the Outcomes dimension is partly constructed from those same gap variables, those models carry partial circularity and are not reported as primary findings. Substantive validity claims for the SSCI rest on the retention models and on the component decomposition evidence reported below.

Table 2. Weight Sensitivity Analysis: Five Alternative Weighting Schemes

Scheme	Weights (Cap/Rep/Out)	β	SE	95% CI	R ²
BASE (primary)	40/35/25	0.092	0.018	[0.058, 0.128]	.724
EQUAL	33/33/33	0.095	0.018	[0.060, 0.131]	.725
CAP- HEAVY	50/30/20	0.092	0.018	[0.057, 0.127]	.724
REP- HEAVY	30/50/20	0.073	0.016	[0.042, 0.104]	.722
OUT- HEAVY	25/25/50	0.091	0.017	[0.057, 0.124]	.725

Note. $n = 800$. Dependent variable: first-year retention rate. Full covariate set including ACT 25th percentile, Pell %, URM student %, Carnegie classification, public/private, log enrollment, and large institution indicator. HC3 robust standard errors throughout. β range across all five schemes = 0.022. R^2 range = 0.003. All schemes significant at $p < .001$. BASE scheme uses the primary 40/35/25 configuration reported throughout. Stability criterion met: β range < 0.05 , significance maintained across all configurations.

Covariates

The regression includes controls for URM student percentage, Pell-eligible student percentage, log undergraduate enrollment, Carnegie classification dummies, public institution indicator, and large institution indicator. These variables are included to isolate the structural capacity effect from enrollment composition and institutional type, the composite coefficient reflects what institutions provide, net of who they serve (Astin, 1993; Goldrick-Rab, 2016; McCormick & Zhao, 2005).

The STATE_ANTI_DEI Control

The regression includes a binary variable coded 1 if the institution operated in a state with enacted binding legislative or executive restrictions on diversity-related spending, programming, or administrative functions during the observation year, and 0 otherwise. Coding was based on the Chronicle of Higher Education DEI Legislation Tracker (Gretzinger et al., 2025), which documents state-level legislative and executive actions restricting DEI programs at public colleges and universities. A restriction was classified as binding if it had been signed into law by the governor or issued as an enforceable executive order with institutional compliance requirements during the relevant observation year. Fourteen states met this criterion across the 2020–2024 panel: Alabama, Arkansas, Florida, Iowa, Idaho, Indiana, Kansas, Kentucky, North Carolina,

Oklahoma, South Dakota, Tennessee, Texas, and Utah. Oklahoma was coded based on a governor-issued executive order with binding institutional compliance requirements, consistent with the coding logic applied to enacted legislation in other states. The variable's inclusion serves two purposes. First, it controls for the possibility that the composite simply reflects political environment, that institutions in permissive states score higher and retain better for reasons unrelated to their structural investments. Second, it enables a direct test of whether the structural capacity effect holds after accounting for state-level political constraint.

Analytic Strategy

All models were estimated using ordinary least squares regression with heteroscedasticity-consistent HC3 robust standard errors (Cohen et al., 2013). All coefficients reported are unstandardized OLS coefficients (b), presented using β notation consistent with reporting conventions in this field. The core specification is: $RET_PCF = \beta_0 + \beta_1(SSCI) + \beta_2(URM_STU_PCT) + \beta_3(PGRNT_P) + \beta_4(STATE_ANTI_DEI) + \beta_5(ACTCM25) + \beta_6(\log_UG) + \beta_7(IS_PUBLIC) + \beta_8(IS_LARGE) + \text{Carnegie dummies} + \varepsilon$. A component decomposition model enters all three dimension scores simultaneously as free predictors, constituting the lossless aggregation test reported in Finding Two. The panel model estimates the association across 2020–2024 with institution-clustered standard errors and year fixed effects.

Regression diagnostics were conducted for all models. Breusch-Pagan tests confirmed heteroscedasticity across all specifications (all $p < .001$), which is the direct statistical justification for the HC3 robust standard error correction applied throughout. Variance inflation factors were within acceptable bounds for the three SSCI component scores (VIF range: 1.50–2.06). Elevated VIFs for Carnegie classification dummies and log undergraduate enrollment reflect expected collinearity between institutional size and Carnegie type and do not affect the substantive findings. Listwise deletion was applied to address missing data. Independent re-estimation in R confirmed all reported coefficients within rounding. A 1,000-replication cluster bootstrap confirmed HC3 standard errors within ± 0.08 across all key coefficients. Variable construction procedures, IPEDS survey collection sources, and analytical code are available from the author upon reasonable request. AI-assisted tools were used for language editing during manuscript preparation. All analyses, interpretations, theoretical framing, and scholarly contributions are the original work of the author.

Results

Three findings constitute the core of this analysis. The first is the primary validation: structural student success capacity is significantly associated with institutional first-year retention at $\beta = 0.214215$ ($p < .001$) across 1,284 institutions, $\beta = 0.093$ ($p < .001$) in the selectivity-controlled specification, and $\beta = 0.066064$ ($p < .001$) across the five-year panel. The second is component independence: Capacity, Representation, and Outcomes each independently predict retention, with a component decomposition producing $\Delta R^2 = .001$ versus

the composite, confirming the fixed weighting scheme is essentially lossless. The third is panel stability: the structural relationship holds across 4,266 institution-year observations spanning 2020 through 2024.

Descriptive Statistics and Bivariate Correlations

Table 3 presents descriptive statistics for the 2024 analytical sample. The mean institutional first-year retention rate is 74.12% (SD = 16.91). The mean SSCI composite score is 49.89 (SD = 15.32). Approximately 29% of institutions operated under binding state anti-DEI legislation. HSIs comprise 20% of the sample.

Table 3. Descriptive Statistics, *Cross-sectional sample, 2024*

Variable	N	M	SD	Min	Max
First-Year Retention Rate (%)	1,958	74.12	16.91	0.00	100.00
SSCI Composite Score	1,286	49.89	15.32	12.62	91.38
Capacity Score	1,749	51.13	20.20	1.69	98.31
Representation Score	2,043	50.12	28.87	0.34	100.00
Outcomes Score	1,388	49.81	24.54	0.69	99.88
URM Student Percentage (%)	2,348	32.41	23.95	0.00	100.00
Pell-Eligible Student Percentage (%)	2,345	36.61	18.21	0.00	100.00
Log Undergraduate Enrollment	2,348	7.30	1.75	0.00	12.01
Public Institution (binary)	2,580	0.31	0.46	0.00	1.00
Hispanic-Serving Institution (binary)	2,580	0.20	0.40	0.00	1.00

Note. SSCI = Student Success Capacity Index. Component scores reflect within-Carnegie-classification percentile ranking on 0–100 scale.

Table 4 reports bivariate correlations ($n = 1,284$). The SSCI composite correlates positively with first-year retention ($r = .44$, $p < .001$). All three components correlate independently with retention: Capacity ($r = .10$), Representation ($r = .17$), and Outcomes ($r = .21$), all $p < .001$. Component intercorrelations are modest, consistent with the formative composite specification.

Table 4. Bivariate Correlations, $n = 1,284$

Variable	1	2	3	4	5	6	7
1. SSCI	1.00	—	—	—	—	—	—
2. Capacity	.61	1.00	—	—	—	—	—
3. Representation	.72	.06	1.00	—	—	—	—
4. Outcomes	.55	.12	.14	1.00	—	—	—
5. Retention	.44	.10	.17	.21	1.00	—	—
6. URM %	-.18	-.14	-.32	.23	-.33	1.00	—
7. Pell %	-.37	-.14	-.44	-.07	-.58	.66	1.00

Note. All retention correlations significant at $p < .001$. Anti-DEI correlations with SSCI, Capacity, and Representation do not reach conventional significance thresholds.

Finding One: Student Success Capacity Predicts Institutional Retention

Table 5 reports the primary regression results. In the V1b full-sample specification ($n = 1,284$), the SSCI composite is a positive, statistically significant predictor of first-year retention ($\beta = 0.214215$, $SE = 0.017$, $p < .001$, 95% CI [0.182, 0.247]). In the V1 selectivity-controlled specification ($n = 800$), the coefficient is $\beta = 0.093$ ($SE = 0.018$, $p < .001$, 95% CI [0.058, 0.128]). Both estimates are significant at $p < .001$. V1 is the conservative lower bound; V1b is the unbiased population estimate.

The STATE_ANTI_DEI control is negative and significant in V1b ($\beta = -3.123$, $SE = 0.510$, $p < .001$), confirming that binding state-level anti-DEI legislation independently predicts lower institutional retention after controlling for structural investment. The SSCI coefficient is undiminished by this control. Structural student success capacity predicts retention in permissive and constrained political environments alike.

Table 5. Primary Regression Results: Student Success Capacity Predicting First-Year Retention

Variable	V1b β (SE)		V1 β (SE)	
SSCI Composite	0.215 (0.017)	***	0.093 (0.018)	***
Pell-Eligible Percentage	-0.294 (0.040)	***	-0.128 (0.037)	***
URM Student Percentage	-0.061 (0.026)	*	-0.052 (0.027)	†
Log Undergraduate Enrollment	2.816 (0.592)	***	2.086 (0.545)	***
Public Institution	-2.629 (0.789)	***	-1.223 (0.683)	†
Large Institution	1.205 (0.958)		0.095 (0.815)	
ACT 25th Percentile	—		1.095 (0.061)	***
Carnegie Classification Dummies	Yes		Yes	
n	1,284		800	
R²	.519		.724	
Adj. R²	.515		.721	

Note. Carnegie reference category: Associate/Special. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Finding Two: Component Independence

Table 56 reports the component decomposition model ($n = 800$). All three components are independently significant positive predictors of retention: Capacity ($\beta = 0.037044$, $SE = 0.013012$, $p = .004 < .001$), Representation ($\beta = 0.024023$, $SE = 0.009$, $p = .012013$), and Outcomes ($\beta = 0.040039$, $SE = 0.011010$, $p < .001$). The component decomposition produces $R^2 = .726724$, a difference of only $\Delta = .001$ from the composite specification, confirming that the fixed 40/35/25 weighting scheme is essentially lossless. Each structural dimension carries its own independent predictive signal for first-year retention. The near-zero loss in predictive power between the composite and decomposition specifications ($\Delta R^2 = .001$) confirms that the composite is an efficient and lossless summary of the structural signal, supporting its use as a single-number benchmark for cross-institutional comparison.

The independence of each component is strategically significant. Removing any single structural dimension carries its own retention consequence that cannot be offset by preserving the others.

Table 6. Component Decomposition: Predicting First-Year Retention, n = 800

Variable	β	SE	95% CI	p
Capacity Score	0.044	0.012	[0.020, 0.068]	<.001
Representation Score	0.023	0.009	[0.005, 0.041]	.013
Outcomes Score	0.039	0.010	[0.019, 0.059]	<.001
Pell-Eligible Percentage	-0.139	0.036	[-0.210, -0.068]	<.001
URM Student Percentage	-0.065	0.030	[-0.124, -0.007]	.028
ACT 25th Percentile	1.081	0.061	[0.961, 1.201]	<.001
Log Undergraduate Enrollment	1.781	0.309	[1.175, 2.387]	<.001
Carnegie Classification Dummies	Yes			
n	800			
R ²	.724			
ΔR^2 vs. composite	+.001			

Note. All component scores on 0–100 percentile scale. * $p < .05$, *** $p < .001$.

Finding Three: Panel Stability Across Five Years

Table 67 reports the panel model ($n = 4,266$ institution-year observations, 800 unique institutions). The SSCI composite coefficient is $\beta = 0.066064$ ($SE = 0.012$, $p < .001$, 95% CI [0.043, 0.089]). Year fixed effects are negative and significant across all post-baseline years, confirming a sector-wide retention decline following 2020 consistent with documented post-COVID enrollment disruption, while the within-institution SSCI effect remains positive and stable throughout. The structural relationship between student success capacity and retention is not a single-year artifact. It is a durable pattern in the federal data.

Table 7. Panel Model: Student Success Capacity Predicting First-Year Retention, 2020–2024

Variable	β	SE	95% CI	p
SSCI Composite	0.064	0.012	[0.041, 0.087]	<.001
Pell-Eligible Percentage	-0.130	0.032	[-0.193, -0.067]	<.001
URM Student Percentage	-0.035	0.020	[-0.074, 0.004]	.079
ACT 25th Percentile	1.163	0.052	[1.061, 1.265]	<.001
Log Undergraduate Enrollment	2.585	0.358	[1.883, 3.287]	<.001
Public Institution	-2.021	0.536	[-3.072, -0.970]	<.001
Large Institution	-0.139	0.559	[-1.235, 0.957]	.803
Year FE: 2021	-2.345	0.227	[-2.790, -1.900]	<.001
Year FE: 2022	-2.197	0.232	[-2.651, -1.743]	<.001
Year FE: 2023	-1.440	0.237	[-1.905, -0.975]	<.001
Year FE: 2024	-0.921	0.235	[-1.381, -0.461]	<.001
Carnegie Classification Dummies	Yes			

Institution-Clustered SE	Yes
Institution-Years	4,266
Unique Institutions	800
R²	.692
Adj. R²	.691

Note. Standard errors clustered at the institution level. † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

The results reported here carry three distinct lines of implication: what the component findings mean for student success strategy, what Analysis Found

Structural institutional conditions predict first-year retention. That is the STATE_ANTI_DEI direct finding means for the policy argument, of this study and what both together give practitioners it requires discussing on its own terms before it is interpreted or extended. When student services expenditure ratio is added to a model already controlling for selectivity, Carnegie type, Pell concentration, enrollment size, and coalition-builders who need a sector, it remains a significant independent predictor of whether students return. The budget decision an institution makes about how much of its total spending reaches student-facing support has a measurable consequence for retention, observable in federal data, stable across five years, significant after the most obvious alternative explanations are held constant. When student support services staffing density is added alongside it, the structural signal strengthens. When faculty-student demographic alignment is tested independently, entered as the sole structural predictor against full controls, it is a significant positive predictor of retention in its own right.

Each structural dimension carries its own independent signal. Representation ratio loses significance in the full simultaneous model because when expenditure and staffing density are already in the model, they absorb variance representation would otherwise explain. The component matrix recovers it. Entered alone against the same controls, representation alignment predicts retention at $p < .001$.

What this means taken together is that the decisions institutions make about resource allocation, professional staffing, and faculty composition are student success decisions. They move retention in the direction the investment suggests they should. Across 1,284 institutions. Over five years. After holding constant the characteristics of the students those institutions enroll. The structural relationship between what institutions build and whether students return is durable and it is in the federal data.

Implications

The staffing levels, budget allocations, and faculty composition decisions that governing boards approve, that state legislatures scrutinize, and that executive policy has recently moved to constrain, these are the structural conditions this study found to predict retention.

The practical implication is a call for granularity that the federal reporting infrastructure does not currently require. IPEDS knows what an institution spent on student services. It does not know whether that spending reached the tutoring center that kept a first-generation student enrolled or the housing operation that would have run regardless. A savvy Vice President for Student Success cannot wait for that distinction to appear in federal data. The infrastructure and allocation mechanics driving or hindering retention require institutional-level investigation that IPEDS was not designed to produce. QuantCrit highlights the need for a more critical analysis of data in order to unearth the sources of retention gaps that aggregate federal reporting obscures. The finding here is not that student services spending is irrelevant. It is that spending without diagnostic precision is not a retention strategy.

That context is the entry point for understanding why the methodological commitments of this study are technical necessities. QuantCrit demands that quantitative anchor in the current political research be turned toward surfacing structural inequity rather than reproducing it (Covarrubias & Vélez, 2013; García et al., 2018). This study answers that demand by identifying the structural conditions at which institutional behavior becomes legible in federal data, staffing density, expenditure ratio, and representation alignment. An institution that has reduced its student services expenditure ratio over consecutive years has made a measurable structural decision. The data now show what that decision is associated with. The five-year panel this study builds is an infrastructure for tracking whether those conditions are present, absent, or deteriorating as the policy environment shifts. The findings give practitioners specific, empirically grounded claims: staffing density is significantly associated with retention, expenditure allocation is significantly associated with retention, faculty-student demographic alignment is significantly associated with retention. A Vice President of Student Affairs arguing for staffing investment does not need a values argument. This study provides an empirical one, drawn from the same federal data the institution already uses to evaluate itself.

As of July 2026, the Chronicle of Higher Education was tracking 153 anti-DEI bills across 30 states, 34 of which had been signed into law (Gretzinger et al., 2025). The policy argument driving that legislative wave rests on the assertion that equity-oriented institutional structures lack evidence of effectiveness. This study tests that claim on the same empirical terms the policy debate has already accepted, student retention, measured from federal data, across more than a thousand institutions, over five years. The structures being measured here are the structures currently being restricted. What that empirical record shows, and what it means for the specific claim that representation-focused policy lacks a public-benefit justification, is addressed directly below. QuantCrit is the epistemological

framework that made producing this evidence possible, by insisting that the same federal data infrastructure used to hold students accountable for outcomes can and must be turned toward holding institutions accountable for the structural conditions that produce them.

What the Findings Mean for Student Success Strategy

The central contribution of this study is that equity-oriented institutional conditions are measurable components of student success infrastructure, and that when institutions invest in those conditions, students return at higher rates. The SSCI composite is a student success capacity measure whose components include equity-oriented structural conditions because those conditions predict retention.

The component decomposition model establishes that Capacity ($\beta = 0.037044$, $p = .004 < .001$), Representation ($\beta = 0.024023$, $p = .012013$), and Outcomes ($\beta = 0.040039$, $p < .001$) each independently predict first-year retention. This independence is strategically significant. Dismantling any single structural dimension carries its own retention cost that cannot be offset by preserving the others. An institution that eliminates its DEIA office while retaining faculty of color does not recover the Capacity effect. An institution that reduces student services expenditures while maintaining favorable graduation equity ratios does not recover the Representation effect. The structural damage accumulates across dimensions rather than canceling out.

The important null in the component matrix reinforces and refines this interpretation. Capacity and Representation individually do not reach significance as predictors of six-year graduation equity gaps in the cross-sectional specification. This is an honest boundary condition: infrastructure investment and representational alignment predict retention now, while gap closure appears to require that investment to compound over multiple institutional cycles (Braxton et al., 2014; Hossler et al., 2009). The near-zero loss in predictive power between the composite and decomposition specifications ($\Delta R^2 = .001$) confirms that the composite is an efficient and essentially lossless summary of the structural signal, supporting its use as a single-number benchmark for cross-institutional comparison.

What the STATE_ANTI_DEI Finding Means

The STATE_ANTI_DEI coefficient is negative and significant in the primary V1b specification ($\beta = -3.123$, $p < .001$), confirming that binding state-level anti-DEI legislation is independently associated with lower institutional retention after controlling for structural investment. The political environment carries a measurable and independent student success cost. Institutions operating under binding anti-DEI legislative restrictions retain at lower rates, and that effect is independent of what those institutions have actually built in terms of structural capacity. The legislation is associated with degraded conditions in which equity-oriented investment operates.

The SSCI coefficient remains positive, large, and significant at $\beta = 0.214$ ($p < .001$) in the presence of that control. Structural student success capacity is

associated with retention in permissive and constrained political environments alike. This finding reframes the policy question. The debate has been conducted as though the question is whether DEI is worth defending on values grounds. The data suggest the question institutions and policymakers should be answering is different: what is the student success consequence of eliminating structural conditions that are significantly associated with retention? This study produces an empirical basis for that conversation.

What This Gives Practitioners and Coalition-Builders

The evidentiary gap that anti-DEI policy has exploited is the absence of population-level, federally sourced, quantitative evidence linking equity-oriented institutional conditions to the student success outcomes policymakers already accept as the legitimate standard of institutional effectiveness (Cumming et al., 2023; Hinton & Lambert, 2022). That gap has allowed the policy argument, these structures lack evidence of effectiveness, to operate as an assertion rather than a finding.

The political fight over DEI has always lived in the qualitative, values, climate, belonging, identity. IPEDS has been sitting there the whole time disaggregating by race, gender, and Pell status, telling institutions who shows up and who graduates, but nobody built the quantitative instrument that connects those data points to the structural decisions institutions make. The data system reflects what the racialized order has decided is worth measuring and worth answering. QuantCrit names this directly: the absence of predictive quantitative research on DEI-related institutional levers is a product of a racialized system unwilling to earnestly explore the statistical information connected to equity infrastructure. This paper picks up that question and uses the federal government's own data infrastructure to answer it. Taking IPEDS, the same system institutions use to benchmark and satisfy accreditors, and turning it toward a question the system was designed to avoid, that is what this paper does. For practitioners navigating legislative scrutiny, governing board challenge, or institutional review, the contribution is a precisely bounded empirical claim: not a DEI argument, but a student success argument, and one the current policy environment has not yet had to answer on its own terms. Representation, Public Benefit, and the Anti-DEI Premise

The clearest empirical challenge this study offers to the anti-DEI legislative premise comes from the Representation dimension specifically. Faculty-student demographic alignment, the single IPEDS-derived structural variable most directly tied to what representation-focused DEI initiatives target, significantly predicts institutional retention ($\beta = 0.023$, $p = .013$). This is not a value claim. It is a measurable pattern in the same federal data infrastructure states already use to fund and evaluate their public institutions.

What that pattern shows matters for how the finding should be read. The retention outcome measured is institution-wide, not disaggregated by race. The data therefore do not show that a faculty population mirroring the student population's racial composition retains URM students at higher rates specifically.

They show something broader: closer alignment between who teaches and who learns is associated with higher retention for the student body as a whole, URM and non-URM students alike. This distinction has bearing on how representation-focused policy is typically challenged, though this study is not positioned to resolve it. Critics of race-conscious hiring and representation goals often frame them as benefiting a single racial group at the expense of institutional neutrality, the premise underlying strict scrutiny challenges to race-conscious policy more broadly. Whether an empirical record showing a broad-based rather than single-group retention benefit should bear on that premise is a legal and policy question this study raises rather than answers. Legal scholars and policymakers evaluating representation-focused policy may find that question worth taking up directly, using retention data of this kind as an evidentiary starting point rather than assuming the single-beneficiary premise *a priori*.

This finding gives empirical weight to what qualitative scholarship on identity-affirming campus environments has argued for decades: that representation is not a benefit confined to the students it is often assumed to target, but a structural condition that shapes the institutional climate all students experience (Harper & Hurtado, 2007; Patton, 2006, 2010; Museus & Quaye, 2009).

Read against that backdrop, this study's findings do more than leave the anti-DEI legislative premise unsubstantiated. They suggest the premise runs against what public institutions are actually for. States fund public higher education, in part, on the premise that it serves the broad public good of the citizens who attend it. A structural condition this study finds to be associated with retention benefits across the full student population, not a subset of it, is difficult to reconcile with legislation restricting that same condition in the name of protecting students from preferential treatment. The empirical record and the stated purpose of the policy are, on this dimension, in tension with each other.

Conclusion

This study set out to answer a specific empirical question in a specific policy moment: do the structural conditions being eliminated under current anti-DEIA policy predict whether students return for their second year? The answer, produced from the federal government's own institutional reporting data across 1,284 institutions and five years of observation, is yes, and the finding is robust across specifications, samples, and the political environment designed to constrain it.

The Student Success Capacity Index composite is significantly associated with first-year retention at $\beta = 0.214215$ ($p < .001$) across the full analytical sample, $\beta = 0.093$ ($p < .001$) in the most conservative selectivity-controlled specification, and $\beta = 0.066064$ ($p < .001$) across the five-year panel with institution-clustered standard errors and year fixed effects. All three structural dimensions, Capacity, Representation, and Outcomes, independently predict retention. State anti-DEI legislation is independently associated with lower retention, and the SSCI coefficient remains undiminished in its presence. The

structural relationship holds even where the law has moved against these structures.

Equity-oriented institutional conditions, representational alignment between who teaches and who learns, equitable graduation outcomes across racial and socioeconomic lines, and the staffing capacity that enables both, are measurable components of the structural conditions significantly associated with whether students return. Institutions that invest in those conditions retain at higher rates. Institutions that eliminate them face a student success consequence that their retention frameworks have no mechanism to explain unless the structural relationship is named and measured. This study names it and measures it.

Limitations

Four limitations bound the current findings. First, the analytical sample excludes HBCUs. This exclusion is theoretically grounded, HBCU equity infrastructure operates under a structurally distinct historical and organizational logic that a benchmarking instrument calibrated against predominantly white institutional norms is not designed to capture (Conrad & Gasman, 2015), but it is a meaningful scope boundary that the field should not treat as permanent.

Second, all five instrument variables are drawn from IPEDS, which captures what institutions disclose through federally mandated reporting. IPEDS does not capture qualitative dimensions of student success infrastructure, the presence and quality of cultural centers, the depth of advising relationships, or the degree to which stated institutional commitments translate into experienced campus climate. The SSCI measures structural inputs as proxied through federal disclosure. It is an infrastructure measure, not a climate measure, and the two are related but not identical.

Third, additionally, the cross-sectional component null, Capacity and Representation do not independently predict equity gap closure in the single-year specification, establishes a boundary on what the data can show within the current analytical window. Longitudinal tracking of SSCI scores against gap trajectories over time, particularly for institutions that have experienced anti-DEI legislative rollback, is the most direct next analytical step.

Fourth, the binary STATE_ANTI_DEI operationalization flattens meaningful variation in the form, intensity, and enforcement of anti-DEI legislative constraints across states. A graduated operationalization distinguishing legislative intensity, spending prohibition, and administrative constraint would produce a more precise estimate of the policy environment effect and is a named priority for subsequent work.

Future Directions

The most consequential extension of this work is longitudinal tracking. As institutions in constrained states restructure, rename, defund, and eliminate

equity-oriented units in response to legislative mandate, IPEDS data will begin to capture those structural changes in the variables the SSCI measures. Tracking SSCI score trajectories for affected institutions against subsequent retention outcomes will produce the most direct empirical test of the association this paper documents.

One empirical signal in the data warrants a dedicated investigation this study is not positioned to provide cleanly. Exploratory models examining state anti-DEI legislation against graduation equity gaps produced a positive and significant association between binding legislative restrictions and socioeconomic graduation gaps, with institutions operating under anti-DEI constraints showing larger gaps between Pell and non-Pell six-year graduation rates independent of their structural capacity scores. Because the Outcomes dimension of the SSCI is partly constructed from graduation gap variables, those models carry partial circularity that prevents clean interpretation within this analytical architecture. A study designed specifically to test that relationship, using an instrument that excludes gap variables from the predictor construction or a difference-in-differences design tracking gap trajectories before and after legislative enactment, would produce the most direct empirical test of whether restrictions on equity infrastructure are associated with measurable harm to the students those structures were built to serve. A second priority is instrument extension to community colleges, whose student populations, low-income, first-generation, racially minoritized, are precisely those for whom the retention relationship documented here is most consequential. A third priority is HBCU-specific instrument development, capturing HBCU equity infrastructure on its own structural terms rather than against a predominantly white institutional benchmark.

Conclusion

The argument that equity-oriented institutional structures lack evidence of effectiveness has operated as an assertion in the current policy debate. It has been politically effective in part because the evidentiary record has not consistently answered it on the terms the debate has demanded, quantitative, federally sourced, population-level, and directly responsive to the student success metrics that institutional accountability frameworks already accept.

This paper answers it on those terms. Structural student success capacity, including its equity-oriented components, predicts whether students return. That finding is stable across 1,284 institutions, five years of federal data, and the political environment that has declared these structures expendable. It is a finding about what produces student success outcomes, and it is a finding the current policy environment has not yet had to account for.

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