Online Appendix for
"Beyond Teachers: Estimating Individual School Counselors' Effects on Educational Attainment"

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A Additional Figures and Tables

Table A.1: Breakdown of Counselor Time Usage

Activity	% of Time
Postsecondary admission counseling	30%
Choice and scheduling of HS courses	20%
Personal needs counseling	22%
Academic testing	12%
Occupational counseling and job placement	6%
Teaching	5%
Other Activities	5%

Notes: This table reports the average percentage of time counselors spend on the activities listed above. These estimates come from the National Association for College Admission Counseling's 2018 Counseling Trends Survey, as reported in NACAC's 2018 *State of College Admission*.

Table A.2: School Summary Statistics

	All	In Sample	Not in Sample
(A) Demographics and Achievement			
White	0.65	0.80	0.56
African American	0.11	0.05	0.15
Hispanic	0.17	0.08	0.22
Asian	0.04	0.04	0.04
English Language Learner	0.05	0.02	0.07
Students with Disabilities	0.20	0.15	0.23
Low-Income	0.39	0.25	0.48
Accountability Percentile	0.50	0.57	0.45
(B) Location and Size			
Urban	0.22	0.12	0.28
Suburban	0.56	0.66	0.50
Rural	0.20	0.22	0.19
Traditional School	0.78	0.92	0.70
Charter School	0.10	0.03	0.14
Vocational School	0.10	0.05	0.13
Per-Pupil Spending	14,629	13,688	15,268
(C) Postsecondary Plans			
Plan to Attend Four-Year College	54%	65%	46%
Plan to Attend Two-Year College	25%	20%	29%
Plan to Work	8%	7%	9%
Plan to Join Military	2%	2%	3%
N	390	146	244

Notes: This table summarizes the characteristics of Massachusetts high schools and their students. Column 1 is based on all Massachusetts high schools. Column 2 is based on all Massachusetts high schools in my sample. Column 3 is based on all Massachusetts high schools not in my sample. Panel (A) summarizes the average student demographics of the schools. Low-income is measured using free or reduced-price lunch status and the accountability percentiles are reporte dby the state. Estimates for postsecondary plans in panel (C) are from a state survey of high schoolers.

Table A.3: Validity of Predicted Effects without Imputed Assignments

	Including Imputations		Not Always Imputed		Never Imputed	
	Predicted Outcome (1)	Actual Outcome (2)	Predicted Outcome (3)	Actual Outcome (4)	Predicted Outcome (5)	Actual Outcome (6)
VA Measure						
High School Graduation	0.008	1.112***	0.000	0.849***	0.022***	1.016***
	(0.005)	(0.111)	(0.002)	(0.046)	(0.006)	(0.145)
Attend College	0.021	0.908***	0.000	0.615***	0.056***	0.793***
	(0.013)	(0.086)	(0.005)	(0.044)	(0.014)	(0.112)
Four-year College	-0.006	-0.006	-0.003	0.865***	0.014	1.114***
	(0.022)	(0.022)	(0.011)	(0.087)	(0.028)	(0.193)
Composite Index	-0.018	1.155***	-0.017	0.918***	0.064***	0.999***
	(0.021)	(0.086)	(0.013)	(0.057)	(0.024)	(0.122)
Non-Cognitive Skills	-0.002	0.885*** -0.002	0.841***	0.002	1.049***	
	(0.001)	(0.038)	(0.001)	(0.033)	(0.002)	(0.058)
Cognitive Skills	0.038	1.255***	-0.013	1.045***	0.046	0.271**
	(0.053)	(0.154)	(0.045)	(0.149)	(0.029)	(0.124)
College Readiness	-0.032***	1.037***	-0.023***	0.922***	0.037*	1.179***
	(0.011)	(0.091)	(0.008)	(0.071)	(0.020)	(0.146)
College Selectivity	0.023	1.136***	-0.005	0.837***	0.060**	0.937***
	(0.029)	(0.161)	(0.018)	(0.103)	(0.028)	(0.190)
Education Attainment Index	0.007	1.114***	-0.000	0.893***	0.038**	1.073***
	(0.014)	(0.098)	(0.006)	(0.057)	(0.018)	(0.144)

Notes: Heteroskedasticity robust standard errors clustered by counselor and cohort are in parentheses. (*p<.10 **p<.05 *** p<.01). Each estimate comes from a regression of a student's predicted or actual (residual) outcome on their counselor's leave-one-out value-added estimate for the relevant outcome. In all cases, I use the residual outcome, controlling for the first letter of a student's last name, school, grade, and year (when a student was first assigned to the counselor), the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. In columns 1, 3, and 5 the outcome is the student's predicted outcome (e.g. high school graduation) based on their seventh grade test scores. In columns 2, 4 and 6, the dependent variable is the student's actual outcome (e.g. high school graduation). These estimates indicate the extent to which value-added is correlated with predicted versus actual outcomes. Estimates in column 1 and 2 are those from the main sample. Columns 3 and 4 exclude students whose assignments are always imputed. Columns 5 and 6 exclude students whose assignments are imputed at least once (during their high school time). Imputations are based on observed counselor assignments in other years the student was at the school or in adjacent years and HR records indicating when a counselor was employed by the school. Estimates are based on the first counselor to which a student is quasi-randomly assigned. College attendance is based on attendance within six months of completing high school.

Table A.4: Impacts of Counselors without Imputed Assignments

	Student Outcomes					Indices			
	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Cognitive Skills (6)	Non-Cognitive Skills (7)	College Readiness (8)	College Selectivity (9)
(A) Never Imputed									
Composite Index	0.014***	0.016***	0.017***	0.011***	0.011***	0.027***	0.037***	0.055***	0.033***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.008)	(0.005)
Education Index	0.024***	0.023***	0.021***	0.014***	0.017***	0.023***	-0.004	0.060***	0.040***
	(0.003)	(0.004)	(0.004)	(0.002)	(0.003)	(0.006)	(0.008)	(0.009)	(0.007)
(B) Not Always Imputed									
Composite Index	0.038***	0.033***	0.028***	0.016***	0.029***	0.017***	0.069***	0.084***	0.047***
	(0.003)	(0.003)	(0.002)	(0.001)	(0.002)	(0.005)	(0.008)	(0.006)	(0.004)
Education Index	0.043***	0.036***	0.030***	0.015***	0.032***	0.019***	0.030***	0.078***	0.047***
	(0.002)	(0.003)	(0.003)	(0.001)	(0.002)	(0.005)	(0.007)	(0.005)	(0.004)
(C) Including Imputations									
Composite Index	0.021***	0.022***	0.020***	0.014***	0.018***	0.020***	0.070***	0.076***	0.039***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.009)	(0.007)	(0.005)
Education Index	0.026***	0.027***	0.022***	0.015***	0.024***	0.024***	0.012	0.062***	0.041***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.005)	(0.009)	(0.006)	(0.005)

Notes: Heteroskedasticity robust standard errors clustered by counselor and cohort are in parentheses. (*p<.10 **p<.05 *** p<.01). The coefficients indicate the impact of assignment to a counselor who is predicted to be one standard deviation above average on the relevant metric. Each row is a separate regression, so that each row shows the independent relationship between one value-added measure and the outcome described in the column header. The estimates are based on the leave-year-out estimates of counselor value-added. Value-added is measured using the composite index (which captures counselors' effects on multiple domains) or the education index. The effects in columns 1-5 are in percentage points. Those in columns 6-9 are in standard deviation units (of the relevant index). Panel (A) is based on student-counselor assignments that are never imputed (i.e. observed in every year the student is in high school). Panel (B) is based on student-counselor assignments that are observed in at least one year a student is in high school, but may be imputed in some years. For instance, it includes students whose counselor linkages are observed in grade 10 and 12 but not grade 11 as long as the HR records indicate the counselor was employed at the school the year the student was in grade 11. Panel (B) includes all students also in Panel (A). Panel (C) includes all observed and imputed student-counselor linkages. In addition to the observations included in Panel (B), this includes students for whom we can approximate their likely counselor based on a counselor's assignment window in years before and after the student was in the school and HR records confirming counselor was employed at the school. For instance, if a counselor served students with last names A-F in the 2009-2012 cohorts and 2014-2016 cohorts, I impute the assignments as A-F for the 2013 cohort. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. These results are based on the leave-year-out estimates of counselor effects.

Table A.5: Impacts of Counselors with Reweighting to Represent State Population

	Student Outcomes					Indices			
	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Cognitive Skills (6)	Non-Cognitive Skills (7)	College Readiness (8)	College Selectivity (9)
(A) Propensity Scores based on Student Characteristics									
Composite Index	0.025***	0.024***	0.022***	0.017***	0.021***	0.010	0.114***	0.100***	0.043***
	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.010)	(0.015)	(0.009)	(0.008)
Education Index	0.033***	0.033***	0.024***	0.016***	0.030***	0.020**	0.032**	0.077***	0.046***
	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.009)	(0.016)	(0.009)	(0.008)
(B) Propensity Scores based on School Characteristics									
Composite Index	0.074***	0.063***	0.046***	0.027***	0.045***	0.008	0.250***	0.093***	0.062***
	(0.015)	(0.012)	(0.010)	(0.006)	(0.011)	(0.023)	(0.049)	(0.027)	(0.017)
Education Index	0.075***	0.050***	0.041***	0.024**	0.031**	0.011	0.126**	0.107***	0.038
	(0.015)	(0.016)	(0.014)	(0.009)	(0.015)	(0.022)	(0.056)	(0.027)	(0.036)
(C) Propensity Scores based on Student and School Characteristics									
Composite Index	0.026*	0.047***	0.033***	0.018**	0.028**	-0.009	0.149***	0.094***	0.042
	(0.016)	(0.014)	(0.011)	(0.008)	(0.012)	(0.023)	(0.035)	(0.028)	(0.026)
Education Index	0.042**	0.052***	0.037***	0.019**	0.035**	0.008	0.077**	0.101***	0.048*
	(0.019)	(0.016)	(0.012)	(0.008)	(0.014)	(0.022)	(0.038)	(0.028)	(0.027)

Notes: Heteroskedasticity robust standard errors clustered by counselor and cohort are in parentheses. (*p$<$.10 **p$<$.05 *** p$<$.01). The coefficients indicate the impact of assignment to a counselor who is predicted to be one standard deviation above average on the relevant metric. All estimates are reweighted to be representative of the Massachusetts population of students or schools using the approach from Miller, Shenhav, & Grosz (2021). Panel (A) is based on reweighting results to be representative in terms of student characteristics. Panel (B) is based on reweighting to be representative in terms of school characteristics. Panel (C) is based on reweighting to be representative in terms of both student and school characteristics. Each row is a separate regression, so that each row shows the independent relationship between one value-added measure and the outcome described in the column header. The estimates are based on the leave-year-out estimates of counselor value-added. Value-added is measured using the composite index (which captures counselors' effects on multiple domains) or the education index (in SDs). The effects in columns 1-5 are in percentage points. Those in columns 6-9 are in standard deviation units (of the relevant index). All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. These results are based on the leave-year-out estimates of counselor effects.

Table A.6: Correlation in Student Outcomes

	Graduate High School (1)	Attend College (2)	Attend Four-year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Earn BA Degree (6)	HS GPA (7)	HS Classes Failed (8)	10th gr. Math Test (9)	10th gr. Reading Test (10)	Log Absences (11)	Log Days Truant (12)	Log. Suspensions (13)	HS Dropout Score (14)	Max SAT Tests (15)	Any AP (16)
Graduate HS	1.000															
Attend College	0.500	1.000														
Attend Four-Year	0.405	0.765	1.000													
College Grad Rate	0.357	0.634	0.876	1.000												
Persist 1st Year	0.424	0.815	0.740	0.638	1.000											
Bachelor's Degree	0.332	0.607	0.735	0.691	0.687	1.000										
HS GPA	0.433	0.507	0.568	0.621	0.522	0.543	1.000									
Classes Failed	-0.414	-0.369	-0.360	-0.360	-0.353	-0.309	-0.670	1.000								
10th gr Math	0.283	0.409	0.512	0.593	0.423	0.468	0.642	-0.366	1.000							
10th gr Reading	0.292	0.414	0.494	0.562	0.419	0.452	0.606	-0.364	0.734	1.000						
Log Absences	-0.152	-0.253	-0.293	-0.335	-0.289	-0.315	-0.497	0.406	-0.355	-0.279	1.000					
Log Days Truant	-0.079	-0.121	-0.139	-0.174	-0.126	-0.135	-0.260	0.257	-0.191	-0.171	0.330	1.000				
Log Suspensions	-0.226	-0.246	-0.263	-0.269	-0.264	-0.305	-0.349	0.240	-0.259	-0.252	0.285	-0.062	1.000			
HS Dropout	-0.417	-0.232	-0.188	-0.187	-0.200	-0.160	-0.324	0.315	-0.164	-0.172	0.244	0.083	0.220	1.000		
Max SAT	0.086	0.181	0.358	0.538	0.223	0.348	0.570	-0.166	0.778	0.665	-0.202	-0.078	-0.181	-0.034	1.000	
Any AP Test	0.295	0.404	0.499	0.563	0.424	0.476	0.523	-0.256	0.558	0.513	-0.246	-0.067	-0.217	-0.141	0.550	1.000
College Mean Inc	0.337	0.595	0.686	0.839	0.562	0.567	0.561	-0.313	0.549	0.507	-0.310	-0.168	-0.225	-0.178	0.521	0.522

Notes: These estimates indicate the correlation of student outcomes for all students in my sample. College attendance is based on attendance within 6 months of finishing high school. Persistence and college graduation rates are zero for students who do not attend college. College's graduation rate refers to the average historical 6 year graduation rate at the college a student attends. Test scores are based on the 10th grade Massachusetts state test (MCAS). HS GPA refers to students cumulative GPA at the end of high school. HS classes failed counts the number of classes a student failed in high school. Log absences takes the log of days absent plus one. Log of days truant and log of days suspended are similarly defined. HS dropout is an indicator for having officially dropped out of high school. Max SAT score refers to the student's maximum SAT score among all times they took it. Any AP tests is an indicator for taking any AP tests.

Table A.7: Predictors of the Number of Students Matched to a Counselor

(A) Student Predictors

	8th Grade Test Scores	8th Grade Absences	Low Income	Male	White	Asian	Hispanic	Black
Caseload (in 10s)	0.0002	0.0004	-0.0000	0.0002	0.0005*	-0.0004	-0.0003	0.0002*
	(0.0004)	(0.0005)	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0001)

(B) Counselor Predictors

	Log Experience	Novice	Male	White	NonWhite	Institution type for Undergrad: Massachusetts	Institution type for Undergrad: Selective
Caseload (in 10s)	-0.001	-0.000	0.005	-0.001	0.001	0.001	0.004
	(0.004)	(0.002)	(0.003)	(0.001)	(0.001)	(0.006)	(0.003)
N	218,641	218,641	218,604	218,604	218,604	45,997	45,997

Notes: Heteroskedasticity robust standard errors clustered by counselor in parentheses. (*p<.10 **p<.05 *** p<.01). All regressions include school by year fixed effects. These estimates are from regressions of student or counselor characteristics on the number of students matched to a counselor. They indicate which characterics are predictive of counselor caseloads. The independent variable is divided by ten so the coefficient indicates how a ten student increase in the number of students matched to the counselor is associated with different student or counselor characteristics. Each coefficient comes from a separate regression. Counselor years of experience are based on when the student is in 9th grade.

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Table A.8: Regression Discontinuity Estimates of Counselor Effects in Units of Outcome Measure

	Donut - (Excluding Students on the Margin)				Without Donut			
	Graduate High School (1)	Attend College (2)	Education Index (3)	Composite Index (4)	Graduate High School (5)	Attend College (6)	Education Index (7)	Composite Index (8)
Letters from Assignment Range								
7+ Before	0.164*	0.017	0.051	0.061	0.158	0.016	0.052	0.067
	(0.099)	(0.079)	(0.089)	(0.071)	(0.096)	(0.078)	(0.089)	(0.070)
1-6 Before	0.007	0.061	0.082	0.134*	0.000	0.060	0.084	0.141*
	(0.116)	(0.091)	(0.103)	(0.080)	(0.114)	(0.089)	(0.103)	(0.080)
In Range	0.827***	0.638***	0.698***	0.477***	0.822***	0.637***	0.700***	0.483***
	(0.137)	(0.095)	(0.113)	(0.090)	(0.135)	(0.094)	(0.113)	(0.089)
1-6 After	-0.108	0.097	-0.001	-0.113	-0.149	0.072	0.021	-0.050
	(0.124)	(0.133)	(0.116)	(0.076)	(0.095)	(0.098)	(0.100)	(0.069)
7+ After	0.153	0.024	0.129	-0.004	0.147	0.023	0.131	0.003
	(0.125)	(0.090)	(0.100)	(0.074)	(0.123)	(0.089)	(0.099)	(0.073)

Notes: Effect sizes are in standard deviations. Heteroskedasticity robust standard errors clustered by counselor and student are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the relationship between a counselor's predicted value-added and student outcomes as one moves from last names outside the counselor's assignment window, to those in-range (i.e. assigned to that counselor) and then out of the assignment window. All estimates are based on regressions of residualized student outcomes on counselor value-added (measured in the same units as the outcome), conditional on school by year fixed effects. These are akin to the validity estimates in Table 3. Counselor value-added measures are interacted with indicators for a student's distance (in terms of letters) from assignment to that counselor. In most cases, distance is binned by groups of six letters. In columns 1-4, with the donut, the first bin excludes students within one letter of the assignment threshold in case the thresholds are fuzzy. The coefficients indicate the relationship between a counselor's value-added and student outcomes for students of the relevant distance from the assignment threshold. Students in-range have last names that indicate they are actually assigned to that counselor while all other students are outside the assignment range - by the noted number of letters. Student observations are repeated since there are multiple counselors in each school (and year) so students will typically be in the assignment range for one counselor and then outside it for 1-5 counselors. Effect sizes are in percentage points for columns (1) through (3) and standard deviations of the outcome measure for columns (4) through (8). Student outcomes are residualized on the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor) and a vector of student baseline controls. Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. College attendance is based on attendance within six months of completing high school.

Table A.9: Validity of Predicted Effects with Alternate Models

	Simple FE		Letter		Cohort x Letter		Race x Letter	
	Predicted Outcome	Actual Outcome	Predicted Outcome	Actual Outcome	Predicted Outcome	Actual Outcome	Predicted Outcome	Actual Outcome
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VA Measure								
High School Graduation	0.083***	0.965***	0.008	1.068***	0.006	1.035***	0.008	1.066***
	(0.010)	(0.072)	(0.005)	(0.109)	(0.005)	(0.105)	(0.005)	(0.103)
Attend College	0.155***	0.938***	0.019	0.856***	0.014	0.869***	0.019	0.877***
	(0.022)	(0.065)	(0.013)	(0.084)	(0.012)	(0.078)	(0.012)	(0.078)
Four-year College	0.234***	0.979***	-0.010	0.924***	-0.023	0.827***	-0.015	0.898***
	(0.031)	(0.079)	(0.022)	(0.158)	(0.019)	(0.143)	(0.021)	(0.158)
Composite Index	0.280***	0.986***	-0.020	1.097***	-0.032*	1.017***	-0.023	1.078***
	(0.039)	(0.061)	(0.021)	(0.085)	(0.019)	(0.078)	(0.020)	(0.084)
Non-Cognitive Skills	-0.015	0.913***	-0.002	0.882***	-0.003*	0.884***	-0.003*	0.894***
	(0.011)	(0.047)	(0.001)	(0.037)	(0.002)	(0.038)	(0.002)	(0.040)
Cognitive Skills	0.530***	0.991***	0.035	1.244***	0.025	1.146***	0.045	1.235***
	(0.064)	(0.079)	(0.053)	(0.154)	(0.049)	(0.141)	(0.053)	(0.152)
College Readiness	0.117***	0.962***	-0.033***	0.988***	-0.036***	0.974***	-0.035***	0.985***
	(0.031)	(0.060)	(0.011)	(0.087)	(0.011)	(0.081)	(0.011)	(0.083)
College Selectivity	0.317***	1.015***	0.020	1.089***	-0.003	0.969***	0.015	1.054***
	(0.039)	(0.085)	(0.029)	(0.160)	(0.026)	(0.149)	(0.028)	(0.160)
Education Attainment Index	0.166***	0.963***	0.004	1.036***	-0.003	0.983***	0.003	1.031***
	(0.020)	(0.055)	(0.014)	(0.097)	(0.012)	(0.088)	(0.013)	(0.092)

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the forecast bias tests vary according to the model specification. Each estimate comes from a regression of a student's predicted or actual (residual) outcome on their counselor's leave-one-out value-added estimate for the relevant outcome. In columns 1, 3, 5, and 7 the outcome is the student's predicted outcome (e.g. high school graduation) based on their seventh grade test scores. In columns 2, 4, 6, and 8, the dependent variable is the student's actual outcome (e.g. high school graduation). These estimates indicate the extent to which value-added is correlated with predicted versus actual outcomes. The specifications in column 1 and 2 include school, cohort and grade fixed effects. Those in columns 3 and 4. also include first letter of last name fixed effects. The estimates in columns 5 and 6 include cohort by first letter of last name fixed effects instead of separate cohort and letter fixed effects. These estimates also include school and grade fixed effects. The estimates in columns 7 and 8 include first letter of last name fixed effects interacted with race/ethnicity fixed effects (in addition to cohort, school and grade fixed effects). In all columns, I use the residual outcome, controlling for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender (in addition to the noted fixed effects). Estimates are based on the first counselor to which a student is quasi-randomly assigned. College attendance is based on attendance within six months of completing high school.

Table A.10: Counselor Impacts on AP Courses and Tests Taken

	AP Courses				AP Tests		
	Total Courses (1)	AP Calculus (2)	Any AP STEM (3)	Number AP STEM (4)	Any AP Tests (5)	Number AP Tests. (6)	Calculus Test (7)
(A) Outcome-Specific Measure							
Value-Added	0.209***	0.020***	0.039***	0.127***	0.041***	0.363***	0.010***
	(0.014)	(0.003)	(0.003)	(0.010)	(0.002)	(0.031)	(0.001)
(B) Composite Index							
Composite Index	0.075***	0.004**	0.018***	0.030***	0.030***	0.255***	0.002**
	(0.017)	(0.002)	(0.003)	(0.009)	(0.003)	(0.028)	(0.001)
N	187,416	187,879	187,879	187,879	217,310	217,310	217,310

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. These results are based on the leave-year-out estimates of counselor effects. Panel (A) is based on counselors' estimated value-added on the relevant outcome (e.g., total AP courses in column 1). Panel (B) is based on counselors' estimated value-added on the composite index outcome. The coefficients represent the impact of a one standard deviation improvement in counselor effectiveness (on the measure noted). Columns one through four are based on AP courses indicated in the course records files. These are available from 2011 to 2019. Columns five through seven are based on AP courses taken as recorded in the College Board data files. These are available from 2009 to 2019, so they cover a larger sample than the course records.

Table A.11: Counselor Impacts on Behavior and Achievement in High School

					10th Grade State Test	
	Days Absent (1)	Days Suspended (2)	High School Dropout (3)	High School GPA (4)	Math Test (5)	English Test (6)
(A) Composite Index						
Composite Index	-0.012**	-0.054***	-0.005***	0.016***	0.018***	0.021***
	(0.005)	(0.008)	(0.001)	(0.006)	(0.004)	(0.004)
(B) Outcome-Specific Measure						
Value-Added	0.072***	0.015	0.007***	0.058***	0.047***	0.056***
	(0.009)	(0.010)	(0.002)	(0.004)	(0.005)	(0.005)
N	224,563	224,563	224,563	187,821	203,558	204,167

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). Panel (A) is based on counselors' estimated value-added on the relevant outcome (e.g., log of days absent in column 1). Panel (B) is based on counselors' estimated value-added on the composite index outcome. The coefficients represent the impact of a one standard deviation improvement in leave-year-out counselor value-added on the student outcomes in the columns. For days absent and days suspended, I take the log of days plus one to deal with large values and zeros. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. These results are based on the leave-year-out estimates of counselor effects.

Table A.12: Counselor Impacts on SAT Taking and College Type

	SAT			College Selectivity			College Match	
	Took SAT (1)	Max SAT all Students (2)	Max SAT Among SAT Takers (3)	Selective College (4)	Highly Selective College (5)	College Mean Inc (6)	Under-match (7)	Over-match (8)
(A) Composite Index								
Composite Index	0.035***	3.877***	13.507***	0.018***	0.006***	933.468***	0.004*	0.003
	(0.004)	(0.918)	(1.495)	(0.002)	(0.001)	(108.947)	(0.002)	(0.002)
(B) Outcome-Specific Measure								
Value-Added	0.040***	4.478***	17.121***	0.021***	0.005	1165.395***	0.011***	
	(0.005)	(1.104)	(1.959)	(0.004)	(0.005)	(171.458)	(0.003)	
N	224,563	143,286	224,563	224,563	224,563	224,563	119,714	

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). The coefficients represent the impact of a one standard deviation improvement in leave-year-out counselor value-added on the student outcomes in the columns. Panel (A) is based on counselors' estimated value-added on the relevant outcome (e.g., SAT taking in column 1). Panel (B) is based on counselors' estimated value-added on the composite index outcome. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. Undermatch is defined as attending a college where the student's SAT score is above the 75th percentile of SAT scores among accepted students. Overmatch is defined as attending a college where the student's SAT score is below the 25th percentile of SAT scores among accepted students.

Table A.13: Counselor Impacts on College Majors

	STEM Major (1)	Science (2)	Engineering (3)	Social Sciences (4)	Health (5)	Business & Communications (6)
(A) Composite Index						
Composite Index	0.005*	0.003	0.002	-0.003	0.006***	-0.007***
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
(B) Education Index						
Education Index	0.007**	0.005	0.003*	-0.004	0.007**	-0.008**
	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
N	148,519	148,519	148,519	148,519	148,519	148,519

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01).These estimates show how counselor value-added is related to students' major choices. Panel (A) is based on counselors' estimated value-added on the composite index outcome. Panel (B) is based on counselors' estimated value-added on the education index outcome. For most of the majors there is insufficient power to compute major-specific value-added. The coefficients represent the impact of a one standard deviation improvement in counselor effectiveness (on the measure noted) on different types of majors. Majors are based on CIP codes reported for students who attend college. Majors are classified using NSF's classification system for the Integrated Postsecondary Education Data System. However, the other category has been broken into a few more groups, such as business and communications. Here, STEM consists of science, engineering, math and technological programs, but not social studies or health. All major categories are mutually exclusive (except for STEM which encompasses several categories).Not all major categories are listed here. Some categories are too small to generate reliable value-added estimates. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. These results are based on the leave-year-out estimates of counselor effects. The major analyses are restricted to students who attend college.

Table A.14: Impact of a Predicted 1 SD Better Counselor by Additional Subgroups

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Education Index (6)
(A) By Gender						
Male	0.022***	0.019***	0.019***	0.013***	0.017***	0.050***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
Female	0.018***	0.021***	0.019***	0.014***	0.016***	0.049***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
P-value Difference	0.20	0.63	1.00	0.76	0.82	0.90
Male Mean	0.85	0.60	0.47	0.34	0.50	0.13
Female Mean	0.89	0.72	0.59	0.41	0.63	0.36
(B) By Prior Achievement						
Low Test	0.034***	0.026***	0.023***	0.015***	0.023***	0.069***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.003)	(0.008)
Med Test	0.012***	0.022***	0.021***	0.015***	0.020***	0.046***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.007)
High Test	0.006***	0.012***	0.012***	0.011***	0.007*	0.025***
	(0.002)	(0.003)	(0.004)	(0.002)	(0.004)	(0.007)
Low Test Score Mean	0.78	0.49	0.31	0.20	0.36	-0.16
Middle Test Score Mean	0.92	0.74	0.60	0.39	0.63	0.42
High Test Score Mean	0.96	0.86	0.80	0.61	0.79	0.71
(C) By Location						
Rural	0.012***	0.014**	0.015***	0.011***	0.008	0.034***
	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.012)
Suburban	0.020***	0.023***	0.021***	0.016***	0.018***	0.054***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.006)
Urban	0.027***	0.019***	0.017***	0.012***	0.021***	0.053***
	(0.006)	(0.005)	(0.006)	(0.004)	(0.005)	(0.012)
Rural Mean	0.88	0.67	0.55	0.58	0.39	0.28
Suburban Mean	0.89	0.69	0.58	0.60	0.41	0.34
Urban Mean	0.77	0.52	0.33	0.40	0.22	-0.12
N	219,679	219,679	219,679	219,679	197,383	219,679

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the relationship between a counselor's predicted (leave-year-out) value-added and student outcomes varies by student characteristics. Panel (A) divides students by their gender. Panel (B) divides students by how their 8th grade test scores compare to the distribution of test scores in my sample. Students with scores in the bottom third are in the "low test" group, those in the middle third are the "Med Test" group, and those in the top third are the "High Test" group. the state average are classified as high test students and those below average are referred to as low test students. Panel (C) shows estimates separately by the urbanicity of the school's location. Counselor effectiveness is defined using the composite index of effectiveness (in SDs). The coefficients reported are those from the interaction of the relevant subgroups (e.g., male) with counselor value-added. Within each panel and column, all coefficients are estimated in one regression. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table A.15: Impact of a Predicted 1 SD Better Counselor by School Subgroups

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year College (5)	Education Index (6)
(A) School Percent Free/Reduced Lunch						
Low Percent FRPL	0.024***	0.021***	0.018***	0.014***	0.019***	0.053***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
High Percent FRPL	0.015***	0.019***	0.020***	0.014***	0.014***	0.045***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
P-value Difference	0.02	0.73	0.71	0.96	0.26	0.44
High Percent FRPL Mean	0.82	0.57	0.40	0.26	0.46	0.02
Low Percent FRPL Mean	0.91	0.76	0.67	0.49	0.67	0.48
(B) School Persistent Poverty						
Low Poverty	0.024***	0.020***	0.017***	0.012***	0.019***	0.051***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.009)
High Poverty	0.017***	0.020***	0.020***	0.015***	0.015***	0.048***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.005)
P-value Difference	0.14	0.97	0.61	0.47	0.37	0.72
High Poverty Mean	0.80	0.52	0.35	0.23	0.41	-0.08
Low Poverty Mean	0.90	0.74	0.64	0.46	0.65	0.43
(C) School Percent High Needs						
Lower Needs	0.024***	0.021***	0.018***	0.014***	0.019***	0.053***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
Higher Needs	0.015***	0.019***	0.019***	0.013***	0.014***	0.045***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
P-value Difference	0.03	0.61	0.84	0.86	0.23	0.37
Higher Needs Mean	0.82	0.56	0.39	0.26	0.45	0.01
Lower Needs Mean	0.91	0.76	0.67	0.49	0.68	0.48
(D) School Accountability Level						
Level 2-3 (Worse)	0.019***	0.019***	0.018***	0.014***	0.014***	0.047***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
Level 1 (Better)	0.021***	0.022***	0.019***	0.013***	0.020***	0.052***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
P-value Difference	0.53	0.51	0.94	0.74	0.15	0.61
Level 1 Mean	0.91	0.72	0.61	0.44	0.63	0.39
Level 2-3 Mean	0.83	0.61	0.46	0.32	0.51	0.12

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the relationship between a counselor's predicted (leave-year-out) value-added and student outcomes varies by school characteristics. Panel (A) divides schools by the share of students who receive free or reduced-price lunch (frpl). Low poverty schools are defined as those where fewer than 50% of students receive free or reduced-price lunch, while high poverty are schools where more than 50% of students receive free or reduced-price lunch. Panel (B) uses the average years that students in a particular school and cohort receive free or reduced-price lunch to construct a measure of persistent poverty (Michelmore & Dynarski, 2017). Schools are split by whether they are above or below the average for years the mean student receives frpl (conditional on the cohort to account for the years of data available). Panel (C) splits shools by whether fewer than 50% of students are classified as high needs (a lower needs school) relative to higher needs schools with more than 50% of students classified as high needs. Panel (D) is based on the school accountability level reported by the state. Level one is the best and level three is the worst. Counselor value-added is defined using the composite index of effectiveness (in SDs). The coefficients reported are those from the interaction of the relevant subgroups (e.g., low poverty) with counselor value-added. Within each panel and column, all coefficients are estimated in one regression. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table A.16: Impact of a Predicted 1 SD Better Counselor by School Subgroups and Family Income

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Education Index (6)
(A) School Percent Free/Reduced Lunch						
Low Percent FRPL & Low Inc Student	0.038***	0.029***	0.021***	0.015***	0.026***	0.074***
	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)	(0.010)
High Percent FRPL & Low Inc Student	0.015**	0.015*	0.014	0.016**	0.011	0.037**
	(0.007)	(0.008)	(0.009)	(0.007)	(0.008)	(0.018)
0.008)						
Low Percent FRPL & High Inc Student	0.016***	0.019***	0.020***	0.015***	0.018***	0.046***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.008)
High Percent FRPL & Low Inc Student	0.015***	0.020***	0.020***	0.013***	0.014***	0.046***
	(0.002)	(0.003)	(0.004)	(0.003)	(0.004)	(0.007)
P-value Difference for Low-Inc Students by School Type	0.01	0.13	0.52	0.91	0.11	0.07
(B) School Persistent Poverty						
Low Poverty & Low Inc Student	0.033***	0.024***	0.016***	0.012***	0.022***	0.062***
	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)	(0.010)
High Poverty & Low Inc Student	0.034***	0.032***	0.027***	0.022***	0.026***	0.078***
	(0.007)	(0.007)	(0.007)	(0.005)	(0.007)	(0.015)
Low Poverty & High Inc Student	0.016***	0.021***	0.023***	0.015***	0.022***	0.051***
	(0.005)	(0.006)	(0.007)	(0.004)	(0.006)	(0.013)
High Poverty & High Inc Student	0.015***	0.019***	0.019***	0.014***	0.014***	0.044***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.006)
P-value Differencef for Low-Inc Students by School Type	0.88	0.32	0.21	0.08	0.60	0.35

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the relationship between a counselor's predicted (leave-year-out) value-added and student outcomes varies by both student and school characteristics. Within each panel, students are separated by income, where Low Inc refers to students who received free or reduced-price lunch while High Inc refers to those who did not. Panel (A) divides schools by the share of students who receive free or reduced-price lunch (frpl). Low poverty schools are defined as those where fewer than 50% of students receive free or reduced-price lunch, while high poverty are schools where more than 50% of students receive free or reduced-price lunch. Panel (B) uses the average years that students in a particular school and cohort receive free or reduced-price lunch to construct a measure of persistent poverty (Michelmore & Dynarski, 2017). Schools are split by whether they are above or below the average for years the mean student receives frpl (conditional on the cohort to account for the years of data available). The coefficients reported are those from the interaction of the relevant student and school subgroups (e.g., low poverty schooland low-income student) with counselor value-added. Within each panel and column, all coefficients are estimated in one regression. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table A.17: Impact of a Predicted 1 SD Better Counselor by Caseload Size

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Education Index (6)
(A) By Gender						
Large Caseload	0.010***	0.012***	0.019***	0.014***	0.014***	0.034***
	(0.003)	(0.004)	(0.005)	(0.003)	(0.004)	(0.009)
Small Caseload	0.020***	0.020***	0.019***	0.014***	0.017***	0.049***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)
P-value Difference	0.00	0.01	0.91	0.93	0.28	0.02
Large Caseload Mean	0.86	0.65	0.51	0.35	0.55	0.21
Small Caseload Mean	0.87	0.68	0.55	0.39	0.58	0.28

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows the relationship between counselor value-added (in terms of the composite index and leave-year-out estimates) and student outcomes varies with caseload size. The estimates are from a regression of the student outcome on counselor value-added interacted with indicators for whether the counselor has a small or large caseload. Small caseloads are defined as fewer than 250 students and large caseloads are defined as 250 or more per year. This is close to the state average and is the caseload recommended by the American School Counselors Association. Caseloads are determined by the number of students I observe in each counselors assignment window for last names. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table A.18: Group Specific Impacts of Counselors

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Education Index (6)
(A) By Prior Achievement						
High Achievers	0.020***	0.034***	0.038***	0.021***	0.027***	0.077***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Low Achievers	0.019***	0.032***	0.048***	0.036***	0.030***	0.082***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
High Achiever Mean	0.94	0.81	0.73	0.73	0.53	0.60
Low Achiever Mean	0.80	0.47	0.27	0.35	0.16	-0.18
(B) By Income						
High Income	0.017***	0.025***	0.025***	0.016***	0.025***	0.055***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
Low-Income	0.028***	0.040***	0.040***	0.032***	0.042***	0.091***
	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.007)
High Income Mean	0.92	0.76	0.65	0.67	0.47	0.47
Low-Income Mean	0.76	0.46	0.28	0.34	0.18	-0.22
(C) By Race						
White	0.020***	0.024***	0.022***	0.016***	0.020***	0.055***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.005)
Non-White	0.023***	0.026***	0.022***	0.019***	0.029***	0.059***
	(0.005)	(0.006)	(0.005)	(0.003)	(0.004)	(0.011)
White	0.89	0.69	0.58	0.60	0.41	0.33
Non-White	0.78	0.54	0.38	0.43	0.26	-0.06

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the relationship between a counselor's predicted (leave-year-out) value-added for a specific group of students relates to outcomes for that group. These are different value-added estimates than in the main Tables because value-added is computed separately for six distinct groups. The regressions show how student outcomes for a specific group relate to the value-added for that group. Counselor value-added is defined using the composite index of effectiveness for the noted subgroup. Panel (A) divides students by their 8th grade test scores. Students with scores above the state average are classified as high test students and those below average are referred to as low test students. Panel (B) shows estimates separately by whether the student received free or reduced-price lunch in 8th grade. Low Inc refers to students who received free or reduced-price lunch while High Inc refers to those who did not. (These are the best measures of income available in the data.) Panel (C) divides students by whether they are white or non-white. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table A.19: Correlation of Group-Specific Value-Added Across Groups

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Composite Index (6)	Education Index (7)	Non-Cognitive Skills (8)	Cognitive Skills (9)	College Readiness (10)	College Selectivity (11)
VA by Achievement	-0.064***	-0.221***	-0.296***	-0.209***	-0.252***	-0.007***	-0.176***	-0.015***	0.301***	0.006**	-0.225***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
VA by Income	0.170***	-0.111***	-0.158***	-0.151***	-0.188***	0.117***	0.011***	0.067***	0.241***	0.133***	-0.143***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)
VA by Race	0.328***	0.106***	0.037***	-0.063***	0.045***	0.212***	0.204***	0.135***	0.161***	0.330***	-0.050***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.001)

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). These estimates show the correlation between counselor value-added for one group relative to the counselor's value added for the second group. First, this is done by achievement, where students with 8th grade test scores above the state average are classified as high achieving students and those below average are referred to as low achieving students. Second, this is done by whether the student received free or reduced-price lunch in 8th grade. Low Inc refers to students who received free or reduced-price lunch while High Inc refers to those who did not. (These are the best measures of income available in the data.) Third, value-added is estimated separately for white and non-white students. These results are based on the leave-year-out estimates of effectiveness calculated separately by the noted groups. Each row is from a separate regression. The N for VA by achievement is 217,675. For VA by Income it is 221,733, and for VA by race it is 219,619.

Table A.20: Impact of Counselor Value-Added for Course-Taking on Long-Term Outcomes

	Attend College (1)	Attend Four-Year (2)	STEM Major (3)	College Graduation Rate (4)	Persist 1st Year (5)
(A) VA for Any APs					
Any AP Tests	0.013***	0.014***	0.000	0.009***	0.012***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
(B) VA Total APs					
Number of AP Tests	0.013***	0.015***	0.001	0.011***	0.012***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
(C) VA AP Calculus					
AP Calculus	0.002	0.003**	0.000	0.001	0.003*
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
N	224,563	224,563	148,519	224,563	201,834

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). These estimates show how value-added for taking advanced placement exams is related to students' longer-term outcomes. (Course-taking is proxied by the AP exams because course data are not available for the full sample period.) These results are based on the leave-year-out estimates of counselor effects for the value-added measure described in each panel. Panel (A) is based on counselors' estimated value-added for taking any AP tests. Panel (B) is based on counselors' estimated value-added on the number of AP tests taken. Panel (C) is based on counselors' estimated value-added on taking the AP Calculus test.The coefficients represent the impact of a one standard deviation improvement in counselor effectiveness in terms of the relevant AP metric on the outcome described by the column header. Majors are based on CIP codes reported for students who attend college. STEM major is only defined for students who attend college. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table A.21: Correlation in Counselor Value-Added Measures

	Indices								
	Composite Index (1)	Non-Cognitive Skills (2)	Cognitive Skills (3)	College Readiness (4)	College Selectivity (5)	Education Index (6)	Graduate High School (7)	Attend College (8)	Highly Selective (9)
(A) Indices									
Composite Index	1.000								
Non-Cognitive Skills	0.425	1.000							
Cognitive Skills	0.541	-0.063	1.000						
College Ready	0.779	0.236	0.228	1.000					
College Quality	0.743	0.042	0.452	0.461	1.000				
Education Index	0.832	0.150	0.392	0.592	0.677	1.000			
(A) Outcome-based VA									
Graduate High School	0.611	0.219	0.202	0.467	0.329	0.762	1.000		
Attend College	0.611	0.219	0.202	0.467	0.329	0.762	1.000	1.000	
Highly Selective College	0.332	-0.008	0.221	0.162	0.689	0.201	0.065	0.065	1.000
Persist 1st Year	0.610	0.078	0.312	0.432	0.564	0.742	0.391	0.391	0.205

Notes: These estimates indicate the correlation of the counselor value-added measures listed in the columns and rows. These correlations are based on the leave-year out value-added estimates for counselors in the main sample. Panel (A) includes the main indices used to construct value-added measures while panel (B) is based on the outcome-specific value-added measures.

Table A.22: Counselor Effects with Logit Specification (Odds Ratios)

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	Persist 1st Year (4)
(A) Composite Index				
Composite Index	1.212***	1.103***	1.103***	1.071***
	(0.023)	(0.014)	(0.015)	(0.013)
(B) Additional Indices				
Behavior Index	1.020*	0.998	0.996	0.992
	(0.012)	(0.007)	(0.007)	(0.007)
HS Index	1.085***	1.077***	1.070***	1.053***
	(0.026)	(0.015)	(0.015)	(0.014)
College Readiness Index	1.151***	1.056***	1.067***	1.040***
	(0.024)	(0.012)	(0.013)	(0.012)
College Quality Index	1.183***	1.110***	1.119***	1.087***
	(0.032)	(0.020)	(0.020)	(0.016)
Edu Index	1.260***	1.137***	1.117***	1.102***
	(0.028)	(0.017)	(0.018)	(0.014)
(C) Education Outcomes				
Outcome-specific VA	1.231***	1.106***	1.099***	1.077***
	(0.029)	(0.013)	(0.022)	(0.019)
N	224,563	224,563	224,563	201,834

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). The coefficients indicate the impact of assignment to a counselor who is predicted to be one standard deviation above average on the relevant metric. Each row is a separate regression, so that each row shows the independent relationship between one value-added measure and the outcome described in the column header. The estimates are based on the leave-year-out estimates of counselor value-added. In Panel (A), value-added is measured using the composite index (which captures counselors' effects on multiple domains) or the education index. Panel (B) contains results based on four different (and mutually exclusive) indices of counselor effectiveness. The composite index is based on the five indices in panel (B). Panel (C) is based on outcome-specific value-added measures, e.g., value-added for high school graduation in column one, or for college attendance in college two. This table looks out binary outcome variables and fits a logistic regression. The reported coefficients are odds ratios. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table A.23: Regression Discontinuity Estimates of Counselor Effects for Additional Outcomes

	Four-Year College (1)	Graduation Rate (2)	Persist 1st Year (3)	Cognitive Skills (4)	Non-Cognitive Skills (5)	College Readiness (6)	College Selectivity (7)
Letters from Assignment Range							
7+ After	0.171	0.072	-0.044	0.063	-0.020	-0.011	0.121
	(0.166)	(0.140)	(0.147)	(0.116)	(0.025)	(0.059)	(0.165)
2-6 After	0.049	-0.126	0.078	-0.128	-0.026	0.000	-0.432***
	(0.167)	(0.144)	(0.168)	(0.092)	(0.030)	(0.060)	(0.166)
In Range	0.629***	0.452***	0.467***	0.465***	0.116**	0.454***	0.418**
	(0.157)	(0.128)	(0.150)	(0.099)	(0.046)	(0.065)	(0.170)
2-6 Before	0.246	0.179	0.001	0.105	0.001	0.161**	0.152
	(0.172)	(0.151)	(0.185)	(0.105)	(0.024)	(0.068)	(0.173)
7+ Before	-0.006	0.047	0.050	0.029	0.053**	0.147***	-0.127
	(0.138)	(0.115)	(0.135)	(0.103)	(0.026)	(0.057)	(0.150)

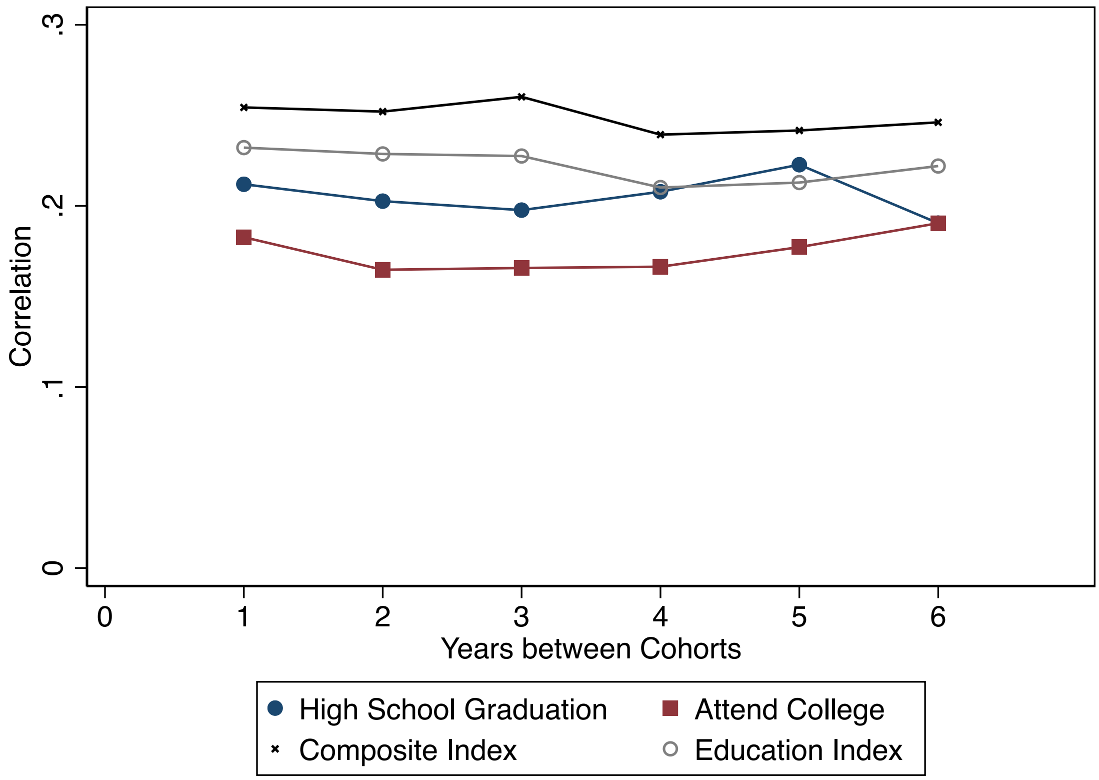
Notes: Effect sizes are in standard deviations. Heteroskedasticity robust standard errors clustered by counselor and student are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the relationship between a counselor's predicted value-added and student outcomes as one moves from last names outside the counselor's assignment window, to those in-range (i.e. assigned to that counselor) and then out of the assignment window. All estimates are based on regressions of residualized student outcomes on counselor value-added (measured in the same units as the outcome), conditional on school by year fixed effects. These are akin to the validity estimates in Table 3. Counselor value-added measures are interacted with indicators for a student's distance (in terms of letters) from assignment to that counselor. In most cases, distance is binned by groups of six letters. In columns 1-4, with the donut, the first bin excludes students within one letter of the assignment threshold in case the thresholds are fuzzy. The coefficients indicate the relationship between a counselor's value-added and student outcomes for students of the relevant distance from the assignment threshold. Students in-range have last names that indicate they are actually assigned to that counselor while all other students are outside the assignment range - by the noted number of letters. Student observations are repeated since there are multiple counselors in each school (and year) so students will typically be in the assignment range for one counselor and then outside it for 1-5 counselors. Effect sizes are in percentage points for columns (1) through (3) and standard deviations of the outcome measure for columns (4) through (8). Student outcomes are residualized on the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor) and a vector of student baseline controls. Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. College attendance is based on attendance within six months of completing high school.

Table A.24: Correlation between Value-Added and Caseload (in 10s of Students)

	Graduate High School (1)	Attend College (2)	Attend College Readiness (3)	College Selectivity (4)	Composite Index (5)	Education Index (6)
(A) No FE						
Caseload (in 10s)	0.00310	0.00321	-0.00199	0.00040	-0.00056	0.00110
	(0.00229)	(0.00238)	(0.00240)	(0.00168)	(0.00216)	(0.00216)
(B) School, Year FE						
Caseload (in 10s)	0.00462	0.00479	-0.00121	0.00243	0.00143	0.00346
	(0.00305)	(0.00317)	(0.00363)	(0.00234)	(0.00306)	(0.00303)

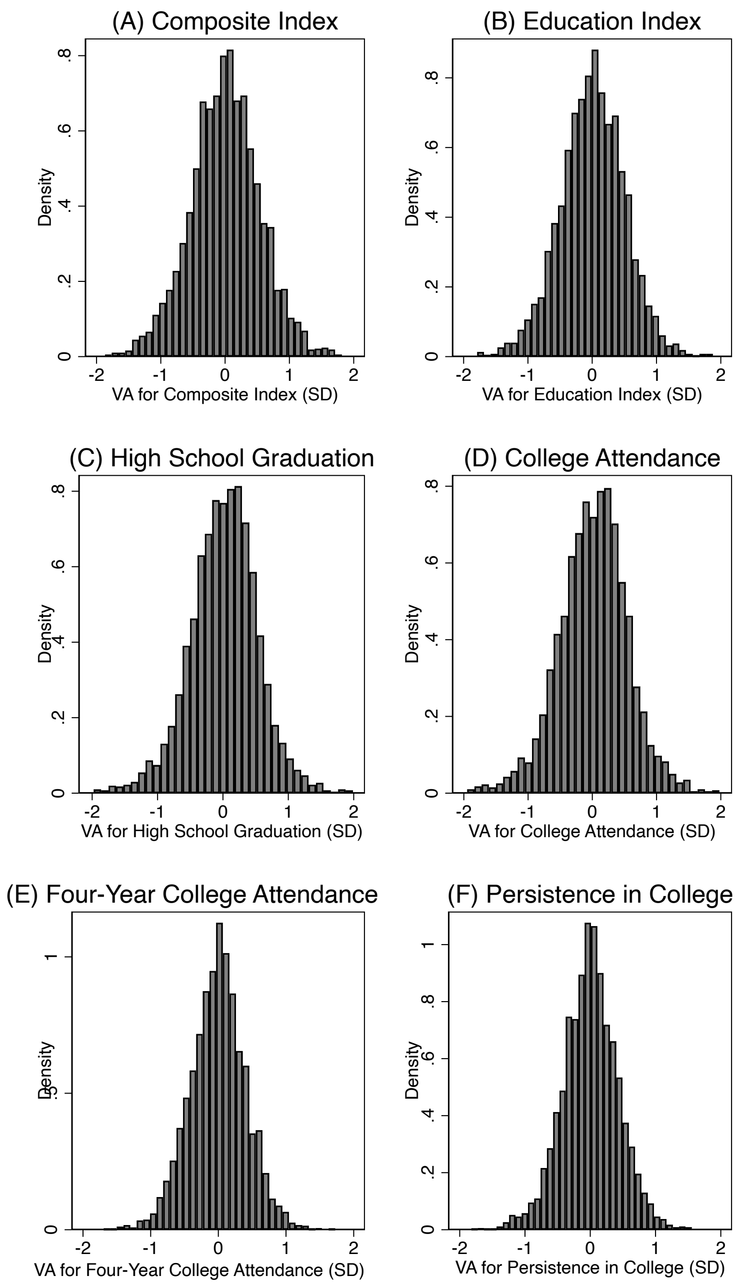
Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). The estimates show the correlation between a counselor's value-added and their caseloads. The value-added measures are defined by the column headers. Caseloads are divided by ten, so the estimates represent the change in value-added associated with a ten student increase in caseloads. Panel A does not include any fixed effects, and panel B conditions on school and year fixed effects.

Figure A.1: Autocorrelation Vectors



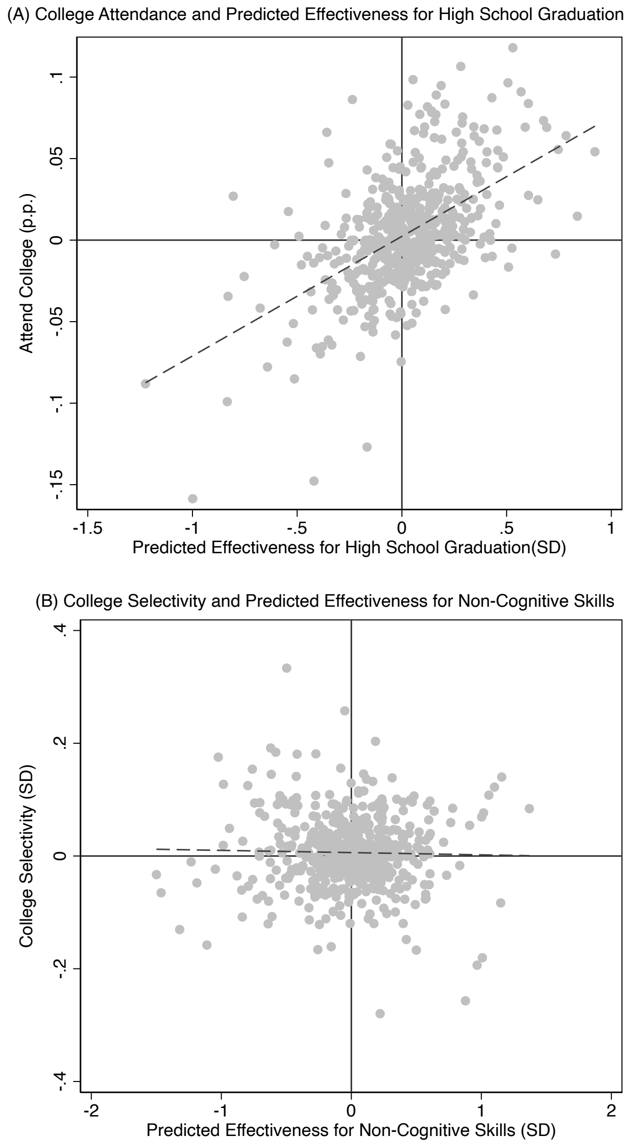
Notes: This figure shows the correlation between individual counselor residuals over time. In particular, it examines the autocorrelation for the counselor's residual effects on the Composite Index, Education Index, high school graduation and college attendance. For this, I residualize the outcomes using within-counselor variation with respect to my baseline set of controls. Then, I calculate the mean outcome for each counselor-year combination and calculate the autocorrelation coefficients as the correlation across years for each counselor.

Figure A.2: Distribution of Value-Added



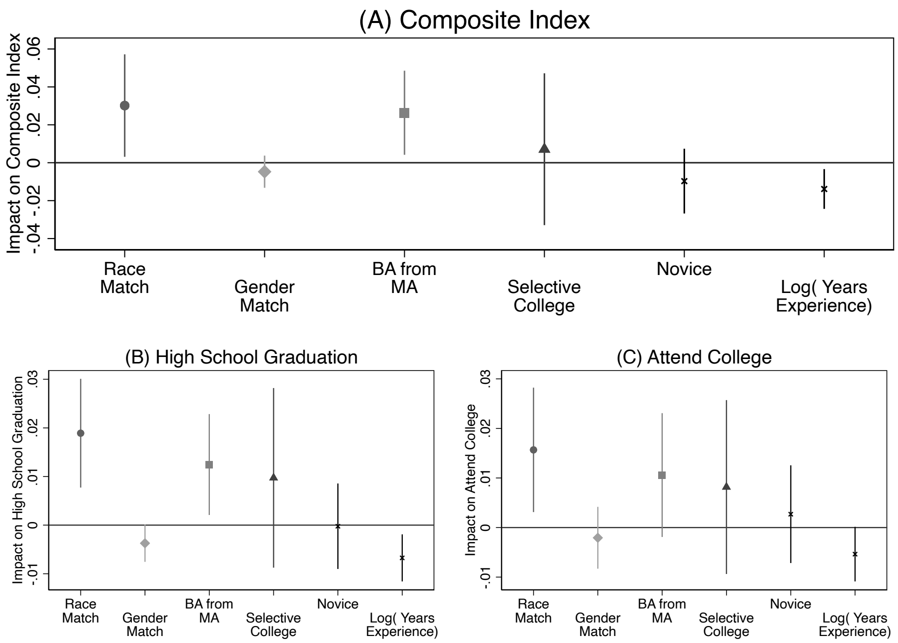
Notes: The figures above show histograms of counselor effects. These are based on empirical Bayes estimates of effectiveness for all students a counselor has served in my sample. Each counselor is represented once. Panels (A) through (E) are in standard deviation units (for the given index). Panels (F) through (I) indicate counselor effects in terms of percentage points on the relevant outcome.

Figure A.3: Dimensions of Effectiveness



Notes: The figures above show the relationship between counselors' predicted effectiveness in terms of one outcome and their impact on a different outcome. They contain one dot for each counselor. In panel (A), the x-axis represents the counselor's predicted (i.e. leave-year-out) effectiveness in standard deviations for high school graduation. The y-axis indicates the counselor's average impact on college enrollment rates (in percentage points), conditional on student demographics, eighth grade achievement, eighth grade attendance and services received, as well as school, grade, cohort, and first letter of last name fixed effects. The dashed line represents the relationship between coun- selors' predicted effectiveness in terms of high school graduation and college enrollment rates for the left out students. In panel (B), the x-axis represents the counselor's predicted effectiveness, in standard deviations, for the non- cognitive skills index. The y-axis represents their average effect, in standard deviations, on the college selectivity index. The dashed line represents the relationship between counselors' predicted effectiveness in terms of non-cognitive skills and college selectivity for the left out students.

Figure A.4: Student Outcomes and Counselor Characteristics



Notes: These figures show the coefficients from a regression of student outcomes (the composite index of multiple outcomes, high school graduation, or college attendance) on measures of counselor characteristics - or similarities between students and counselors. Each estimate is from a separate regression and the bars represent the 95% confidence intervals. Race match is defined as assignment to a non-white counselor for non-white students and a white counselor for white students. Gender match is an indicator for assignment to a counselor whose gender is the same as the student's. BA from MA is an indicator for the counselor earning a bachelor's degree in Massachusetts. Selective college is an indicator for the counselor attending a college ranked as selective in the 2009 Barron's rankings. Novice is an indicator for being in one's first year as a Massachusetts counselor. Log(years) refers to the natural log of one plus the number of years for which a counselor has worked as a counselor in Massachusetts (since the HR data began in 2008). Novice and log(years experience) are based on the counselor's years of experience as of a student's 9th grade year. The impacts on the composite index are in standard deviation units, and the effects on high school graduation and college attendance are in percentage points. College attendance is based on attendance within six months of completing high school. All estimates are from regressions which include letter of last name, school, cohort, and grade fixed effects as well as controls for students' race and gender, 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of Title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, and days truant.

B Results from Wake County North Carolina

B.1 Summary of Results

In this section, I present results from Wake County, North Carolina to strengthen the external validity of my Massachusetts estimates. Wake County is a more diverse district than Massachusetts and all traditional high schools assign counselors based on student last names. I find similar results in this location, though they are noisier because the sample is about a third the size of the Massachusetts sample and not all of the same outcome measures are available.

Table B.1 shows the variance in student outcomes due to counselors.[1] In Wake County, the standard deviation of counselor effects on high school graduation is 5.9 percentage points and it is 3.1 percentage points for college enrollment. Table B.2 indicates similar effects when student outcomes are regressed on their counselor's predicted value-added.[2] Table B.3 shows that counselor effects are similar across student achievement levels, gender and race.[3]

The Wake County estimates are larger than those from Massachusetts, but also noisier. They are noisier in part because the Wake County sample is much smaller. They may be larger than those from Massachusetts because the Wake County sample is more diverse and has lower baseline levels of achievement. The Wake County estimates are also similar to those from the specifications which reweight my Massachusetts estimates to be representative of the state population (Table A.5). Thus, my main estimates from Massachusetts may understate counselor effects in the broader US population.

In addition, Wake County provided data on principals' evaluations of counselors from 2015 to 2018. I focus on counselors who were evaluated in at least two years during this time period because the reliability of the evaluation scores is much higher with more than one year of data. North Carolina Principals evaluate counselors on a scale of 0 to 4 and 3 is the most common score.

Figure B.2 shows that counselors' evaluation scores are not predictive of student outcomes - though I have limited power to rule out moderate effect sizes. In fact, the correlation coefficients in Table B.4 are all negative.[4] Scatterplots in Figure B.3 also indicate little relation between a counselor's average evaluation score and their students' high school graduation and college attendance rates.[5]

These correlations indicate that evaluations may pick up on different skills than the effects I measure. However, the results are noisy so they should be interpreted with caution. The items on the evaluation rubric are focused on how counselors support students within the school, promote diversity, demonstrate leadership, and implement an effective counseling program. While there is no clear mention of the outcomes for which I construct value-added scores, I expected the sections on supporting student success to lead to total evaluation scores more highly (and positively) correlated with educational attainment. Overall, this analysis indicates that current evaluation tools may not be especially effective at identifying counselors who impact students' educational attainment, which is consistent with research on principal evaluations of teachers (Jacob & Lefgren, 2008). Furthermore, Table B.5 shows that experience is not positively related to counselor effects.

[1] I use the education index instead of the composite index used in the Massachusetts data because Wake County is missing data on key components of the composite index for many years.

[2] Figure B.1 shows the main placebo tests and predictive validity tests for Wake County.

[3] Income data are not available from Wake County.

[4] Disattenuating them to account for measurement error only increases them slightly.

[5] I focus on quantiles because there is little variation in the rounded evaluation scores.

Novice counselors have larger impacts and the coefficient on years of experience is negative. New tools may be needed if schools wish to identify the most effective counselors or target professional development to counselors who most need guidance on increasing educational attainment.

Finally, Wake County provided information on sibling pairs which can be used to conduct an additional validation test. For this, I identify siblings assigned to different counselors and regress the difference in student outcomes on the difference in their counselor's value-added. These tests are based on 2,985 students with a sibling assigned to a different counselor. They indicate that a one standard deviation change in counselor value-added is associated with a 1.16 SD increase in the student's educational attainment index. The confidence interval includes one, so these estimates provide a nice validation of the value-added estimates.

B.2 Tables and Figures

Table B.1: Wake County Standard Deviations of Counselor Effects

	Covariance Approach (1)	CFR Approach (2)
Education Index	0.100	0.112
High School Graduation	0.059	0.064
College Attendance	0.031	0.036
Four-Year College Attendance	0.036	0.043
College's Graduation Rate	0.018	0.023
Persistence in College	0.059	0.062

Notes: This table shows the standard deviation of counselor effects in the Wake County sample. Column 1 shows estimates based on the covariance of individual counselor effects over time ($Cov(\mu_{jt}, \mu_{j,t+1})$. Column 2 shows estimates based on the approach for computing the variance of teacher (or counselor) effects in Chetty, Friedman and Rockoff (2014a).

Table B.2: Wake County Predicted Counselor Effectiveness (in SDs) and Educational Attainment

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College Graduation Rate (4)	Persist 1st Year (5)	Education Index (6)
(A) Overall Effects						
Education Index	0.064***	0.035***	0.042***	0.020***	0.064***	0.115***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.005)
(B) Outcome-Specific Measure						
Value-Added	0.064***	0.036***	0.044***	0.023***	0.066***	0.115***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.005)
N	88,690	88,690	88,690	88,690	80,338	88,690

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). The coefficients indicate the impact of assignment to a counselor who is predicted to be one standard deviation above average on the relevant metric. Each row is a separate regression, so that each row shows the independent relationship between one value-added measure and the outcome described in the column header. The estimates are based on the leave-year-out estimates of counselor value-added. In Panel (A), value-added is measured using the education index (which captures counselors' effects on multiple domains). Panel (B) is based on outcome-specific value-added measures. For instance, the first column in panel (B) shows how a counselor's value-added for high school graduation specifically relates to students' high school graduation rates. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned in Wake County, North Carolina. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, enrollment in 8th grade in an Wake County public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. Counselor effectiveness is in standard deviation units and is based on the leave-year-out empirical Bayes estimates of effectiveness. The estimates indicate how much a predicted one standard deviation better counselor increases educational attainment. The effects in columns 1-5 are in percentage points. Those in columns 6 and 7 are in standard deviation units. College attendance is based on attendance within six months of completing high school. Persistence is an indicator for enrolling in a second year of college. College's graduation rate refers to the six-year graduation rate at the college a student attends. College graduation rate and persistence are zero for students who do not attend college within six months of finishing high school.

Table B.3: Wake County Impact of Predicted Counselor Effectiveness by Student Characteristics

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Education Index (6)
(A) By Prior Achievement						
Low Achievers	0.051***	0.030***	0.036***	0.018***	0.051***	0.095***
	(0.008)	(0.004)	(0.005)	(0.003)	(0.008)	(0.012)
High Achievers	0.052***	0.038***	0.045***	0.026***	0.054***	0.110***
	(0.006)	(0.004)	(0.005)	(0.003)	(0.007)	(0.011)
P-value Difference	0.95	0.18	0.15	0.80	0.07	0.35
Low Achiever Mean	0.84	0.60	0.41	0.31	0.27	0.19
High Achiever Mean	0.76	0.57	0.44	0.33	0.31	0.12
(B) By Gender						
Male	0.050***	0.039***	0.043***	0.022***	0.053***	0.107***
	(0.006)	(0.004)	(0.005)	(0.003)	(0.006)	(0.010)
Female	0.054***	0.031***	0.040***	0.023***	0.051***	0.101***
	(0.006)	(0.004)	(0.004)	(0.003)	(0.006)	(0.010)
P-value Difference	0.46	0.15	0.55	0.69	0.64	0.55
Male Mean	0.77	0.55	0.38	0.26	0.28	0.06
Female Mean	0.82	0.62	0.47	0.32	0.35	0.24
(C) By Race						
Non-White	0.058***	0.039***	0.044***	0.023***	0.054***	0.115***
	(0.007)	(0.005)	(0.005)	(0.004)	(0.007)	(0.011)
White	0.046***	0.031***	0.039***	0.022***	0.051***	0.094***
	(0.007)	(0.005)	(0.006)	(0.004)	(0.007)	(0.013)
P-value Difference	0.13	0.29	0.51	0.67	0.86	0.23
Non-white Mean	0.72	0.45	0.30	0.23	0.20	-0.11
White Mean	0.86	0.69	0.53	0.39	0.38	0.38

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the relationship between a counselor's predicted (leave-year-out) value-added and student outcomes varies by student characteristics. Panel (A) divides students by their 8th grade test scores. Students with scores above average are classified as high test students and those below average are referred to as low test students. Panel (B) shows estimates separately by gender.Panel (C) divides students by whether they are white or non-white. Counselor effectiveness is defined using the education index (in SDs). The coefficients reported are those from the interaction of the relevant subgroup (e.g., Low Inc) with counselor value-added. Within each panel and column, both coefficients are estimated in one regression. The p-value reports the statistical significance of the difference between the two groups in the panel. All regressions include fixed effects for the first letter of the student's last name, each school, grade and year (when a student was first assigned to the counselor). Estimates are based on the first counselor to which a student is quasi-randomly assigned. Estimates also contain controls for the student's 8th grade test scores, English language proficiency, special education receipt, enrollment in 8th grade in a Wake County public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender.

Table B.4: Correlation of Value-Added & Observation Ratings in Wake County

	Value-Added Measures				
	Education Index (1)	Graduate High School (2)	Attend College (3)	Attend Four-year College (4)	Historical Graduation Graduation Rate (5)
VA Graduate High School	0.939	1			
VA Attend College	0.925	0.772	1		
VA Attend Four-Year College	0.944	0.806	0.892	1	
VA Historical Graduation Rate	0.797	0.584	0.836	0.918	1
Average Evaluation Rating	-0.0207	0.0369	-0.0290	-0.0657	-0.0905

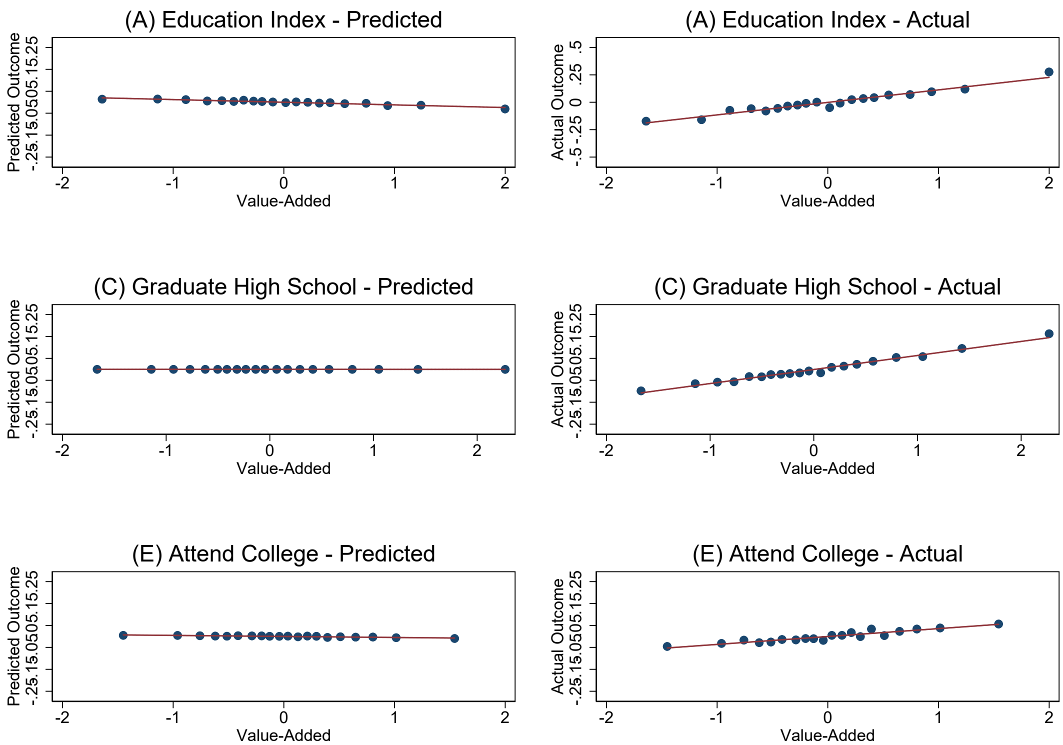
The above estimates show the correlations of each counselor's value-added (in Wake County, NC) and their average evaluation rating. Average evaluation ratings are only used for counselors evaluated in at least two years between 2015 and 2018 (to improve the validity of these measures). Fifty-three counselors have evaluation ratings in at least two years and value-added estimates (based on three cohorts of students). Counselors are typically evaluated by principals in Wake County. Counselors effects are in standard deviations and the evaluation ratings are on a scale of 0 to 4. College attendance is based on attendance within six months of completing high school. Historical graduation rate refers to the six-year graduation rate at the college a student attends. Historical graduation rates are zero for students who do not attend college within six months of finishing high school.

Table B.5: Impact of Counselor Characteristics in Wake County

	Graduate High School (1)	Attend College (2)	Attend Four-Year (3)	Persist 1st Yr (4)	Education Index (5)
(A) Race Match					
Race Match	-0.002	0.006	0.009	-0.000	0.000
	(0.007)	(0.008)	(0.009)	(0.006)	(0.000)
Non-White Match	-0.002	0.004	0.007	-0.002	0.007
	(0.009)	(0.010)	(0.010)	(0.008)	(0.022)
White Match	-0.004	0.002	0.005	-0.006	0.003
	(0.007)	(0.008)	(0.009)	(0.006)	(0.018)
(A) Gender Match					
Gender Match	0.000	-0.009**	-0.007*	-0.011***	-0.013
	(0.005)	(0.005)	(0.004)	(0.004)	(0.008)
Female Match	0.003	-0.005	0.003	-0.005	0.000
	(0.006)	(0.007)	(0.007)	(0.005)	(0.013)
Male Match	-0.002	-0.014**	-0.017***	-0.019***	-0.027**
	(0.006)	(0.006)	(0.005)	(0.005)	(0.011)
(B)Educator Experience					
Novice Counselor	0.020***	0.022***	0.021***	0.020***	0.051***
	(0.006)	(0.007)	(0.005)	(0.005)	(0.013)
Log(Years Counselor)	-0.024***	-0.024***	-0.026***	-0.019***	-0.060***
	(0.006)	(0.008)	(0.007)	(0.006)	(0.016)
Log(Years Educator)	-0.021***	-0.019***	-0.015***	-0.018***	-0.044***
	(0.005)	(0.006)	(0.005)	(0.005)	(0.012)

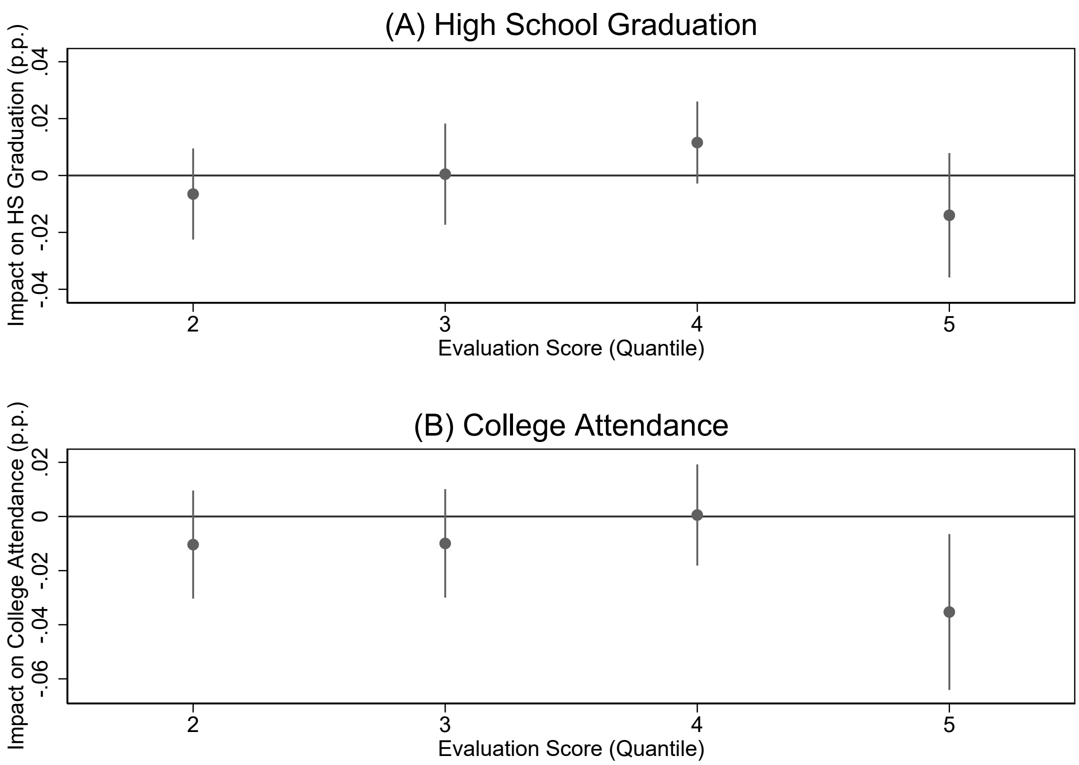
Notes: Heteroskedasticity robust standard errors clustered by counselor in parentheses. (*p<.10 **p<.05 *** p<.01). These estimates indicate the relationship between a counselor's observable characteristic or experience and the student outcome in the relevant column. Each row (and column) is a separate regression. The coefficients indicate the causal relationship between being assigned to a counselor with the noted characteristic and student outcomes, but not necessarily the causal effect of the characteristic/experience itself. In panel (A), race match is defined as assignment to a counselor of the same broad race/ethnicity category: white, Asian, Hispanic or Black. The other race-match rows focus on matches just for non-white students, white students, or black students respectively. Non-white match refers to whether non-white students are matched to another non-white counselor. White match refers to whether white students are matched to a white counselor. Panel(B) shows the estimatd impacts of being assigned to a counselor who is the same gender of the student, separately by whether the student is male or female. Panel (C) shows estimates based on the counselor's years of experience in Wake County. Experience is based on years of experience in Wake County when the student is first assigned the counselor. All regressions include letter of last name, school, cohort and grade fixed effects students' race, gender, achievement, attendance, and average income levels at the school. Estimates are based on a student's first assigned high school counselor in Wake County, North Carolina.

Figure B.1: Effects of Counselor Value-Added on Predicted and Actual Outcomes in Wake County



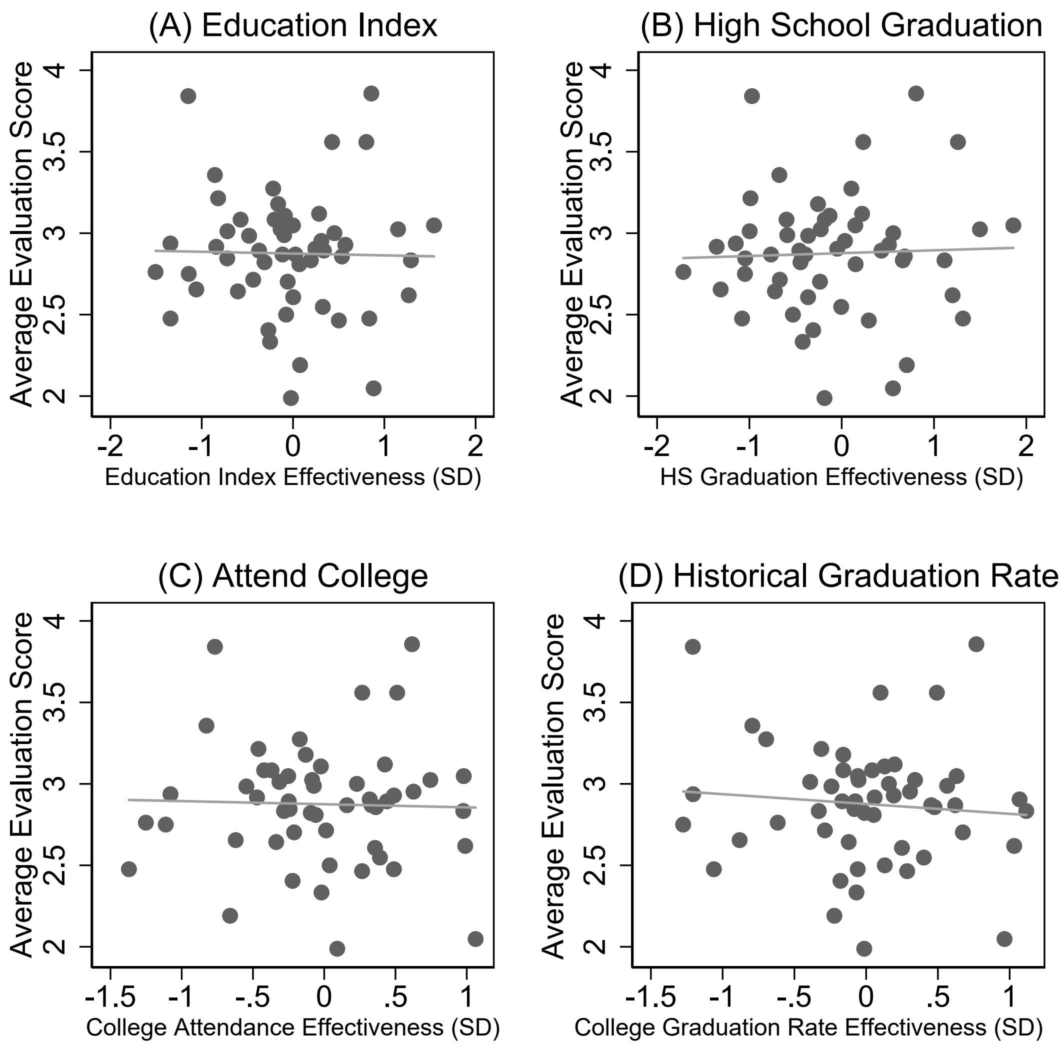
Notes: The figures above show binscatters of counselor value-added and students predicted and actual outcomes in Wake County, NC. The figures on the left show students' predicted outcomes based on their seventh grade test scores. The figures on the right show students actual outcomes. Both predicted and actual outcomes are residualized on the first letter of the student's last name, school, grade, and year fixed effects as well as controls for student demographics, services received in eighth grade and eighth grade attendance. In each graph, the y-axis indicates students' predicted or actual outcome (Panels (A) and (B) are for the composite index, panels (C) and (D) for high school graduation, and panels (E) and (F) for four-year college attendance). Estimates are all The x-axis is based on counselors leave-year-out empirical Bayes estimates of effectiveness. The lines are from regressions of the residualized outcomes on counselor value-added. There are the same number of students in each bin. The relationship between counselor value-added and predicted effects is not significant at the 10% level in any of the figures on the left. Conversely, the relationship between value-added and actual outcomes is significant at the 1% level for all figures on the right, and each of the confidence interval for each of these coefficients contains 1.

Figure B.2: Predictive Power of Evaluation Scores for Educational Attainment



Notes: The figures above show the relationship between the quantile of a counselor's average evaluation score and the rate of high school completion (in Panel A) or college attendance (in Panel B). All estimates are relative to counselors in the bottom quintile. These estimates are based on data from Wake County, North Carolina. A counselor's quintile of evaluation score is based on their average score in all years between 2015 and 2018. Counselors are typically rated by principals. They are rated on a scale of 0-4 on five main domains. Their average across these domains is used to generate a cumulative score between 0 and 4. In panel (A) the x-axis is the average effect of counselors on high school graduation and in panel (B) the x-axis indicates counselors' average effects on college attendance. The x-axis is in terms of percentage points and these effects are conditional on school, year, grade and first letter of last name fixed effects plus controls for student demographics, achievement and services received in eighth grade. School fixed effects should also capture rater effects since, in most cases, all counselors in a school will be evaluated by the same person. College attendance is based on attendance within six months of graduating high school. Here, high school graduation is an indicator for whether the student graduated from a public high school in Wake County, NC. The bars represent 95% confidence intervals.

Figure B.3: Scatterplots of Evaluation Scores and Effectiveness Measures



Notes: The figures above are scatterplots of each counselor's average evaluation score and that counselor's average effectiveness. The y-axes are counselors' average evaluation scores between 2015 and 2018 (from Wake County, NC). The x-axis indicates each counselor's empirical Bayes estimate of effectiveness. Panel (A) is based on effectiveness in terms of the education index. Panel (B) is for effectiveness in terms of high school graduation. Panel (C) is for effectiveness in terms of four-year college attendance and panel (D) is for effectiveness in terms of the historical six-year graduation rate at the college a student attends. Four-year college attendance and historical graduation rate are based on college attendance within six months of graduating high school. Effectiveness is in standard deviations. There is one dot per counselor. These figures are based on counselors from Wake County, NC who were evaluated at least twice between 2015 and 2018 (and who were matched to at least two cohorts of 20 students based on a last name assignment rule). The lines indicate the results from a regression of counselors' average evaluation scores on the measures of effectiveness.

C Test of Specialization

In this section, I formally examine whether counselors specialize in the student outcomes they achieve. School counselors are workers who face a complex task. They are charged with achieving many outputs with a diverse set of inputs. The outputs they are responsible for range from course schedules to high school graduation and college enrollment. They are also expected to impact many intermediate outcomes and it may be difficult for them to attain all desired outcomes given their large caseloads and limited training on things like college advising. There also unclear incentives for achieving many of these outputs.

I explore how counselors manage tradeoffs in the outcomes they help produce by measuring the extent to which counselor effectiveness is unidimensional versus specialized. Theory predicts that workers will specialize in their skills and trade with one another to achieve maximum production (Rosen, 1983). Specialization occurs in many fields but most studies of it rely on formal classifications (Epstein, Ketcham & Nicholson, 2010; Garicano & Hubbard, 2008; Righi & Simcoe, 2019). For instance, doctors can pick which patients to see or firms can choose which tasks to assign to which workers. School counselors are an interesting setting to study worker specialization because they face complex tasks and have a lot of discretion over which outputs to produce and how to produce them.

Worker specialization is typically measured by comparing workers' task composition to random assignment of tasks (Epstein, Ketcham & Nicholson, 2010; Righi & Simcoe, 2019). Workers are defined as specialists if they focus more on some tasks than is expected under a normal distribution or random assignment of tasks. The analog in this case is to compare the outcomes a counselor attains to those expected given the counselor's average quality if the counselor was equally focused on all outcomes. Specifically, does an average counselor improve all outcomes roughly equally, or do they achieve this level of "quality" by increasing some outcomes a lot and ignoring others?

To test this, I use my composite index as a measure of average counselor effectiveness. Then, for each counselor and outcome, I test if effectiveness on the individual outcome is significantly different from average effectiveness. Under the null hypothesis of no specialization, a counselor's impact on individual outcomes will not significantly differ from his or their average effectiveness.

$$H1_0 : \Delta_z = (\mu_{overall} - \mu_{outcome_z})^2 = 0 \tag{1}$$

I can also measure relative specialization by comparing a counselor's effectiveness on two different outcomes. Under the null hypothesis of no specialization, a counselor's effectiveness will be the same for both outcomes.

$$H2_0 : \delta_{xz} = (\mu_{outcome_x} - \mu_{outcome_z})^2 = 0 \tag{2}$$

I test these hypotheses using the effectiveness estimates from section 5 to construct Δ_x and δ_{xz}. Then, I use a chi-square test to determine if the differences are significantly different from zero. This method been used to test the dimensionality of teacher effects (Jackson, 2018; Kraft, 2019).

The first row of Table C.1 shows that there are some differences in counselors' average effectiveness and their effectiveness for individual indices, but none of these differences are significant. The largest differences are for non-cognitive skills, cognitive skills, and highly selective college attendance.

The remaining rows in Table C.1 test the second hypothesis. They also indicate some differences in effectiveness across the dimensions but none of these differences are statistically significant. Thus, in general, the same counselors who improve college readiness and attendance also tend to improve college selectivity and skills in high school.

All together, these results indicate that there is not much specialization apparent across counselors different responsibilities. I also do not find much evidence of specialization over certain types of students (based on academic achievement or income).

Table C.1: Test of Specialization Over Outcomes

	Non-Cognitive Skills	Cognitive Index	College Readiness	College Selectivity	Education Index	Highly Selective
(A) Overall						
Composite Index	0.574	0.358	0.286	0.277	0.239	0.404
(B) Relative to Indiv. VA						
Non-Cognitive	0.000					
Cognitive skills	0.667	0.000				
College Readiness	0.659	0.477	0.000			
College Selectivity	0.644	0.357	0.394	0.000		
Education Index	0.660	0.410	0.370	0.293	0.000	
Highly Selective Coll	0.601	0.368	0.437	0.236	0.400	0.000

Notes: These estimates indicate the absolute value of the differences in a counselor's estimated effect for the outcomes, in standard deviation units. The stars are from a chi-square test for whether the differences are statistically significant from zero. (*p<.10 **p<.05 *** p<.01). None of the differences are significant at the 10% level. Estimates are based on the first counselor to which a student is quasi-randomly assigned. Highly selective college is an indicator for whether the student attends a highly selective college as defined by Barron's 2009 rankings.

D Additional Details on Predictors of Counselor Effectiveness

I use the following empirical specification to estimate how assignment to a counselor with a particular characteristic, experience, or level of education is related to student outcomes. I control for the first letter of the student's last name (ν_n), cohort (ψ_t), school (δ_s), and assignment grade (γ_g) fixed effects as well as the student's academic achievement and demographics (X_i). The student level control variables (X_i) are the same as those used in the effectiveness estimates.

$$Y_i = \alpha_0 + \alpha_1 CounselorType_j + \beta X_i + \nu_n + \delta_s + \gamma_g + \psi_t + \epsilon_{iy} \tag{3}$$

The estimate α_1 indicates how being assigned to a counselor of a certain type is causally linked to a student's outcome.

In addition to the results discussed in the paper on race-match, I find that the undergraduate college a counselor attended is predictive of whether and where their students attend college. Data on counselors' undergraduate and graduate education are available for about 20% of the counselors in my sample.[6] Master's degrees are required for all counselors in Massachusetts and since very few counselors have doctorates, I focus on the type of colleges at which counselors received their undergraduate and master's degrees.

Table 9 shows that the location of the counselor's undergraduate college is a predictor of counselor effectiveness. Students assigned to counselors who received their bachelor's degree in Massachusetts are 1.3 percentage points more likely to graduate high school than those assigned to a counselor who earned one outside of the state. There are similar effects for college attendance and the graduation rate of the college attended, but these estimates are only marginally significant. Fifty-nine percent of students in the education sample have a counselor who earned a bachelor's degree in Massachusetts. These counselors may have a better understanding of the local college options, the needs of local students, or state graduation requirements than counselors educated elsewhere.[7] Receiving a master's degree in Massachusetts is also associated with higher student educational attainment, possibly because the location of master's institutions are less predictive of where one attended high school than undergraduate institutions (Table D.1). This is consistent with the hypothesis that local knowledge of the education system is beneficial.

I find no evidence that counselors who attended more selective undergraduate institutions are more effective than their peers, but these estimates are quite noisy. Table D.4, however, provides some evidence that counselors guide students to attend colleges which are similar to where they attended. Thus, counselors may use their own college experiences to guide the recommendations they provide to students. Table D.5 also compares the relationship between where a counselor went to college and where students attend separately for high and low achieving students.

[6]Education data are self-reported. Table 1 compares these counselors to others in terms of experience and demographics. On average, they look similar to the full sample.

[7]Counselors educated in Massachusetts may also be more likely to have attended high school in Massachusetts. Table D.3 shows which other observable characteristics of counselors are correlated wtih having a bachelor's degree from Massachusetts. None of the correlations are very large.

D.1 Experience

I estimate returns to years of experience using Papay and Kraft's (2015) approach to control for year and counselor effects. I estimate the year fixed effects in a first stage regression and then use the estimated effects ($\hat{\delta}_y$) in a second stage regression with counselor fixed effects (μ_j), name fixed effects (ν_n) and student level controls (X_i). This enables the inclusion of counselor and year effects while addressing the collinearity of experience and years. I also use the log of experience since the returns to experience are often non-linear.

$$(1) \qquad Y_i = \alpha + \gamma_o Exper + \beta_o X_i + \nu_n + \delta_y + \epsilon_i$$

$$(2) \qquad Y_i = \alpha + \Gamma Exper + \beta X_i + \nu_n + \hat{\delta}_y + \mu_j + \epsilon_i$$

Panel (C) of Table 9 indicates that the returns to experience are not positive. In particular, student outcomes are not significantly different for novice versus more experienced counselors, and high school graduation rates are lower among students assigned to counselors with more years of experience. Figure D.1 shows that these estimates are quite noisy, but overall there do not appear to be large returns to experience. Table D.2 also indicates that novice counselors tend to have higher value-added than more experienced counselors. This is true across multiple value-added measures. Counselors with more experience may not be more effective than newer counselors if there are benefits to being close in age to students or if counseling skills rapidly depreciate. For instance, newer counselors may have received more training on the state's current counseling standards or they may be more familiar with technological innovations in the college application process and teen culture that make it easier for them to relate to students.

Finally, I examine how caseloads relate to value-added. Panel D of Table D.2, along with Table A.24 and Figure E.2 indicate that caseload size is not a significant predictor of the main value-added measures. However, these results are noisy, so they should be interpreted with caution. In addition, this relationship is difficult to measure because the value-added estimates vary with the caseloads. In the empirical Bayes framework, counselors with fewer students will have their estimates shrunken more towards the mean. In addition, the number of students I measure matched to the counselor may not be their exact caseload if there is noncompliance with the assignment mechanisms or for counselors assigned to work with special populations of students.

D.2 Tables and Figure

Table D.1: Impact of Additional Counselor Characteristics

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Composite Index (6)
(A) Gender Match						
Gender Match	-0.004*	-0.002	-0.005*	-0.000	-0.001	-0.005
	(0.002)	(0.003)	(0.003)	(0.000)	(0.003)	(0.004)
Female Match	-0.003	-0.002	-0.005	-0.000	-0.001	-0.003
	(0.003)	(0.004)	(0.004)	(0.000)	(0.004)	(0.007)
Male Match	-0.006*	-0.002	-0.006*	-0.000	-0.002	-0.008
	(0.003)	(0.004)	(0.004)	(0.000)	(0.004)	(0.006)
N	218,673	218,673	218,673	218,673	196,408	218,673
(B) Experience						
Teacher	-0.009***	-0.006*	-0.002	0.000	-0.003	-0.016**
	(0.003)	(0.003)	(0.004)	(0.000)	(0.003)	(0.007)
Supervisor	0.001	-0.003	-0.006	-0.000	-0.011	-0.015
	(0.005)	(0.006)	(0.007)	(0.000)	(0.007)	(0.011)
N	218,673	218,673	218,673	218,673	196,408	218,673
(C) Education						
Master's in MA	0.000	-0.006	-0.013*	-0.000	-0.006	-0.025**
	(0.006)	(0.006)	(0.007)	(0.000)	(0.005)	(0.010)
N	49,001	49,001	49,001	49,001	42,640	49,001

Notes: Heteroskedasticity robust standard errors clustered by counselor are in parentheses. (*p<.10 **p<.05 *** p<.01). These estimates indicate the relationship between a counselor's observable characteristic or experience and the student outcome in the relevant column. Each row (and column) is a separate regression. All regressions include letter of last name, school, cohort, and grade fixed effects as well as controls for student race and gender. They also include controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of Title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, and days truant. The coefficients indicate the causal relationship between being assigned to a counselor with the noted characteristic and studnet outcomes, but not necessarily the causal effect of the characteristic/experience itself. In panel (A), gender match is defined as beign assigned to a counselor of the same gender as the student. In panel (B), Teacher is an indicator for whether the counselor has a teaching license in the Massachusetts repcords. Supervisor is an indicator for whether the counselor is a counseling supervisor while the student is assigned to that counselor. Panel(C) is based on whether the counselor has a Master's degree from an institution in Massachusetts. Estimates are based on the first counselor to which a student is quasi-randomly assigned. The effects in columns 1-5 are in percentage points. Those in column 6 are in standard deviation units (of the education index). College attendance is based on attendance within six months of completing high school. Persistence is an indicator for enrolling in a second year of college. Historical graduation rate refers to the six-year graduation rate at the college a student attends. Historical graduation rate and persistence are zero for students who do not attend college within six months of finishing high school.

Table D.2: Predictors of Counselor Value-Added

	Graduate High School (1)	Attend College (2)	Attend Four-Year College (3)	College's Graduation Rate (4)	Persist 1st Year (5)	Composite Index (6)
(A) Demographics						
White	0.000	0.000	0.000	0.001	0.000	0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)
Female	0.000	0.000	0.000	0.000	-0.000	0.001
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
N	3,304	3,304	3,304	3,304	3,304	3,304
(B) Education						
Undergrad In Massachusetts	0.003*	0.003*	0.001	0.001*	0.001	0.004
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)
Undergrad Selective	0.000	0.000	0.001	0.000	0.002	0.003
	(0.003)	(0.003)	(0.002)	(0.001)	(0.002)	(0.005)
Master's Highly Selective	-0.001	-0.001	0.004	0.002	0.002	0.018*
	(0.005)	(0.005)	(0.003)	(0.002)	(0.003)	(0.009)
N	770	770	770	770	770	770
(C) Years Experience (9th Grade)						
Novice	0.003*	0.003*	0.003***	0.002***	0.002*	0.007**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)
Log(Years)	0.001	0.001	0.000	-0.000	-0.001*	-0.001
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.003)
Former Teacher	-0.001	-0.001	-0.001	-0.000	-0.001	-0.004*
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)
N	3,304	3,304	3,304	3,304	3,304	3,304
(D) Assigned Students						
Caseload (in 100s)	-0.001	-0.001	-0.001	-0.000	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)
N	1,700	1,700	1,700	1,700	1,700	1,700

Notes: Heteroskedasticity robust standard errors clustered by counselor in parentheses. (*p<.10 **p<.05 *** p<.01). These estimates show how counselor's observable characteristics relate to their value-added. Estimates are from regressions of counselors' value-added on their characteristics, where each row is a separate regression. The regressions include year fixed effects. Observations are counselor-year pairs. Estimates of experience effects compute year fixed effects in a two-step process to account for collinearity between years of experience and year fixed effects. Estimates in panel (C) are based on years of experience for the 9th grade cohort. Selective college is defined using Barron's 2009 rankings. Novice is an indicator for being in one's first year as a Massachusetts counselor. Log(years) refers to the natural log of one plus the number of years for which a counselor has worked as a counselor in Massachusetts (since the HR data began in 2008). The effects in columns 1-5 are in percentage points. Those in column 6 are in standard deviation units (of the education index). College attendance is based on attendance within six months of completing high school. Persistence is an indicator for enrolling in a second year of college. Historical graduation rate refers to the six-year graduation rate at the college a student attends. Historical graduation rate and persistence are zero for students who do not attend college within six months of finishing high school.

Table D.3: Correlation in Counselor Value-Added Measures

	Undergrad in Massachusetts (1)	Selective Undergrad (2)	Highly Selective Undergrad (3)	Public Undergrad (4)	Teaching License (5)	White (6)	Black (7)	Male (8)	Year Started in MA (9)
Undergrad in MA									
Selective Undergrad	0.113								
Highly Sel. Undergrad	-0.020	0.192							
Public Undergrad	0.221	-0.119	-0.480						
Teaching License	0.132	-0.079	-0.103	0.046					
White	-0.111	-0.040	-0.004	-0.074	-0.007				
Black	0.061	0.022	0.116	-0.065	0.004	-0.740			
Male	-0.283	-0.023	-0.059	-0.028	0.027	-0.025	0.015		
Year Started in MA	0.115	-0.040	-0.246	0.144	0.010	-0.004	0.003	-0.008	
Caseload	-0.131	0.031	0.118	-0.106	0.122	-0.056	0.081	0.056	-0.103

Notes: These estimates indicate how counselors' obvservable characteristics are correlated. The estimates based on the subset of counselors with non-missing data for all of these characteristics. Undergrad in MA refers to whether the counselor's bachelor's degree is from a college in Massachusetts. Teaching license refers to whether the counselor has a teaching license in the Massachusetts records.

Table D.4: Impact of Counselor's College

	Attend Four-Year (1)	Attend In-State (2)	Attend Public (3)	Attend Large (4)	Small Private (5)	College's Grad Rate (6)	Highly Selective (7)	Elite (8)
(A) Overall								
Coll in MA	0.006	0.011**	-0.002	-0.005	0.009*	0.000*	0.009***	0.006***
	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.000)	(0.003)	(0.002)
Large Coll	0.007	-0.004	-0.008	0.009	0.000	0.000	0.007**	-0.003
	(0.006)	(0.006)	(0.007)	(0.006)	(0.005)	(0.000)	(0.003)	(0.002)
Private Coll	-0.009	0.001	0.006	0.000	-0.003	-0.000**	-0.006*	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.000)	(0.003)	(0.002)
High Sel. Coll	-0.006	-0.001	-0.004	0.001	-0.000	-0.000	0.001	0.002
	(0.009)	(0.006)	(0.005)	(0.008)	(0.003)	(0.000)	(0.004)	(0.003)
Elite Coll	-0.027***	-0.011	-0.010	-0.008	-0.008	-0.000**	0.003	0.007
	(0.010)	(0.007)	(0.007)	(0.007)	(0.006)	(0.000)	(0.005)	(0.004)
N	46,013	46,013	46,013	46,013	46,013	46,013	46,013	46,013
(B) Among College Attendees								
Coll in MA	0.006	-0.000	-0.019***	-0.006	0.012*	0.000**	0.016***	0.010***
	(0.006)	(0.004)	(0.007)	(0.007)	(0.006)	(0.000)	(0.004)	(0.003)
Large Coll	0.010*	-0.000	-0.006	0.010	-0.001	0.000**	0.008*	-0.006*
	(0.005)	(0.006)	(0.009)	(0.008)	(0.008)	(0.000)	(0.005)	(0.003)
Private Coll	-0.015***	0.001	0.008	0.001	-0.004	-0.000***	-0.009*	-0.004
	(0.005)	(0.004)	(0.006)	(0.007)	(0.006)	(0.000)	(0.004)	(0.003)
High Sel. Coll	-0.004	-0.001	-0.002	0.006	0.001	-0.000	0.001	0.003
	(0.006)	(0.006)	(0.005)	(0.009)	(0.005)	(0.000)	(0.005)	(0.004)
Elite Coll	-0.016**	-0.001	0.001	-0.008	-0.004	-0.000**	0.007	0.010**
	(0.006)	(0.008)	(0.007)	(0.009)	(0.007)	(0.000)	(0.006)	(0.005)
N	30,345	30,345	30,345	30,345	30,345	30,345	30,345	30,345

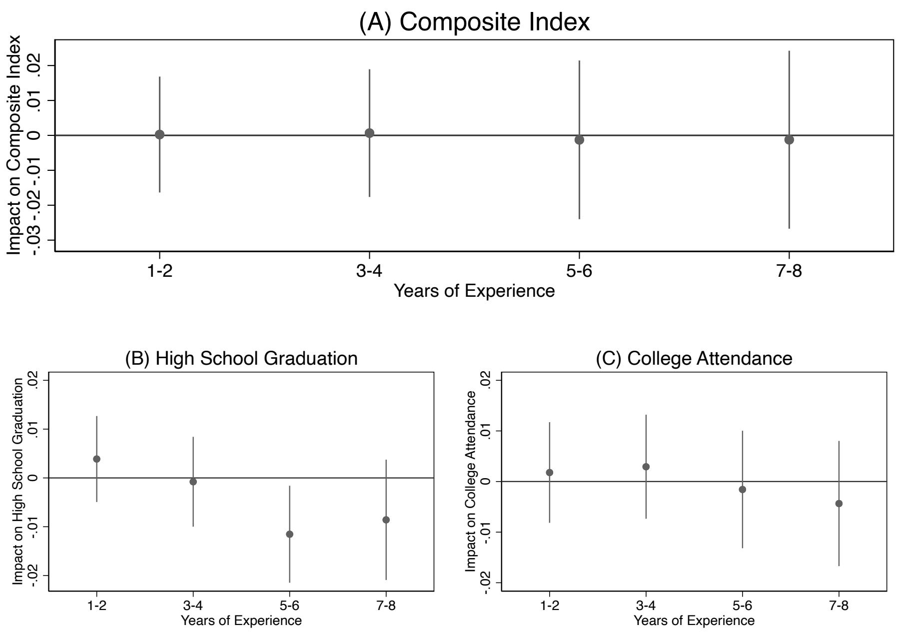
Notes: Heteroskedasticity robust standard errors clustered by counselor in parentheses. (*p<.10 **p<.05 *** p<.01). This table shows how the characteristics of the college a counselor attended (for their bachelor's degree) relates to the types of colleges their students attend. Specifically, each cell is a coefficient from the regression of an outcome (e.g., whether the student attends a public college) on a characteristic of the counselor's undergraduate institution (e.g., a large college). All regressions include letter of last name, school, cohort and grade fixed effects as well as controls for student race and gender. They also include controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, and days truant. Estimates are based on the first counselor to which a student is quasi-randomly assigned. Large college is an indicator for a college enrolling more than 10,000 students. College selectivity is based on the Barron's 2009 Tiers. Estimates in panel (A) are for all students, where outcomes are zero for students who do not attend college. Panel (B) is based on students who attend college.

Table D.5: Impact of Counselor's College by Student Achievement Levels

	Attend College (1)	Attend Four-Yr (2)	Attend In-State (3)	Attend Public (4)	Attend Large (5)	Small Private (6)	Grad Rate (7)	Highly Selective (8)
(A) High Scoring Students								
College in MA	0.009	0.009	0.009	-0.004	-0.001	0.007	0.000**	0.015***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.009)	(0.007)	(0.000)	(0.006)
Large College	-0.004	0.004	-0.007	-0.004	0.016	-0.007	0.000	0.014**
	(0.007)	(0.008)	(0.009)	(0.011)	(0.010)	(0.009)	(0.000)	(0.006)
Private Coll	0.005	-0.010	0.002	0.007	0.003	0.000	-0.000**	-0.009
	(0.006)	(0.007)	(0.008)	(0.008)	(0.010)	(0.006)	(0.000)	(0.006)
High Sel. College	0.004	-0.006	0.002	0.003	0.009	-0.004	-0.000	-0.003
	(0.006)	(0.007)	(0.008)	(0.009)	(0.012)	(0.007)	(0.000)	(0.006)
ugrad_elite	-0.014	-0.023**	-0.002	-0.017	-0.016	0.006	-0.000**	0.001
	(0.009)	(0.011)	(0.008)	(0.013)	(0.013)	(0.009)	(0.000)	(0.008)
N	21,280	21,280	21,280	21,280	21,280	21,280	21,280	21,280
(B) Low Scoring Students								
College in MA	0.012	0.006	0.015**	0.000	-0.007	0.010*	0.000	0.004
	(0.009)	(0.008)	(0.007)	(0.008)	(0.005)	(0.005)	(0.000)	(0.003)
Large College	-0.003	0.009	-0.001	-0.011	0.002	0.005	0.000	0.001
	(0.009)	(0.007)	(0.008)	(0.008)	(0.005)	(0.005)	(0.000)	(0.002)
Private College	-0.004	-0.009	-0.003	0.003	-0.002	-0.002	-0.000	-0.004
	(0.008)	(0.008)	(0.007)	(0.007)	(0.004)	(0.005)	(0.000)	(0.002)
High Sel. College	-0.009	-0.007	-0.004	-0.007	-0.004	0.005	-0.000	0.002
	(0.013)	(0.013)	(0.011)	(0.010)	(0.005)	(0.007)	(0.000)	(0.004)
ugrad_elite	-0.019	-0.031**	-0.023**	0.005	0.000	-0.024***	-0.000*	-0.003
	(0.013)	(0.015)	(0.009)	(0.012)	(0.007)	(0.007)	(0.000)	(0.004)
N	24,732	24,732	24,732	24,732	24,732	24,732	24,732	24,732

Notes: Heteroskedasticity robust standard errors clustered by counselor in parentheses. (*p<.10 **p<.05 *** p<.01). AThis table shows how the characteristics of the college a counselor attended (for their bachelor's degree) relates to the types of colleges their students attend. Specifically, each cell is a coefficient from the regression of an outcome (e.g., whether the student attends a public college) on a characteristic of the counselor's undergraduate institution (e.g., a large college). All regressions include letter of last name, school, cohort and grade fixed effects as well as controls for student race and gender. They also include controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, and days truant. Estimates are based on the first counselor to which a student is quasi-randomly assigned. Large college is an indicator for a college enrolling more than 10,000 students. College selectivity is based on the Barron's 2009 Tiers. Panel (A) is based on students who scored above the state average on their 8th grade test, while panel (B) is based on students who scored below average.

Figure D.1: Experience and Counselor Effectiveness



Notes: The figures above show the coefficients from a regression of an indicator for high school graduation (in panel (A)) or four-year college attendance (in panel (B)) on indicators for two-year bins of a counselor's years of experience (in Massachusetts as a counselor). The effects are in percentage points. They are from models which include counselor and year fixed effects to account for potential bias in which counselors have a lot of experience. The bars represent 95% confidence intervals. All estimates are relative to novice counselors. Since HR data are only available since 2008, few counselors have more than 6 years of experience at the point when they are first assigned to a student in my sample. These estimates are based on years of experience when first assigned to a 9th grade student.

E Additional Details for Caseload Effect Estimates

This section presents additional details on how I estimate the relationship between counselors' caseloads and student outcomes, as well as how the estimates vary across approaches.

To address the endogeneity in caseloads, I use five approaches to measure the relationship between caseloads and educational attainment in Massachusetts high schools.[8] I focus on the impact of 9th grade caseloads on high school graduation since many dropouts leave in early grades. For the college outcomes, I focus on 11th grade caseloads since students make many decisions in 11th grade which affect college attendance.[9]

First, I control for student characteristics and school fixed effects. Panels (B) and (C) of Table 10 indicate that controlling for student characteristics or school and year fixed effects eliminates the significant OLS relationship between caseloads and most measures of educational attainment.

Second, I use within school variation in the number of counselors over time. This approach indicates limited benefits to hiring additional counselors. Panel (C) of Figure E.1 shows a relatively flat relationship between caseloads and college attendance when caseloads vary due to the number of counselors in a school, and panel (D) of Table 10 indicates no significant relationships associated with changes in the number of counselors in a school.

Third, I use within school variation in the size of the student body over time as an instrument for caseload size (similar to Bound & Turner, 2007). I include school and year fixed effects as well as school-specific time trends, controls for the number of counselors at the school, and the size of the student's cohort. Panel (E) of Table 10 indicates that a 100 student increase in caseloads, based on this variation, is associated with a reduction in high school graduation rates and the average graduation rates at the colleges students attend.[10]

Fourth, I use variation in the number of students outside of a student's own cohort to control for how cohort size affects access to other school resources. Panel (D) of Figure E.1 shows that college attendance is slightly lower when caseloads are larger due to within school variation in the number of students in other grades (but this relationship is not statistically significant). However, this approach indicates a slightly larger and negative association between caseloads and high school graduation rates (1.6 pp). On average, hiring a new counselor in a Massachusetts high school would reduce full caseloads by 74 students and caseloads in other grades by 46 students. Thus, the estimates in panels (E) and (F) of Table 10 suggest that, on average, hiring a new counselor would increase high school graduation rates by approximately 0.8 percentage points.

Table 10 also indicates that the benefits may be much larger for low-achieving students. For these students, there is a negative and statistically significant relationship between larger counselor caseloads and high school graduation, college attendance, and four-year college attendance.[11]

Finally, I do an event study around when schools hire or lose counselors. Event study plots

[8] For these analyses I use the full population of Massachusetts high schools and students. I compute average caseloads in a school and year based on the number of full-time-equivalent counselors and students in a school. Using all schools, instead of just those in the quasi-random assignment sample, increases my power a lot. I also use average caseloads instead of the number of students linked to a counselor in case more effective counselors are be assigned more students. My results are similar but noisier if I limit my sample to schools for which I observe linkages or if I use caseloads based on student-counselor linkages. Table E.1 shows the caseload estimates from table 10 for the sample of students used included the value-added estimates.

[9] Estimates for 12th grade caseloads and college attendance are similar but slightly smaller.

[10] There is also a marginally significant relationship with four-year college attendance.

[11] The same pattern is not evident for low-income students. If anything, caseloads have a more negative effect on high income students.

(Figure E.3) show only small and statistically insignificant changes in high school graduation and college attendance when an additional counselor is hired or lost. While these estimates are quite noisy, the 95% confidence intervals indicate we can rule out increases in high school graduation and college attendance that are larger than 2 percentage points when a new counselor is added or 3 percentage points when a counselor leaves. Table A.24 and Figure E.2 also describe the association between caseload size and counselor value-added.[12] Overall, there are no statistically significant relationships between caseload size and the main value-added estimates.

Together, these results suggest that caseloads are probably negatively related to educational attainment, but I can rule out large returns to hiring additional counselors in most Massachusetts high schools.

[12]Table E.1 shows the same specifications as Table 10 but restricted to the sample used to calculate value-added.

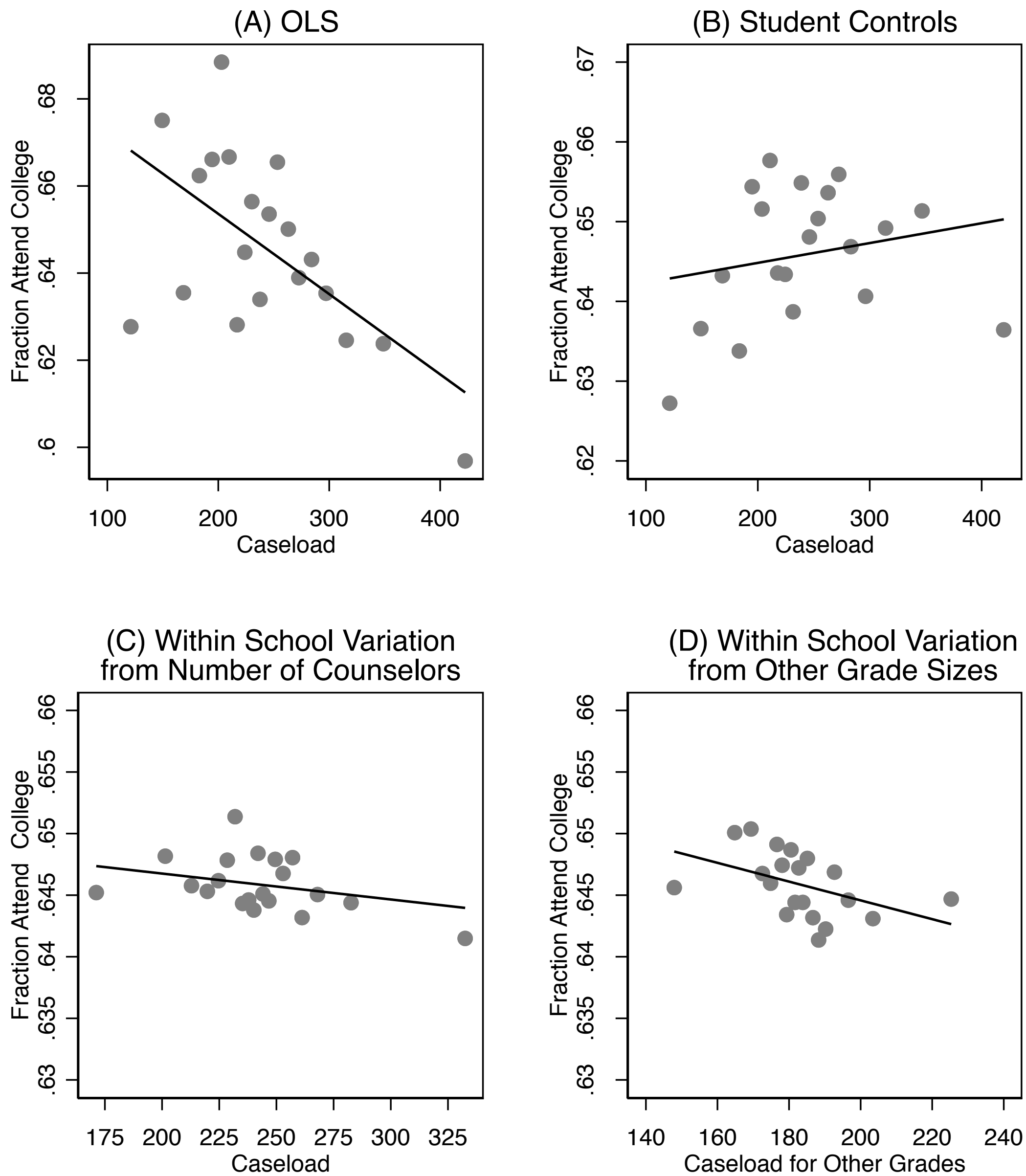
E.1 Table and Figures

Table E.1: Impact of Caseloads on Counselor Value-Added Sample

	Grade 9 Caseload	Grade 11 Caseload		
	Graduate High School	Attend College	Attend Four-year College	College's Graduation Rate
	(1)	(2)	(3)	(4)
(A) OLS Caseload				
Caseload (in 100s)	-0.030**	-0.018	-0.031*	-0.039**
	(0.012)	(0.011)	(0.015)	(0.013)
(B) Student Controls				
Caseload (in 100s)	-0.013*	-0.002	-0.009	-0.021***
	(0.006)	(0.005)	(0.007)	(0.007)
(C) School, Year FE				
Caseload (in 100s)	-0.003	-0.000	-0.000	0.000
	(0.003)	(0.002)	(0.002)	(0.002)
(D) Within School var. from Num. Counselors				
Caseload (in 100s)	0.001	-0.002	-0.002	-0.006**
	(0.003)	(0.002)	(0.003)	(0.002)
(E) Within School var. from HS Size				
Caseload (in 100s)	-0.012**	-0.007	-0.008*	-0.006**
	(0.004)	(0.004)	(0.004)	(0.002)
(F) Within School var. from Other Gr. Size				
Caseload (in 100s)	-0.015**	-0.007	-0.008	-0.006*
	(0.005)	(0.005)	(0.005)	(0.003)
For High-Achievers	0.012*	0.033***	0.045***	0.030***
	(0.006)	(0.006)	(0.008)	(0.005)
For Low-Achievers	-0.043***	-0.061***	-0.077***	-0.054***
	(0.005)	(0.007)	(0.008)	(0.005)
N	638,974	705,358	705,358	705,358

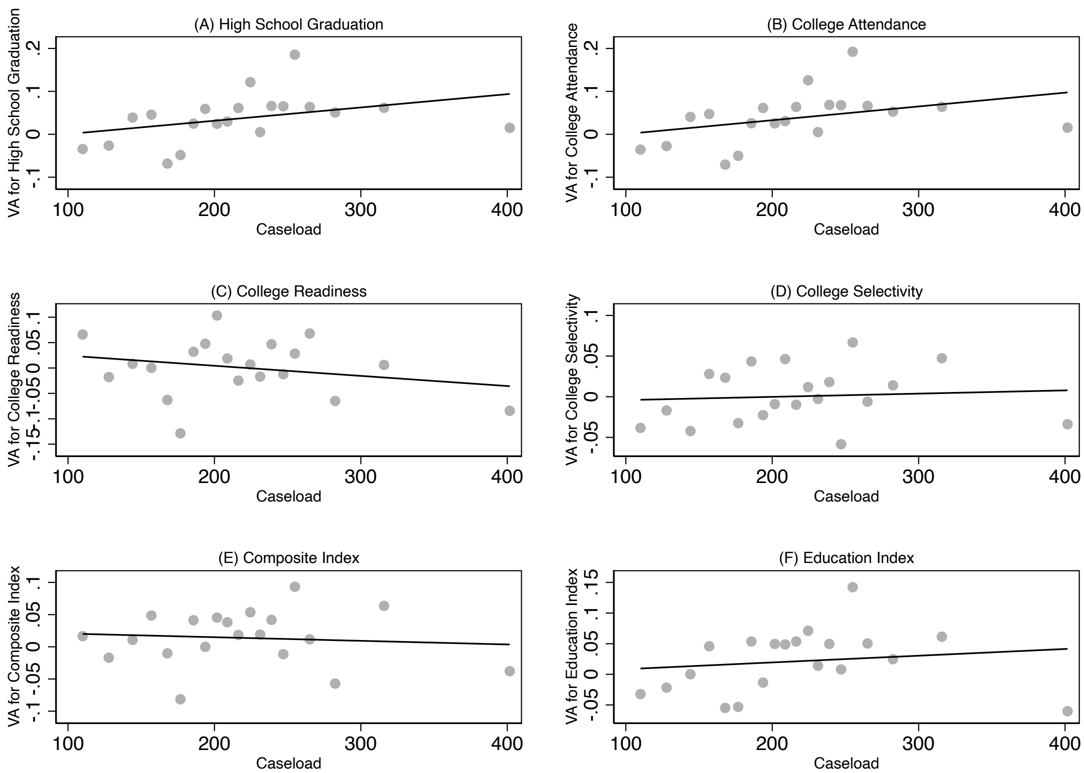
Notes: Heteroskedasticity robust standard errors clustered by school and year are in parentheses. (*p<.10 **p<.05 *** p<.01). The point estimates represent the change in the counselor's value-added associated with a 100 student change in caseloads (or students per counselor). Panel (A) contains estimates based on a simple OLS regression with no controls. The estimates in panel (B) include controls for the student's 8th grade test scores, English language proficiency, special education receipt, receipt of free or reduced-price lunch, receipt of title 1 services, existence of a 504 plan, enrollment in 8th grade in an MA public school, days absent, days truant, indicators for race (Black, white, Asian or Hispanic) and gender. Estimates in panel (C) includes school and year fixed effects plus school specific time trends (but no student-level controls.) Estimates in panel (D) are from the same specification as those in panel (c) but they also include controls for the size of the school. Thus, the variation in caseloads for these estimates comes from changes in the number of counselors over time within a school. Estimates in panel (E) include school and year fixed effects plus school specific time trends and controls for the number of counselors and students in one's grade. Thus, the variation in caseloads for these estimates comes from changes in the number of students over time within a school. The effects are in percentage points. College attendance is based on attendance within six months of finishing high school. College's graduation rate refers to the six-year graduation rate at the college a student attends. College graduation rate is zero for students who do not attend college within six months of finishing high school.

Figure E.1: Relationship between Caseloads and College Attendance



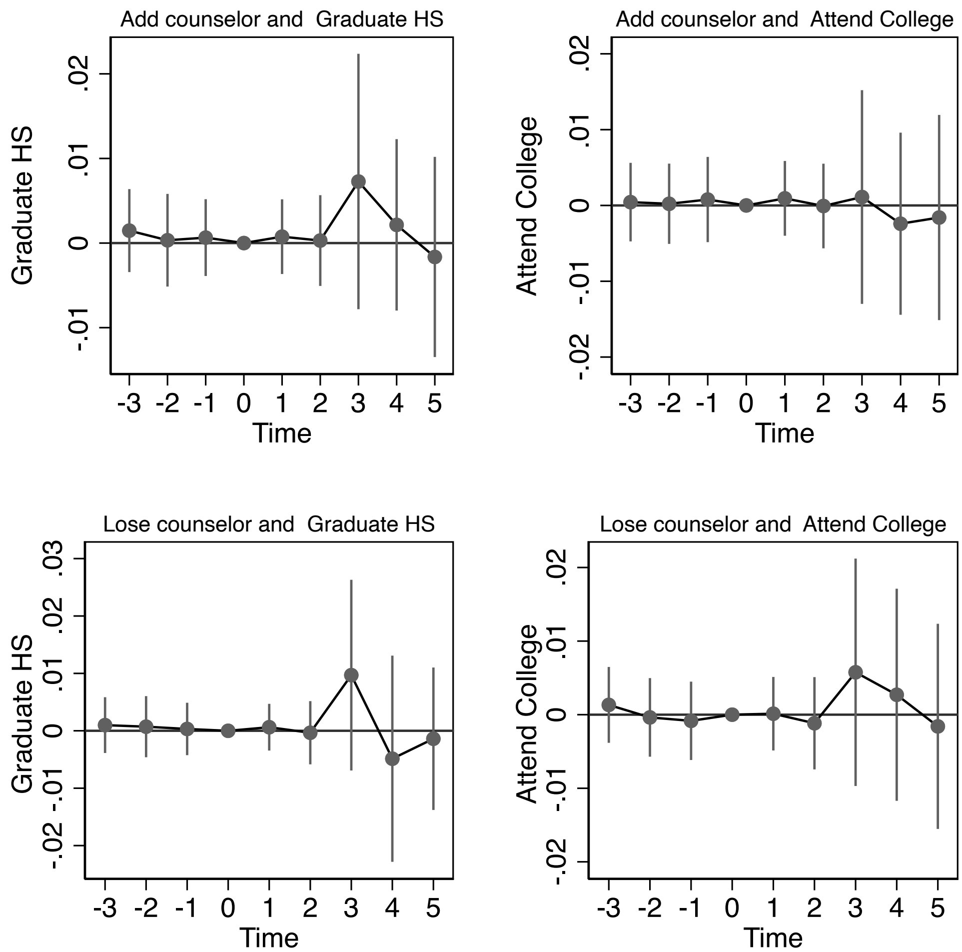
Notes: The figures above show binscatters of the relationship between the average number of students per full-time equivalent counselor when a student is in 11th grade and students' college enrollment. Panel (A) is based on a simple OLS regression of college attendance on caseload size. Panel (B) indicates the same relationship but now includes controls for students' eighth grade achievement and demographics. Panel (C) shows the same relationship but only uses within school variation in caseloads due to changes in the number of enrolled students in grades 9, 10, and 12. Panel (D) uses within school variation in caseloads due to changes in the number of full-time-equivalent counselors in the school. The estimates in panels (C) and (D) include controls for the number of students in one's grade, school-specific time trends, and year fixed effects. The estimates in panel (C) also control for the number of counselors in the school, while the estimates in panel (D) control for the number of students in the school.

Figure E.2: Correlation between Caseloads and Value-Added



Notes: These figures show the relationship between counselor caseloads and counselor value-added. They include school fixed effects and observations have been binned into twenty groups (of equal size). None of the relationships are statistically significant at the 1% level. They are based on the six value-added measures listed in each subfigure title and counselors who have between 100 and 500 students per year. I use leave-year-out value-added estimates so the same students are not represented in both the dependent and independent variables. Caseload estimates are based on the number of students estimated to fall within a counselor's assignment range based on student last names. Thus they may contain some measurement error. Observations are at the counselor level.

Figure E.3: Event Study around Number of Counselors in a School



Notes: The figures above show how high school completion (in panels (A) and (C)) or four-year college attendance (in panels (B) and (D)) change when the number of counselors at a school increases (panels (A) and (B)) or decreases (panels (C) and (D)). Time 1 on the x-axis is when 12th graders first received or lost an additional counselor. Time 2 is when 11th graders first experienced the change, time 3 for 10th graders, and time 4 for 9th graders. All changes are relative to time 0. The number of counselors in a school must have been constant for at least 2 years prior to the change, and the change must have been sustained for at least 2 years for the change to be included in this event study. Some of the noise at the tails may be due to additional changes to the number of counselors. The x-axis indicates the change in the high school graduation or four-year college enrollment rate, conditional on school fixed effects and year fixed effects. The bars represent 95% confidence intervals.