

Online Appendix

Residential vs. Online? Experimental Evidence on Delivery Mechanisms for STEM Diversity Programming

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Figure A.1. : Experiment Timeline and Available Data



Notes: This figure shows student progress over time by experimental cohort, assuming students maintain on-time progress through college. The most recent available information on college enrollment and graduation reflects the spring 2023 semester.

Table A.1—: Covariate Balance and Attrition by Program Assignment: 6- and 1-Week vs. Online

	All (1)	6-Week (2)	1-Week (3)	Online (4)	Strata-Adjusted Differences 6-Week vs. Online (5)	1-Week vs. Online (6)
<hr/> (A) Baseline Characteristics <hr/>						
Black	0.366	0.412	0.350	0.349	0.081+ (0.046)	-0.034 (0.039)
Hispanic	0.412	0.406	0.411	0.417	-0.015 (0.045)	0.009 (0.038)
Native American	0.046	0.053	0.049	0.037	-0.000 (0.022)	0.005 (0.017)
Asian	0.131	0.088	0.146	0.147	-0.050+ (0.030)	0.017 (0.028)
White	0.046	0.041	0.045	0.050	-0.015 (0.020)	0.002 (0.017)
Multiethnic	0.333	0.359	0.333	0.312	0.020 (0.045)	0.013 (0.038)
GPA	3.897	3.908	3.891	3.894	0.004 (0.017)	-0.003 (0.022)
Free/reduced-price lunch	0.453	0.482	0.447	0.436	-0.004 (0.047)	0.008 (0.040)
Standardized math score	2.116	2.110	2.087	2.154	0.005 (0.082)	-0.060 (0.075)
Female	0.500	0.500	0.504	0.495	0.000 (0.000)	0.000 (0.000)
First-generation college	0.301	0.335	0.313	0.261	0.003 (0.043)	0.047 (0.037)
<i>p</i> -value					0.418	0.879
<hr/> (B) Survey Response and Data <hr/>						
Pre-program survey	0.954	0.965	0.959	0.940	-0.020 (0.016)	0.006 (0.019)
Included in HI/NSC data request	1.000	1.000	1.000	1.000	0.000 (0.000)	0.000 (0.000)
Senior year HS fall survey	0.899	0.965	0.870	0.881	0.043 (0.027)	-0.020 (0.031)
Senior year HS spring survey	0.793	0.776	0.797	0.803	-0.016 (0.047)	0.002 (0.038)
First year college survey	0.566	0.518	0.565	0.606	-0.111* (0.056)	-0.026 (0.046)
Second year college spring survey	0.666	0.676	0.634	0.693	-0.027 (0.054)	-0.057 (0.045)
N	634	170	246	218		

Notes: Panel A summarizes baseline characteristics for program applicants assigned to the block which randomized students between treatment arms. Panel B summarizes survey response and data availability. In 2015 and 2016 this was randomization block 1 and in 2014 it was block 2. Race/ethnicity categories are not exclusive. First-generation college is defined as no parental college attendance. Students missing parental college information were coded as not first-generation. Columns 5 and 6 report coefficients from regressions of the characteristic or response category on assignment to each program, including controls for randomization strata (+ $p < 0.10$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$). The *p*-values are from tests of the hypothesis that all coefficients on each program offer are zero.

Table A.2—: Baseline Characteristics by Program Assignment: Online vs. Control

	All (1)	Online (2)	Control (3)	Online vs. Control (4)
<hr/> (A) Baseline Characteristics <hr/>				
Black	0.339	0.339	0.339	-0.012 (0.033)
Hispanic	0.441	0.445	0.440	-0.003 (0.035)
Native American	0.042	0.047	0.041	0.006 (0.015)
Asian	0.139	0.134	0.141	0.009 (0.025)
White	0.036	0.031	0.037	-0.003 (0.014)
Multiethnic	0.366	0.390	0.361	0.018 (0.034)
GPA	3.838	3.870	3.830	0.032* (0.013)
Free/reduced-price lunch	0.352	0.319	0.360	-0.036 (0.034)
Standardized math score	1.809	1.754	1.822	-0.041 (0.088)
Female	0.350	0.508	0.312	0.000 (0.000)
First-generation college	0.214	0.193	0.219	-0.005 (0.029)
<i>p</i> -value				0.778
<hr/> (B) Survey Response and Data <hr/>				
Pre-program survey	0.861	0.913	0.849	0.083*** (0.021)
Included in HI/NSC data request	0.999	1.000	0.999	0.001 (0.001)
Senior year HS fall survey	0.682	0.831	0.647	0.204*** (0.028)
Senior year HS spring survey	0.610	0.764	0.573	0.187*** (0.033)
First year college survey	0.520	0.626	0.495	0.117** (0.036)
Second year college spring survey	0.553	0.642	0.532	0.094** (0.036)
N	1327	254	1073	

Notes: Panel A summarizes baseline characteristics for program applicants assigned to the block which randomized students between the online and control conditions. Panel B summarizes survey response and data availability. In 2015 and 2016 this was randomization block 2 and in 2014 it was block 3. Race/ethnicity categories are not exclusive. First-generation college is defined as no parental college attendance. Students missing parental college information were coded as not first-generation. Column 4 reports coefficients from regressions of the characteristic or response category on assignment to each program, including controls for randomization strata (+ $p < 0.10$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$). The *p*-value is from a test of the hypothesis that all coefficients on the online program offer are zero.

Table A.3—: The Impact of Random Assignment to STEM Summer Programs on 4-Year College Attendance and Graduation

	Attended in Year 1		Graduated by Year 4			Graduated by Year 6		
	Any (1)	Competitive (2)	Any (3)	Competitive (4)	In STEM (5)	Any (6)	Competitive (7)	In STEM (8)
(A) Block 1: Residential vs. Online								
6-week	0.005 (0.017)	0.066 (0.057)	0.029 (0.038)	0.071 (0.047)	0.089 (0.056)	-0.019 (0.034)	0.036 (0.051)	0.088 (0.066)
1-week	0.028 (0.027)	0.043 (0.047)	0.035 (0.048)	0.045 (0.051)	0.048 (0.050)	0.052 (0.035)	0.046 (0.039)	0.089 (0.053)
Online Mean	0.892	0.630	0.594	0.450	0.424	0.785	0.565	0.512
(B) Block 2: Online vs. Control								
Online	0.014 (0.017)	0.092* (0.037)	0.028 (0.027)	0.045 (0.039)	0.038 (0.026)	0.040+ (0.019)	0.094* (0.039)	0.030 (0.022)
Control Mean	0.877	0.475	0.560	0.356	0.392	0.773	0.428	0.517
(C) $\beta_{res} + \beta_{online}$								
6-week	0.018 (0.043)	0.159* (0.065)	0.057 (0.067)	0.116+ (0.067)	0.127+ (0.068)	0.021 (0.056)	0.130+ (0.067)	0.118+ (0.067)
1-week	0.042 (0.037)	0.136* (0.058)	0.063 (0.059)	0.090 (0.059)	0.086 (0.060)	0.092+ (0.048)	0.139* (0.059)	0.119* (0.060)

Notes: Each coefficient labeled by program is the estimate of the impact of assignment to one of three STEM summer program on the outcome indicated in the heading. All regressions control for randomization strata and a vector of characteristics including indicators for GPA, standardized math score, race/ethnicity, and free and reduced-price lunch status. The sample includes STEM summer program applicants who applied in 2014, 2015, and 2016 and passed an initial screen, who were then subject to random assignment. Panel A compares students assigned to a residential program vs. the online program (N= 504). Panel B compares the online program to a control group (N=1,327). The online and control means are adjusted for randomization strata. Panel C combines estimates from Panel A and Panel B using seemingly unrelated regression. Robust standard errors are in parentheses (+ p<0.10 * p<0.05 ** p<0.01 ***p<0.001).

Table A.4—: The Impact of Random Assignment to STEM Summer Programs on HI Application, Attendance, and Graduation

	Applied (1)	Accepted (2)	Attended in Y1 (3)	Graduated by Y4 (4)	Graduated by Y6 (5)
(A) Block 1: Residential vs. Online					
6-week	0.121* (0.047)	0.106*** (0.029)	0.107* (0.038)	0.106*** (0.032)	0.106*** (0.032)
1-week	0.050 (0.053)	0.028 (0.036)	0.038 (0.035)	0.017 (0.034)	0.024 (0.035)
Online Mean	0.654	0.265	0.157	0.134	0.135
(B) Block 2: Online vs. Control					
Online	0.353*** (0.024)	0.091*** (0.028)	0.040+ (0.020)	0.034+ (0.019)	0.038+ (0.019)
Control Mean	0.312	0.059	0.055	0.038	0.039
(C) $\beta_{res} + \beta_{online}$					
6-week	0.474*** (0.062)	0.197*** (0.057)	0.147** (0.051)	0.141** (0.048)	0.144** (0.048)
1-week	0.402*** (0.056)	0.120* (0.047)	0.078+ (0.041)	0.052 (0.037)	0.062+ (0.038)

Notes: Each coefficient labeled by program is the estimate of the impact of assignment to one of three STEM summer program on the outcome indicated in the heading. All regressions control for randomization strata and a vector of characteristics including indicators for GPA, standardized math score, race/ethnicity, and free and reduced-price lunch status. The sample includes STEM summer program applicants who applied in 2014, 2015, and 2016 and passed an initial screen, who were then subject to random assignment. Panel A compares students assigned to a residential program vs. the online program (N= 504). Panel B compares the online program to a control group (N=1,327). The online and control means are adjusted for randomization strata. Panel C combines estimates from Panel A and Panel B using seemingly unrelated regression. Robust standard errors are in parentheses (+ p<0.10 * p<0.05 ** p<0.01 ***p<0.001).