Can the Academic Impacts of a Brief Middle-School Self-Affirmation Intervention Propel Students Through High School?

Geoffrey D. Borman
Yeseul Choi
Garret Hall

University of Wisconsin—Madison

Background/Context
Prior research suggests that identity threats, such as stereotypes (Steele & Aronson, 1995), explain significant portions of achievement gaps. By prompting students to write about values relevant to their well-being, researchers may shore up students' overall self-concept through "self-affirmation" (Steele & Lui, 1983). Interventions that buffer against identity threats subtly target specific psychological processes to promote lasting cycles of positive change (Yeager & Walton, 2011). Immediate impacts of self-affirmation interventions on achievement (GPA) have been demonstrated in field settings (Borman et al., 2016; Cohen et al., 2006; Sherman et al., 2013). Similar evidence shows that self-affirming diminishes recursive impacts of identity threats, thus propagating enduring benefits beyond middle school on ninth grade GPA (Borman et al., 2018), advanced high school course-taking behavior, and increases in college attendance (Goyer et al., 2017).

Purpose/Objective/Research Question/Focus of Study
Given prior research, it is critical to further understand how these interventions may produce scalable impacts across major transitions. In the current study of a district-wide "scale-up," we examine whether the academic impacts through ninth grade reported by Borman et al. (2018) persisted through twelfth grade and whether, ultimately, the intervention increased students' on-time graduation rates.

Setting
This self-affirmation intervention was implemented during the 2011-2012 academic year in all eleven Madison Metropolitan School District (MMSD) middle schools. The current analyses use data through the 2016-2017 academic year.

Population/Participants/Subjects:
The analytic samples include 804 students with complete longitudinal GPA data (see Table 1), and 952 students with complete on-time high school graduation information (see Table 2). Commensurate with previous studies, we label African American and Latino students as "potentially threatened," as they are more likely to be at-risk for stereotype threat in academics. We label white and Asian students as "potentially non-threatened."

Attrition rates were statistically comparable and student-level randomization blocked within schools produced balanced treatment and control samples for the GPA (see Table 2) and graduation (see Table 3) outcome samples, both for the full sample and potentially threatened subsample.

Intervention/Program/Practice:
The intervention replicated the self-affirmation writing activities fielded by Cohen and colleagues (2006). To maintain randomization, researchers delivered personalized copies of the intervention materials while both students and teachers were blind to treatment assignment. Students were assigned to complete four exercises during the 2011-2012 school year, which were administered prior to high-stakes assessments, which may induce stereotype threat (see Figure 1 timeline). Teachers administered the 15-20 minute exercises to students in homeroom or Language Arts. The exercises presented students with a list of things that may be important to them or others (e.g., family and friends, religion, music). Treatment students were asked to select

and write a short passage about two or three of their *most* important items and control students selected their two or three *least* valued items and wrote about why they are important to *others*.

Research Design/Data Collection and Analysis:
We hypothesized that the impact of the intervention would persist through twelfth grade, thus mitigating the decline in GPA over time and increasing the likelihood of on-time graduation for potentially threatened students. As such, for the GPA outcome, we used the following model, allowing us to assess the effect of the intervention on both the twelfth grade time-point and the longitudinal trajectory of GPA:

$$\begin{aligned} GPA_{it} = \beta_{00} + \beta_{01}Affirmed_i + \beta_{02}Threatened_i + \beta_{03}Affirmed_i \times Threatened_i \\ + \beta_{10}Year_t + \beta_{11}Affirmed_i \times Year_t + \beta_{12}Threatened_i \times Year_t \\ + \beta_{13}Affirmed_i \times Threatened_i \times Year_t + \beta\boldsymbol{X_i} + \eta_i + \varepsilon_{it} \end{aligned}$$

The outcome GPA_{it} represents the GPA of student i at time t (t=0, end term of twelfth grade). Each student GPA was averaged in a given term (four GPA terms in middle school, two in high school) using a four-point scale. $\beta\boldsymbol{X_i}$ includes student covariates and indicator variables for the eleven schools. The coefficients, β_{03} and β_{13}, respectively represent the effects of the intervention on twelfth grade GPA and on the trend in student GPA over time for potentially threatened students.

For the on-time graduation outcome, we first estimated the following logit model for each group, potentially threatened and non-threatened:

$$logit(Graduation_i) = \alpha + \beta_1 Affirmed_i + \beta\boldsymbol{X_i} + \varepsilon_i$$

where $logit(Graduation_i)$ is the predicted log odds of on-time graduation for student i, β_1 represents the change in the log odds of on-time graduation predicted by treatment, and the vector $\beta\boldsymbol{X}$ includes the student covariates and indicator variables for the eleven schools. We then estimated marginal effects at the two respective group means. Following Long and Mustillo (2018), we used the average discrete change (ADC) to assess the treatment effect averaged across the baseline covariates.

Findings/Results:
Results revealed an overall decline in GPA from seventh through twelfth grade, though potentially threatened students showed a greater decline (see Figure 2). As predicted, we found that the treatment impacts persisted through the end of twelfth grade GPA (see Table 3). Additionally, the intervention mitigated the decline in GPA for potentially threatened students.

Regarding on-time graduation outcomes, as shown in the first and second data columns of Table 4, the intervention effect for potentially threatened students was statistically significant, and the third and fourth columns show no statistically significant impact for non-threatened students. The result from the test of the equality of these probabilities indicated a statistically significant difference for the dichotomous on-time graduation indicator (β=0.08 (95%(CI)=[0.01, 0.16], z(2.09), *p*=.04). The resulting subgroup analysis suggests that treated potentially threatened

students realized on-time graduation rates 10 percentage points higher than those of their non-treated counterparts.

Conclusion:
These results indicate that a self-affirmation intervention replicated at-scale can produce long-term, district-wide impacts on the academic outcomes of potentially-threatened students. This is consistent with the theory underlying recursive processes (Cohen et al., 2009), whereby interventions enact affirming psychological processes buffering students against stereotype threat, and improving achievement over time as the identity threats are mitigated. Alternatively, the growing impacts of a brief, but well-timed, self-affirmation intervention may simply signal diverging positive and negative recursive trajectories experienced by, respectively, those benefitting from affirmation and those experiencing this difficult social and academic transition without intervention (Cohen et al., 2009; Harackiewicz & Priniski, 2018). Nevertheless, the evidence shows lasting benefits for threatened students.

Appendices

Appendix A. References

Borman, G. D., Grigg, J., Rozek, C., Hanselman, P., & Dewey, N.A. (2018). Self-affirmation effects are produced by school context, student engagement with the intervention, and time: Lessons from a district-wide implementation. *Psychological Science, 29*, 1773-1784.

Borman, G. D., Grigg, J., Hanselman, P. (2016). An effort to close achievement gaps at scale through self-affirmation. *Educational Evaluation and Policy Analysis, 38*(1), 21-42.

Cohen, G. L., Garcia, J., Apfel, N., & Master, A. L., (2006). A self-affirmation intervention to reduce the racial achievement gap. *Science, 313*, 1307–1310.

Cohen, G. L., Garcia, J., Purdie-Vaughns, V., Apfel, N., & Brzustoski, P. (2009). Recursive processes in self-affirmation: Intervening to close the minority achievement gap. *Science, 324*, 400–403.

Harackiewicz, J.M., & Priniski, S.J. (2018). Improving student outcomes in higher education: The science of targeted intervention. *Annual Review of Psychology, 69*, 409-435, doi:10.1146/annurev-psych-122216-011725

Long, J. S., & Mustillo, S. A. (2018). Using predictions and marginal effects to compare groups in regression models for binary outcomes. *Sociological Methods and Research*. Advance online publication. doi: 10.1177/0049/124118799374

Sherman, D. K., Hartson, K. A., Binning, K. R., Purdie-Vaughns, V., Garcia, J., Taborsky-Barba, S., Tomassetti, S…,& Cohen, G.L. (2013). Deflecting the trajectory and changing the narrative: How self-affirmation affects academic performance and motivation under identity threat. *Journal of Personality and Social Psychology 104*, 591- 618.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist, 52*(6), 613-629.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*, 797–811.

Steele, C. M., Liu, T. J. (1983). Dissonance processes as self-affirmation. *Journal of Personality and Social Psychology*, 45(1), 5-19.

Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're not magic. *Review of Educational Research, 81*, 267-301.

Appendix B: Tables and Figures

Table 1. Baseline Characteristics for GPA Outcome Sample.

All Students

Variable	Overall	Control	Treatment	*p*-value
Potentially Threatened	0.32	0.33	0.32	0.94
African-American	0.11	0.10	0.12	0.30
Latino	0.13	0.15	0.12	0.13
Asian	0.10	0.09	0.10	0.52
American Indian	0.01	0.01	0.01	0.99
White	0.56	0.58	0.55	0.46
Multiracial	0.09	0.07	0.10	0.19
Female	0.51	0.53	0.49	0.29
Limited English Proficiency	0.15	0.16	0.14	0.28
Free/Reduced Lunch Eligible	0.35	0.34	0.36	0.51
Special Education Services	0.11	0.10	0.12	0.25
Prior GPA	3.35	3.37	3.32	0.24
	(0.59)	(0.57)	(0.60)	
N	804	399	405	

Potentially Threatened Students

Variable	Overall	Control	Treatment	*p*-value
African-American	0.34	0.31	0.38	0.21
Latino	0.41	0.47	0.36	0.07
American Indian	0.02	0.02	0.02	0.99
Multiracial	0.22	0.20	0.24	0.47
Female	0.48	0.51	0.45	0.35
Limited English Proficiency	0.31	0.36	0.27	0.10
Free/Reduced Lunch Eligible	0.75	0.75	0.75	0.97
Special Education Services	0.16	0.15	0.18	0.52
Prior GPA	2.92	2.95	2.88	0.36
	(0.62)	(0.64)	(0.61)	
N	261	130	131	

Notes: Standard deviations in parentheses; Treatment-control differences for binary variables tested with two-sample proportion test and scale variables tested with two-sample *t*-test (H_0: T – C =0).

Table 2. Baseline Characteristics for On-Time Graduation Outcome Sample.

All Students

Variable	Overall	Control	Treatment	*p*-value
Potentially Threatened	0.36	0.36	0.35	0.36
African-American	0.12	0.11	0.13	0.12
Latino	0.14	0.16	0.12	0.14
Asian	0.09	0.09	0.09	0.09
American Indian	0.01	0.01	0.01	0.01
White	0.54	0.54	0.54	0.54
Multiracial	0.10	0.09	0.11	0.10
Female	0.50	0.52	0.48	0.50
Limited English Proficiency	0.15	0.17	0.13	0.15
Free/Reduced Lunch Eligible	0.38	0.39	0.38	0.38
Special Education Services	0.14	0.13	0.14	0.14
Prior GPA	3.26	3.27	3.25	3.26
	(0.64)	(0.65)	(0.63)	
N	952	473	479	

Potentially Threatened Students

Variable	Overall	Control	Treatment	*p*-value
African-American	0.34	0.31	0.37	0.24
Latino	0.39	0.43	0.35	0.10
American Indian	0.02	0.02	0.02	0.71
Multiracial	0.25	0.23	0.26	0.51
Female	0.48	0.50	0.46	0.42
Limited English Proficiency	0.30	0.35	0.25	0.05
Free/Reduced Lunch Eligible	0.76	0.78	0.74	0.30
Special Education Services	0.19	0.19	0.19	0.91
Prior GPA	2.84	2.83	2.84	0.80
	0.64	0.67	0.61	
N	341	171	170	

Notes: Standard deviations in parentheses; Treatment-control differences for binary variables tested with two-sample proportion test and scale variables tested with two-sample *t*-test (H_0: T – C =0).

Table 3: Estimates from Growth Models of GPA Grades 7-12.

	Main	Main: full covariates	Simple Effects: All	Simple: Threatened
Intercept (End of Grade 12)	3.394*	0.051	-0.020	-0.219
	(0.055)	(0.112)	(0.112)	(0.212)
Potentially Threatened Group	-0.962*	-0.428*	-0.194*	
	(0.067)	(0.049)	(0.035)	
*Self-Affirmation * Threatened*	0.134	0.174*		
	(0.092)	(0.062)		
Years (slope)	-0.039*	-0.039*	-0.058*	-0.098*
	(0.004)	(0.004)	(0.003)	(0.007)
*Years * Threatened*	-0.059*	-0.059*		
	(0.007)	(0.007)		
*Years * Treatment*	-0.008	-0.008	0.001	0.020*
	(0.005)	(0.005)	(0.004)	(0.010)
*Years * Self-Affirmation * Threatened*	0.028*	0.028*		
	(0.009)	(0.009)		
Self-Affirmation	-0.063	-0.031	0.026	0.141*
	(0.052)	(0.035)	(0.029)	(0.064)
Grade 6 GPA		0.898*	0.896*	0.856*
		(0.029)	(0.029)	(0.050)
Female		0.112*	0.112*	0.177*
		(0.025)	(0.025)	(0.055)
Limited English Proficiency		0.100*	0.096*	0.105+
		(0.040)	(0.040)	(0.063)
Special Education		0.104*	0.104*	-0.018
		(0.043)	(0.043)	(0.078)
Free/reduced Lunch		-0.118*	-0.118*	-0.260*
		(0.037)	(0.037)	(0.072)
Var(Student)	0.315*	0.112*	0.112*	0.169*
	(0.016)	(0.006)	(0.006)	(0.017)
Var(Within)	0.199*	0.199*	0.201*	0.321*
	(0.003)	(0.003)	(0.003)	(0.007)
Observations	12798	12798	12798	4147
Students	804	804	804	261

Notes: Students N=804; all models include school fixed effects (not shown); standard errors in parentheses; + $p < 0.10$, * $p < 0.05$

Table 4. Estimates of Twelfth Grade On-Time Graduation Outcomes.

Simple Effects	Threatened		Non-Threatened	
	No covariates	Full covariates	No covariates	Full covariates
Intercept	1.14*	-1.80	2.80*	-0.13
	(0.18)	(1.20)	(0.25)	(1.63)
Self-Affirmation	0.69*	0.71*	0.22	0.48
	(0.28)	(0.31)	(0.36)	(0.44)
Grade 6 GPA		1.05*		1.00*
		(0.29)		(0.44)
Female		0.39		0.37
		(0.31)		(0.43)
Limited English Proficiency		0.19		0.02
		(0.34)		(0.70)
Special Education		-1.06*		-1.90*
		(0.35)		(0.50)
Free/reduced Lunch		-0.72		-0.34
		(0.48)		(0.48)
Student *N*	341	341	611	611

Notes: The models with full covariates include school fixed effects (not shown); standard errors in parentheses; All coefficients are log-odds; * $p < 0.05$

Figure 1: Timing of Interventions during the Seventh Grade Year

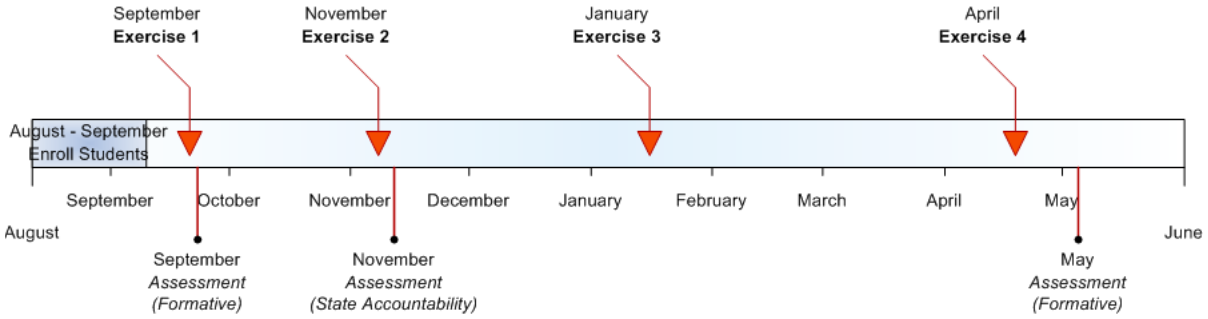
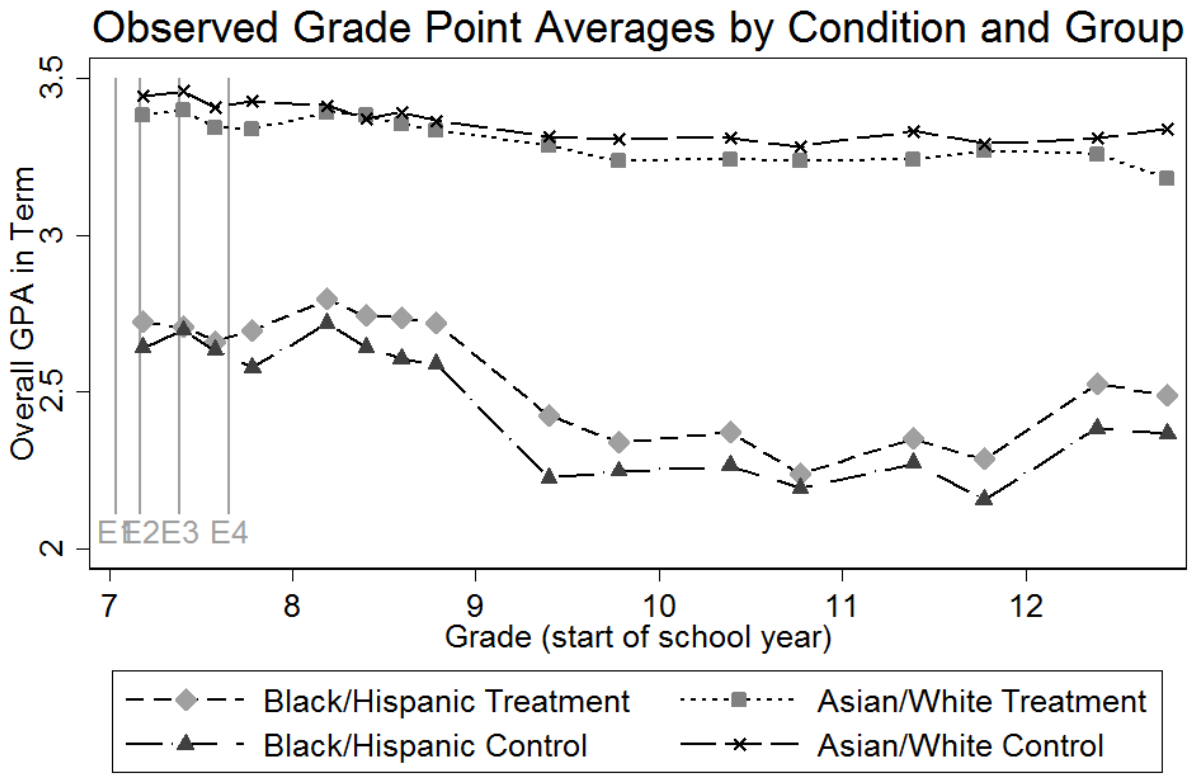


Figure 2: GPA Trends in 7-12 Grades by Treatment Condition and Students Group



Points represent end of marking period.
E1-E4 represent median implementation time of each of the four exercises.