Awareness is Not Enough: A Double-blind Randomized Controlled Trial of the Effects of Providing Discipline Disproportionality Data Reports to School Administrators

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Abstract

One commonly-used strategy used in attempts to decrease racial disproportionality in school discipline across the country is sharing data with school administrators that discipline disparities are a problem in their schools, with the assumption that it will increase attention to equity and improve outcomes. The purpose of this study was to assess the effects of providing monthly disciplinary equity reports to school administrators in 35 schools on levels of (a) disciplinary equity report viewing, (b) disciplinary equity, and (c) inclusion of disciplinary equity into school improvement plan goals. We used a small, double-blind randomized controlled trial, in which half of the schools were randomly assigned to receive either monthly disciplinary equity reports or monthly general discipline reports. Results showed that schools receiving the equity reports had significantly increased rates of viewing equity reports, but no meaningful change in disciplinary equity or equity goal setting.

Keywords: Racial Equity, Performance Feedback, Data, School Discipline

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The disproportionate use of office discipline referrals (ODRs) for Black students is a longstanding concern in education (U.S. Government Accountability Office, 2018). Although there is evidence for effectiveness of some systems-level interventions, such as positive behavioral interventions and supports (McIntosh, Gion, & Bastable, 2018), implementing these interventions with fidelity requires administrator commitment and substantial resources; thus, district-wide implementation can be challenging. Accordingly, there is a tendency to seek efficient interventions that can be implemented quickly.

To motivate school administrators to take action, districts or state teams in multiple states have adopted the intervention of sending school administrators regular (e.g., monthly) reports showing the extent to which their schools have racial disparities in exclusionary discipline (Santiago-Rosario, 2019). Although minimal in terms of effort, sending equity reports has intuitive appeal as a way to draw attention to and signal the importance of addressing the problem (Kluger & DeNisi, 1996). Further, there is evidence that school teams that use data more often for decision making also have lower racial discipline disproportionality (Tobin & Vincent, 2011). Even so, at the school level, simply making equity reports available to school administrators on demand does not necessarily increase their viewing of discipline data (McIntosh, Eliason, Horner, & May, 2014). Moreover, sharing reports showing racial inequities could backfire, increasing resistance to equity efforts (Hetey & Eberhardt, 2018; Kluger & DeNisi, 1996).

Purpose of the Study

The study's purpose was to provide a rigorous experimental test of providing disciplinary equity data reports to school administrators. We assessed the effects of providing monthly disciplinary equity reports, compared to a control of monthly discipline summary reports, to school administrators on (a) viewing disciplinary equity reports, (b) equity in school discipline, and (c) identifying disciplinary equity as a school improvement goal.

Method

Settings and Participants

A total of 35 public K-12 schools and their school administrators within three school districts in the U.S. Pacific Northwest participated in the study. The 26 elementary, 5 middle, and 4 high schools used the *School Wide Information System* (SWIS; May et al., 2018) to record and review discipline data. The average Black-White ODR risk ratio was 2.2 (ranging from 0 to 6.3), meaning that on average, Black students were more than twice as likely to receive one or more ODRs than White students.

Measures

Viewing of school discipline reports. Through SWIS, we extracted counts of discipline data reports (i.e., sets of graphs and tables) generated by school users per month. We standardized the data by using the metric of reports generated per 20 school days, roughly a month of school.

Equity in school discipline. We assessed equity in school discipline using the Black-White ODR rate difference, calculated by subtracting the ODRs per White student per day per month from the ODRs per Black student per day per month. This metric of disciplinary equity accounted for enrollment of each student group and varying school days in each month. A rate difference of zero indicates perfect equity in school discipline, and positive values indicate

higher ODR rates for Black students. The rate difference was selected because, unlike risk ratios, it has a symmetrical distribution based on a standard scale (change in rates) and thus is more appropriate for computation of difference scores without transformation and can be calculated when one group receives zero ODRs (Girvan, McIntosh, & Smolkowski, 2019).

School improvement plan goal setting. We obtained publicly available, annual school improvement plans for each of the participating schools from 2016-17 and 2017-18, which described their formal academic and behavior goals. We coded the plans for whether they included disciplinary equity as a goal (intercoder agreement = 88%).

Intervention

The intervention was a monthly email to school administrators containing one of the continuously-available SWIS school discipline data reports (see http://www.pbisapps.org): either the (a) School Summary Report (control condition), which includes figures and tables showing general patterns of ODRs; or (b) School Ethnicity Report (intervention condition), which includes figures and tables showing the extent of racial discipline disproportionality. No other communication or support was provided.

Procedure

Once recruited, schools were matched into pairs within districts based on their disciplinary equity (specifically the Black-White ODR risk ratio) and randomly assigned to condition in January of Year 2. School administrators were emailed the reports on the first day of each month for the remaining five months of the school year (one school was lost from the sample due to not receiving its report in time). Figure 1 shows the participant flow diagram. The school and district administrators, lead author (principal investigator), second author (methodologist), and fifth and sixth authors were all blinded to condition until all analytic

decisions were completed. Only the third and fourth authors, who generated and sent the reports, were aware of condition during the study, and they did not participate in analytic decisions.

Data Analysis

Report viewing and disciplinary equity. Analyses assessed the effects of receiving the emailed equity reports on (a) rates of viewing disciplinary equity reports and (b) actual discipline disparities. For both DVs, we subtracted Year 1 data for each month from Year 2 data for the same month to produce year-on-year monthly change over time. Thus, the analyses directly addressed the hypothesis that the schools that received equity reports compared to general reports would experience an immediate increase in their viewing of reports and disciplinary equity above levels from the same time in the previous year. The supplemental appendix provides a detailed description of data analysis.

School improvement plan goal setting. We evaluated each school's school improvement plan for 2016-17 and 2017-18 to assess the extent to which the intervention condition group had an increased proportion of schools including goals to increase racial equity in school discipline. We conducted a chi-square test of proportions across groups to assess statistical significance.

Results

Report Viewing and Disciplinary Equity

Figure 2 presents the year-on-year mean differences for equity report viewing and disciplinary equity by condition, with 95% confidence intervals, pre and post intervention. Results showed a statistically significant increase in equity report views (p = .023, Hedges' g = 0.65) upon intervention for the intervention schools but no decrease in Black-White ODR differences, while control schools saw a decrease (p = .155, Hedges' g = 0.09). The supplemental

appendix provides detailed results.

School Improvement Plan Goal Setting

Prior to intervention, no schools in either condition included school improvement plan goals referring to increasing racial equity in school discipline. After intervention, no control schools and one intervention school reported a school improvement plan goal of increasing disciplinary equity. A χ^2 analysis of post-test proportions showed that the one-school increase in equity goal setting was not statistically significant ($\chi^2 = 1.09$, $p > .05$).

Discussion

Given the need to address disciplinary equity, district and state teams are increasingly engaging in the practice of sending school administrators reports of their disciplinary equity. Our study examined the effects of directly sending monthly disciplinary equity reports to school principals on (a) accessing data, (b) disciplinary equity, and (c) equity goal setting. The double-blind randomized controlled trial design with an attention control provided an opportunity to assess the effects of this common intervention with less susceptibility to reactivity or social desirability bias.

Regarding data report viewing, although they had already been available to school administrators, sending equity reports directly to them significantly increased how much they accessed and viewed the reports. Although the increase in equity report viewing was encouraging, the provision of reports did not lead to any meaningful changes in disciplinary equity or school improvement plan goal setting. As such, we view this intervention as ineffective in improving equity on its own. This study adds to previous research in performance feedback and equity data that simply sharing data showing inequities could have iatrogenic effects, especially if recipients perceive that they do not have sufficient control of the context to achieve

equitable disciplinary outcomes (Bastable & McIntosh, 2020; Hetey & Eberhardt, 2018; Kluger & DeNisi, 1996).

Limitations

Although tightly controlled and rigorous, this study has limitations worth considering. First, due to software limitations, we could not assess which users were accessing reports. As a result, it is unclear whether the increase in viewing came from school administrators or other school or district personnel. Second, the study was small and may have been under-powered to detect changes in ODRs.

Implications

Our findings indicate that sending equity reports directly to school administrators increases attention to data, although such effects do not appear to change equity in school discipline or goal setting. This study suggests that when provided evidence of disproportionality, school administrators are unlikely to take important actions, like setting equity goals in their school improvement plans. Yet it is noteworthy that providing reports increased views, which has been an elusive outcome (McIntosh et al., 2014). More research is needed to determine how this common intervention might be supplemented to increase goal setting or disciplinary equity.

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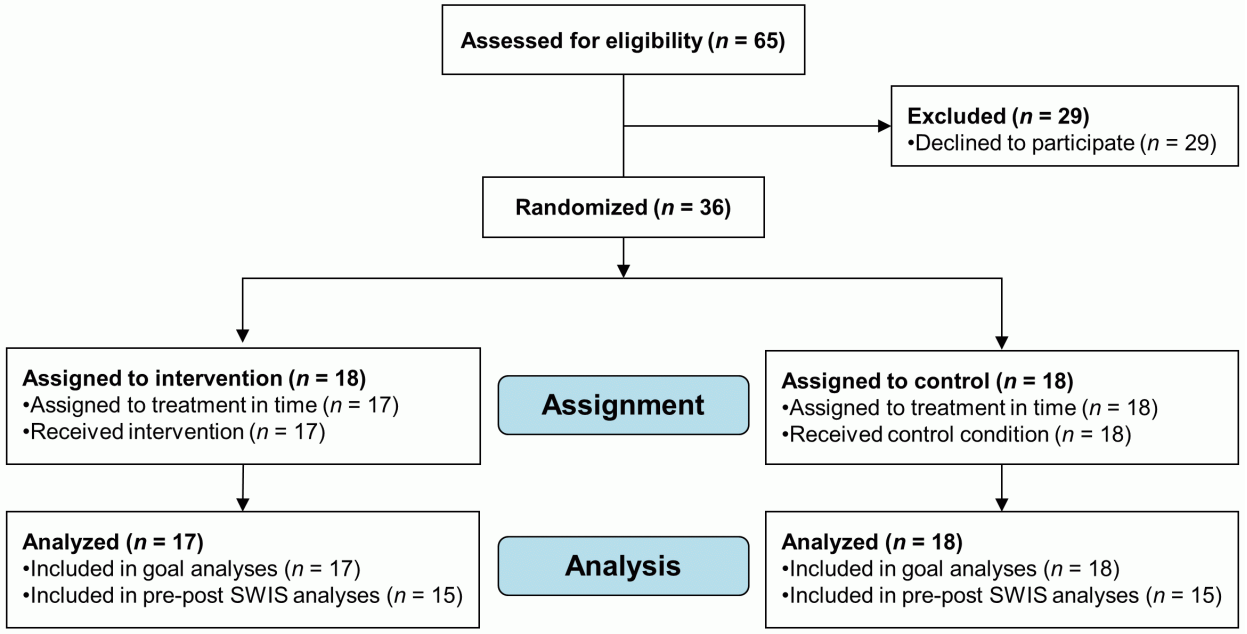
Figure 1

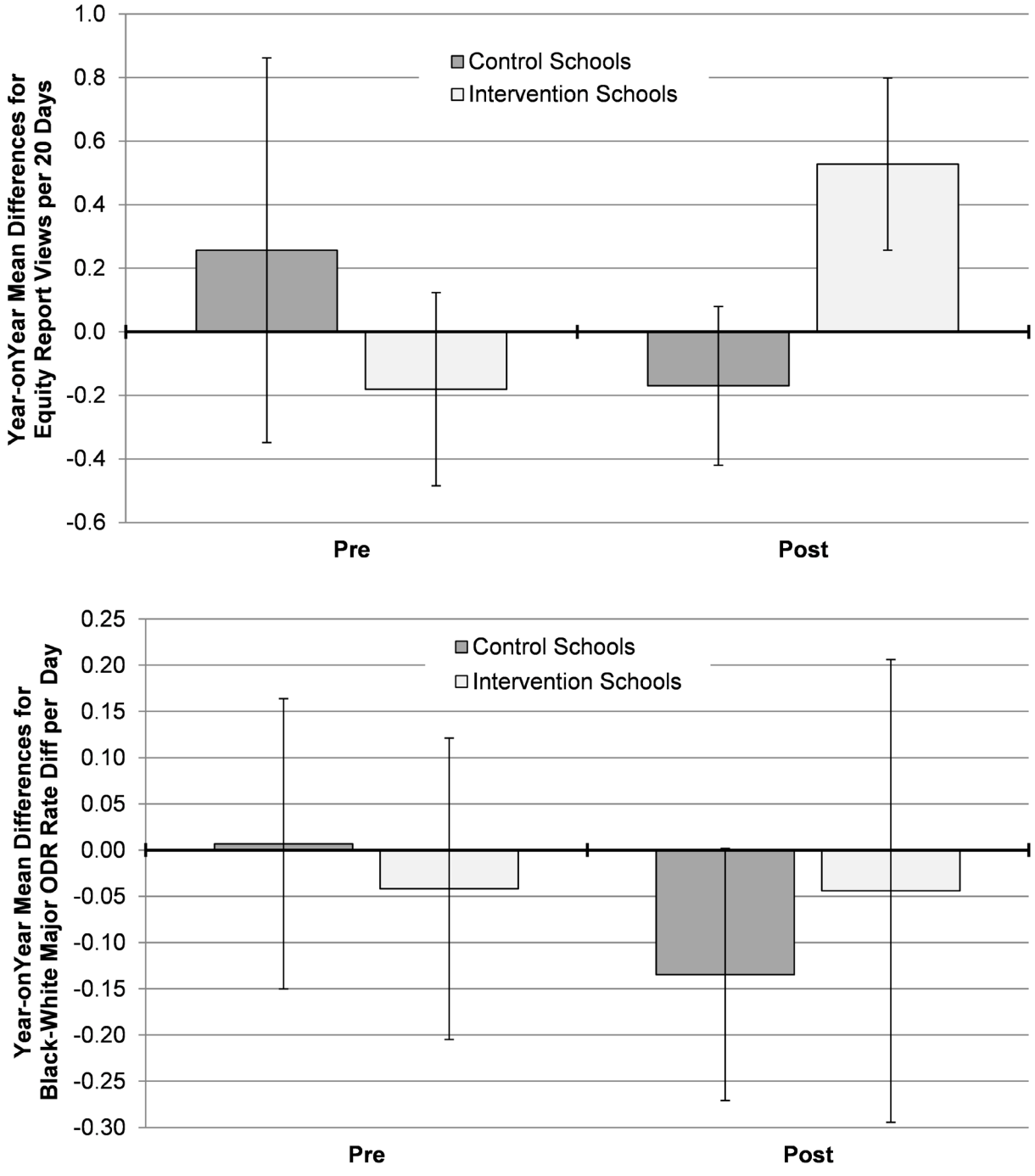
Study Participant Flow Diagram



Note. The figure depicts the number of schools considered for the study and their participation in the two conditions at the assignment and analysis phases.

Figure 2

Mean Year-On-Year Differences in Equity Report Views per 20 School Days (top) and Black-White ODR Rate Differences per Day (bottom)



Note. Each graph presents the average year-on-year differences over the five months before intervention (Pre) and the five months after intervention (Post) separately for each condition. The error bars represent 95% confidence bounds.

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Supplemental Appendix

In this double-blind randomized controlled trial, we randomly assigned schools to one of two conditions and compared conditions on the number of discipline reports viewed and equity metrics for two years. The intervention began in January of the second year. We examined schools' year-on-year differences for each measure to control for month-to-month fluctuations in data. This supplemental appendix provides additional details about the statistical analysis and results that were not presented in the brief report.

Data Analysis: Report Viewing and Disciplinary Equity

The analyses were intended to address the hypothesis that schools that received equity reports halfway through the second year would increase their views of the equity reports and other SWIS reports. The reports delivered to the school as part of the study, such as the equity reports provided to intervention schools, were not included in the data. Due to differences in school days, SWIS data varies substantially from month to month. We accounted for month-to-month variability in two ways. First, we analyzed report data per 20 school days, roughly a month of school, and analyzed average ODR data per day for each month to normalize the data for varying school days in each month. Second, we subtracted the Year 1 data from the Year 2 data to produce *year-on-year monthly change over time*. Specifically, for each dependent variable (DV), we subtracted the September data collected in Year 1 from the September data collected in Year 2 and repeated this process for each month during the school year. This procedure produced more stable data that can be interpreted as changes from Year 1 to Year 2 for each month. The

analysis of these data addressed the hypothesis that midway through the school year, for example, the schools that received equity reports increased views of these reports during the latter half of the year over those viewed in the previous year.

For any test of condition effects, the correct interpretation of model parameters and associated *p* values depends on the validity of the underlying model (Wasserstein & Lazar, 2016). "The *P*-value simply indicates the degree to which the data conform to the pattern predicted by the test hypothesis and all the other assumptions used in the test (the underlying statistical model)" (Greenland et al., 2016, p. 4). Because delivery of reports may have (a) changed the level of the DVs or (b) increased the DVs over time in a linear fashion across the second half of the school year, the analysis fit the data for each DV to two different models: Model A, a constant change model, and Model B, a linear change model. Both models allowed for linear growth over time for control schools and constrained the two conditions equal until the beginning of the intervention period. Figure A1 shows the two competing models.

We then selected the most likely model given the pair and the underlying data in order to use the most valid model, as per Greenland et al. (2016), before interpreting condition effects. To select the most valid and generalizable model for each DV, we compared the models using a small-sample bias correction variant of the Akaike Information Criterion (AIC; Burnham & Anderson, 2002), an index called the AICc. Because the AICc is a relative measure of fit, we calculated the Δ AICc, the difference between the AICc value from each model and the minimum AICc value among the pair of models (Burnham & Anderson, 2002). The model with the smallest AICc value has a Δ AICc of zero and the greatest support from the data. Plausible alternative models tend to have Δ AICc values less than about 2 to 4, and values of 6 to 10 or more indicate limited support over the best-fitting model (Burnham & Anderson, 2002).

We also reported Akaike weights, which express the relative likelihood of a model given the data and the set of models under consideration (Burnham & Anderson, 2002). The weights, also called model probabilities, describe the strength of evidence for a model. Specifically, they quantify the strength of evidence for each hypothesis, represented by a statistical model, given the data and all other hypotheses (models) tested (Anderson, 2008; Burnham, Anderson, & Huyvaert, 2011). The weights, denoted *w* for each model, sum to 1 across the two models for each DV. The weight, *w*, can be interpreted as the probability that the same model would be selected with a "replicate data set from the same system" (Burnham et al., 2011, p. 30) and, in the general case with several models, "allow statements such as 'the probability of H4 is 0.78, while the probability of H2 is 0.015'" (Burnham et al., 2011, p. 26). If both models have similar weights, one can inspect parameters from both models (i.e., *multimodel inference*; Burnham & Anderson, 2002). Once we selected a model, we interpreted condition effects.

Condition effects were similarly examined with model probabilities. To examine condition differences, we compared models for two hypotheses, one that hypothesized an intervention effect (H_A) and one that did not (H_0) and reported the Akaike weight, *w*, for the model with the condition effect (H_A). For example, if $w = .75$, it suggests the probability of H_A is .75 while the probability of H_0 is .25. Incidentally, $w = .75$ is often roughly equivalent to $p = .05$, which better communicates the tenuous nature of "just-significant" results ($p \approx .05$) because the model for H_A is only three times as likely as the model for H_0 given the two models and data.

We fit the data to our models with SAS PROC MIXED (SAS Institute, 2016) using the full information maximum likelihood estimation (FIML). Restricted (residual) maximum likelihood (REML), generally recommended for multilevel models (Snijders & Bosker, 2012), does not include fixed effects in the log-likelihood function, which makes it inappropriate for

comparisons between models that differ on fixed effects. In analyses with missing data, maximum likelihood estimation (a) minimizes the likelihood of biased parameter estimates, (b) uses all available information to produce efficient estimates with minimum sampling variability, and (c) produces accurate estimates of precision, such as standard errors and *p* values (Allison, 2009; Graham, 2009). All tests of condition relied on 28 degrees of freedom.

Results

Table A1 reports mean ODR rates for Black and White students by treatment condition and month. Table A2 reports means and standard deviations for the year-on-year differences for each dependent variable by month of the school year and intervention condition. Figure A2 presents the year-on-year mean differences for each dependent variable graphically by month and condition with 95% confidence intervals. For this analysis, we included the 15 schools in each condition that contributed data for both years.

The statistical models constrained the trajectories over time to be identical across conditions for the first five months and then allowed the intervention condition to differ in the last five months. We characterized potential differences in two possible ways: a constant change or linear change, both beginning in Month 6 (see Figure A1). The top two rows of Table A3 summarize the ability of the two models to approximate the data at hand for each DV with the Δ AICc and Akaike weights, *w*. For equity report views, the constant-change model ($w = .70$) was just more than twice as likely as the linear change model. For Black-White ODR rate differences, the linear model ($w = .71$) was the more likely of the two models given the data. Hence, we interpreted the constant model equity report views and the linear model for the Black-White ODR rate difference but with some caution as the model selection statistics were somewhat equivocal. The most likely models indicate an increase in equity report views with the constant-change

model, Hedges's g = 0.65, 95% CI [0.10, 1.20], t_{28} = 2.41, p = .023, w = .86, after the introduction of intervention halfway through the second school year. Here w represents the difference between a model with the condition difference and a model without and implies a 6:1 ratio of support for the model with condition differences. The Condition at Intercept parameter estimates the difference between conditions within the first five months of the school year and favors the control condition (g = −0.17). We found no evidence of condition differences on Black-White ODR rate differences with the more-likely linear-change model, g = 0.09 [-0.04, 0.21], t_{28} = 1.46, p = .155, w = .51. The Condition at Intercept parameter suggests the difference between conditions favors the control condition (g = −0.16).

The effect sizes require some explanation. For the constant-change models, the effect sizes in Table A3 straightforwardly describe the size of the constant change. In the linear-change models, in contrast, the effect size describes the size of the per-unit-time change. The Hedges's g for equity report views was 0.65 for the more-likely constant-change model, but 0.16 per time point in the linear-change model, which appears to be inconsistent. The effect size for the linear-change model, however, was 0.16 in Month 6, 0.31 in Month 7, and so on up to 0.78 in Month 10. The average of the monthly effect sizes was 0.47, which is closer to the g of 0.65 described by the constant model. The intervention, therefore, appeared to increase equity report views but not affect Black-White ODR rate differences in the participating schools.

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Table A1

Raw Mean Rates of Black and White ODR Rates by Month and Treatment Condition

	ODR Rates for Black Students				ODR Rates for White Students				
Month in	Control		Intervention		Control		Intervention		
School Year	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Days
1	3.23	4.50	5.19	5.30	3.81	5.24	3.50	3.94	19.3
2	5.54	11.21	11.19	9.41	5.76	5.48	7.04	7.90	20.5
3	8.72	9.29	7.96	14.22	4.98	6.34	5.26	8.36	17.2
4	10.60	7.50	6.92	4.75	4.49	3.47	4.63	4.86	12.8
5	9.55	9.66	10.72	17.16	5.53	7.31	5.28	11.85	19.0
6	8.50	9.56	11.53	14.48	5.87	7.15	5.80	10.65	17.5
7	16.66	12.56	18.15	19.98	8.43	8.67	6.85	14.27	22.0
8	12.34	9.37	15.57	16.78	6.13	6.11	4.64	9.03	15.5
9	15.29	11.45	20.74	29.76	8.34	10.19	6.71	10.60	21.3
10	4.98	7.42	9.73	14.31	2.27	4.76	3.20	6.13	13.5

Note. The table reports the mean ODR rates per 100 students per month across schools. Intervention began in Month 6 of Year 2 (shaded). The Days column reports the average number of school days per month across districts and years, which was similar, within 1 or 2 days, across districts and years for most months and never varied by more than 5 days (Month 1; mean difference of 2.8 days across months). Using the number of days specific to each district and year, the Year-on-year differences in Black-White ODR rate differences per day, used as the dependent

variable in the analysis, equals $[(Rate_{Black.Y2} - Rate_{White.Y2}) - (Rate_{Black.Y1} - Rate_{White.Y1})] / Days$.

Table A2

Year-on-Year Differences in Equity Report Views and Black-White ODR Rate Differences by Month and Treatment Condition

Month in School Year	Year-on-Year Differences in Equity Report Views per 20 School Days				Year-on-Year Differences in Black-White ODR Rate Differences per Day			
	Control		Intervention		Control		Intervention	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	Before Intervention (Pre)							
1	-0.35	1.68	-0.60	1.78	0.00	0.28	-0.04	0.60
2	0.60	2.61	-0.56	1.88	0.30	0.42	-0.12	0.76
3	1.08	4.04	-0.06	0.82	-0.07	0.77	0.16	0.72
4	0.46	1.34	0.33	0.93	-0.09	1.06	-0.18	0.76
5	-0.51	2.86	-0.01	0.79	-0.10	0.68	-0.03	0.80
	After Intervention (Post)							
6	-0.27	1.72	-0.01	0.61	-0.01	0.53	-0.08	0.91
7	-0.48	1.02	0.43	1.39	-0.18	0.51	-0.24	0.99
8	-0.08	0.75	1.72	1.12	-0.17	0.81	-0.17	1.51
9	0.18	0.80	0.30	1.33	-0.28	0.55	0.22	1.22
10	-0.20	1.00	0.19	0.52	-0.04	0.61	0.04	0.86

Note. The table reports the mean number of equity report views per 20 school days and the Black-White ODR rate differences per day after subtracting each month in Year 1 from the same month in Year 2. See the note to Table A1 for the calculation of Black-White ODR rate differences per day.

Table A3

Results of Analyses to Select the Best Approximating Longitudinal Growth Model for Each Dependent Variable and Test Condition Differences in the Second Half of the School Year

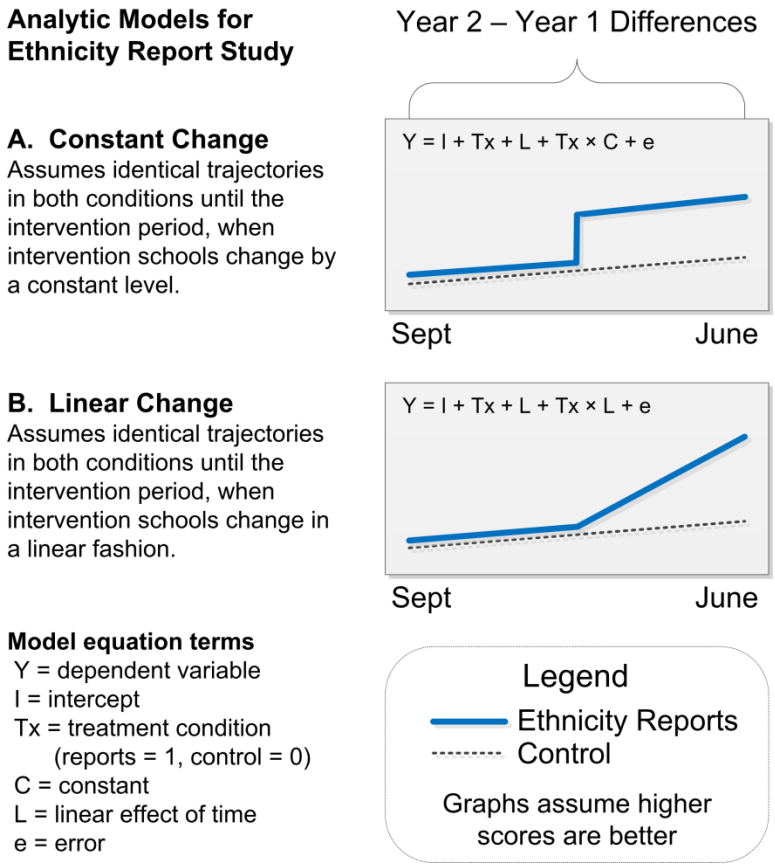
		Equity Report Views per 20 School Days		Black-White ODR Rate Differences per Day	
		Constant	Linear	Constant	Linear
Model Selection	Δ AICc	0.0	1.7	1.8	0.0
	w	.70	.30	.29	.71
Fixed Effects	Intercept	0.19 (.28)	0.16 (.29)	0.03 (.14)	0.10 (.14)
	Condition at Intercept	-0.29 (.28)	-0.17 (.27)	-0.02 (.15)	-0.08 (.15)
	Time	-0.03 (.04)	-0.02 (.04)	-0.02 (.02)	-0.03 (.02)
	Condition by Time	0.84 (.35)	0.20 (.10)	0.09 (.16)	0.07 (.04)
Variances	School	0.08 (.10)	0.08 (.10)	0.08 (.03)	0.08 (.03)
	Residual	2.80 (.24)	2.82 (.24)	0.56 (.05)	0.56 (.05)
Hedges's $g^{\dagger}$ and 95% CI	Condition by Time	0.65 [0.10, 1.20]	0.16 [0.00, 0.32]	0.12 [-0.31, 0.55]	0.09 [-0.04, 0.21]
p value	Condition by Time	.0225	.0535	.5797	.1547

Note. The Δ AICc is the difference between the small-sample corrected Akaike Information Criterion (AICc) for each model and the AICc for the best model among each pair of models for the same dependent variable. Akaike weights (model probabilities), *w*, express the relative probability that the data support the model under consideration given the data and the pair of models; for each DV, *w* values sum to 1.0 across each pair. Fixed effects and variances shown with standard errors in parentheses. Tests of condition, which produced *p* values, used 28 degrees of freedom.

† Hedges's *g* for constant models represent the overall intervention effect size whereas the *g* for linear models represent the effect per unit change (i.e., change per month).

Figure A1

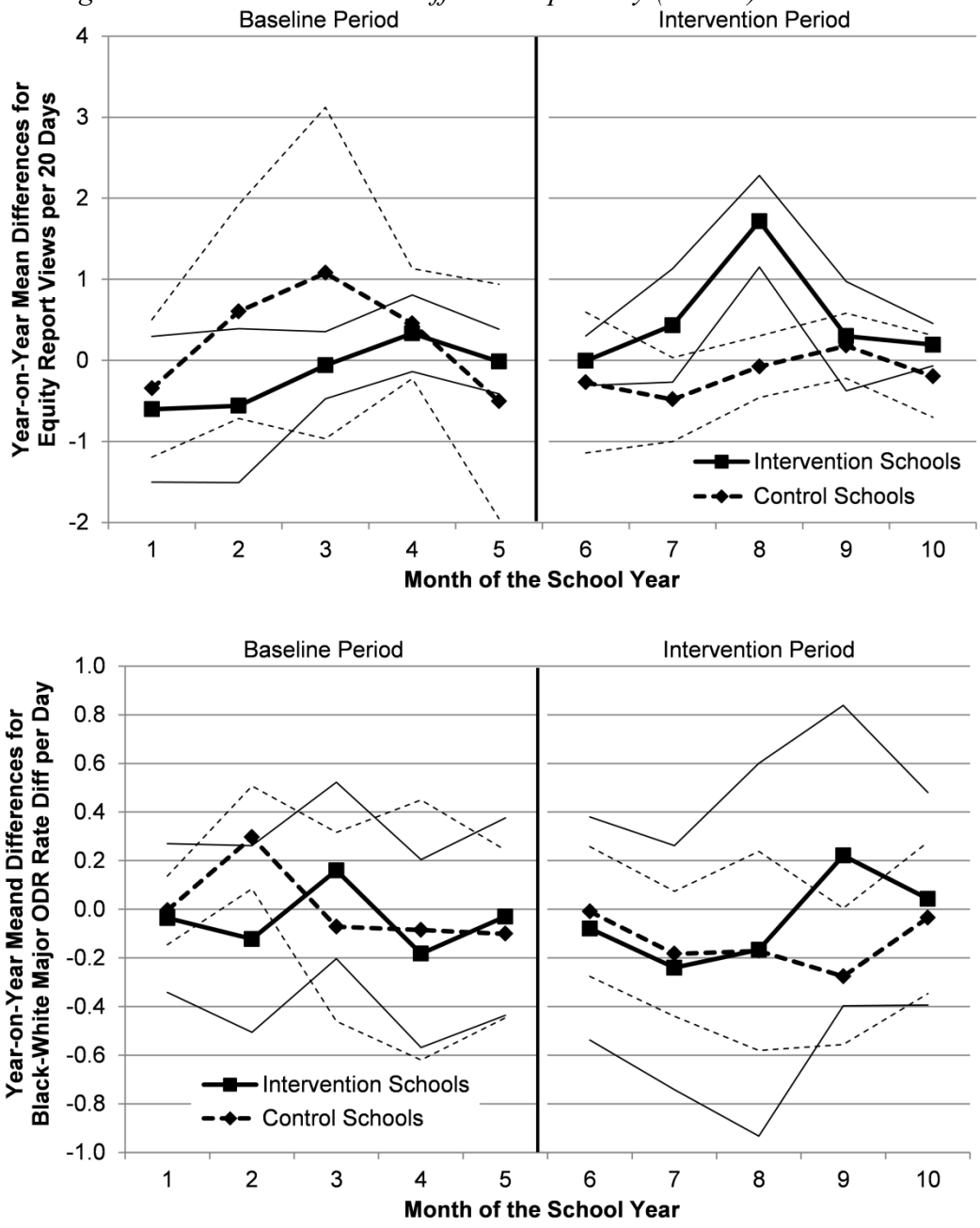
Potential Models of Change



Note. The two potential models of change for each dependent variable demonstrate the expected pattern of data before and after the delivery of school summary (control) or ethnicity (intervention) reports. Model A describes a constant change in the level of the dependent variables immediately after the introduction of the reports. Model B describes a linear change that increases regularly over time during the second half of the school year after the delivery of reports.

Figure A2

Monthly Year-On-Year Differences in Equity Report Views per 20 School Days (top) and Monthly Average Black-White ODR Rate Differences per Day (bottom)



Note. The top figure depicts the mean number of equity report views per 20 school days by month. The bottom figure shows the Black-White ODR rate differences per day averaged over each month. Each graph reports year-on-year differences to control for month-to-month fluctuations in data (e.g., Month 1 values from Year 2 minus Month 1 values from Year1, etc.). The dark lines show mean levels and the lighter, outer lines represent 95% confidence bounds. The vertical line in the center indicates the beginning of the intervention period, where control schools received school summary reports and intervention schools received equity reports.