

Secondary Analysis Plan for Principal Leadership

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1 Evaluating the Effects of Potential Moderators

1.1 Moderators of Val-Ed

We will focus on the 8 covariates identified in previous correspondence:

1. time0pyrsch: AT PTIMEMONTHS=0:PrinBkgd:Total yrs as Prin at this school
2. time0pyrdist: AT PTIMEMONTHS=0:PrinBkgd:Total yrs as Prin in this district
3. m_tdbkgd1b: AT PTIMEMONTHS=0:SCH Avg TchBkgd:Total years teaching this school(1=1to5...4=16+)
4. m_tbkdg3b: AT PTIMEMONTHS=0:SCH Avg TchBkgd:Total years teaching with this principal(1=1to5...4=16+)
5. econdis08: 07-08: Percent Free-Reduced Lunch
6. ctrlrpr08: 07-08: Percent Proficient/Advanced Reading/Language
7. crtmtpr08: 07-08: Percent Proficient/Advanced Mathematics
8. m_tacadempress_80m: SCHOOL AVERAGE TEACHER VU ACADEMIC PRESS SCALE: 80% criterion

The first 7 covariates are considered moderators, i.e. we anticipate that the effect of the intervention may depend on the level of the covariates, but we don't anticipate the intervention to have a direct effect on these covariates in year 1. The last covariate, Academic Press, is potentially considered a mediator in that the intervention may have an impact on Academic Press which in turn affects the outcomes of interest (Val-Ed and teacher-principal trust).

Research suggests that "ctrlrpr08: Spring 08: Percent Proficient/Advanced Reading/Language" is highly correlated with "crtmtpr08: Spring 08: Percent Proficient/Advanced Mathematics." Because these variables typically contain redundant information, we will only include one. Arbitrarily, we have selected "ctrlrpr08: Spring 08: Percent Proficient/Advanced Reading/Language" as the covariate of interest.

In order to test moderation (i.e. interactions) for the 6 moderators, one can only include one predictor in a given model, because one predictor will introduce 4 additional parameters via the interactions. If there are 6 predictors of interest, this implies re-fitting the model 6 times with a different covariate. This approach is exploratory and will have an inflated Type I error, and care should be taken in interpretation if only 1 or 2

of the interactions are significant. In particular, any manuscripts submitted for publication should discuss all tests considered here, not just the significant variables. We will fit the mixed model

$$y_{ij} = \beta_0 + \beta_1 \text{Time} + \beta_2 \text{Intervention} + \beta_3 \text{Time} * \text{Intervention} + \beta_4 \text{Covariate} + \beta_5 \text{Time} * \text{Covariate} + \beta_6 \text{Covariate} * \text{Intervention} + \beta_7 \text{Time} * \text{Intervention} * \text{Covariate} + b_{0i} + b_{1i} \text{Time} + \epsilon_{ij} \quad (1)$$

in which y_{ij} is the mean teacher 36-item Val-Ed for principal i at wave j , Covariate is the predictor for principal i at time j , Intervention is the group randomization, and Time is the time since first data collection corresponding to wave j for principal i . The random intercept b_{0i} allows a different model intercept for each principal, and the random slope b_{1i} allows a different slope over time for each principal. The random intercept and slope are modeled with an unstructured covariance matrix, e.g. $\mathbf{b}_i = (b_{0i}, b_{1i})' \sim N(\mathbf{0}, \boldsymbol{\psi})$, where $\boldsymbol{\psi}$ is a 2*2 matrix that includes a variance parameter for each of the random effects (Ψ_{11} and Ψ_{22} , respectively), as well as a covariance parameter Ψ_{12} . An additional assumption is that $\epsilon_{ij} \sim N(0, \sigma^2)$, in which σ^2 denotes the within-school variance. Restricted maximum likelihood methods will be used to estimate all parameters.

1.2 Moderators of teacher-principal trust

The analysis will be repeated for teacher-principal trust, i.e.

$$y_{ij} = \beta_0 + \beta_1 \text{Time} + \beta_2 \text{Intervention} + \beta_3 \text{Time} * \text{Intervention} + \beta_4 \text{Covariate} + \beta_5 \text{Time} * \text{Covariate} + \beta_6 \text{Covariate} * \text{Intervention} + \beta_7 \text{Time} * \text{Intervention} * \text{Covariate} + b_{0i} + b_{1i} \text{Time} + \epsilon_{ij} \quad (2)$$

where y_{ij} is the teacher-principal trust.

2 Gap in principal and teacher evaluation

It may be that the effect of the intervention on the teacher's Val-Ed rating depends on the difference between the principal's Val-Ed rating and the teacher's Val-Ed rating. To address this, we will create a variable called "last wave gap Val-Ed" to indicate the magnitude of the Val-Ed gap, calculated as teacher value minus principal value from previous wave. We will use the gap presented to the principals or the gap which would have been presented if in the control group (not the analysis gap variable that uses the 80% missing data criterion).

In order to allow for this, we will use a linear regression model with a restricted cubic spline for gap (i.e. not the linear mixed model). We will use a GEE-like "sandwich" estimator to correct the standard errors in accounting for the repeated measures.

The "gap analysis" will be repeated for the teacher-principal trust outcome (m.ttp.trust.80m) with the following predictors: Time, Intervention, Time*Intervention, lastwvgapRCS, lastwvRCS*Intervention, and lastwvTrust, where lastwvTrust is the last wave teacher-principal trust. A graph will be provided showing the model-based relationship between gap and teacher-principal trust.

3 Does the variance of the teacher Val-Ed change over time?

How does the variance for teachers within a school vary over time? (compare feedback vs. no feedback). In other words, each school has a variance taken over all the teachers. It is hypothesized that the variance will decrease over time as teachers will become more in agreement.

We will calculate a standard deviation for principal effectiveness within a principal's school for each wave. If normally distributed, we will fit a linear mixed model with the standard deviation as the outcome and time, intervention, and intervention*time as predictors. The intervention*time interaction will be the parameter of interest. A graph of the predicted standard deviations by group will be provided. In addition, for descriptive purposes, an intraclass correlation (ICC) will be computed for each group for each wave. We will informally review how the ICCs change across time.