Title: School-Based Mentoring Programs: Using Volunteers to Improve the Academic Outcomes of Underserved Students

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Abstract Body

Background / Context:
Prior research on mentoring relationships outside of school does point toward relationship closeness (for example, DuBois & Neville, 1997; Parra et al., 2002) and related indicators of the emotional quality of the mentor-protégé tie (for example, Thomson & Zand, 2010; Zand et al., 2009) as important influences on youth outcomes. There is preliminary evidence that this may also be the case for School Based Mentoring (SBM), or at least that closeness promotes protégé and mentor perceptions of relationship quality (Pryce & Keller, 2012). To date, however, there has not been a rigorous test of the role of relationship closeness in promoting academic outcomes in SBM. The present research addresses this gap using data from a randomized trial evaluation of the BBBSA SBM program conducted by Public/Private Ventures (P/PV).

Prior work with the same data set examined the effects on academic outcomes of match length and status (that is, whether the original match was intact and, if not, whether the protégé had been rematched with a new mentor). That work found negative impacts for protégés given a new mentor after a prior match was terminated (Grossman, Chan, Schwartz, & Rhodes, 2012). Theoretically, though, a positive emotional quality or tenor in a mentoring relationship should mediate the benefits of program participation, independent of whatever effects may be associated with relationship length or status (Rhodes, 2005). Accordingly, in our analyses we explore whether relationship quality matters even when relationship length and current status are taken into account.

Purpose / Objective / Research Question / Focus of Study:
The overarching aim of this paper is to enrich the field's understanding of how volunteer mentors can best support the academic mission of schools.

Our central empirical analysis investigates whether emotionally closer relationships between mentors and protégés lead to better academic outcomes. We wish to determine whether SBM works primarily through the connection that the protégé feels with the mentor rather than through other, more direct processes, such as engaging the child in academic activities during meetings. Outcomes include teachers' perceptions of student academic performance (Pierce, Hamm, &Vandell, 1999), quality of work (Herrera, 2004), completion of work (Herrera, 2004), and scholastic efficacy (Harter, 1985).

Setting:
The sample for our study consists of the students who participated in the randomized control trial of the Big Brothers Big Sisters of America (BBBSA) SBM program during the 2004-2005 school year (Herrera et al., 2007). Study participants were recruited by 10 BBBSA study agencies across the country, each with four or more years of experience in SBM. Recruitment proceeded in the usual way, that is, mostly through referrals by school staff; children had to be

entering grades four through nine and had to have parental consent to be part of the research. Over one thousand (1,139) students across 71 public schools in rural and urban school districts (41 elementary, 27 middle, and 3 high schools) met these criteria.

Population / Participants / Subjects:
Table 1 reports basic descriptive statistics for the control and treatment samples at baseline. Overall, just over half (54 percent) of the students were female and the majority (63 percent) were members of ethnic and racial minority groups. Most (69 percent) received free or reduced-price lunches. On average they struggled academically, receiving below a 3.0 on the teacher survey (the rating for "average" or "satisfactory" performance). The average age was 11, standard deviation of 1.7.

Intervention / Program / Practice:
In the BBBS School-Based Mentoring (SBM) program adults or older students meet with their protégés on school grounds during the school day or immediately after, typically for one hour per week during the academic year. BBBSA SBM program has well-defined national standards. These include, for example, an expectation that mentors receive monthly support contacts from program staff.

The amount of exposure to mentors varied by pair. Many pairs met for between 45 and 60 minutes (40 percent) but another 39 percent met for more than an hour. Almost all matches met three (10 percent) or four (79 percent) times a month. Over the year, the average protégé received 17 hours of mentoring over 5.3 months.

The particular activities each pair engaged in also varied. About half (49 percent) of SBM programs had protégés meet their mentors only during the school day, with the others meeting after school (47 percent) or both during and after school (4 percent). Programs reported using a variety of locations in the school for meetings, including the cafeteria (41 percent), library (34 percent), and a designated classroom (33 percent). Some programs used more than one meeting place. Almost half of all mentoring pairs shared their meeting space with other pairs.

Research Design:
Using results from a stratified (on the school level) Randomized Control Trial from the impact study of BBBS, we employ instrumental variables and other approaches to provide insight into why the BBBSA school-based mentoring program is effective.

Because of course relationship closeness cannot be randomly assigned, we use instrumental variables and other controls to account for factors such as the preexisting characteristics of protégés that may contribute to both relationship closeness and youth outcomes. Two-stage least squares (2SLS) is used to estimate this effect of the treatment on the treated, where Z_i acts as an instrument for T_i.

This instrumental variables estimate can be interpreted as the average treatment effect for the compliers — that is, the effect on the students who form a close relationship with a program mentor — under two assumptions: monotonicity and independence (Angrist, Imbens, & Rubin, 1996). Monotonicity requires that the assignment of a mentor increase the likelihood of a new close mentoring relationship for each and every student assigned to treatment. This requirement is met, since control students were not offered the opportunity to form relationships with BBBSA mentors. Independence requires two things: first, that we be able to identify the causal impact of the instrument, which is also true by construction here, and second, that potential outcomes not be directly affected by the instrument. We test the second requirement by taking advantage of the variation in program activities.

Data Collection and Analysis:
The students' teachers and mentors also completed baseline surveys in the fall of 2004. Follow-up surveying of all groups occurred at the end of the school year, beginning in April 2005. All but 6 percent of the protégés completed the survey at follow up. Survey completion rates were slightly lower for teachers, with follow-up outcome measures missing for approximately 16 percent of the overall sample.[2] Importantly, however, survey non-completion rates are almost identical for the treatment and control groups (6 percent versus 7 percent for the student survey, and 16 percent versus 17 percent for the teacher survey).

We estimate the causal effect of having a close relationship with a mentor, that is, the effect among the "compliers" with the SBM treatments, à la Angrist, Imbens, and Rubin (1996). In producing our estimates, we must take care not to reintroduce selection bias into the results. Although treatment status, Z_i, was assigned randomly, the students who actually received the intended treatment, T_i, are not necessarily a random subset. These students may have an underlying characteristic, A_i, affecting both their ability to form a relationship with a mentor and their academic progress over the study year — for example, a general ability to have good relationships with adults. One approach is to control for the characteristic explicitly. The youth survey includes questions about a student's relationship with his or her teacher, and we use baseline responses to construct a variable A_i, which provides a direct measure of a student's ability to have a close relationship with a non-parental adult, to include in our ordinary least squares (OLS) regressions.

$$Y_i = \alpha_3 + \beta_3 T_i + \rho A_i + X_i \gamma_3 + \varepsilon_i \ (3)$$

Alternatively, when compliance is imperfect, we can use the randomized treatment status, Z_i, as an instrument for the treatment of interest, having a relationship with a mentor, T_i. As established in Angrist, Imbens, and Rubin (1996), random assignment status is an ideal candidate for an instrument because it is independent of student characteristics. We thus derive the Wald estimate of the causal effect among compliers: the difference in outcomes between the nominal treatment and control groups divided by the difference in the probability of receiving

treatment between the groups. This estimate, which provides the effect of the treatment on the treated or, more generally, the local average treatment effect, measures the effect of program participation on those protégés who successfully connected with their assigned mentors (Bloom, 1984; Imbens & Angrist, 1994).

Findings / Results:
We find evidence that a close mentoring relationship positively affects academic performance. Effect sizes, obtained by dividing the impact coefficients reported in the table by the standard deviation of the appropriate outcome measure, range from 0.13 standard deviations (for overall academic performance and scholastic efficacy) to 0.18 standard deviations (for completeness of schoolwork), and are consistent across alternative specifications.

When we interact the match closeness indicator with match status, however, we find that only close, intact matches have an impact. Protégés in intact matches who are not close to their mentors fared no better than they would have without mentors. Protégés who were rematched and had a close relationship with their new mentors were not negatively affected. Indeed, there is evidence that rematched students in close relationships were doing significantly better than their control peers with respect to the quality of their schoolwork, and it is possible that the positive impacts of being matched had not yet grown large enough to be statistically significant for the rematched students' other out- comes. Thus, the current study refines the work of Grossman et al. (2012) to suggest that rematching does not have negative effects as long as the new relationship clicks.

Conclusions:
We find the mentor-protégé relationship to be the core element of mentoring, and we believe that other analyses of experimental data on mentoring programs should consider the partial compliance model used in this paper. Although instrumental variables and other non-experimental techniques do not produce results as convincing as evidence from randomized control trials, in the end it is not possible to randomly assign close relationships. Statistical techniques can appropriately adjust for the presence or absence of closeness.

Many schools have been struggling to meet increasingly higher standards and supporting at-risk students to stay in school and achieve academic success is a foremost priority. Under binding budget constraints, volunteer labor will be increasingly attractive. We find that school-based mentoring programs that aim to provide relationships can improve academic outcomes. Not every adult can be a good tutor, but many of them could help students academically by being a caring presence.

Appendices

Not included in page count.

Appendix A. References

Appendix A. References

References are to be in APA version 6 format.

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Appendix B. Tables and Figures

Table 1: Student Characteristics at Baseline

	Control		Treatment		Treatment Difference (Control-Treatment)	
	Mean	SD	Mean	SD	Mean	SD
Age	11.22	1.66	11.24	1.67	-.02	.099
African-American/Hispanic (proportion)	0.61	0.49	0.64	0.48	-.04	.029
Female (proportion)	0.54	0.50	0.54	0.50	.00	.030
Free/reduced-price lunch (proportion)	0.69	0.43	0.69	0.43	-.00	.025
Teacher-rated outcome measures:						
Overall academic performance	2.47	1.09	2.56	1.10	-.08	.070
Quality of schoolwork	2.82	0.91	2.84	0.94	-.02	.058
Completion of schoolwork	2.96	0.99	3.00	1.06	-.04	.065
Student-reported outcome measure: Scholastic efficacy	2.75	.64	2.80	.62	-.05	.038
Sample Size	584		565			