

Detailed Summary of Meta-Analysis Performed for “Review of Three Recent Randomized Trials of School-Based Mentoring: Making Sense of Mixed Findings”

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This document provides further detail on the methodology and findings of the meta-analysis that is described in the SRCD Social Policy Report entitled, “Review of Three Recent Randomized Trials of School-Based Mentoring: Making Sense of Mixed Findings” (Wheeler, Keller, & DuBois, 2010, [available online](#)). Meta-analysis was used to synthesize the findings of three recent randomized evaluation trials of school-based mentoring programs implemented by Big Brothers Big Sisters of America (BBBSA) affiliates (Herrera, Grossman, Kauh, Feldman, & McMaken, 2007), grantees of the U.S. Department of Education’s Student Mentoring Program (SMP; Bernstein, Dun Rappaport, Olsho, Hunt, & Levin, 2009), and Communities In Schools of San Antonio, Texas (CIS-SA; Karcher, 2008).

Our first step in conducting the meta-analysis was to examine each of the three trials for the constructs measured as outcomes. We compared the constructs assessed in each trial and identified 19 constructs that were measured in at least two of the three studies.

The next step was to identify the effect sizes that were obtained in each study for program impact on measures of the 19 identified constructs. For our effect size metric, we used Cohen’s *d* (Cohen, 1988). This metric represents the raw difference between treatment and control group means on the outcome measure at post-test divided by the pooled (weighted average) standard deviation of the measure for the two groups (see Cooper, 2010, formula 5.11). When findings were in the form of odds ratios, we

converted these to standardized mean difference effect sizes using the Cox index where $LOR_{Cox} = LOR/1.65$ (Sanchez-Meca, Marin-Martinez, & Chacon-Moscoso, 2003)¹. Utilizing means that have been adjusted for baseline or pre-test levels on the same measure as well as for other baseline control variables can increase the precision of effect size estimates (Borenstein, 2009). Accordingly, we utilized effect sizes that were based on the difference between treatment and control group means at post-treatment after adjustment for study covariates. Similarly, in the case of the odds ratios that were converted directly to estimated standardized mean difference effect sizes, we used the odds ratios obtained in analyses that included study covariates. As summarized in Table 1, covariates differed somewhat across studies, but in all instances included baseline scores on the outcome measure as well as student gender. In general, for the BBBSA and SMP trials, we were able to derive effect size estimates from information included in the study reports (as noted in Table 2, additional information needed to be obtained from the authors of the BBBSA trial to estimate effect sizes for absenteeism and non-familial adult relationships). For the BBBSA trial, we utilized the standardized mean difference effect sizes that are reported in Appendix E of the study report; these effect sizes are based on impact coefficients from study analyses and thus are adjusted for study covariates (Herrera et al. 2007); following Lipsey and Wilson (2001, p. 180), these effects were computed by dividing impact coefficients by the pooled unadjusted standard deviations of the outcome

¹ LOR refers to the natural log of the odds ratio.

measures for treatment and control groups. For the SMP trial, we similarly utilized the estimated effect sizes reported in Exhibits 4.3, 4.4, D.2, D.3, and D.4 of the study report (Bernstein et al., 2009), which we confirmed were computed as standard mean difference effect sizes using average weighted site-level standard deviations (L. Bernstein, personal communication, May 18, 2009), except for those that were odds ratios,

which were converted to effect sizes using the formula referred to above. We also averaged three separately reported effect sizes pertaining to substance use to obtain one effect size for this outcome for the SMP trial, as recommended by Lipsey and Wilson (2001, p. 125). For the CIS-SA report, it was generally not possible to derive standardized mean difference effect sizes from the study report. The study author,

Table 1. Covariates Used In Analyses of Program Impact in Three Randomized Trials of School-Based Mentoring

<i>Covariate</i>	<i>BBBSA</i>	<i>CIS-SA</i>	<i>SMP</i>
Baseline value of outcome measure	X	X	X
Gender	X	X	X
Age	X		X
Minority status or race/ethnicity	X		X
Free or reduced price lunch eligibility	X		X
Number of stressful life events	X		
Family structure			X
Extracurricular involvement	X		
Total hours of support services (excluding mentoring) ^a		X	
Baseline measure of hope		X	
Baseline measure of self-in-the-present		X	
Baseline measure of Connor’s Global Index of internalizing and externalizing problem behaviors		X	
Baseline measure of substance abuse	X		

Note: BBBSA denotes the Public/Private Ventures evaluation of Big Brothers Big Sisters of America school-based mentoring programs (Herrera et al., 2007); CIS-SA denotes the evaluation of Communities in Schools – San Antonio’s mentoring program performed by Karcher (2008); SMP denotes the evaluation of the U.S. Department of Education’s Student Mentoring Program (Bernstein, et al., 2009).

^aReflects number of hours of programming received during the year.

Table 2. Summary of Effect Sizes (Cohen's *d*) for Program Impact on Common Constructs and Measures for Three Randomized Trials of School-Based Mentoring

Construct	Measures ^a	BBBSA ^b	CIS-SA ^c	SMP ^d	Mean ^e (95% CI)
Math Performance	Teacher Report (BBBSA)	.02	-.02 ^g	-.05	-.02 (-.08,.03)
	Grades ^f (CIS-SA, SMP)				
Reading Performance	Teacher Report (BBBSA)	.06	-.07 ^g	-.04	-.01 (-.06,.04)
	Grades ^f (CIS-SA, SMP)				
Science Performance	Teacher Report (BBBSA)	.10	-	-.03	.01 (-.05,.07)
	Grades ^f (CIS-SA, SMP)				
Social Studies Performance	Teacher Report (BBBSA)	.06	-	-.01	.01 (-.05,.07)
	Grades ^f (CIS-SA, SMP)				
Connectedness to School	School Connectedness Scale, School Liking Scale (BBBSA)	.02	.09 ^g	.03	.03 (-.03,.09)
	Hemingway School Connectedness Scale (CIS-SA)				
	School Bonding Scale (SMP)				
Absenteeism	Teacher report of absences (BBBSA)	-.08 ^g	.02 ^g	-.09	-.07 (-.14,-.01)
	Number of classes missed ^f (CIS-SA)				
	Overall absence rate ^f (SMP)				
Truancy	Teacher report of unexcused absences (BBBSA)	-.26	-	-.14	-.18 (-.26,-.10)
	Unexcused absence rate ^f (SMP)				
Perceived Scholastic Efficacy	Scholastic Efficacy Scale adapted from the Self-Perception Profile for Children (BBBSA, SMP)	.11	-	.09	.10 (.03,.16)
Academic Self-Esteem	School Scale of Self-Esteem Questionnaire	.04	.05 ^g	-	.04 (-.06,.15)
Future Orientation	College Expectations Scale (BBBSA)	.05	-.08 ^g	.08	.05 (-.01,.11)
	Self-in-the-Future Scale (CIS-SA)				
	Future Orientation Scale (SMP)				
Teacher-Student Relationship Quality	Teacher-Student Relationship Quality Scale (BBBSA)	.00	-.03 ^g	-	-.01 (-.11,.09)
	Connectedness to Teachers Scale (CIS-SA)				
Peer Self-Esteem/Self-Concept	Social Acceptance Scale adapted from SPPC (BBBSA)	.06	.12 ^g	-	.08 (-.03,.18)
	Peer Scale of Self-Esteem Questionnaire (CIS-SA)				
Peer Support	Sense of Emotional Support from Peers (BBBSA)	.08	.25	.03	.07 (.003,.13)
	Hemingway Connectedness to Peers Scale (CIS-SA)				
	Peer Relationships, original items (SMP)				
Parent Relationships	Inventory of Parent and Peer Attachment (BBBSA)	.05	.02 ^g	.01	.02 (-.04,.08)
	Scale adapted from items in AddHealth study (SMP)				
Non-familial Adult Relationships	Original items	.18 ^{g,h}	-	.09	.12 (.05,.19)
Global Self-Esteem	Global Scale of Self-Esteem Questionnaire	.03	.16	-	.08 (-.02,.18)
School-related Misconduct	Teacher Report of Engagement in Serious School Misconduct (BBBSA)	-.24	-	-.04 ^h	-.09 (-.17,-.02)
	Committing repeated infractions ^f (SMP)				
General Misconduct	Misconduct Outside of School (BBBSA)	.07	-	.01	.03 (-.03,.09)
	Adaptation of 21 st Century Report of Delinquency/ Misconduct (SMP)				
Substance Use	Policy Studies Substance Abuse Report (BBBSA)	.11	-	-.08 ^{h,i}	-.03 (-.09,.04)
	Adaptation of SAMHSA Report (SMP)				

Note: BBBSA denotes the Public/Private Ventures evaluation of Big Brothers Big Sisters of America school-based mentoring programs (Herrera et al., 2007); CIS-SA denotes the evaluation of Communities in Schools – San Antonio’s mentoring program performed by Karcher (2008); SMP denotes the evaluation of the U.S. Department of Education’s Student Mentoring Program (Bernstein, et al., 2009). All effect sizes were gathered from published documents, unless otherwise noted. Dashes in table indicate data not reported or available from study authors.

^aAll measures are based on youth reports unless otherwise noted. Details on measures are available within the primary reports for the three studies. ^bEffect sizes are adjusted for the following covariates: baseline value of outcome measure, gender, age, minority status, free or reduced-price lunch eligibility, number of stressful life events, extracurricular involvement, and baseline level of substance use. ^cEffect sizes are adjusted for the following covariates: baseline value of outcome measure, gender, referral source, total hours of support services (excluding mentoring), and baseline values of hope, self-in-the-present, Connor’s Global Index. ^dEffect sizes are adjusted for the following covariates: baseline value of outcome measure, gender, age, race/ethnicity, school lunch eligibility, and family structure. ^eThe 95% confidence interval for each mean effect size is provided in parentheses. Mean effect sizes were computed as the average of available effect sizes with each effect size weighted by the inverse of its sampling variance (see Cooper, 1998, formulas 5.11-5.13). Each effect size was further weighted to account for clustering data within participating schools using procedures recommended by Higgins and Green (2008). ^fMeasure obtained from school records. ^gEffect size computed from data supplied by study author, adjusted for covariates. ^hEffect size was estimated by converting an odds-ratio to a standardized mean difference using the Cox index, LORCox = LOR/1.65 (Sanchez-Meca et al., 2003). ⁱRepresents an average of three separately reported substance use effect sizes (tobacco, alcohol and drug use; see Lipsey & Wilson, p. 125).

however, provided us with the required information in the form of adjusted means for treatment and control group as well as treatment and control group standard deviations. Because each effect size represented a standardized mean difference adjusted for covariates, we then computed the variance of each effect size using a formula provided by Borenstein (2009, p. 229, formula 12.26) which takes into account the multiple correlation between the covariates and the outcome measure.²

We next computed mean effect sizes and 95% confidence intervals for each construct across available effect sizes for the three trials. The effect size contributed by each study was weighted by the inverse of its sampling variance (see Cooper, 2010, Chapter 6, Formulas 12-14). We further weighted each effect size to account for clustered data using procedures described by Higgins and Green (2008; section 16.3.4). The latter procedures utilize information about the number of clusters and the intra-class correlation (ICC) for the outcome measure (a measure of the degree to which scores are more similar within than between clusters). For the CIS-SA and BBBSA studies, we based the number of clusters on the reported number of schools involved in each study. For the SMP study, we relied on a report of the number of schools involved provided by the principal investigator (L. Olsho, personal communication, Apr. 20, 2010). ICCs for outcome measures in the CIS-SA trial were able to be derived from information included in the study report, but were not able to be derived for either of the other trials. For these trials, we utilized ICCs for measures of the same or most similar available constructs from the CIS-SA trial. A fixed effects model was used in estimating mean effect sizes and their confidence intervals based on the small number of studies and our interest in synthesizing the findings of these particular investigations.

As shown in Table 2, our findings show statistically significant mean effects for six of the 19 constructs evaluated ($p < .05$). These constructs are: peer support (.07), non-familial adult relationships (.12), perceived scholastic efficacy (.10), school-related misconduct (-.09), absenteeism (-.07) and truancy (-.18). For interpretation of these results, please see our full manuscript (Wheeler, Keller, & DuBois, 2010).

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² For the BBBSA trial we were unable to obtain the multiple correlation between covariates and outcome for five of the outcome measures included in Table 2 (truancy, non-familial adult relationships, school-related misconduct, general misconduct, and substance use). For these outcomes, as a conservative approach, we used the lowest multiple correlation associated with any of the study's other outcome measures.

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