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Final Report

Investigation of Long-Term Effects of the Big Brothers Big Sisters Community-Based

Mentoring Program: Final Technical Report for OJJDP*

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David DuBois chairs the Research Advisory Committee of BBBSA and Carla Herrera is a member of this committee. The content of this report, however, is solely the responsibility of the authors and does not necessarily represent the views or positions of BBBSA. BBBSA, furthermore, did not exercise any control or decision-making influence over the report’s contents or conclusions.

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Executive Summary

Background: A major part of the appeal of mentoring programs directed toward youth from under-resourced backgrounds for practitioners and policy-makers is their widely assumed potential to have enduring beneficial effects on participants' longer-term developmental trajectories. These anticipated benefits include improved prospects for post-secondary education, employment, reduced likelihood of involvement in problem behavior and the justice system, and enhanced social-emotional functioning and health during adulthood. Very few studies have sought to rigorously examine these possibilities, however, and the interpretation of available findings is complicated by several considerations, including unique features of the programs involved. To help strengthen the evidence base in this area, the current research undertakes a long-term follow-up of participants from one of the largest and most influential mentoring evaluations to date: Public/Private Ventures' (P/PV) 1995 randomized controlled impact study of the Big Brothers Big Sisters of America (BBBS) community-based mentoring (CBM) program.

Method: The core sample of interest for the research consists of the 1,138 participants in the randomized controlled trial of the BBBS CBM program conducted by Public/Private Ventures in the early 1990s (Tierney et al., 1995). The complete dataset from the original study was made available to the researchers. The researchers then collected data on post-secondary education participation for all sample members from the National Student Clearinghouse and, for the more than 90% of the sample that could be located through public records searched via Lexis Nexis Accurint, records of arrests during adulthood. An effort was also made to contact as many of the original study participants as possible and engage them in completing a survey, the primary purposes of which were to gather information about adult outcomes (employment, problem behavior/justice system involvement, and various aspects of social-emotional well-being and

health broadly defined), juvenile justice system involvement (e.g., arrests), and mentoring relationships (if any) through the BBBS program. Thus far, 296 participants from the original study sample have responded to the survey. For a portion of additional participants, it was possible to obtain information about match history (i.e., whether the participant was matched with a BBBS mentor at any time, including the years following the original study and, if so, how long the relationship lasted) from agency records or contact with the participant's parent or guardian from the time of the original study.

Analyses conducted to date have examined: a) one-year match history status (i.e., a dichotomous variable indicating whether or not a participant ever had a BBBS match relationship of one year or longer) as a predictor of the records-based outcomes of post-secondary education and adult arrest; and b) retrospective reports of mentoring relationship quality (i.e., a dichotomous variable indicating whether a participant reported a BBBS mentoring relationship that lasted at least one year with a relatively high level of reported closeness to the mentor) on the adult survey as predictors of outcomes assessed on the survey. For the analyses predicting records-based outcomes, predictive analytics that made use of data available from the original study were used to estimate the likelihood of whether a participant had a BBBS match of one year or longer for the 40% of the sample that lacked direct reports of this information from one of the sources indicated above; observations were weighted by the predicted probabilities to take into account varying levels of certainty in making this determination. The outcomes examined in these analyses were dichotomous measures of post-secondary attendance, receiving a post-secondary degree, having at least one property offense, and having at least one person offense, as well as total number of offenses of any type. For the analyses using reports of a high-quality mentoring relationship as a predictor of outcomes assessed with the adult survey data, the

outcomes examined were as follows: juvenile arrest, current hours worked, stealing, property damage, and fighting during adulthood, current reported levels of grit (perseverance in pursuit of goals), perceived stress, depressive symptoms, emotional well-being, psychological well-being, social well-being, overall health, alcohol use, marijuana use, and illicit drug use during adulthood, current smoking, and substance use interference with work or school responsibilities.

An extensive set of covariates was included in both sets of analyses both to control for pre-existing differences between those ‘mentored’ or not as defined above as well as to increase statistical precision in estimates of mentoring as a predictor of the outcomes. Analyses included tests for interactions of mentored status with each of the following demographic variables: participant age, participant gender, participant race/ethnicity, parent low education (post-secondary education outcomes only), household low-income (adult arrest outcomes only), and urban neighborhood (records-based outcomes only). Any interactions that were evident were followed up appropriately to identify associations between mentoring and outcomes for subgroups of participants.

Results: One-year match history status was a statistically significant predictor of fewer total arrests. It did not reach or approach significance as a predictor of any of the other records-based outcomes (i.e., post-secondary attendance or degree, arrest for one or more property or person offenses). Tests of interactions revealed, however, that among racial/ethnic minority group members, one-year match history was a statistically significant predictor of greater likelihood of post-secondary attendance, lower likelihood of a property offense, and fewer total offenses. In addition, among participants with low parental education one-year match history predicted greater likelihood of post-secondary attendance and among younger participants it predicted greater likelihood of post-secondary degree completion. One-year match history also predicted

lower likelihood of a property offense among females. In contrast to the foregoing associations, one-year match history status also predicted poorer outcomes in a number of instances for particular subgroups. Most notably, among White participants it was associated with increased likelihoods of one or more property and person offenses and among White females it predicted lower likelihood of receiving a post-secondary degree.

In analyses examining reports of a high-quality mentoring relationship as a predictor of outcomes assessed using the adult survey data, reports of a high-quality mentoring relationship approached or reached statistical significance as a predictor of a lower likelihood of a juvenile arrest, less reported stealing during adulthood, greater reported grit, emotional, psychological, and social well-being, and self-rated health, and less alcohol use during adulthood. An interaction with participant gender for grit revealed that reports of a high-quality mentoring relationship was a relatively strong predictor of this outcome among females.

Discussion: Overall, the results of the analyses conducted to date offer preliminary evidence that one-to-one CBM relationships between youth and adult volunteers as established through BBBS agencies, at least those that satisfy basic criteria for quality, can be of enduring benefit to youth as they transition into adulthood. As in evaluations of shorter-term effects of formal mentoring programs (DuBois et al., 2011; Tolan et al., 2014), including the P/PV randomized controlled trial that provides the foundation for the current research (Tierney et al., 1995), outcomes for which benefits are evident extend across multiple domains: education/academics, problem behavior, social-emotional functioning, and health. The magnitude of these associations is comparable (or greater) to those reported in this literature on shorter-term effects (DuBois et al., 2011; Tolan et al., 2014). These observations, however, must be tempered with several important qualifications. These include the association between mentoring and poorer outcomes for some

subgroups, the non-experimental nature of the findings involved (i.e., they do not involve a comparison between persons who were randomly assigned to receive BBBS mentoring or not), the incompleteness of direct information on whether a substantial portion of participants in the original sample experienced a BBBS mentoring relationship and, if so, for what duration, and the availability of outcomes assessed by adult survey data for only a limited portion of the sample. The results of tests for subgroup differences in associations of mentoring with outcomes must be interpreted with additional caution in view of the relatively small sizes of the groups involved and the substantial number of tests conducted. One intriguing pattern suggested by these findings, however, is that receipt of mentoring as operationalized in the present analyses appears to exhibit differentially strong associations with outcomes for subgroups that absent supportive intervention are known to be prone to less favorable outcomes in the areas involved. This includes post-secondary attendance and justice system involvement in the case of racial/ethnic minority group members (e.g., Henderson & Baffour, 2016) and post-secondary degree completion in the case of participants whose parents had a low level of formal education (i.e., less than completion of high school or equivalent; Putnam, 2015). It is perhaps noteworthy, too, that mentoring showed a particular strong association with grit (self-reported perseverance in pursuit of goals) among female participants given their increased likelihood of encountering both negative messages concerning their abilities and institutional and other barriers when pursuing their aspirations (e.g., Turner & Maschi, 2014).

To strengthen future analyses involving records-based outcomes (post-secondary education and adult arrest), efforts will be continued to obtain match history information from the parents of original study participants for whom this information is not available from another source (e.g., agency records, adult participant survey). Efforts to obtain adult survey data will

continue as well, although they are expected to yield at most a relatively small number of additional completed surveys.

Several priorities exist for future analyses. These include: 1) exploring the viability of using an instrumental variable approach, also referred to as complier average causal effect (CACE) analysis, as a means of increasing the robustness of findings to account for potential bias attributable to confounding between mentored status and unmeasured influences on outcomes; 2) investigating lower rates of juvenile arrest as a mediator of adult outcomes; and 3) more thoroughly investigating subgroup differences in associations between mentoring and outcomes. We also plan to conduct three sets of analyses using additional data: 1) using the estimated impacts from the study to conduct a cost-benefit analysis; 2) conducting qualitative analyses of adult survey participants' open-ended recollections of how their mentoring relationships affected their lives; and 3) linking the dataset with data from the Internal Revenue Service for purposes that include examining whether mentoring has long-term effects on participants' source of employment and earnings.

The current research offers perhaps the first rigorous investigation of the possible effects of a prototypic one-to-one volunteer-based mentoring program on longer-term outcomes extending into adulthood. Its findings promise to add significantly to existing understanding of the outcomes for which such effects may occur and their magnitude, the profiles of youth for whom mentoring received through programs such as BBBS is most likely to yield lasting dividends, and the relationship characteristics and intervening processes that are most likely to give rise to longer-term benefits. Even more importantly, the findings reported through this work can serve as a stimulus and guide for increasing rigorous and informed investigation of longer-

term benefits of program-supported volunteer-based mentoring relationships made available and supported through BBBS and other similar programs.

Background

A major part of the appeal of mentoring programs for practitioners and policy-makers is their widely assumed potential to have enduring beneficial effects on participating youths' longer-term developmental trajectories. Key anticipated positive outcomes include increased rates of participation in post-secondary education, avoidance of adult criminal behavior, and improved social-emotional functioning and health during adulthood. To date, these potential longer-term effects have been largely unexamined in research. They do, however, appear plausible for at least two reasons. First, positive relationships and attachments with caring adults occupy a central role in numerous developmentally themed and empirically supported perspectives on academic achievement (see Martin & Dowson, 2009), problem behavior prevention (e.g., the Social Development Model of Hawkins et al.), and social-emotional well-being and skill development (see, e.g., Oberle, Schonert-Reichl, Guhn, Zumbo, & Hertzman, 2014). Second, mentoring programs for youth have a well-demonstrated ability to have shorter term impacts on outcomes that are well-established predictors of educational attainment, adult criminality, and social-emotional functioning and health in adulthood. These include improved school grades and attendance, reduced levels of delinquent behavior, and strengthened social relationships and emotional well-being (for recent meta-analyses, see DuBois, Portillo, Rhodes, Silverthorn, & Valentine, 2011, and Tolan, Henry, Schoeny, Lovegrove, & Nichols, 2014). The present research, which explores the possibility of long-term effects of mentoring provided through the Big Brothers Big Sisters (BBBS) program, is guided by the conceptual model shown in Figure 1.



Figure 1. Conceptual model of potential effects of youth mentoring on adult outcomes.

The importance of reducing criminal behavior—especially during adulthood when the preponderance of crimes are committed (U.S. Department of Justice, 2009)—cannot be overstated. The societal costs of crime in the U.S. are staggeringly high and multi-faceted. In 2007, for example, more than 23 million criminal offenses were committed, resulting in an estimated \$15 billion in economic losses to the victims and \$179 billion in government expenditures on police protection, judicial and legal activities, and corrections (U.S. Department of Justice, 2004, 2007, 2008). Added to such estimates are opportunity costs associated with involvement in illegal rather than legal and productive activities as well as indirect costs stemming from losses suffered by crime victims including pain and suffering, decreased quality of life, and psychological distress (McCollister, French, & Fang, 2010). For several types of offenses (murder, rape/sexual assault, aggravated assault), in fact, the latter indirect (“intangible”) costs have been estimated to exceed direct (“tangible”) costs by a multiple of 4 or more (McCollister et al., 2010). The enormous personal and societal costs associated with lower levels of both educational attainment and employment, although not detailed here, are equally well-established as are those associated with poorer health (e.g., substance abuse). Outcomes

within all of these areas, furthermore, are likely to be interdependent and mutually reinforcing. Illustratively, with respect to criminal behavior and employment, it is noteworthy that adults with criminal histories face a variety of obstacles to employment such as increased stigma and hiring restrictions in various occupations (Pager, 2003). Problems with obtaining employment, in turn, are likely to increase susceptibility to involvement in criminal behavior. The curved lines with bi-directional arrows in the right-most portion of Figure 1 reflect this expectation of a likely complex, cyclical set of dynamics among adult outcomes.

One mechanism through which mentoring programs may have the ability to decrease rates of problematic adult outcomes and contribute to those that are salutary is by reducing the likelihood of delinquent behavior and juvenile justice system involvement. Youth mentoring programs show promise in this regard for at least two reasons. First, studies have shown the potential of mentoring programs to reduce youth involvement in delinquent and problem behavior. In meta-analyses, standardized mean difference effect sizes for mentoring program effects on problem behavior (such as drug use and bullying) have been estimated as $-.20$ and $-.21$ (DuBois, Holloway, Valentine, & Cooper, 2002; DuBois et al., 2011) and $-.21$ on delinquent behavior (Tolan et al., 2014). Similarly, in a broader meta-analysis of the effectiveness of programs for juvenile offenders, already involved in the juvenile justice system, Lipsey (2009) found that mentoring was among the intervention strategies with the strongest effects on reducing recidivism.

Short-term improvements in other outcomes also merit consideration as potential mediators of program effects on adult outcomes. Such outcomes include improvements in relationships with parents, teachers, and other influential adults (e.g., Rhodes, Grossman, & Resch, 2000; Rhodes, Reddy, & Grossman, 2005; DuBois, Neville, Parra, & Pugh-Lilly, 2002)

as well as in academic achievement and school attendance (DuBois et al., 2002, 2011; Tolan et al., 2008). In addition to proving beneficial in their own right for improved educational attainment and prevention of adult arrest, gains in these areas could serve to interrupt pathways linking juvenile delinquency to adult crime and educational/occupational outcomes (i.e., moderate the impact of delinquency on adult outcomes; that is, even to the extent that mentored youth exhibit delinquent behavior in the short-term, benefits that accrue in other areas could buffer or lessen the risk that delinquent behavior presents for negative adult outcomes).

To summarize, mentoring program participation may produce benefits in areas that help promote stronger adult outcomes both directly and through their ability to mitigate longer-term negative consequences of delinquency. Long-term program benefits independent of immediate effects on delinquency or other outcomes, although possible, are likely to be much weaker and thus are modeled as secondary, non-hypothesized pathways of influence in Figure 1 (see dotted lines).

A further key consideration in whether mentoring program effects extend into adulthood may be the quality and duration of the relationship(s) that each youth had with his or her mentor(s) in the program. In research focused on short-term program effects, among the factors that appear to be especially important in promoting more favorable outcomes are: 1) the strength of the youth's emotional bond with the mentor; 2) the degree to which the mentor engages in a collaborative and developmentally appropriate manner with the youth (e.g., seeks out youth's ideas, incorporates fun and recreational activities); and 3) the extent to which the mentor provides guidance and other active forms of support (e.g., help with coping, working toward goals) (for a review, see Rhodes & DuBois, 2006; see also DuBois et al., 2011; Nakkula & Harris, 2005, 2014). Available evidence also points fairly consistently to enhanced benefits when

youth experience longer-term relationships with mentors (Rhodes & DuBois, 2006; Grossman, Chan, Schwartz, & Rhodes, 2012; Grossman & Rhodes, 2002; Herrera, Grossman, Kauh, Feldman, & McMaken, 2007; Karcher, 2005). Analyses of data from randomized controlled trials of the community- and school-based mentoring programs of Big Brothers Big Sisters (BBBS), for example, have pointed to favorable program effects being concentrated among youth whose relationships have lasted at least one year (or to the end of the school year in the case of the school-based program) and those who report relatively closer emotional connections with their assigned mentors (see, e.g., Bayer, Grossman, & DuBois, 2015; Grossman & Rhodes, 2002; Herrera et al., 2007). Theoretically, relationship strength and duration could prove to be important mediators of the long-term effects of mentoring program participation on adult outcomes via their role in shaping not only the immediate program effects on juvenile delinquency and other outcomes but also longer-term benefits that arise independent of such effects. The latter may occur, for example, as a result of aspects of relationships (e.g., guidance) that prove instrumental later in life and to ongoing benefits of more informal ties that may be maintained with mentors after formal program relationships have ended. Both possibilities are represented in Figure 1. In either case, all short- and longer-term impacts of mentoring program involvement are expected to be, in effect, mediated in one way or another by the quality of the mentoring relationships that are established through the program.

Unfortunately, there is very little direct research evidence to support the potential for mentoring to contribute to reduced criminal activity in adulthood or related outcomes of improved educational attainment and employment status. Further, the studies that do exist are inherently limited in their ability to address this question. In a 30-year follow-up of participants (all male) in the Cambridge-Somerville Youth Study conducted in the 1930s and 1940s, youth

who had been randomly assigned to a community-based treatment program, involving support from a counselor who “tried to build a close personal relationship with the boy and assist both the boy and the family in a number of ways” (McCord, 1992, p. 198), were found to be significantly *more* likely to have been arrested for a serious street crime (FBI Index offense) than matched control group participants (McCord, 1978). Negative outcomes were particularly salient among youth who had participated multiple times in summer camps as part of the program (McCord, 2003), perhaps as a result of peer contagion or deviance training in which gathering youth in relatively unsupervised settings can increase their involvement in problem behavior (Dishion & Tipsord, 2011). As such, the harmful effects of this particular component of the intervention could have masked, at least in part, beneficial effects of the one-on-one mentoring that youth received.

A more recent randomized controlled study examined long-term effects of the Buddy System (O’Donnell & Williams, 2013)—a program for youth between the ages of 11 and 17 in which mentors were paid community members without professional training—on adult criminal offenses 35 years later. The proportions of the control and participant groups with adult arrests did not differ significantly (46.4% and 47.8%, respectively, from Table I of O’Donnell & Williams, 2013). This study did find, however, a significant beneficial effect of the program on reducing the likelihood of adult arrest among those who had been arrested in the year prior to program referral (rates of arrest during adulthood were 75% for controls and 54.9% for program participants, respectively) as well as a significant effect in the opposite (i.e., harmful) direction among females without a history of prior arrest at program referral (O’Donnell & Williams, 2013). These divergent findings as a function of prior arrest history (and, in part, gender), which are similar to impacts on arrest rates immediately following program participation (O’Donnell,

Lydgate, & Fo, 1979), were interpreted by the authors as “peer network” effects that had been created during the many opportunities the program provided for youth to meet one another and form friendships during their participation (benefiting youth with prior arrest histories, but harming those without). Such effects are not likely to be applicable to more traditional mentoring programs in which mentors and youth meet primarily on their own, separate from other mentors and youth.

A crucial next step in clarifying the effects of mentoring on adult criminality and other associated outcomes would be to conduct a long-term follow-up of participants in a rigorous evaluation of a traditional (i.e., one-to-one, volunteer-based), “stand alone” mentoring program (thus avoiding complications in interpretation associated with the follow-up studies to date that have been on multi-component programs; DuBois et al., 2011). To address this need, the current research undertakes a long-term follow-up of participants from one of the largest and most influential mentoring evaluations to date: Public/Private Ventures’ (P/PV) 1995 randomized controlled impact study of the BBBS community-based mentoring (CBM) program. This study involved over a thousand youth who were between 10 and 16 years old at baseline. Findings from this rigorous landmark study indicated that, relative to their non-mentored peers in the control group, those assigned to receive mentoring through the program had better self-reported outcomes at an 18-month follow-up in a wide range of areas including aggressive behavior, substance use initiation, truancy (skipping school), relationships with parents and peers, and academic attitudes and performance (Tierney, Grossman, & Resch, 1995). These impacts were relatively small in magnitude by conventional metrics for gauging effect size (DuBois et al., 2002), and for several other outcomes, impact estimates did not reach or approach statistical significance. Still, overall, the findings make the P/PV evaluation a good candidate for long-term

follow-up for at least two reasons. First, without evidence of shorter-term effects on delinquent behavior and other relevant outcomes (establishing the path from mentoring to these outcomes in Figure 1), the potential for long-term effects would be greatly reduced. Second, the presence of these types of short-term effects provides a valuable starting point (albeit not absolutely essential; Shrout & Bolger, 2002) for testing whether short-term effects on delinquent behavior and other outcomes do indeed mediate long-term effects on adult outcomes.

The following features of BBBS' CBM program also make it desirable as a focus for investigation of possible long-term effects of mentoring on adult outcomes: a) it is the largest stand-alone mentoring program in the country, serving approximately 200,000 youth annually; b) it has retained the same basic structure and practices from the time of the original evaluation, enhancing relevance of findings to the current-day program; c) it is the only stand-alone mentoring program that, based on findings from the P/PV study, consistently has earned inclusion on lists of evidence-based programs such as Blueprints for Healthy Youth Development (<http://www.blueprintsprograms.com/>) and the National Registry of Evidence-Based Programs and Practices [NREPP] (<http://www.nrepp.samhsa.gov/>); and d) it is widely emulated by the field as a "best practices" model (Rhodes & DuBois, 2006). Furthermore, much of the field's current knowledge base has been derived from extensive secondary analyses of data from the evaluation. For example, the dataset has provided the strongest evidence to date of the benefits of longer-term mentoring relationships (Grossman & Rhodes, 2002) and has contributed to much of our understanding about how mentoring effects on behavioral and educational outcomes may be mediated by impacts on other outcomes such as the quality of the parent-child relationship (e.g., Rhodes et al., 2005). Thus, a follow-up study will provide a relatively seamless extension of existing understandings without interpretation challenges arising from short-term

and long-term results being derived from differing datasets and program models. If findings from the follow-up study are favorable (e.g., indicating long-term effects on adult criminal activity), then clearly this will offer key support for continued implementation and support of the BBBS CBM program model and others that align closely with it; if such evidence is lacking, the study will serve as an important indication that program modifications may be needed to achieve long-term effects. In either case, because the research is being guided by a theoretical model (Figure 1), findings will offer valuable insights about the extent to which different mechanisms or pathways are important in leading to long-term effects of mentoring program participation on adult outcomes, thus informing mentoring program practice.

Along with the advantages of investigating long-term outcomes using the P/PV study sample and dataset, the wait-list control design of the study presents both a notable limitation and a significant methodological challenge. That is, because youth assigned to the control group were eligible to be matched with a mentor after completing the 18-month follow-up assessment, a simple comparison of outcomes between those assigned to the treatment and control groups would likely underestimate the true effects of program participation. Likewise, determining which youth in the control group were in fact ultimately matched with a mentor is not a straightforward undertaking due to limitations in the availability of agency records and the inevitable challenges of trying to obtain this information from study participants after such an extended period of time. A similar challenge exists for treatment group youth with respect to determining if those not matched with a mentor by the 18-month follow-up assessment (about 25% of the treatment group) were matched at a later point in time as well as the ultimate duration of relationships that were established during the original study period. The strategies that were used to address these concerns in the most rigorous and reliable manner possible are detailed in

the Method section of this report which follows.

Method

Sample

Original study. The core sample of interest for the research consists of all participants in the randomized controlled trial of the BBBS CBM program conducted by Public/Private Ventures in the early 1990s (Tierney et al., 1995). Briefly, youth were recruited into the original study through eight BBBS affiliates. One of the criteria in selecting the affiliates was that they all needed to have a large caseload as this helped to ensure sufficient numbers of youth for the research sample and to minimize the impact of research activities on agency operations. A second consideration in selecting affiliates was geographic diversity. The selected sites represented most regions of the U.S. and were located in Philadelphia, PA; Rochester, NY; Minneapolis, MN; Columbus, OH; Wichita, KS; Houston, TX; San Antonio, TX; and Phoenix, AZ. All age-eligible youth who came to the study agencies during a 17-month study enrollment period, which lasted from October of 1991 to February of 1993, were recruited for the study. The study was intended to focus on youth who were between the ages of 10 and 14 years old when eligibility for BBBS services was determined, although a small portion (approximately 7%) ended up being 15 or 16 years old. Relatively small numbers of youth were excluded due to inability to complete the telephone interview due to a physical or learning disability ($n = 13$), not applying for the core BBBS program ($n = 50$), or being part of a group to which the agency was contractually obligated to provide services ($n = 61$). All but 3% of the eligible families approached consented to study participation. In total, 1,138 youth were enrolled in the study. Each of these youth was randomly assigned to a treatment or wait-list control group. Agencies were instructed to provide youth in the treatment group with access to a mentor through normal

program procedures, whereas youth in the control group were not eligible to receive services until the end of the study's 18-month follow-up period. (It should be noted that P/PV's report of the study's findings was based on analyses of data from only the 959 youth in the study sample for whom both baseline and 18-month follow-up data were able to be collected; the remaining 179 youth were primarily excluded because of a lack of follow-up data, although there was a small group [$n = 30$] excluded due to inability to collect complete baseline data, primarily due to refusal or inability to locate. Except where noted, the present research draws on the entire original randomized sample of 1,138 youth.). In terms of basic demographics, these youth were 63.7% male with an average age of 12.29 years ($SD = 1.39$) at study baseline; nearly half (42.7%) lived in families receiving public assistance; and in terms of race/ethnicity, 59.7% were minority (non-White). Further information regarding study enrollment procedures and characteristics of the sample can be found in the original study report.

Present research. This section provides information on the varying samples available for analyses conducted for the present research. The reader is cautioned that the numbers reported are subject to minor change as further review and auditing of study information takes place.

Data on post-secondary education participation as assessed by records from the National Student Clearinghouse were effectively available for the entire original study sample. Data on records of adult arrests were available for a subset of 1,084 participants from the original sample who were able to be located with confidence through Lexis Nexis Accurint ("Accurint"), which served as the source for these data (see Measures for details; note that a small number of these individuals [$n = 33$] were located after the coding of adult arrest data and there has not yet been sufficient opportunity to record these data for them, thus reducing the effective sample size for these analyses for the current report to 1,051). Data on all other outcomes of interest were

assessed via responses of original study participants to a survey administered for purposes of this research (“adult survey”) and thus the analyses of these remaining outcomes are based on the subgroup of original study participants who have (to date) completed the adult survey.

Attempting to secure these later data through the adult survey was a multi-step process. Initially, information from the original study dataset, primarily participant name and date of birth, was used to attempt to locate contact information for each participant in Accurint. As noted, this was possible for 1,084 participants. A total of 40 persons from this group were excluded from this portion of the research due to an Accurint record (or, for example, parental report as explained below) of the participant being deceased; the 30 persons without complete baseline data in the original study also were excluded for ethical reasons given that one of the common reasons for this was a refusal and thus arguably an implicit withdrawal from the research. The next step was to send an advance letter to the remainder of the located individuals. The letter provided pertinent information about the current study, including why the person, as a participant in the original study, was being contacted, and explained that participation would involve completing a 20- to 25-minute survey for which a payment of \$50 would be provided. An effort then was made to reach each of these persons by telephone for purposes of further reviewing study information and answering any questions. Those who were reached and indicated a willingness to participate (i.e., complete the adult survey) were emailed a link to the study consent form and survey, both of which were housed on REDCap, a secure web-based data collection platform. Multiple call attempts were made, and voicemail messages explaining the purpose of the call and providing the toll-free study phone number and email address were provided when there was opportunity to do so. For individuals for whom address and/or telephone information available through Accurint were determined to not be current, as well as those whom it was not possible

otherwise to reach by phone, the advance letter was sent by email, if one or more email addresses was available through Accurint, and/or via a direct message to the person on Facebook for those who were able to be reliably located on this social media platform. In addition, where contact information for a participant's parent or guardian from the time of the original study was able to be located on Accurint and this individual was not deceased, an effort was made to reach the study participant with this person's assistance via a similar process of advance letter and follow-up telephone call (as explained under Measures, contacts with parents of original study participants were also initiated for the limited purpose of obtaining information about whether participants had ever been matched with a BBBS mentor and, if so, for how long).

Overall, it has been possible to date to contact 472 of the original study participants. Of these, 71 have declined study participation. Others have been determined to be ineligible for this portion of the research due to being incarcerated or otherwise under institutional care ($n = 31$) or due to having a legal guardian appointed ($n = 4$). Another group ($n = 70$) has expressed willingness to participate in the research but to date has not formally consented and completed the study survey. The remaining 296 have provided consent and completed the adult survey (or, in some instances, a portion of it), which equates to a response rate of 28.7% of the original study sample after removing those deceased, ineligible, and who did not complete baseline interview ($n = 1,061$). Six of those responding to the adult survey did not report whether they had been matched with a Big Brother or Big Sister and thus are not included in analyses for the present report. The remaining 290 participants constitute the sample used for analyses of the outcomes that are assessed with the adult survey data. This group and the remainder of the original study sample were compared on the full set of baseline variables from the original study, utilized as covariates in the analyses that are included in this report (see Analyses section).

Compared with the remainder of the sample, the adult survey subgroup includes a significantly higher proportion of female participants (41.6% vs. 34.5%) as well as those who are White (45.4% vs. 38.5%) and a significantly lower proportion of persons identified as having a learning disability (9.6% vs. 18.3%) as well as those who had repeated a grade in school (31.7% vs. 38.3%). The adult survey respondents also had moved significantly less often than others in the original study sample, reported lower global self-esteem and were less likely to have been rated by case managers as being expected to benefit from BBBS mentoring due to being an “underachiever at school” (44.1% vs. 56.4%) or being “insecure with or does not trust adults” (31.3% vs. 37.3%).

Measures

Original study. In the original study, researchers collected baseline and follow-up surveys from youth via telephone interviews. These interviews gathered information on a wide range of constructs including: antisocial activities (e.g., alcohol and drug use, hitting, stealing, principal’s office visits, damaging property); relationships with family and friends; academic performance, attitudes and behavior; self-concept; and social and cultural enrichment. Standardized measures were used to assess most, but not all, of the constructs. At follow-up, youth in the treatment group who had been matched with BBBS mentors also reported on their relationships with these persons. Surveys completed by the parent and BBBS case manager at baseline provided detailed information on the youth’s background, demographics and recent stressful life experiences; case managers also provided additional information about each youth’s experiences in the program, including information about the volunteers with whom they were matched and the start and end dates of their matches. Further details on study measures are included in the original P/PV report (Tierney et al., 1995).

Current research. Data collected for the current research include: a) match history (i.e., whether a youth was matched with a BBBS mentor either during or after participation in the original study and, if so, how long the relationship lasted); b) retrospective self-reports on the adult survey of additional characteristics of participants' relationships with BBBS mentors, if any, and the perceived impact of these relationships on present-day functioning; c) records of participation in post-secondary education and adult arrests; and d) self-reports on the adult survey of employment, problem behavior/justice system involvement, and various aspects of social-emotional well-being and health (broadly defined) during adulthood as well as significant relationships with nonparental adults, school performance, and problem behavior/juvenile justice system-involvement during childhood and adolescence. The remainder of this section provides more details about the variables/measures that have been utilized in analyses conducted to date, which are a subset of those available.

Match history. Information about the match history of youth in the original study sample was obtained from the following sources: the original study dataset, agency records that were added to the dataset by Big Brothers Big Sisters of America for selected affiliate agencies (see below), responses to relevant questions on the adult survey of study participants, and information shared by the parents of participants who were contacted in the course of attempting to locate and contact participants for the adult survey. Where match history data were available, for purposes of the current analyses, the focus was on whether the participant was indicated or reported to have had a match of at least one year with a BBBS mentor. This approach was based on both scientific and pragmatic considerations. Scientifically, findings from the original study indicated that favorable effects of program participation were concentrated among youth whose matches lasted a year or more. In addition, BBBS requires a one-year commitment from its CBM

volunteers; thus, understanding whether matches of this length (or longer) can foster long-term benefits is an important programmatic question. Pragmatically, a focus on whether a participant had a match of one year or more allowed us to make use of match history information from the original dataset. More specifically, nearly one-third of youth in the treatment group (30.6%) had already been in matches of a year or more by the 18-month follow-up assessment of the original study. Even if no other information was available on the match history of these youth from other sources, we could still confidently code them as having had a match of a year or longer.

Match history information was also obtained by BBBS from 3 of the 8 BBBS agencies involved in the original study for all, or nearly all of the youth who were enrolled in the study through those agencies. The 3 agency locations are Columbus (now BBBS of Central Ohio), San Antonio (now BBBS of South Texas), and Wichita (now BBBS Kansas). In the case of Wichita, match history information could be obtained only for youth assigned to the control group. It should be noted that the information from agency records included all applicable years after the 18-month follow-up of the original study. It was thus valuable as a source of information regarding both: a) whether youth in the control group had been matched after the conclusion of the study (and, if so, whether these matches lasted for at least a year); and b) whether treatment group youth who had not had a match of at least a year by the 18-month follow-up did ultimately have such a match, either as a continuation of a match that was active at the follow-up, but was less than a year in duration at that point in time, or a new match established after the follow-up.

In total, we were able to code whether a match of a year or more was experienced for approximately 60 percent of the sample (687 of the 1,138 participants). When match history information was available from more than one source, highest priority was given to original study records, followed by agency records, adult participant survey responses, and information

shared by participants' parents. So, for example, if match information was available from agency records as well as responses on the adult participant survey, agency records were used as the basis for coding whether the participant ever had a match of one year or more. The extent to which each source was used as the basis for coding the binary match history variable (i.e., match of one year or more, or not) was as follows:

- original study dataset: 175 (15.4%);
- agency records: 320 (46.6%);
- adult survey of study participants: 155 (22.6%); and
- parents of participants: 37 (5.4%).

Substantial numbers of participants had data available from more than one of these sources, thus permitting some examination of agreement among them. Of particular interest were comparisons between agency records and the other 3 data sources. The levels of agreement between agency records and the two data sources with enough cases to permit a meaningful comparison (i.e., original study data and the adult survey), are as follows:

- original study dataset: 37 of 46 also had agency records indicating a match of one year or more (80.4%); and
- adult survey of study participants: 26 of the 39 for whom agency records indicated a match of one year or more also reported this on the adult survey (66.7%), which increases to 87.1% if reports of matches lasting more than six months but less than a year are included (it is generally understood that those involved in a match may regard it as having ended prior to its official closing by an agency, thus plausibly accounting for this pattern); 49 of the 58 for whom agency records indicated a match of less than one year (or no match) also reported this on the adult survey (84.4%).

To derive the most likely status on the match history variable for the remainder of the sample, the C.5.0 Decision Tree analysis procedure of SPSS was used. This procedure estimates a classification tree model using the C5.0 algorithm, which uses the R C.50 package (Kuhn, Weston, Coulter, & Culp, 2017). As input variables, we used essentially all variables from the baseline assessment of the original study (scale scores were used for standardized measures rather than individual items; a complete list of these variables is available from the first author on request) as well as variables representing random assignment status (treatment or control group), match status as of the 18-month follow-up assessment (i.e., not matched, in a match of 3 months duration or less, in a match of between 3 and 6 months duration, in a match of between 6 and 9 months duration, or in a match of more than 9 months duration), and whether 18-month follow-up data were collected from the participant. It was specified for the classification model to be built using 80% of the observations with known match history status (as described above)—referred to as the training sample, the remainder being reserved as a test sample to see how well the model performed when used to predict match history status for an independent group of observations (i.e., those not used in construction of the model). The classification model correctly classified 96.3 percent of the training sample and 79.7% of the test sample. Among those with unknown match history, the model classified 22.0% as being most likely (i.e., probability of .50 or greater) to have had a match of one year or more. These cases were coded as having a one year or longer match. The rest of this group was coded as not having a match of this length.

Overall, about one-third of the sample (32.7%; $n = 372$) was in the group coded as having had (based on either direct report or predictive analytics) a BBBS mentoring relationship of one year or longer. As expected, those assigned to the treatment group in the original study were

much more likely to have this designation (56.7% of the treatment group; n = 324) than were those assigned to the control group (8.5%; n = 48).

Mentoring relationship quality. The adult survey of participants included a number of questions about their relationship, if any, with a BBBS mentor. One question asked about the length of the relationship (restricting consideration to the period of formal program participation) with response choices as follows: less than 3 months, 3-6 months, more than 6 months but less than a year, one year, and more than one year (in which case a follow-up question asked for the number of years). Another question asked the participant to rate his/her feelings of closeness toward his/her mentor using a visual analog scale in which a response could be indicated anywhere from 0 to 100 using a slider, with anchors of Not at All (0), Somewhat (50), and Extremely (100). For purposes of the present report, we coded a participant as having experienced a high-quality relationship with a BBBS mentor if the relationship was reported to have lasted at least one year and the participant reported having had relatively strong feelings of closeness toward the mentor as indicated by a rating of 75 or higher on the above-referenced scale. A total of 212 of the adult survey respondents reported having had a BBBS mentoring relationship. Of these, 94 participants reported a BBBS mentoring relationship of one year or longer and 81 reported relatively strong feelings of closeness to their BBBS mentor. The reports of 61 participants (43 from the original study treatment group and 18 from the control group) met both criteria and it is this group that was considered to have reported experiencing “high-quality mentoring relationships.”

Post-secondary education (records). To determine the involvement of each participant in the original sample in post-secondary education, a list of participant names and dates of birth was submitted to the Research Center of the National Student Clearinghouse

(NSC; <https://nscresearchcenter.org/>). The NSC gathers data for all types of post-secondary institutions (i.e., two-year and four-year institutions, public and private institutions, and nonprofit and for-profit institutions). The coverage rates of the NSC have improved steadily over time and were notably lower during the time period when participants in the original study would have most likely enrolled in a post-secondary educational institution, which we estimate as 1997 to 2003 (Dynarski, Helmelt, & Hyman, 2015). Established coverage rates for Title IV institutions for the states in which the BBBS agencies involved in the study were located are of particular interest and are summarized below as taken from Dynarski et al. (2015):

- Arizona (Phoenix agency): .119 (1997) to .480 (2003);
- Kansas (Wichita agency): .273 (1997) to .809 (2003);
- Minnesota (Minneapolis agency): .324 (1997) to .764 (2003);
- New York (Rochester agency): .784 (1997) to .862 (2003);
- Ohio (Columbus agency): .695 (1997) to .884 (2003);
- Pennsylvania (Philadelphia agency): .792 (1997) to .895 (2003); and
- Texas (Houston and San Antonio agencies): .411 (1997) to .711 (2003).

Current analyses make no attempt to adjust for differences in coverage rate across location or time and thus the findings reported should be regarded as preliminary pending future planned analyses that incorporate such adjustments. Each participant's involvement in post-secondary education was coded as 0 (none indicated); 1 (record of attendance but not graduation); or 2 (record of graduation – i.e., receiving a 2- or 4-year degree).

Adult arrests (records). The adult arrest history of each participant in the original sample was determined through searches conducted using Accurant. For each of these participants, a Criminal Records report was run. If the report indicated any arrests, this information was coded

and entered in a secure database using the REDCap system at the first author's institution. Accurint draws information from the Department of Corrections, court records, and arrest logs within each state (including the District of Columbia) to the extent that these are publicly available. Only three states do not have information included from any of these sources (Delaware, South Dakota, and Wyoming) and none of these are states in which BBBS agencies were located for the original study. The degree of which coverage of arrests is comprehensive within each state, however, is not known and is likely to vary over time. For the level of access obtained for the current research, Accurint also does not include any records of Federal arrests. These limitations should be kept in mind in considering the findings obtained for adult arrest outcomes in this report. For the current analyses, adult arrests were represented using three variables that indicated whether the participant had one or more arrests as an adult for a property- or person-related offense, respectively, as well as the participant's total number of arrests for any type of offense.

Juvenile arrest. The adult survey included a question asking the respondent to indicate if he or she had been arrested prior to turning 18 years old.

Employment. The adult survey included a question asking the respondent to indicate how many total hours he or she currently worked each week for pay. Response choices were as follows: I do not currently work for pay, Less than 10 hours, 10, 11-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44.

Problem behavior/justice system involvement. The adult survey included questions asking about the frequency with which the respondent had engaged in each of three different types of problem behaviors since turning 18 years old: physical fighting where you wanted to hurt someone; damaging public or private property on purpose; stealing or trying to steal

something. Response options were as follows: none, 1 time, 2-3 times, 4-5 times, and more than 5 times. Another question asked respondents if they had been arrested since turning 18 years old.

Social-emotional well-being. The adult survey included standardized multi-item scales assessing each of the following constructs:

- Grit (Short Grit Scale; Duckworth & Quinn, 2009; coefficient alpha for this sample [α] = .73).
- Perceived Stress (Short Form Perceived Stress Scale; Warttig et al., 2013; α = .73)
- Depressive symptoms (3 items from the [CDC Healthy Days Measure: Health Related Quality of Life: HRQOL](#), with open-ended response format of the original measure adapted to a Likert format for ease of responding; α = .89).
- Emotional well-being (same-named subscale of the Mental Health Continuum Short Form [MHC-SF], Lamers et al., 2011; α = .87).
- Psychological well-being (same named subscale of the MHC-SF; α = .74)
- Social well-being (same named subscale of the MHC-SF; α = .63).

Health. The adult survey included a question asking the respondent to report on his or her overall health (“How is your health?”), taken from the [CDC National Health Interview Survey](#). Response options for the question are as follows: very poor, poor, fair, good, and very good. The adult survey also included questions that permitted assessment of each of the following substance use behaviors: current smoking (yes/no), number of instances of drinking 5 or more alcoholic beverages (or 3 more in the case of women) on a single occasion as an adult, use of marijuana as an adult (yes/no), and use of illegal drugs (other than marijuana) as an adult (yes/no). Two additional questions taken from the [Add Health Study Wave IV assessment instrument](#) with minor adaptation also asked the respondent to report how often alcohol and drug

use, respectively, had interfered with his or her responsibilities at work or school. These questions had 3 response options: never, once, and more than once. Responses to the two items were averaged to yield a single index of substance use problems ($\alpha = .63$).

Analyses

Primary analyses conducted to date have examined: a) one-year match history status (i.e., the dichotomous variable described above, derived from multiple information sources as well as predictive analytics, indicating whether or not a participant had a match relationship of one year or longer) as a predictor of the records-based post-secondary education and adult arrest outcomes; and b) retrospective reports of mentoring relationship quality (i.e., strength and duration, as described above) as predictors of outcomes assessed using adult survey responses. In addition to these primary analyses, supplementary intent-to-treat analyses have been conducted in which treatment group assignment in the original study was examined as a predictor of each of the outcomes considered in the primary analyses. The covariates used in these analyses were the same as those used in the corresponding primary analyses for the same outcomes (see below). For the records-based outcomes, interactions between treatment group assignment and the same participant characteristics (e.g., gender) tested for interactions with mentoring in primary analyses were also investigated. Interactions with treatment group assignment were not explored for the outcomes based on adult survey responses in view of the large number of these outcomes and the general absence of significant interactions in findings from the primary analyses for these outcomes.

One-year match history status as a predictor of records-based outcomes. In the first group of primary analyses, binary logistic regression was used to examine one-year match history status as a predictor of the post-secondary education outcomes and those indicating

whether or not the participant had arrests for a property and person offense, respectively. To predict total number of arrests, a negative binomial model was used (this model was used rather than a Poisson model, which is also appropriate for prediction of outcomes in the form of counts, because the dispersion factor was indicated to be significantly greater than 1).

A wide range of baseline measures from the original study's dataset were included as covariates in these analyses. The primary purpose of the covariates was to control for bias that could be introduced by confounding of match history status with baseline measures. A secondary purpose was to improve precision and thus increase statistical power for detecting associations between match history status and the outcomes of interest. The covariates included are as follows:

- BBBS agency (8-category nominal variable)
- Youth age^d
- Youth gender^d
- Youth race/ethnicity (minority vs. White)^a
- Youth physical disability^{ad}
- Youth learning disability^{ad}
- Youth significant health problems^{ad}
- Youth involvement in counseling^{ad}
- Youth history of emotional abuse^{ad}
- Youth history of physical abuse^{ad}
- Youth history of sexual abuse^{ad}
- Death of parent^{ad}
- Divorce of parents^{ad}

- Arrest of youth or family member^{ad}
- Other trauma^{ad}
- Youth history of involvement in criminal justice system^{ad}
- History of substance abuse of a family member^{ad}
- History of domestic violence in family^{ad}
- History of serious injury of youth or significant other^{ad}
- Parent's relationship to youth (5-category nominal variable)
- Parent age^d
- Parent gender^{ad}
- Parent employment status (5-category nominal variable)^c
- Parent low educational attainment (less than high school diploma or GED)^a
- Low household income (\$10,000 or less for past year)^a
- Family receiving public aid^{ac}
- Parents' relationships status (6-category nominal variable)^d
- Number of siblings^b
- Number of adults in the home^b
- Urban neighborhood^a
- Source of referral to BBBS (8-category nominal variable)^c
- Youth referred at intake to other services^d
- Anticipated benefits from participation in BBBS (set of 12 dichotomous variables)^d
- Youth history of previous match through BBBS^a
- Youth current relationship with a non-parental adult outside the home^a
- Number of BBBS activities participated in prior to baseline interview^b

- School absences^b
- School grades^b
- History of repeating a grade in school^{ab}
- Global Self-Worth scale of Self-Perception Profile (SPP; Harter, 1985)^b
- Scholastic Competence scale of SPP^b
- Social Acceptance scale of SPP^b
- Athletic Competence scale of SPP^b
- Behavioral Conduct scale of SPP^b
- Mastery and Coping scale of Self-Image Questionnaire for Young Adolescents
(Petersen, Schulenberg, Abramowitz, Offer, & Jarcho, 1984)^b
- Intimacy in Communication scale of the Features of Children's Friendship Battery
(FCFB; Berndt & Perry, 1986)
- Instrumental Support scale of FCFB^b
- Emotional Support scale of FCFB^b
- Conflict scale of FCFB^b
- Relationship inequality scale of FCFB^b
- Parent-child relationship - Trust scale of the Inventory of Parent and Peer Attachment
(IPPA; Armsden & Greenberg, 1987)^b
- Parent-child relationship – Communication scale of IPPA^b
- Parent-child relationship – Anger and Alienation scale of IPPA^b
- School value scale - adapted from the School Value Scale (Berndt & Miller, 1990)^b
- Organized out-of-school-time activities^b
- Number of problem behaviors^b

^aDichotomous measure. ^bYouth interview. ^cParent interview. ^dInformation obtained by case manager at program intake.

To account for the varying levels of uncertainty in determining match history (i.e., BBBS mentoring relationship of one year or longer) for the portion of the sample without direct reports of this information, analyses were weighted by the estimated probability of the designation provided for each of these participants (see earlier description of the analyses used to determine match history for those without available data). To provide an indication of the magnitude of associations found, odds ratios are reported.

In addition to testing for one-year match history as a predictor of post-secondary education and adult arrest outcomes at the level of the full sample, analyses also tested for interactions between one-year match history and each of the following demographic variables: participant age, participant gender, participant race/ethnicity, parent low education (post-secondary education outcomes only), household low-income (adult arrest outcomes only), and urban neighborhood. A three-way interaction also was tested for participant gender and race/ethnicity with one-year match history and removed if not evident prior to testing the other lower-order interactions. Any interactions that were evident were followed up appropriately (Aiken & West, 1991).

Experiencing a high-quality mentoring relationship as a predictor of outcomes assessed via the adult survey. In the second group of primary analyses, report of a high-quality mentoring relationship (as described previously) was examined as a predictor of outcomes assessed via the adult survey. Binary logistic regression analyses were conducted for dichotomous outcomes and ordinary least squares regression analyses were conducted for continuous outcomes. To provide an indication of the magnitude of the associations found, odds

ratios are again reported for dichotomous outcomes; for continuous outcomes, standardized mean differences (*d*) are reported, computed as the unstandardized prediction coefficient (i.e., difference in model-estimated means for those reporting and not reporting a high-quality mentoring relationship) divided by the pooled standard deviation of the measure.

For the most part, the same baseline measures from the original study dataset included as covariates in the analyses predicting the records-based outcomes were used as covariates in these analyses. However, in view of the smaller sample size for these analyses, it seemed prudent to pare down the number of covariates somewhat to help avoid possible difficulties stemming from over-parameterization. The covariates excluded were as follows: parent-report of referral source for the BBBS program, a nominal variable consisting of 8 categories and thus requiring 7 dummy variables to represent; parental employment status, a nominal variable consisting of 7 categories and thus requiring 6 dummy variables to represent; and the set of 13 dichotomous variables representing the case manager's assessment of different reasons why the youth had the potential to benefit from BBBS program participation. None of these variables exhibited significant associations with whether a participant reported a high-quality mentoring relationship, and there was also no a priori reason for expecting any of them to exhibit important associations with the outcomes being predicted, conditional on the other included covariates. Interactions between report of a high-quality mentoring relationship and the following demographic variables were examined: participant age, participant gender, and participant race/ethnicity. Other interactions examined in the prediction of records-based outcomes were not tested due to limitations in sample size (i.e., too few participants in different subgroups).

Results

One-year Match History Status Predicting Post-Secondary Education and Adult Arrests

Post-secondary education. Approximately one-third of the original study sample (34.9%) had a record of involvement in post-secondary education. A much smaller portion of the sample had a record of earning a post-secondary degree (12.4% of the overall sample), with the remainder having a record only of attendance (22.5% of the overall sample).

Post-secondary attendance. One-year match history status (referred to subsequently in this section of the report as OYMHS) did not reach or approach a conventional level of significance (i.e., p -value was greater than .10) as a predictor of post-secondary attendance (adjusted odds-ratio [OR] of 1.26, $p = .15$). There was, however, a significant interaction of OYMHS with parent low education attainment in predicting this outcome ($p < .05$) and a marginally significant (this term and the phrase “approached significance” are used in this report for findings with p values less than .10 but not less than .05) OYMHS x racial/ethnic minority status interaction ($p < .10$). Follow-up analyses revealed that OYMHS was a significant predictor of post-secondary attendance both among participants with low parent educational attainment (OR = 2.31, $p < .05$) and among racial/ethnic minority youth (OR = 1.62, $p < .05$).

Post-secondary degree. OYMHS did not reach or approach statistical significance as a predictor of receiving a post-secondary degree (OR = 1.11, $p = .67$). There was, however, a significant interaction of OYMHS with participant age in predicting this outcome ($p < .05$) as well as a significant OYMHS x gender x race/ethnicity interaction ($p < .05$). Follow-up analyses revealed that OYMHS was a marginally significant predictor of greater likelihood of receiving a post-secondary degree when participants were relatively young (-1 SD below the sample mean, which corresponds to 10.90 years old at baseline of the original study; OR = 1.87, $p < .10$) and a

marginally significant predictor of less likelihood of this outcome among White female participants (OR = 0.32, $p < .10$).

Adult arrests. Nearly 1 in 5 participants in the original study sample (18.2%) had a record of arrest for a property offense. A slightly smaller proportion had a record of arrest for a person offense (14.7%). Approximately 1 in 4 (26.4%) had a record for at least one of these types of offenses.

Arrest for property offense. OYMHS did not reach or approach statistical significance as a predictor of adult arrest for a property offense (OR = 0.78, $p = .23$). There were, however, significant interactions of OYMHS with participant gender ($p < .01$) and participant race/ethnicity ($p < .001$) in prediction of this outcome. Follow-up analyses revealed that OYMHS was a significant predictor of a lower likelihood of adult arrest for a property offense among female participants (OR = 0.36, $p < .05$) and among racial/ethnic minority participants (OR = 0.42, $p < .01$). In addition, among White participants, OYMSH was a marginally significant predictor of a *greater* likelihood of this type of arrest (OR = 1.91, $p < .10$).

Arrest for person offense. OYMHS did not reach or approach statistical significance as a predictor of adult arrest for a person offense (OR = 1.08, $p = .75$). There was, however, a significant interaction of OYMHS with participant race/ethnicity ($p < .05$) and residence in an urban neighborhood ($p < .05$) in prediction of this outcome. Follow-up analyses revealed that OYMHS reached and approached significance, respectively, as a predictor of greater likelihood of adult arrest for a person offense among White participants (OR = 2.24, $p < .05$) and those living in non-urban neighborhoods (OR = 2.48, $p < .10$), respectively.

Total number of offenses. OYMHS was a significant predictor of fewer total number of offenses during adulthood ($b = -.251$, $p < .05$). There was also a significant interaction with

participant race/ethnicity ($p < .05$) in prediction of this outcome. Follow-up analyses revealed that OYMHS was a significant predictor of fewer offenses among racial/ethnic minority participants ($b = -.546, p < .01$).

Experiencing a High-Quality Mentoring Relationship as a Predictor of Outcomes Assessed Via the Adult Survey

Juvenile arrest. Report of a high-quality mentoring relationship (referred to also in the text that follows as “HQMR”) was a significant predictor of a reduced likelihood of reporting arrest as a juvenile ($OR = 0.11, p < .01$). Among those reporting a HQMR, 20% reported a juvenile arrest, whereas the corresponding percentage among those not reporting a HQMR was 29.2%.

Employment. HQMR did not reach or approach statistical significance as a predictor of hours currently working for pay ($b = .059, p = .91, d = .02$).

Problem behavior/justice system involvement. HQMR was a significant predictor of reports of less stealing during adulthood ($b = .418, p < .05, d = .40$), but did not reach or approach significance as a predictor of property damage ($b = .022, p = .84, d = .03$), fighting ($b = .088, p = .62, d = .07$), or arrest ($OR = 0.54, p = .16$) during adulthood.

Social-emotional well-being. HQMR was a significant predictor of higher levels of self-reported grit ($b = .187, p < .05, d = .29$). There also was a marginally significant interaction with gender in prediction of this outcome ($p < .06$), with HQMR a significant predictor of greater grit among females, ($b = .363, p < .01, d = .62$). HQMR did not reach or approach statistical significance as a predictor of perceived stress ($b = -.194, p = .11, d = .23$) or depressive symptoms ($b = -.198, p = .20, d = .18$), HQMR was, however, a significant predictor of greater reported emotional well-being ($b = .411, p < .01, d = .47$), psychological well-being ($b = .521, p$

$< .01, d = .47$), and social well-being ($b = .421, p < .01, d = .48$).

Health. HQMR was a marginally significant predictor of better self-reported health ($b = .213, p < .10, d = .27$). HQMR did not reach or approach statistical significance as a predictor of current smoking use ($OR = 1.01, p = .99$), either marijuana use ($OR = 0.99, p = .99$) or illegal drug use ($OR = 0.56, p = .34$) during adulthood, or interference of substance use with work or school responsibilities ($b = -.121, p = .14, d = .24$). HQMR was, however, a significant predictor of less alcohol use during adulthood ($b = -.472, p < .05, d = .34$).

Summary of Findings from Primary Analyses

The main findings of interest from the primary analyses are summarized in Table 1. It can be seen that mentoring (either OYMHS or HQMR) exhibited a statistically significant association with 8 of the 22 outcomes at the level of the full sample that was available for analysis of the outcome and approached statistical significance ($p < .10$) for one additional outcome. In all of these instances the association was in the direction of mentoring being associated with a more favorable status on the outcome. Associations of mentoring for specific subgroups, as determined by follow-up of interactions that reached or approached statistical significance between mentoring and a participant demographic or background characteristic, were evident for all five of the outcomes assessed based on records and for one of the outcomes assessed using the adult survey. These associations were primarily, but not exclusively, also in a favorable direction (i.e., mentoring was associated with more desirable levels of the outcome).

<i>Table 1. Summary of Findings of Interest from Primary Analyses Examining Mentoring Relationships as Predictors of Outcomes</i>		
	<i>Associations with Mentoring</i>	
<i>Outcome</i>	<i>Full sample</i>	<i>Subgroups^a</i>
<i>One-Year Match History Status</i>		
Post-secondary attendance	No	Participants with low parental education Racial/ethnic minorities
Post-secondary degree	No	Younger participants [†] (White females [†])
Property offense	No	Females Racial/ethnic minorities (Whites)
Person offense	No	(Living in non-urban neighborhood [†]) (Whites)
Total number of offenses	Yes	Racial/ethnic minorities
<i>High-Quality Mentoring Relationship</i>		
Juvenile arrest	Yes	
Current hours worked	No	
Adult stealing	Yes	
Adult property damage	No	
Adult fighting	No	
Grit	Yes	Females
Perceived Stress	No	
Depressive symptoms	No	
Emotional well-being	Yes	
Psychological well-being	Yes	
Social well-being	Yes	
Self-rated health	Yes [†]	
Adult alcohol use	Yes	
Current smoking	No	
Adult marijuana use	No	
Illicit drug use	No	
Substance use interference with work or school responsibilities	No	
<p><i>Note.</i> Findings are statistically significant ($p < .05$) unless otherwise noted with the relevant superscript ([†]). Findings are in the direction of mentoring predicting more favorable status on the outcome unless enclosed in parentheses in which case the finding is in the direction of less favorable status on the outcome in association with mentoring.</p> <p>^aThe subgroups listed are those for which an association with the outcome was evident in follow-up analysis of an interaction with the relevant variable (e.g., participant gender in the case of male and female subgroups).</p> <p>[†]$p < .10$.</p>		

Supplementary Intent-to-Treat Analyses

As noted previously, the substantial number of control group participants who did receive mentoring following the study suggested that the supplemental intent-to-treat analyses were unlikely to yield significant findings. Although generally found to be true, there were, as was also noted previously, a few exceptions. All of these findings involved prediction of the records-based outcomes. Specifically, there was a marginally significant interaction of treatment group assignment with parent low education attainment in predicting post-secondary attendance ($p < .10$). Follow-up analyses revealed that among participants with low parent educational attainment, assignment to the treatment group (rather than wait-list control group) was a marginally significant predictor of greater likelihood of post-secondary attendance (OR = 1.81, $p < .10$). At the level of the full sample, assignment to the treatment group also was marginally significant as a predictor of greater likelihood of receiving a post-secondary degree (OR = 1.50, $p = .06$). In addition, there were marginally significant and significant interactions of treatment group status with racial/ethnic minority status ($p < .10$) and residence in an urban neighborhood ($p < .05$) in prediction of this outcome. Follow-up analyses indicated that assignment to the treatment group was predictive of greater likelihood of receiving a post-secondary degree among White study participants (OR = 2.54, $p < .01$) and among those living in an urban neighborhood (OR = 2.11, $p < .01$). There also was a treatment group assignment x gender interaction in prediction of having an arrest for a property offense as an adult ($p < .05$), with treatment group assignment predictive of *greater* likelihood of a property offense among male study participants (OR = 1.68, $p < .05$). Treatment group assignment did not reach or approach statistical significance as a predictor of any of the outcomes assessed with adult survey responses.

Discussion

Overall, the results of the analyses conducted to date suggest that one-to-one mentoring relationships between youth and adult volunteers through the BBBS CBM program, at least those that satisfy basic criteria for quality (particularly the minimum expected duration of one year), can be of enduring benefit to youth as they transition into adulthood. As in evaluations of shorter-term effects of formal mentoring programs (DuBois et al., 2011; Tolan et al., 2014), including the P/PV randomized controlled trial that provides the foundation for the current research (Tierney et al., 1995), outcomes for which benefits are evident extend across multiple domains: education/academics, problem behavior, social-emotional functioning, and health. In addition, the magnitude of these associations is comparable—or greater—than those reported in the literature on shorter-term effects (DuBois et al., 2011; Tolan et al., 2014). These observations, however, must be tempered with several important qualifications. These include the non-experimental nature of the findings (i.e., they do not involve a comparison between persons who were randomly assigned to receive BBBS mentoring or not), the incompleteness of direct information on what portion of participants in the original sample experienced a BBBS mentoring relationship and, if so, for what duration and of what subjective quality, and the availability of outcomes assessed by adult survey data for only a limited portion of the sample.

The results of tests for subgroup differences in associations between mentoring and outcomes must be interpreted with additional caution in view of the relatively small sizes of the groups involved and the substantial number of tests conducted. One intriguing pattern suggested by these findings, however, is that receipt of mentoring as operationalized in the present analyses appears to exhibit differentially strong associations with outcomes for subgroups that absent supportive intervention are known to be prone to less favorable outcomes in the areas involved.

This includes post-secondary attendance and justice system involvement in the case of racial/ethnic minority group members (e.g., Henderson & Baffour, 2016) and post-secondary degree completion in the case of participants whose parents had a low level of formal education (i.e., less than completion of high school or equivalent; Putnam, 2015). It is perhaps noteworthy, too, that mentoring showed a particular strong association with grit (self-reported perseverance in pursuit of goals) among female participants given their increased likelihood of encountering both negative messages concerning their abilities and institutional and other barriers when pursuing their aspirations (e.g., Turner & Maschi, 2014).

Clearly, too, the associations that have emerged in analyses to date between mentoring as assessed in this research and poorer outcomes in the areas of post-secondary education and adult arrests merit further investigation. These findings in all cases involved White participants. Any possible explanations that are posited for this trend must be regarded as highly speculative. One avenue worthy of exploration, however, could be to consider the potential for mentoring as provided through programs such as BBBS to have the potential to contribute to negative change on one or more mediators of longer-term educational and justice system outcomes among White youth. Illustratively, through the experience of receiving mentoring in the BBBS program, White youth likely had greater exposure than they otherwise would have to those living in better economic and other material circumstances. This, in turn, for some might have engendered increased frustration and sense of inequity regarding one's economic circumstances as an adult, potentially thereby enhancing susceptibility to rationalizing illegal behavior on this basis. Similar dynamics might not be as operative for racial/ethnic minority group members and also could be offset by salutary mechanisms with less relevance to White participants such as mentoring-facilitated reductions in stereotype threat in the case of educational attainment (Sanchez, 2014).

To strengthen future analyses with the dataset involving records-based outcomes (post-secondary education and adult arrest), we will continue efforts to obtain match history information from the parents of the original study participants for whom this information is not available from another source (e.g., agency records, adult survey). As efforts to collect this information from parents were initiated relatively late in the project period, it is likely that there are a significant number of additional participants for whom we will be able to obtain this information. Efforts to obtain adult survey data will also continue. In view of the relatively extensive efforts already made to obtain these data, it is anticipated that at most a relatively small number of additional completed surveys will be obtained. Nonetheless, even a modest increase in the currently available number of respondents would be of value for adding to the robustness of the analyses of these data.

Several priorities exist for future analyses. One is to explore the viability of using an instrumental variable approach, also referred to as complier average causal effect (CACE) analysis, to increase the robustness of findings to potential bias attributable to mentored status being confounded with unmeasured (i.e., not captured by covariate measures) influences on outcomes. The random assignment design of the original study is well-suited to this approach (see, e.g., Bayer et al., 2015). However, CACE methods have less precision (i.e., larger standard errors) than standard analytic methods such as those used in this report especially when the association between random assignment and the predictor of interest (in the present context, mentored status) is only moderate as is the case for these data (e.g., the correlation between treatment status and one-year match history status is $r = .51$ and with high-quality mentoring relationship is $r = .21$). It is also unclear whether all necessary assumptions for the CACE approach are met in the current dataset. For example, this approach assumes that random

assignment to treatment has no effects on the outcomes of those who do not comply with treatment (in this context, those who do not receive the specified type of mentoring relationship); however, considering the possible demoralizing effects of both having not been matched with a mentor when one was anticipated and having a less than ideal relationship, such as one that ends prematurely (Grossman & Rhodes, 2002), this assumption may well not be met for the current sample. Recent advances in CACE methods may be useful in addressing these types of concerns (see, e.g., Connell, 2009) and will be consulted in exploring the viability of this approach with the current data.

A second priority is to investigate whether lower rates of juvenile arrest mediate other outcomes assessed on the adult survey as posited in the conceptual model described earlier in this report (Figure 1). Mediation is most plausible for outcomes that exhibit overall associations with reports of a high-quality mentoring relationship (e.g., adult alcohol use). It is possible, though, with other outcomes (e.g., adult arrest), if the residual portion of the association between mentoring and the outcome is in a countervailing direction (Shrout & Bolger, 2002).

A third priority is to more thoroughly investigate subgroup differences in associations between mentoring and outcomes of interest. Present analyses examined only a limited number of factors that theory and/or research suggest could be important in moderating effects of mentoring on adult outcomes. Analytic approaches that are suitable to comprehensively assessing datasets for interactions while guarding against chance findings will be well-suited to this task (see, for example, Loh, 2002).

We are also planning three additional sets of analyses using external data or data that were collected as part of the study, but were not discussed here. First, we will use the estimated impacts from the study to conduct a cost-benefit analysis assessing the long-term dollar value of

BBBS CBM. Second, we are collaborating with Renee Spencer to conduct qualitative analyses of participants' open-ended recollections of how their mentoring relationships affected their lives, as part of the adult survey. Third, we are developing a collaboration with a researcher at Harvard University in which we will link the current dataset (including the original P/PV dataset) with data from the Internal Revenue Service. This will allow us, among other possibilities, to: (1) examine whether mentoring has long-term effects on participants' source of employment and earnings; and (2) obtain more complete data on post-secondary education.

The current research offers perhaps the first rigorous investigation of the possible effects of a prototypic one-to-one volunteer-based mentoring program on longer-term outcomes extending into adulthood. Its findings, both those currently reported and those forthcoming, add significantly to existing understanding of the outcomes for which such effects may occur and their potential magnitude. They also promise to enhance understanding of both the profiles of youth for whom mentoring received through programs such as BBBS is most likely to yield lasting dividends as well as the relationship characteristics and intervening processes that are most likely to give rise to longer-term benefits. Ultimately, however, due to inherent limitations of the available data, the paucity of evidence from prior research to draw on for comparison, and the constraints of what any single study can offer in the way of definitive evidence, the findings reported through this work seem best suited to serve as a stimulus and guide for further investigation of longer-term benefits of program-supported volunteer-based mentoring relationships made available and supported through BBBS and other similar programs. The authors of this report, for example, have recently initiated a new randomized controlled trial of the BBBS CBM program that will be following approximately 2,500 participants for 4 years. The reduced likelihood of control group participants later being matched with BBBS mentors

given the substantially longer study period as well as the study's considerably larger projected number of participants augur well for longer-term follow-up with this sample to be able to both build on and extend the findings of the current research.

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