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Cost-benefit Analysis of Enhanced Mentoring for Delinquency Prevention

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Cost-benefit Analysis of Enhanced Mentoring for Delinquency Prevention

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Abstract

Youth with certain risk factors (e.g., from a minority group, low-income status, previous contact with the juvenile justice system) are particularly at risk for juvenile delinquency and associated problems (e.g., school failure, mental health problems). In addition, these problems are quite costly to youth, their families, and society as a whole. Mentoring programs have shown modest, but consistent, effects in the prevention and reduction of juvenile delinquency and associated problems. Previous research has identified promising enhancements (i.e., advocacy/teaching roles for mentors, rigorous match processes, comprehensive mentor training, ongoing mentor support) that may increase the effectiveness of mentoring in producing positive outcomes, and it is an important next step to evaluate the costs and benefits of these enhancements to determine their feasibility in community settings. The current study utilizes cost-benefit analysis via the Washington State Institute for Public Policy (WSIPP) to analyze results from a national demonstration trial of mentoring that incorporates promising enhancements. Results of the cost-benefit analysis indicated a total benefit (i.e., avoided expense) of -$16 for enhanced mentoring over business as usual mentoring. Results of the cost-benefit analysis indicated a benefit-cost ratio of -0.24, where every dollar spent on enhanced mentoring resulted in a loss of $0.24. Barriers to implementation may have influenced the economic benefit of the current intervention. Policymakers, intervention developers, and stakeholders should consider factors that influence the economic impact of interventions, particularly in diverse community settings when selecting and implementing programs that target juvenile delinquency and its associated problems.

Keywords: mentoring, delinquency, prevention, adolescents, economic analysis

Table of Contents

Introduction

Children and adolescents exposed to certain environmental and individual risk factors are more likely to engage in juvenile delinquency, which is associated with other problems, including mental illness, substance use, and persistent delinquent behavior (Blevins, 2016; Hasking, Scheier, & Abdallah, 2011; Kazdin, 1993). In 2015, juveniles accounted for approximately 9% of all arrests (Federal Bureau of Investigation, 2015), including 10% of all violent crimes (e.g., murder, non-negligent manslaughter, rape, and aggravated assault). Although rates of juveniles engaged in delinquent behavior have declined in recent years (Federal Bureau of Investigation, 2015), the United States maintains the highest incarceration rate of any developed country (National Research Council, 2014). Furthermore, 30-60% juveniles who engage in delinquent behavior are likely to continue committing crimes into adulthood (Le Blanc & Fréchette,1989), and this likelihood increases significantly in juveniles who begin offending in early adolescence to middle adolescence (Loeber & Farrington, 2001). Indeed, Stouthamer-Loeber (2010) found approximately 57% of juvenile delinquents continuing to engage in crime throughout early adulthood.

With the increased likelihood of continued criminal behavior for early adolescents, prevention efforts are imperative to reduce the impact of juvenile crime and associated problems, including higher rates of school drop-out, lower occupational attainment, and increased health problems (Bushway, Stoll, & Weiman, 2007; Golzari, Hunt, & Anoshiravani, 2006; Nagin & Waldfogel, 1995). Moreover, the associated economic burden for these issues is immense, with the lifetime economic impact for a single youth who at risk for engaging in juvenile delinquency estimated at a current value of 3.03 million after converting to 2017 dollars to adjust for inflation using the Consumer Price Index (Bureau Labor of Statistics, 2017) due to expenses related to

justice system costs (e.g., incarceration), victim costs (e.g., stolen property, medical bills), and costs to criminals (e.g., lost wages, legal fees; Cohen, 1998). To reduce the social and economic impact of crime, it is imperative to develop interventions that effectively prevent juvenile delinquency and are supported by policymakers, families, and community stakeholders.

Economic Impact of Juvenile Delinquency and Associated Problems

Juvenile delinquency and associated problems are taxing interpersonally as well as financially, with each outcome presenting unique financial challenges. Juvenile offenders tend to continue engaging in such behavior into adulthood (Odgers et al., 2008), leading to significant individual (e.g., legal fees, lost wages), victim (e.g., value of stolen property, medical care, loss of life), and societal expenses (e.g., for legal investigation, prosecution, incarceration). Criminal and other serious antisocial behavior by youth are cause for serious concern to perpetrators, victims, and society as a whole. In sum, interventions that prevent the development of these problems are likely to be emotionally, mentally, and financially beneficial to youth, their families, crime victims, and society as a whole.

In the general population, behavioral health (mental health and substance use) problems also have considerable economic impact on children, families, and society. Specifically, these problems result in approximately $247 billion in expenses in the form of health service utilization, lost productivity, and increased crime-related expenses (O'Connell, Boat, & Warner, 2009). Indeed, a study by Costello and colleagues (2000) estimated expenditures on behavioral health treatment for adolescents alone to be 12.3 billion, with treatment provided by the juvenile justice system accounting for 16% of the cost (approximately 2 billion). In terms of mental health specifically, children with mental illness also incur more expenses from a societal perspective through increased healthcare visits, school absenteeism, and continued required

mental health care (O'Connell et al., 2009). This is especially important to note in youth who engage in delinquent behavior. The prevalence of mental illness is already great among youth in general, with 20% of youth in the general population meeting criteria for a mental health diagnosis (Merikangas, 2010). Even more so, prevalence rates rise for juveniles who engage in delinquent behavior, with between 65-70% meeting criteria for a mental health diagnosis and over 60% meet criteria for three or more diagnoses (Shufelt & Cocozza, 2006). Overall, mental illness is strikingly prevalent in youth who engage in delinquent behavior and subsequently incurs significant financial expenses.

Another overall aspect of behavioral health is substance use. These costs are presented separately from mental health costs due to the historical division of the two issues into separate service systems (Elliot, Huizinga, Menard, 2012). Substance use has numerous negative impacts on youth, with links to poor school performance, negative health problems, and an increased likelihood of alcohol, tobacco, or other substance use disorders in adulthood (Grant et al., 2006). Furthermore, early to middle adolescence is a particularly vulnerable time for initiation of substance use, as peer relations become increasingly valued during that developmental period and peer substance use is one of the strongest predictors of initiation of use (Dishion & Owen, 2002; Kiesner, Poulin, Dishion, 2010; Prinstein & La Greca, 1999). Relatedly, adolescence is a particularly vulnerable neurobiological period (Fuhrman, Knoll, & Blakemore, 2015), and initiated or sustained high levels of substance use may lead to future issues due to the impact of substance use on the developing brain (Chassin, Pitts, & Prost, 2002). The economic impact of substance use is of significant concern, as tobacco, alcohol, and illicit drug use accounts for 740 million due to crime costs, lost productivity, and negative health problems (National Institute on Drug Abuse, 2017). Moreover, substance use is more prevalent in a juvenile population than the

general population, with the most commonly diagnosed conditions in juveniles beyond disruptive behavior disorders (e.g., conduct disorder) including ADHD, trauma-related disorders, depression, anxiety, and substance use disorders (Fazel, Doll, & Långström, 2008). Approximately 10% of juveniles meet criteria for a substance use disorder (Grisso, 2008; Teplin, Abram, McClelland, Mericle, & Dulcan, 2006). In turn, approximately 14.4 billion is spent on substance use programs in the juvenile justice system annually. Overall, the risk of initiating substance use in adolescence, serious associated problems, and significant financial impact of substance use are cause for concern in youth at risk for juvenile delinquency.

Due to the significant economic burden of delinquency and associated problems, it is essential to identify prevention strategies that produce a positive economic benefit in tandem with meaningful clinical effects. Youth at risk for delinquency are at a higher likelihood of developing a variety of costly problems (mental health problems, substance use, adult criminality), and thus policymakers, community stakeholders, and intervention developers are working to develop and disseminate evidence-based preventative interventions that target these problems (Pardini, 2016; Welsh, Farrington, Gower, 2015). It appears that incarceration is not an effective or inexpensive solution, as incarcerated youth are more likely to recidivate (Gendreau, Gogin, Cullen, & Andrews, 2000), and a lack of decrease in delinquency and crime when expenditures on juvenile incarceration are increased (Petteruti, Walsh & Velazquex, 2009). Indeed, diverting one youth from a trajectory of delinquency and crime produces enormous financial benefits, estimated between 2.6 and 4.4 million lifetime benefits (Cohen & Piquero, 2009). These efforts are consistent with a public preference for prevention programs for youth over increased spending on police presence, prisons, and drug treatment (Cohen, Rust, & Steen, 2006), including taxpayer willingness to pay for such programs with public funds (Nagin et al.,

2006), and stand in contrast to continued federal financial support of more punitive responses to juvenile delinquency (Finklea, 2016). In sum, preventative interventions that are both clinically and economically beneficial are likely to be supported by policymakers and the public and are essential to reducing the burden of juvenile delinquency and associated problems.

Mentoring Interventions to Prevent Juvenile Delinquency

Mentoring may be an ideal preventative intervention for youth at-risk of engaging in juvenile delinquency and may lessen the impact of associated problems (Dubois 2002; Grossman & Garry, 1997; Rhodes 1994). Mentoring is a well-known and widely used intervention aimed to increase social support for children and adolescents, with over 4.5 million youth currently in a structured mentoring relationship in the United States (Bruce & Bridgeland, 2014). As mentoring is accessible across the nation, relatively inexpensive, community-based, and targets salient risk and protective factors for juvenile delinquency, it is an ideal intervention to reduce risk for problems in adolescents (Grossman & Tierney, 1998).

Definitions of mentoring are highly variable, but all include emphasis on development of an emotional bond between a person of greater experience (i.e., mentor) for the benefit of the recipient (i.e., mentee; Dubois & Karcher, 2005; Rhodes 2002). Mentoring can occur in a variety of contexts and populations, but there are three primary models under the broader umbrella of mentoring (Schwartz, Lowe, & Rhodes, 2012). First, natural mentoring occurs in a pre-existing relationship (e.g., family members, teachers and students) that occurs in a pre-established context (e.g., home, school) and is not facilitated by an external agency. However, natural mentoring is often not an appropriate preventative intervention for juvenile delinquency, given that a key risk factor for delinquency is a lack of positive, older role models (Youngblade, Curry, Novak, Vogel, & Shenkman, 2006). Second, community-based mentoring (CBM) is a relationship,

between an older youth or adult mentor and an at-risk youth mentee, that is facilitated by a community program (e.g., Big Brothers Big Sisters) and takes place in community locations (e.g., a city park, a local restaurant, a community pool) for a minimum of one year (Eby, Rhodes, & Allen, 2007; Herrera, Grossman, Kauh, Feldman, & McMaken, 2007). Finally, school-based mentoring (SBM) is also relationship between a youth mentee and an older student or adult mentor, with matches facilitated by a community program or school district and meetings occurring exclusively in the school context over the course of an academic year (Herrera et al., 2007; Herrera & Karcher, 2013). In all of these mentoring models, social and emotional support is emphasized as key to risk reduction (Schwartz, Lowe, & Rhodes, 2012).

In addition to increasing social and emotional support, mentoring is a strong preventive intervention for problems associated with individual and environmental risk (Cavell & Elledge, 2013). Some prevention programs are universal, meaning they target an entire population as the intervention is beneficial to all (Coie et al., 1993). Although this is certainly an admirable goal, this type of prevention program is often expensive and complex to execute. When a population possesses a clearly identifiable risk above that of the general population, an indicated prevention program targeting individuals at greatest risk may be a more financially feasible option (O'Connell et al., 2009). As mentoring programs show greater clinical effects with youth who have more risk factors for juvenile delinquency (Tolan et al., 2014) a mentoring program that targets youth at elevated risk for delinquency might be the most advantageous intervention to reduce the societal and economic impact of juvenile delinquency.

The efficacy of CBM and SBM programs in reducing negative outcomes (juvenile delinquency, mental illness, substance use) have been demonstrated in several rigorous evaluations (Herrera, Grossman, Kauh, McMaken, 2007; Tierney & Grossman, 2007; Karcher,

2008; Wheeler, Keller, & DuBois, 2010). However, the effects of mentoring interventions are modest and tend to diminish within one year after the conclusion of the mentoring relationship or, in the case of SBM, over the duration of the summer break (Herrera et al., 2011). Additionally, one evaluation found a negative impact of mentoring on youth self-worth, perceived scholastic competence, and alcohol use, specifically when matches were terminated in less than one year (Grossman & Rhodes, 2002), and thus length of match may be an important moderating factor when evaluating a mentoring program. Meta-analytic evidence supports the benefits of both CBM and SBM in producing a number of beneficial, if modest, effects including improved interpersonal functioning (*d*s = 0.09-0.29) and academic performance (*d*s = 0.11-0.13) as well as reduced juvenile offending (*d*s = 0.19-0.21) across studies of diverse youth in terms of background and ages (DuBois, Holloway, Valentine, & Cooper, 2002; Tolan 2008; Wheeler, Keller, DuBois, 2010). The authors posited that the differing results found in these two meta-analyses and other evaluations (Grossman & Rhodes, 2002; Herrera et al., 2011) are due to variations in program characteristics.

A subsequent meta-analytic review of 73 studies of mentoring programs by DuBois and colleagues (2011) also found that mentoring is an effective intervention, especially when desired positive outcomes exist across a variety of domains, including social (*g* = 0.17), emotional (*g* = 0.15), and academic (*g* = 0.21). More critically, this review identified a number of moderator variables that positively influenced the effectiveness of programs, including targeting mentees with greater individual or environmental risks, greater proportions of male mentees, strong fit between mentor and mentor organization goals, comprehensive matching processes, and support of mentors in teaching and advocacy roles (DuBois et al., 2011). A recent mentoring program sought to incorporate enhancements by increasing structured teaching activities and focusing on

mentee talents or interests based on the Step-It-Up-2-Thrive theory of change (Dubois & Keller, 2017). The Step-It-Up-2-Thrive theory of change emphasizes the identification of a "spark" (i.e., a special interest or talent) for youth and subsequent steps to increase growth mindset (i.e., the belief that individual abilities and talents are malleable rather than fixed) and identifications of indicators of success and thriving (Benson, 2008). When compared to youth assigned to traditional mentoring, no significant differences were detected between the groups (Dubois & Keller, 2017). This study highlights the difficulty associated with implementing an intervention that relies primarily on volunteers, as over half of youth in the experimental sample reported limited exposure to enhancements and a majority of mentors did not complete subsequent sessions of post-match training to increase adherence to the identification of sparks and the development of growth mindset. Subsequent analyses revealed that youth who were exposed to more enhancements exhibited a number of gains in positive outcomes when compared to youth with less exposure. The authors posit that increased structure and components to promote adherence may be essential in improving outcomes. In sum, mentoring is an effective intervention for adolescents and the effectiveness appears to be influenced by program, setting, mentor, and mentee characteristics. So, there is promise that understanding the influence of these factors may improve the clinical and economic benefit of mentoring programs under the right conditions.

Methods for Evaluation of Economic Impact

Research evidence supports the possibility of clinical benefits from mentoring programs for adolescents at risk for juvenile delinquency, yet little is known about the economic costs and benefits of these programs. This is unfortunate because it is essential that an intervention have a positive economic impact if a program is ever to be scaled up to achieve broad effects with its

target population and sustained for future use (Proctor et al., 2011). Fortunately, methods are available to investigate this question of economic impact to inform the scaling up and sustainment of interventions.

Economic analysis is a group of methods used to compare the monetary costs and benefits of interventions (Steuerle & Jackson, 2016). There are many forms of economic analysis, but all incorporate some combination of direct costs (e.g., compensation and benefits for mentoring agency staff), indirect costs (e.g., lost wages, value of volunteer mentors' time), and outcomes (e.g., reduced recidivism, reduced depression symptoms; including the associated monetary impact of outcomes). Direct costs can be estimated from financial information including budgets, contracts, and out of pocket expenses. Indirect costs are estimated by the societal value of an asset or activity (e.g., the monetary value of time based on money that could have been earned during volunteer experiences). Benefits are estimated by the calculation of human capital variables (e.g., increased salary over a lifetime), savings to taxpayers and program participants, quality of life variables, and linked outcomes, which are estimated changes in an unmeasured outcome of interest based on change in the measured outcome (e.g., reduced recidivism will reduce the likelihood of dropping out of high school; Aos, Lieb, Mayfield, Miller, & Penucci, 2004). Selection of costs and benefits to include in an economic analysis is based on its perspective, which defines what party is investing money to implement an intervention and what party(ies) reaps the benefits of the intervention (Steuerle & Jackson, 2016). For example, an academic screening program may reduce school dropout rates, but if it is paid for by the local school district while the state obtains the financial benefit of reduced dropouts, the benefits are not received by the funding institution. So, it is important to compare the costs to benefits reaped by the party who incurred the costs.

There are a number of ways to compare the economic costs and benefits of intervention programs (see Steuerle & Jackson, 2016), including cost analysis, cost-effective analysis, and cost-benefit analysis. Cost analysis is a calculation of the total cost of an intervention without considering the benefits, such as the price of a manualized psychotherapy. Cost-effectiveness analysis is a way to assess the cost to achieve a unit of change for an outcome in its natural units. For example, how much symptom reduction is observed for every dollar spent on a manualized psychotherapy for depression? Cost-benefit analysis (CBA) is a form of economic evaluation that compares the costs and benefits of an intervention on a monetary metric. For example, how does the monetary value of improvement in depression symptoms compare to the cost of the manualized psychotherapy? All forms of economic analysis monetize costs, but CBA is unique in that it monetizes benefits (Aos et al., 2004). Because of this, CBA is considered the most powerful form of economic analysis, as it allows for direct comparisons between different interventions across various outcome measures on a common metric (e.g., dollars; Steuerle & Jackson, 2016).

Several studies have evaluated the economics of mentoring programs. In an initial cost analysis, Herrera and colleagues (2007) found an average cost of 987 per youth for school-based mentoring and 1,088 per youth for community-based mentoring. Similarly, Fountain and Arbreton (1999) estimated the cost of mentoring per youth to be 1,114. Though these evaluations provide valuable information regarding the costs of mentoring, they did not examine the return on that investment. To that end, the Washington State Institute for Public Policy (WSIPP) developed a comprehensive cost-benefit model (Aos, Phipps, Barnoski, & Lieb, 2001; WSIPP, 2017b) that has demonstrated reliability and validity and has been used to inform legislative and policy decisions about intervention programs for diverse populations (Lee, Aos, Drake,

Pennucci, & Miller 2012; Lee, Drake, Pennucci, Bjornstad, Edovald, 2012). To address return, WSIPP incorporated the cost estimates from Herrera et al. (2007) into its CBA model and found community-based programs where students met with their mentor weekly to be economically beneficial. Net benefits reached up to $9,601 per participant due to reduced criminal behavior, increased labor market earnings, and decreased healthcare expenses related to educational attainment, despite slightly increased expenses associated with higher education (WSIPP, 2017a). Specific programs included in this analysis consisted of Big Brothers Big Sisters, Washington National Mentors Program, Across Ages, Sponsor-a-Scholar, Career Beginnings, the Buddy System, and local programs in Washington state. Results indicated an 82% chance of mentoring programs exhibiting benefits that outweigh the costs. However, a recent update to the analysis of mentoring through Big Brothers Big Sisters through WSIPP indicates a negative economic benefit of $2,600 (WSIPP, 2018). So, the economic impact of mentoring is still uncertain.

Though previous economic evaluations provide some encouraging results of the economic benefits of mentoring programs, those evaluations have a number of limitations. First, those evaluations did not consider how costs and benefits are influenced by differences in important moderating factors (e.g., mentee risk, advocacy and teaching roles for mentors). A study that compared mentoring programs with and without these factors would address this limitation and provide information regarding the financial costs and benefits in relation to those moderating factors. In addition, previous cost estimates were based on estimated rates of labor and services, rather than direct measurement. Furthermore, recent updates to the economic benefits of mentoring highlight uncertainty. A study that directly measured rates of labor, service costs, and supplies would provide a more accurate estimate of economic impact. Finally, the

WSIPP cost-benefit study consists of evaluations of programs in the state of Washington only. A study that considered mentoring programs across a number of states would provide a more comprehensive national representation of the financial benefits of mentoring programs.

Current Study

There is promising evidence for the accessibility, effectiveness, and financial benefit of mentoring as a prevention program for youth at risk for juvenile delinquency. This evidence, along with public and policymaker support for preventative interventions, has motivated federal and community agencies to fund the evaluation of mentoring programs for youth at risk for juvenile delinquency. Of relevance to the current study, the Office of Juvenile Justice and Delinquency Prevention (OJJDP) has partnered with community mentoring agencies (e.g., Big Brothers Big Sisters) to evaluate the implementation process and outcomes of mentoring programs through the OJJDP Mentor Enhancement Demonstration Program (MEDP; Jarjoura et al., 2018). These programs incorporated some of the promising moderating factors (i.e., enhancements) identified by DuBois (2011), including (a) incorporating advocacy and teaching roles for mentors; (b) comprehensive matching criteria based on youth skills, needs, and interests; (c) targeted ongoing training for mentors; and (d) ongoing support of targeted roles for mentors. Those researchers have conducted a randomized trial of 21 mentoring programs across 8 collaborative sites (i.e., three to four programs collaborating together) with youth ages 11-15 (N = 1,526) assigned to enhanced mentoring or business as usual (BAU) mentoring. Jarjoura and colleagues collected detailed cost information about the various mentoring conditions and enhancements as part of their evaluation, but they have not used that information to conduct a formal economic evaluation of mentoring programs in MEDP. The current study examined the

economic costs and benefits of mentoring programs in the MEDP trial and compared metrics of economic impact between BAU mentoring and mentoring that incorporated enhancements.

Method

MEDP was a randomized demonstration trial, a design to identify which models and characteristics of enhanced mentoring would be associated with effectiveness rather than the evaluation of a single, highly specified, intervention model. This trial utilized a pretest-posttest control group design. The current study applies cost-benefit analysis to data from that trial. The present study adheres to best practices for economic evaluation detailed in the Consolidated Health Economic Evaluations Reporting Standards (CHEERS; Husereau, 2013).

Participants

Participants were youth (N = 1,526) who previously participated in the MEDP (Jarjoura et al., 2018) and received enhanced mentoring or BAU mentoring at an agency that provided cost data. In the MEDP, youth who expressed interest in participating in mentoring through pre-established mentoring sites (e.g., Big Brothers Big Sisters, school district) were randomly assigned to enhanced mentoring or BAU mentoring. Youth were eligible to participate if they (a) were between 11-15 years old; (b) met specific eligibility criteria as defined by individual sites (e.g., previous serious involvement with the juvenile justice system, known gang involvement); and (c) were not being rematched from a mentor who was not participating in the study. Youth enrolled in this study are considered at-risk based on numerous individual and environmental factors.

MEDP Program Characteristics

Programs varied on a number of key dimensions, including location, mentoring type (e.g., CBM, SBM), and randomization strategy. There were 21 mentoring programs across 8

collaboratives (i.e., two to four programs collaborating together). See Table 1 for a comprehensive list of program characteristics, including collaborative, agency, mentoring type, and number of matches.

Intervention Conditions

Once participants enrolled in mentoring at each program, matches (both mentor and mentee) were randomized 1:1 between the enhanced mentoring condition (n = 749) and the BAU mentoring condition (n = 777). Among all collaboratives except one, staff were delegated to each condition (i.e., one staff member in charge of enhanced groups, one in charge of BAU) to prevent contamination (i.e., where both groups receive some of the enhancements). An alternative randomization strategy was utilized for the remaining site, where mentoring was facilitated through an afterschool 4-H program. Due to youth attending one 4-H program per school and enhanced mentoring activities being so closely related to program activities, it was not possible to separate BAU and MEDP matches individually. Therefore, all youth for a given school were randomized to the BAU or enhancement conditions; differences in school size accounts for the variability in sample size for these groups.

Participants received weekly 1-on-1 mentor meetings through SBM, CBM, or facility-based mentoring. Type of mentoring was determined by pre-existing practices in mentor programs (see Table 1).

Enhanced mentoring. The enhancement group received identified components found to enhance mentoring outcomes including (a) mentor matches made based on consideration of youth needs, experiences, skills, and interests; (b) targeted training prior to the beginning of the mentor relationship and throughout the 12-month mentoring period; (c) encouragement of mentors to participate in advocacy and teaching roles for the mentee with ongoing support for

these targeted roles by program staff; and (d) ongoing support from program staff by checking in with matches on a semi-monthly basis to gather information about frequency of contact and types of activities engaged in with mentee. OJJDP provided training and technical assistance to sites for the implementation of program enhancements.

Business as usual (BAU) mentoring. BAU mentoring is meant to represent the usual, preexisting mentoring process for mentor programs. Matches were made based on existing agency criteria, with mentor training taking place prior to the beginning of the mentor relationship. Mentor agency policies required mentor and mentee meetings between two and four times per month, depending on the program. Program staff briefly checked in with matches approximately once per month to provide support. No advocacy or teaching roles were emphasized for mentors.

Procedures

All procedures and measures for the MEDP were approved by the Institutional Review Board of the American Institutes for Research. Data sharing for the proposed study has been deemed exempt from review by the Institutional Review Board of the University of Arkansas.

MEDP demonstration trial. Participants in the randomized trial by Jarjoura and colleagues (2018) were surveyed prior to the beginning of the match relationship (baseline), and at 12-month follow-up. Specifically, mentors, mentees, and parents of mentees were surveyed. Data analysis was completed by MEDP investigators through hierarchical linear modeling to account for variance in youth outcomes (i.e., juvenile delinquency, depression, and substance use) due to program-level effects (Level 3), staff characteristics and practices (Level 2), and individual characteristics (Level 1). The use of such statistical techniques allows for testing of mediating and moderating variables at these three levels. Additionally, mediation models were

constructed using structural equation modeling (SEM) for hypothesized outcomes. Missing data were addressed using a Full Information Maximum Likelihood approach. Missing data accounted for approximately 25% of the total sample and was primarily due to attrition prior to the 12-month follow up.

Present Study. The present cost-benefit analysis used the Washington State Institute for Public Policy (WSIPP) cost-benefit model, which utilizes computations and calculations in Microsoft Excel to provide estimates of net benefits and benefit-cost ratios (Aos, Phipps, Barnoski, & Lieb, 2001; WSIPP, 2017b). Those estimates were used to evaluate the relative economic costs and benefits (based on changes in delinquent behavior, depression, and substance use) between the treatment versus comparison conditions (Enhanced Mentoring and BAU, respectively). These outcomes cover a wide variety of domains, in the form of benefits to program participants, taxpayers, and society at large. The fiscal year 2017 was used as a baseline year for estimating monetary values, such that all values were adjusted to 2017 values using Federal Bureau Labor of Statistics Consumer Price Index (2017) to account for the impact of inflation. Furthermore, values that were estimated from a particular state (e.g., program-specific costs; WSIPP values from the state of Washington) were adjusted from state-specific cost of living to a national average using the Cost of Living Index (COLI; The Council for Community and Economic Research, 2017). Economic discounting, where benefits are adjusted to account for the reduction in value of future monetary gain compared to immediate monetary gain, was not used due to all costs being accrued in the same year.

Measures

Measures were collected by Jarjoura and colleagues (2018) at baseline and 12 months to assess changes in participants' self-reported delinquent behavior, substance use, and depression

(i.e., clinical effectiveness) over the course of the original randomized trial. Additionally, measures of costs for enhanced mentoring vs. BAU mentoring were collected from programs. The WSIPP model additionally provided estimates of benefits accrued from the observed changes in clinical outcomes.

Clinical effectiveness measures.

Delinquent behavior. Delinquent behavior was measured using five yes/no items from the Self-Reported Behavior Index (Claesen, Brown, & Eicher, 1986), as adapted by Posner and Vandell, 1994, that assess juvenile justice system involvement, gang involvement, and suspensions (e.g., "In the last 12 months have you been arrested for a crime, offense, and/or violation?"). Brown (1986) reported internal consistency reliability for middle schoolers at α = .80 and at α = .88 for high schoolers. Brown also tested validity by computing to correlation between the Self-Reported Behavior Index and the Marlowe-Crowne social desirability measure (Reynolds, 1982) and found a correlation of -.03. This measure is commonly used across mentoring evaluations.

Depression. A key mental health outcome was measured by assessing depression using the Short Moods and Feelings Questionnaire (SMFQ), a three-point response set (i.e., not true, sometimes true, or true) that assesses feelings and actions in the past two weeks (Angold et al., 1995). Responses above 12 indicate a high risk for a depressive disorder. Internal consistency was reported to be α = .85 by Angold and colleagues (1995). Turner and colleagues (2014) reported strong content validity of the SMFQ for a community-based sample of adolescents, with 70% of ICD-10 depression symptoms covered by items. The measure also demonstrated high criterion validity, with a high correlation between the SMFQ and a diagnosis of depression on

the Clinical Interview Schedule-Revised, a reliable and valid measure of psychiatric morbidity (Spearman's $\rho = 0.58$; Turner et al., 2014).

***Substance use*.** Substance use was measured from an adaptation of the Self-Reported Behavior Index (Claesen, Brown, & Eicher, 1986). This scale assesses substance use (tobacco, alcohol, and illicit drugs) over the past year (e.g., "How often, in the year have you used tobacco?"). As described previously, the Self-Reported Behavior Index has demonstrated reliability and validity. Initially, Jarjoura and colleagues planned to code responses on this measure individually, but in the final technical report, any positive indication of substance use was coded as one with all negative responses coded as zero.

Cost measures. Implementation costs were collected from program staff in the form of personnel costs (i.e., staff salary and benefits, time spent on BAU versus enhanced mentoring), administrative costs (e.g., paper supplies, facilities expenses), and match costs (e.g., background checks, mentor training). Costs of specific enhancement-related expenses were also collected, including expenses related to increased match consideration (e.g., additional personnel time spent on matching process), advocacy opportunities (e.g., additional office supplies to support advocacy roles), increased pre-match materials (e.g., supplemental training curriculum), and increased staff support (e.g., additional personnel time and office supplies for support). Research tasks were included in the initial cost collection, but will not be included in the subsequent economic analysis, as research time would not be considered as typical expenses required to deliver the mentoring programs (either with or without enhancements).

I calculated all expenses involved in facilitating the enhanced mentoring programs versus BAU programs, and divided those by the respective number of mentees who received enhanced versus BAU mentoring to determine the cost of each condition per youth. In addition, I

calculated these costs separately for each collaborative and divided those values by the respective number of participants at each site to determine the variability in costs across collaboratives. I calculated costs at the program level divided by number of participants to further examine variability at the individual program level. Finally, I calculated the incremental cost of enhanced mentoring to BAU mentoring at the overall, collaborative, and agency levels by subtracting BAU costs from enhanced mentoring costs.

Benefit measures.

***Crime outcome benefits*.** These benefits were calculated in the WSIPP model by considering the benefits (i.e., avoided expenses) to taxpayers and crime victims as a result of a reduction in crime. Values are estimated comprehensively by considering the benefits of avoided crimes across seven major offense categories (i.e., murder, sexual, robbery, aggravated assault, felony property damage, felony drug, and misdemeanor). Benefits to taxpayers are computed using estimates of crime known to law enforcement, amount of resources utilized (e.g., length of stay in prison), and expenses to the criminal justice system (e.g., law enforcement, criminal trial, state juvenile rehabilitation) using marginal operating and capital costs. Crime victim benefits are considered in the form of tangible and intangible benefits, both based on an expected distribution of crimes given a large body of evidence (e.g., Truman and Langton 2015) suggesting that the actual numbers of offenses that are committed across various types of crimes are much higher than the number of reported crimes. Tangible benefits to crime victims are defined in the WSIPP model as avoided expenses in the form of medical and mental health care expenses, property damage and losses, and reduction in future wages. Intangible benefits are defined by an estimate of the cost of pain and suffering to victims of crime, which are based on a combination of (a) studies that examined jury awards to crime victims for pain and suffering; and

(b) "willingness to pay" studies (Miller et al., 2011), which estimated the amount of money people would spend to reduce risk of death.

***Depression benefits*.** Benefits related to mental health are estimated in the WSIPP model as avoided expenses for a given mental health condition. In the current study, depression was measured as a key mental health outcome. The calculation of benefits from reductions in depression is considered for labor market earnings (i.e., reduction of earnings based on mortality or morbidity of mental illness), health care costs (i.e., inpatient, outpatient, pharmacy, emergency department, and office visits) excluding the costs of mental health treatment, and the value of a statistical life (i.e., to monetize changes in mortality associated with depression through an estimate of society's willingness to pay to reduce mortality; Aldy & Viscusi, 2008).

***Substance use benefits*.** These benefits are calculated from the avoided expenses associated with reductions in illicit drug use (i.e., substance use). Benefits are considered in the WSIPP model across six major categories of avoided expenses, including (1) lost labor market earnings stemming from early death or reduced earnings as a result of substance use; (2) medical costs incurred from substance use in the form of hospitalization, medication usage, and total healthcare; (3) crime costs to victims and taxpayers as a result of substance use; (4) traffic collisions or incidents as a result of alcohol use; (5) treatment of substance use, including rehabilitation; and (6) premature death due to substance use, which is monetized using the value of a statistical life.

***Linked outcomes*.** The WSIPP model provides an estimate of additional benefits that were not measured directly, but have a demonstrated link to measured outcomes based on meta-analyses conducted by WSIPP researchers. For example, if a mentoring program has an effect on juvenile crime outcomes, rigorous evaluation has supported the casual relationship between

juvenile crime and high school graduation. Therefore, the WSIPP model would also monetize the predicted linked effect of the mentoring program on high school graduation rates. Linked outcomes included in the WSIPP model are provided for each clinical effectiveness measure in Table 2.

Analytic Approach

Cost analysis. Cost data were self-reported by program staff and provided by the MEDP team. Costs were allocated across a variety of descriptive categories to provide specific, accurate depictions of expenditures. However, some sites appeared to have difficulty completing the cost survey as intended. Some appeared to report expenditures for all non-enhanced mentoring activities within BAU groups, rather than just reporting expenses for matches enrolled in the MEDP. Some agencies appeared to split expenditures evenly between the two groups despite some costs not being utilized for BAU matches (e.g., enhanced training). Additionally, some agencies had difficulty allocating time spent and associated expenses (e.g., staff salary) according to the intended design of the cost survey, with reported percentages of activities for some staff that did not sum to 100%. For these reporting errors, the difference between the sum of their reported time and 100% was proportionally redistributed across categories according to their initial report. For example, if a staff member reported percentages of time that summed to 80%, the remaining 20% were allocated based on proportions of the staff member's percentage allocations across time categories. These types of adjustments were required in 6 of 21 agency reports.

Cost-benefit analysis. Jarjoura and colleagues (2018) shared results of relevant program outcomes (i.e., delinquency, depression, and substance use) for agencies who provided cost data. Effect sizes were converted from standardized beta coefficients (β) to Cohen's *d*, $(M_1 - M_2)$/

SD_{pooled} (Cohen, 1988), using the Practical Meta-Analysis Effect Size Calculator (Lipsey & Wilson, 2001). Per-youth costs of enhanced mentoring and BAU mentoring were entered into the WSIPP model, and effect sizes were entered and converted into monetary benefits using an integrated set of computations in Microsoft Excel (WSIPP, 2017b). I then evaluated the incremental costs (i.e., cost of enhanced mentoring minus the cost of BAU mentoring) and benefits (i.e., expected benefit of enhanced mentoring minus the expected benefit of BAU mentoring) produced by the WSIPP model. Benefits are based on all benefits (i.e., tangible and intangible) for both measured and linked outcomes. I then computed a benefit-cost ratio by dividing incremental benefits of enhanced mentoring versus BAU mentoring by the incremental costs of the two groups. The enhanced mentoring group was considered cost–beneficial relative to BAU if the net benefit was positive and the benefit to cost ratio was at least 1.00, which is the standard in the field of economics (Boardman et al., 2010).

Sensitivity analysis. Economic evaluations utilize sensitivity analyses to address the uncertainty of the benefit estimates produced (Briggs & Gray, 1999). For the proposed study, a sensitivity analysis was conducted in the WSIPP model to determine how estimates of mentoring program costs and benefits were influenced by variation in key model parameters. Specifically, I completed a Monte Carlo simulation (with 10,000 iterations) which randomly selected (a) effect sizes from the normal distribution resulting from the mean effect size and standard error for each outcome; and (b) values of parameters used to calculate benefits (i.e., rates of undetected crime victimization, spillover benefits from human capital, value of a statistical life, deadweight costs of taxation, discount rate, and treatment costs) based on a range of minimum and maximum plausible values built into the model. I constructed a 95% Confidence Interval to examine the range of plausible costs and values across those 10,000 iterations. Then, I examined whether the

range of benefits (i.e., standard deviation of net benefits and benefit-cost ratios across all Monte Carlo simulations) remains robust (i.e., consistent with the primary analysis) in spite of variability in values of costs and benefits.

Results

Costs

Results of the cost calculations revealed an average per-participant cost of $2,127 for enhanced mentoring and $2,060 for BAU mentoring. The average incremental cost of enhanced mentoring compared to BAU mentoring was $68. However, as shown in Table 3, the distribution of these expenses varied greatly across collaboratives. For five of eight collaboratives, the incremental value of enhanced mentoring versus BAU mentoring was negative, meaning BAU mentoring was costlier. Incremental costs ranged from -$750 to $1,165. This may be best explained by the variability in how agencies reported costs in the cost survey (e.g., splitting total costs equally between groups, allocating all facilities expenditures to BAU costs).

For administrative and program expenses, agencies reported systematic differences in spending between the two groups. While the average total expenditures across both administrative and program expenses differed by only $68, agencies reported spending more on administrative expenses for BAU mentoring than enhanced mentoring. Specifically, agencies indicated spending an average of $4,195 more on administrative expenses for the BAU group than enhanced group. Conversely, agencies reported more expenditures on program expenses (e.g., staff training, program materials, volunteer training, match activities, and transportation) for enhanced mentoring, with agencies spending an average of $4,201 more on enhanced mentoring program expenses than BAU program expenses.

Effectiveness

Results of the MEDP demonstration trial yielded no clinically significant differences between enhanced and BAU mentoring. For the present cost-benefit analysis, only sites who provided cost study data were included in the analysis of these effectiveness measures. Again, enhanced mentoring did not have a significant effect on depressive symptoms (β = .001, p = 0.95, 95% *CI* = -0.029-0.031); persons offenses crimes (β = -.006, p = 0.84, 95% *CI* = -0.059-0.048); property offense crimes (β = .011, p = 0.71, 95% *CI* = -0.044-0.066); or substance use outcomes (β = -.006, p = 0.76, 95% *CI* = -0.041-0.030). Additional results for the full MEDP trial with outcomes that were not utilized in the present cost-benefit analysis can be found in the full report from Jarjoura and colleagues (2018).

Benefits

The total benefits identified in the cost-benefit analysis were -$16 (see Table 4). The WSIPP provides an estimate of benefits at the participant, taxpayer, and societal levels along with the estimate of total benefits. Average benefits were calculated through determining the value of avoided expenses at the participant, taxpayer, societal, and cumulative levels. At each of these levels, benefits are calculated for each category of avoided expense as well as the benefit from linked outcomes listed in Table 2. The benefits to participants were $0, the total benefits to taxpayers were $3, and societal benefits were -$19. These results indicate that there were no benefits (i.e., avoided expenses to participants) to participants. Taxpayers avoided expenses of $3 and societal benefits were split, with one section of societal benefits leading to avoided expenses of $13 but the other leading to a negative benefit at $32.

Cost-Benefit Results

Results of the cost-benefit analysis indicated a benefit-cost ratio of -0.24, where every dollar spent on enhanced mentoring resulted in a loss of $0.24 (see Table 5). The net present value (i.e., benefits-minus total costs) was -$68 for participants, -$65 for taxpayers, $-87 for society, and -$84 for cumulative benefits. So, the incremental cost of enhanced mentoring were greater than the benefits at the participant, taxpayer, societal, and cumulative levels. I also calculated the benefit-cost ratios (i.e., benefits at each level divided by total costs). The benefit-cost ratio to participants was 0.0 due to the lack of any benefit (i.e., negative or positive) of enhanced mentoring at this level. The benefit-cost ratio was 0.04 to taxpayers, -0.28 to society, and summing to the overall benefit-cost ratio of -0.24.

Sensitivity Analysis

I conducted the sensitivity analysis in the WSIPP model, which computed a range of outcomes through Monte Carlo simulation (i.e., 10,000 iterations), while randomly varying benefit parameters. I then constructed a plausible range of values for incremental benefits, net present values, and benefit-cost ratios at the participant, taxpayer, societal, and cumulative levels by calculating the mean (*M*) and constructing a confidence interval (± 1.96 * *SE*). The 95% *CI* of benefits ranged from a minimum plausible societal value of -$19 to a maximum plausible value of -$25 suggesting that enhanced mentoring was not cost-beneficial in a majority of the 10,000 iterations. Incremental benefits at the remaining levels ranged from -$25 to 0. I measured the percentage of benefit scenarios that were greater than 0 within the 10,000 iterations and found 27% of the iterations were cost-beneficial overall. The 95% *CI* of net present values at the participant, taxpayer, and societal levels ranged from -$93 to -$68. See Table 5 for detailed results.

Discussion

Juvenile delinquency is a serious national issue with devastating associated problems that lead to severe emotional and economic consequences. Mentoring is an accessible, preventative intervention that may suppress the development of these problems, especially if mentoring incorporates specific enhancements that may increase its efficacy (Dubois, 2011). The present study examined the economic benefit of enhanced mentoring over BAU mentoring in a national demonstration trial. This study included a number of methodological strengths. First, the data represented in this cost-benefit analysis represents a highly geographically and racially diverse sample. Second, this study utilized a comprehensive cost calculation rather than an estimated average cost of mentoring through direct data collection and analysis of cost information. Third, the outcomes examined in this cost-benefit analysis represent broad domains of mental health, substance use, and juvenile delinquency and include linked outcomes, which represent a more comprehensive picture of economic benefits. Finally, the present study utilized a comprehensive cost-benefit model to estimate economic outcomes.

Results of the present study revealed that enhanced mentoring was not cost-beneficial when compared to BAU mentoring. There are a number of factors that may have contributed to this finding. First, the Self-Reported Behavior Index measure was adapted for the present study, which may impact the psychometric validity of the present measure. Therefore, the outcomes of the substance use and juvenile delinquency variables should be interpreted with caution. Sites reported highly variable costs associated with enhanced and BAU mentoring, and the costs may have not reflected the actual costs of delivering enhanced mentoring over BAU mentoring. While some confusion may be due to variations in interpretations by program staff, this dilemma highlights an important need for clear, comprehensive guidelines for cost measurement. The

consolidated health economic evaluations reporting standards (CHEERS checklist) provides guidelines for how to report incremental costs and cost outcomes (Husereau et al., 2013). However, no one has utilized this feedback to establish clear guidelines for how to construct a survey collecting cost data. As other evaluations of mentoring have used estimates or labor market earnings (Herrera, 2007; WSIPP, 2017a; WSIPP, 2018), this barrier may not have been encountered by previous evaluations. To obtain the most accurate, comprehensive estimates of costs associated with implementing and delivering an intervention, it is imperative that cost surveys be constructed in a pragmatic manner for participants who will complete them.

Additionally, variability in how sites chose to implement enhancements may have influenced the exposure to experimental condition enhancements as (a) many sites had difficulty engaging enhanced matches in enhancement training and (b) enhanced mentor attendance for enhancement training was relatively low (Jarjoura et al., 2018). Furthermore, differences in site structure (e.g., group mentoring) led to variability in structural, organizational, and staff capacity to implement enhancements, and BBBS agencies were typically more able to implement enhancements (Jarjoura et al., 2018). Such constraints are common in demonstration trials (Stuart, Cole, Bradshaw, & Leaf, 2011), as they do not adhere to the rigorous intervention specifications found in randomized controlled trials (RCTs). However, recent literature highlights the drawbacks of RCTs, as their results are less generalizable (Flay et al., 2005). Furthermore, it is common to see "voltage drop" (i.e., a decrease in clinical effectiveness) once interventions tested in rigorously-controlled settings are implemented (Santucci, Thomassin, Petrovic, & Weisz, 2015; Weisz et al., 2013). Approaches like the present demonstration trial highlight the heterogeneous nature of intervention implementation and sustainment and may provide a more accurate depiction of the difficulty in translating research into practice – as

opposed to the traditional, linear approach where efficacy immediately translates into effectiveness (Greenwald & Cullen, 1985; Glasgow, Lichtenstein, & Marcus, 2003). It is essential that interventions such as enhanced mentoring seek to identify flexible adaptations to the intervention to address differences in contexts while maintaining fidelity to core components that maximize clinical efficacy. In doing so, costly non-essential components may be removed while maximizing the "active ingredients" of the intervention in order to produce future economic benefits.

To better understand these core components, Jarjoura and colleagues (2018) examined mediational models for a number of outcomes in the full report, including crime and depression outcomes utilized in the present study. Results of the MEDP trial found increased clinical benefits in mediational models for depression and crime outcomes. Specifically, increased enhancement training hours and teaching and advocacy functions of mentors was found to produce statistically significant effects on the reduction of depressive symptoms ($p < .01$) (Jarjoura et al., 2018). Results also found that increased support of the mentor in an advocacy or teaching role ($p < .05$), match support ($p < .01$), participation in match support activities ($p < .05$), time doing things on behalf of the mentee ($p < .01$), incorporation of teaching functions by mentors ($p < .01$), and focus on expanding mentee connections with other adults and the community by strengthening personal talents and social skills ($p < .05$) each led to a statistically-significant reduction in depressive symptoms. Substance use outcomes were not included in those mediation analyses. Interestingly, while increased support of mentor in an advocacy or teaching role produced a decrease in depressive symptoms, only the mentor actually participating in activities in a teaching role lead to clinically-significant change (i.e., $p < .05$) in depressive symptoms. The results of these mediation models were not included in the present

cost-benefit analysis as both enhanced mentoring and BAU mentoring groups were combined in the analysis and, therefore, economic benefits could not be separated between the two groups. However, results from the MEDP trial reveal that participants in the enhancement group are more likely to have been exposed to these mediating variables than the BAU group.

It is also essential to consider the results of the MEDP in tandem with previous mentoring literature. In numerous evaluations, mentoring shows small effects in reducing delinquency and associated problems (Grossman & Rhodes, 2002; Herrera et al., 2011). Many of these evaluations follow a traditional RCT design and the lack of effects in the present study may highlight the challenges of implementing an intervention with relatively small clinical effects in their intended contexts. Results of the path analyses from Jarjoura and colleagues (2018) illuminate certain mediating variables that may be imperative in maximizing clinical effectiveness for this intervention. These mediating variables may be essential to consider when translating rigorous, controlled research evidence into everyday practice. Additionally, the results of the MEDP trial and the present cost-benefit analysis are congruent with conclusions drawn by Dubois and Keller (2017), as large-scale evaluations of mentoring may be exceptionally difficult given the volunteer nature of mentoring and the limited ability to compel adherence to training and the intervention model. This is an essential component to consider when developing and evaluating mentoring interventions in order to increase factors that maximize clinical efficacy and, therefore, economic benefits.

Beyond mentoring literature alone, a number of clinical interventions have been evaluated for their economic benefits (e.g., Multisystemic Therapy – Dopp, Borduin, Wagner, & Sawyer, 2014; Triple P Positive Parenting Program: Level 4 – WSIPP, 2018a; Parent Child Interaction Therapy – WSIPP, 2018b). A number of common factors emerge that may contribute

to the economic benefit of these interventions. First, these interventions are highly structured and involve intensive training, supervision, and quality assurance (Eyberg 1988; Hembree-Kigin & McNeil, 2011; Henngeler & Borduin, 1990; Sanders, 1999). Second, these interventions are often utilized with children who have significant mental and behavioral health issues, and many of these youth have already been involved in the mental health, juvenile justice, and child welfare system (Chaffin et al., 2011; De Graaf et al., 2008; Sawyer & Borduin, 2011). Mentoring as an intervention differs fundamentally from these approaches in that it is typically unstructured, involves laypersons, and has no specific curriculum to adhere to other than typical goals of support and knowledge acquisition (Eby, Rhodes, & Allen, 2007). There is no structured supervision or quality assurance of mentoring practices and, as mentors typically operate on a volunteer basis rather than a salaried position, mentor agency staff may have little opportunity to provide accountability for mentors (DuBois & Rhodes, 2006; Lakind, Eddy, & Zell, 2014). Furthermore, mentoring is often framed as a preventative and supportive intervention and is targeted for children with anywhere between mild to severe risk of poor behavioral and mental health outcomes (Cavell & Elledge, 2013; Tolan et al., 2014). As such, mentoring may not show as much of an economic benefit since the target population may not always exhibit severe, costly associated problems and incremental improvements in youth functioning may not produce significant avoided expenses in short-term evaluations of economic impact. Other public health crises (such as diabetes) require up to ten years before economic benefits can be detected (Colagiuri & Walker, 2008). By funding preventive interventions rather than solely funding treatment interventions, long-term economic benefits at broad societal levels may be reaped (Knapp, McDaid, & Parsonage, 2011). In tandem with the often small and variable effect sizes in previous mentoring literature, enhanced mentoring may face additional challenges in

becoming cost-beneficial. By increasing the use of components of enhanced mentoring that maximize clinical effects while decreasing more costly components, enhanced mentoring may produce significant clinical and economic benefits from a population health approach.

Despite the factors that may have negatively influenced the effectiveness of the MEDP and the accuracy of this cost-benefit analysis, the present study identified that, under certain conditions, enhanced mentoring may be cost-beneficial in comparison to BAU mentoring. Monte Carlo simulations revealed that in approximately 27% of 10,000 iterations of the randomly varied model, enhanced mentoring was cost-beneficial. This suggests that efforts to reduce the economic costs of enhanced mentoring in tandem with emphasizing factors that may improve the efficacy of enhanced mentoring may lead to economic benefits. A number of components of enhanced mentoring were more expensive, but produced significant benefits in the path analyses (i.e., volunteer training, increased match support and supervision, match activities). In fact, all of the path analyses in the Jarjoura and colleagues report (2018) produced increased clinical effects. However, a number of components were not analyzed in the path analyses and were quite expensive, such as staff time spent on recruitment and matching, facilities expenses, office expenses, and insurance expenses. It seems important for future research to consider whether these activities could be streamlined to reduce costs without interfering with clinical benefits. For example, future efforts to implement enhanced mentoring may seek to move materials to electronic formats, identify inexpensive facility options, and improve recruitment and matching strategies to reduce staff time required.

This study has wide implications for both mentoring interventions broadly, future economic analyses, and policymakers and stakeholders looking to invest in preventative interventions for juvenile delinquency. The present study found that, despite the relatively low

cost of mentoring, it may not always be cost-beneficial due to high variability in outcomes (Grossman & Rhodes, 2002; Herrera et al., 2011; Wheeler, Keller, & Dubois, 2010). In fact, the MEDP found little clinical significance in the difference between outcomes for enhanced mentoring and BAU mentoring. Therefore, it is essential for future evaluations of mentoring programs to evaluate factors that increase the efficacy of mentoring interventions in order to obtain ensure increased positive outcomes. Results of the MEDP trial found increased clinical benefits in mediational models. Specifically, increased enhancement training hours and teaching and advocacy functions of mentors was found to produce statistically significant effects on the reduction of depressive symptoms and crime outcomes (Jarjoura et al., 2018). Results also found that increased work of the mentor in an advocacy or teaching role, match support, participation in match support activities, time doing things on behalf of the mentee, and focus on expanding connections led to a statistically-significant reduction in depressive symptoms. Therefore, future mentoring implementation efforts should seek to incorporate components that increase these factors. For example, future efforts may include increased accountability and quality assurance of training so that (a) mentors attend training and (b) mentors have increased support and motivation to incorporate teaching and advocacy roles, spend time working on behalf of mentees, and participate in in match support activities. Other interventions, such as Multisystemic Therapy (MST) have demonstrated the long-term economic benefit of investing in quality assurance and fidelity despite increased initial costs (Huey et al., 2000; Sundell et al., 2008).

Additionally, the results of this study indicate that even relatively inexpensive interventions, such as mentoring, may not always be cost-beneficial. I do not conclude that these interventions are not worth investment. Rather, it is imperative that policymakers and

stakeholders consider the conditions that may increase the efficacy of interventions broadly and incorporate those considerations in their decision-making. Like all interventions, careful consideration of population, intervention, and agency characteristics is required when choosing both what intervention to implement and how to approach the implementation process. Specifically, it is imperative to identify components that maximize clinical effectiveness while reducing costly components that have limited impact on clinical outcomes. In doing so, stakeholders and policymakers are more likely to demonstrate both clinical and economic benefits. The present cost-benefit analysis also exemplifies the complicated nature of obtaining comprehensive cost data from intervention staff. Agencies appeared to struggle with cost study form instructions and reported costs in a highly variable manner. Future research may evaluate and determine comprehensive and understandable approaches to improve cost study data collection. Under ideal circumstances, enhanced mentoring may prove an effective and cost-beneficial preventative intervention for youth at risk of juvenile delinquency.

There are a number of limitations to the present study. First, this cost-benefit analysis utilizes data from a demonstration trial rather than an RCT, so the results of the trial may reflect issues of implementation and diverse agency contexts rather than the lack or presence of clinical benefits. Second, the present study utilizes self-report data from agencies, which may not have accurately reflected the costs of implementing enhanced mentoring due to variability in how costs were reported. Third, though the results of the mediation model revealed mediating variables that may increase the efficacy of enhanced mentoring on desires outcomes, these results could not be utilized in the present cost-benefit analysis due to both groups being combined in these analyses. Fourth, though the original MEDP trial incorporates a number of proximal, intermediate, and distal outcomes, the present study could only utilize measure of

crime, depression, and substance use as these were the only measured outcomes that were also monetized by the WSIPP model. However, the overall lack of significant effects on all clinical outcomes in the trial suggest that the inclusion of additional variables would likely not have led to a changed economic benefit. Finally, the WSIPP model is a well-validated economic measure, but results are associated with a degree of uncertainty (as shown in the sensitivity analysis).

Conclusions

In conclusion, the present evaluation identifies the potential lack of economic benefit of enhanced mentoring over BAU mentoring. However, I do not see this as a conclusion to cease evaluation and investigation of this intervention. Rather, this evaluation highlights the significant variability in (a) how agencies may report cost data, (b) the variability in how interventions are implemented across geographically and structurally diverse agencies, and (c) the critical importance of additional mediating factors that increase the efficacy of enhanced mentoring. The present evaluation identified that, under certain conditions, this intervention may be both efficacious and cost-beneficial. It is imperative that future evaluations continue to delineate these factors to reduce both the economic and psychological burden of juvenile delinquency and its associated problems on youth. Policymakers and stakeholders should consider these factors when making implementation decisions and incorporate these factors in the implementation and delivery of the intervention in order to maximize economic benefits.

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Appendix

Tables and Figures

Table 1
Mentoring Program Site Characteristics.

Collaborative	Program	Program Model	Number of Matches	Randomization Strategy
A	1	CBM	75	Randomized by match
	2	CBM	91	Randomized by match
	3	CBM	64	Randomized by match
B	1	SBM	52	Randomized by match
	2	Facility-based program[a]	80	Randomized by match
C	1	CBM	85	Randomized by match
	2	CBM	80	Randomized by match
	3	CBM	61	Randomized by match
D	1	CBM	85	Randomized by match
	2	CBM	83	Randomized by match
	3	CBM	67	Randomized by match
	4	CBM	72	Randomized by match
E	1	CBM	91	Randomized by match
F	1	CBM	75	Randomized by match
	2	CBM	72	Randomized by match
	3	CBM	62	Randomized by match
G	1	CBM	70	Randomized by match

Continued

Table 1(Continued)
Mentoring Program Site Characteristics.

Collaborative	Program	Program Model	Number of Matches	Randomization Strategy
G	2	CBM	62	Randomized by match
	3	CBM	45	Randomized by match
H	1	CBM	73	Randomized by school
	2	CBM	82	Randomized by school

Note. CBM = Community-based mentoring; SBM = School-based mentoring. [a] This facility-based program followed a community-based model with 1:1 match ratios, but all mentors were police officers.

Table 2

Linked Outcomes Associated With Effectiveness Measures in the WSIPP Cost-Benefit Model.

Outcome measure	Linked Outcomes
Crime	High school graduation
Depression	High school graduation
	K-12 grade repetition
Illicit drug use	Illicit drug use disorder

Note. WSIPP = Washington State Institute for Public Policy.

Table 3
Expenditures on Mentoring Groups at Agency and Collaborative Levels.

Collaborative	Agency	EG Funds	EG per capita	BAU Funds	BAU per capita	Incremental
A	1	60,694	1,445	40,696	1,233	212
	2	142,764	2,596	121,952	3,388	(792)
	3	58,572	1,889	122,715	3,719	(1,829)
	All	262,029	2,047	285,363	2798	(750)
B	1	48,845	2,035	48,845	3,053	(1,018)
	2	34,148	1,067	22,638	871	196
	All	87,992	1482	71,482	1702	(220)
C	1	103,705	2,593	221,723	4,927	(2,335)
	2	71,819	1,710	37,290	981	729
	3	87,762	2,925	78,474	2,531	394
	All	262,386	2,351	337,487	2,960	(610)
D	1	137,509	3,056	54,294	1,357	1,698
	2	78,177	2,113	53,685	1,167	946
	3	61,356	2,116	29,479	776	1,340
	4	58,301	1,495	30,528	925	570
	All	335,342	2,236	167,985	1,070	1,166
E	1	162,659	3,320	92,162	2,194	1,125
	All	162,659	3,320	92,162	2,194	1,125
F	1	114,740	2,942	48,337	1,343	1,599
	2	34,886	943	38,326	1,095	(152)

Continued

Table 3 *(Continued).*

Collaborative	Agency	EG Funds	EG per capita	BAU Funds	BAU per capita	Incremental
F	3	27,688	791	24,691	914	(123)
	All	177.314	1,597	111,354	1,136	461
G	1	107,021	2,816	140,576	4,393	(1,577)
	2	76,366	2,182	55,161	2,043	139
	3	55,983	2,545	26,568	1,155	1,390
	All	239,370	2,520	222,305	2,711	(191)
H	1	68,916	2,027	62,829	1,611	416
	2	75,905	1,518	89,573	3,583	(2,065)
	All	144,821	1,724	152,402	2,238	(657)
Total		1,740,474	2,128	1,520,699	2,061	68

Note. Amounts above are listed in 2016 USD; parentheses indicate negative values.

Table 4.
Average Incremental Benefits of Enhanced Mentoring Versus BAU Mentoring by Type of Avoided Expense.

	Avoided expense ($)			
Analysis	Participants	Taxpayer	Society	Cumulative
Primary analysis	0	3	(19)	(16)
Sensitivity analysis				
Average	0	(1)	(21)	(22)
95% *CI*[a] – Maximum	0	(1)	(20)	(20)
95% *CI*[a] – Minimum	0	(2)	(22)	(25)

Note. Amounts above are listed in 2016 USD; parentheses indicate negative values.
[a] *CI* = confidence interval. Calculated with formula (± 1.96 * SE) from the results of 10,000 iterations of Monte Carlo simulation

Table 5
Cumulative Benefits of Enhanced Mentoring Including 95% CI of Plausible Benefits.

Benefit	Primary Analysis		Limits of 95% *CI* from sensitivity analysis[a]			
	Net present value ($)[b]	Benefit-cost ratio[c]	Minimum		Maximum	
			Net present value[b]	Benefit-cost ratio[c]	Net present value[b]	Benefit-cost ratio[c]
Participant	(68)	0	(68)	0	(68)	0
Taxpayer	(65)	.04	(70)	(.03)	(69)	(.02)
Society	(87)	(.28)	(90)	(.33)	(88)	(.29)
Cumulative	(84)	(.24)	(93)	(.37)	(87)	(.28)

[a] CI = confidence interval. Calculated with formula (± 1.96 * SE) the results of 10,000 iterations of Monte Carlo simulation
[b] Calculated by subtracting the incremental cost of enhanced mentoring from each benefit category
[c] The benefit divided by the incremental cost of enhanced mentoring over BAU mentoring