Prospective Return on Investment of the Northside Achievement Zone

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Acknowledgments

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Summary

This prospective return on investment (ROI) study quantifies the costs and benefits of implementing NAZ solutions with Brandon, a typical child living in the Northside Achievement Zone. Brandon and his family will be enrolled in NAZ for five years (not necessarily consecutively) and will participate in some of NAZ's most popular programs. According to the NAZ model, even if Brandon is falling behind his peers early on, Brandon and his parents will participate in intensive solutions to ensure that he becomes proficient in age-appropriate reading and math. Once proficient, Brandon and his family can take charge of Brandon's success on their own, knowing that NAZ is ready to lend a helping hand if Brandon starts to fall behind.

With NAZ support behind him, Brandon graduates from high school and is much more likely to enroll in college, well-prepared for success. In adulthood, Brandon's wages are higher and he is less likely to commit crimes, smoke, use drugs, suffer from depression, or use public assistance, resulting in significant savings to society. These are just a few of the benefits Brandon can expect from his participation in NAZ solutions. This ROI study adds up these benefits of Brandon's involvement in NAZ and compares them to the costs of NAZ implementation to estimate the net benefits and social return on investment of NAZ.

Though the term "ROI" is used throughout the report, this approach is best described as a social return on investment (SROI) study. SROI studies differ from traditional business-related ROI calculations in that they include costs and benefits of outcomes that are not typically associated with a dollar value—for example, the value of years of life lost due to smoking. These studies are common in the social sciences. We rely on peer-reviewed economic articles to determine the costs and benefits of our expected outcomes, using conservative estimates whenever possible.

The study finds a projected return to society of $6.12 for every $1.00 invested in NAZ.

How benefits are counted

The cost-benefit model contains three steps:

1. **Establish the potential impact of NAZ's solutions** on a set of outcomes using impacts demonstrated by similar programs working with similar populations elsewhere.

2. **Estimate the monetary value** of the improved outcomes. For example, to calculate the impact of early childhood education (ECE) on any symptom of depression, we use the following calculation:

$$\frac{[\text{Likelihood of depression}]*[\text{Impact of ECE on depression rate (step 1)}]*[\text{Health care costs of depression}]}{(1+\text{Discount Rate})^{([\text{Age of impact}] - [\text{Age at participation}])}}$$

3. **Compute the net benefits** by comparing the monetary benefits (step 2) to the cost of the intervention.

All of the key assumptions in this report err on the conservative side. The results presented in this report can therefore be considered a lower bound for the true net benefits and return on investment of NAZ. A few examples of this conservative approach are described below, and many others are listed in the "Considerations and comments" section of the report.

What is counted in the ROI:

- The **full costs of implementation** of the entire NAZ ecosystem (including NAZ partners' costs of implementing solutions with NAZ families).
- Only **partial benefits of participation:** increased earnings from greater educational attainment, reduced depression and tobacco/drug use, fewer felony arrests, lower need for special education and grade repetition, reduced reliance on public assistance, increased tax revenues, and fewer child abuse/neglect cases.
- Partial **benefits of only selected NAZ programs**: early childhood education, K-12 solutions like expanded learning and mentoring, and parent and family solutions like Family Academy and career/finance navigation.

What is not counted in the ROI:

- Benefits of many **other NAZ programs** could not be quantified due to data limitations. These include, for example:
  - North4, an intensive violence prevention program
  - Housing stabilization support
  - Whole-school effectiveness (with anchor schools)
  - Prenatal services and support
- Many **other benefits of participation**. Even in the programs we do include, we only have data to compute specific benefits. Some of the potential benefits *not* included in the ROI are:
  - Other health benefits (e.g. improved nutrition and health status due to higher incomes, increased access to and use of prenatal and preventative health care)

  - Savings to the justice system from reductions in non-felony and non-drug-related crime
  - Various benefits of improved housing stability
  - Social/emotional benefits of improved parent-child relationships, strengthened community, and a more optimistic outlook for the futures of Northside children

- **Benefits of participation in multiple programs** simultaneously or **synergies between programs**. For any given outcome, only one program's impact is counted per participant.

As NAZ gathers more data related to anticipated benefits and their demonstrated results build more evidence for the strategies not included in the report, the ROI will be updated to more fully represent the true return on investment in NAZ.

Key findings

- The social return on investment in NAZ is $6.12 for every dollar invested, with a net benefit to society of $167,467 per participant. The return on taxpayer investment is $2.74 for every dollar invested.

- Society gains $200,178 in benefits for the average NAZ participant, but spends only $32,711 to implement NAZ solutions with that participant. These benefits result from:
  - Increased net earnings as a result of increased educational attainment, career counseling, and increased productivity ($147,794)
  - Improved health outcomes ($28,281)
  - Increased tax revenues ($15,943)
  - Other public savings due to lower crime rates, reduced need for special education, and fewer public assistance and child welfare cases ($8,160)

- The total social gains from NAZ total more than $16.7 million in net benefits for every 100 participants served.

- Society would fully recover the costs of 15 years of NAZ implementation if about 1,450 scholars achieve their expected benefits. (Enrollment projections are still in development, but NAZ expects to serve at least 7,000 scholars during this period.)

- To put it another way, if a given participant graduates from high school, society will have received full payback on the cost of his or her time as a NAZ scholar.

Introduction

This prospective return on investment study aims to tell the story of Brandon, the typical Northside Achievement Zone (NAZ) scholar. Brandon is a (fictional) representation of the average 3-year-old child living in the Zone. Without the help of NAZ, Brandon has an 18 percent chance of being placed in special education and only a 59 percent chance of graduating from high school on time.[1] There is a 48 percent chance that at least one of Brandon's parents is unemployed, and his household earns less than $32,000 per year.[2] Brandon's family receives at least one form of public assistance (maybe MFIP, health care assistance, Food Stamps, or others, or some combination thereof), as do the families of approximately 90 percent of children living in the Zone.[3]

Brandon and his parents participate in some of NAZ's most popular programs: career and financial support (CF); early childhood education (ECE); expanded learning, mentoring, and achievement planning (EL); and parent education and engagement (PE).[4] They will be enrolled in NAZ for five years (the assumed average length of active enrollment for a NAZ scholar). According to the NAZ model, even if Brandon is falling behind his peers early on, Brandon will spend up to four years in ECE and become proficient in age-appropriate reading and math, even before entering kindergarten. NAZ will continue to provide supports for Brandon and his family throughout (and even beyond) his K-12 education, ensuring that Brandon will stay at or above grade level, graduate from high school, and go to college. In this way, the NAZ model aims to capture and build upon the known and significant benefits of early childhood education by providing academic and family support well beyond early childhood.

Supposing Brandon's family moved to the Zone when his older sister Jasmine was already in first grade, Jasmine will receive a similarly intensive level of supports, tailored to her age and current academic status, to get her up to grade level. Though the solutions for Jasmine will be different than those for Brandon—and likely more intensive, given that she has had more time to fall behind—the NAZ model will apply those solutions to achieve the same outcomes for Jasmine as for Brandon. As a result, whatever the mix of

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1 Based on 2013 data from the Minneapolis Public high schools most commonly attended by students in the Zone. Note that this rate is a likely overestimate as it assumes that Zone students graduate at the same rates as students attending those high schools. Recent data are unavailable to verify or refute this assumption. See footnote 14 for additional information.

2 Based on the Camden and Near North Minneapolis communities, data from Minnesota Compass.

3 Based on 2013 Zone case count supplied by Hennepin County and the 2010 Zone household count from U.S. Census.

4 Due to data availability of intervention impact estimates, the impacts of expanded learning, achievement planning, and mentoring are presented jointly.

NAZ solutions received, NAZ expects the same set of positive outcomes for every NAZ scholar. For the purpose of this report, those outcomes are generally characterized as the outcomes of ECE, but the design of the NAZ model implies that these reported "ECE outcomes" are not limited to the scholars who participate in ECE.[5]

One of the most distinctive and innovative features of NAZ is its comprehensive and holistic approach. That is, participating scholars and their families receive a wide range of solutions, tailored to their specific needs, to facilitate their social and economic development. This aspect of the NAZ model assumes a synergistic impact of jointly applied NAZ solution strategies that will result in cumulative benefits that exceed the benefits from piecemeal implementation of these strategies (a whole that is greater than the sum of the parts).

However, a thorough scan of the literature found no study quantifying the impacts of such a comprehensive program as NAZ. As a result, this prospective ROI study is limited by its reliance on the existing literature to estimate the impacts of individual programs, and further limited by the need to ensure that benefits are never counted twice for the same child. Though anecdotal evidence suggests significant synergies in inter-program interactions, leading to magnified results for children involved in multiple programs like those offered by NAZ, there is no empirical evidence to date to quantify these synergistic impacts. Furthermore, though one might expect two NAZ programs to have independent effects on outcomes, to include both effects (additively) would require assumptions not yet supported by existing research. For this reason, only one program's benefits are counted per outcome. In sum, **this prospective ROI study is necessarily conservative in that it cannot capture the expected synergies, and can only quantify the benefits of a single program per child to avoid double-counting benefits.**

[5] The expected long-term impacts of NAZ are also not limited to NAZ participants; the NAZ model aims to "turn the curve" and create a culture of achievement in the Zone that will extend beyond the children officially enrolled in NAZ. Unfortunately, there is no known research at this time to document the effects of NAZ for non-enrolled children, and so this potential ROI study cannot account for those anticipated benefits.

Finally, because the long-term impacts of NAZ have not yet occurred, this analysis is described as a "prospective" (or potential) ROI study, presenting the anticipated results of NAZ based on demonstrated impacts of similar programs studied in the existing literature. For each expected impact for each NAZ program area covered,[6] the report details:

- The estimated impacts of the program, based on parameters identified in existing literature (e.g. the increased probability of graduating from high school as a result of receiving early childhood education)
- The locally-specific economic value of the impact (e.g. the expected additional lifetime earnings gained from having a high school diploma for North Minneapolis residents, as compared to residents without a high school diploma)

Combining these two components yields an estimate of the economic value of the program's impact for a scholar like Brandon. The sources of all assumptions, along with more detailed calculations, are shown in the Appendix.

[6] Because of the broad scope of the NAZ initiative, a comprehensive ROI that factors in all of the initiative's solutions is not feasible. This analysis focuses instead on the core solutions that are similar to programs that have been implemented and evaluated elsewhere. This ROI presents a conservative (low) estimate of the net benefits of NAZ due to the exclusion of several solutions and the inability to represent the synergies between solutions that drive the NAZ model.

NAZ solution strategies and outcomes

The NAZ model consists of a comprehensive set (referred to as the "NAZ Ecosystem") of interventions (referred to as "solutions") that may span over the lifetime of participants, provided either directly by NAZ or by one of its more than thirty organizational and nine school partners. For instance, educational strategies begin with early childhood education and continue with expanded learning and other solutions for scholars in grades K-12, while the scholars' parents may receive various career/financial, housing, and parent education solutions to improve household stability. The driving assumption behind this comprehensive approach is that interventions combine to produce multiplicative effects. The extent and duration of solutions received will vary across participants, so this report focuses on Brandon, the typical NAZ scholar who receives five years of active and comprehensive NAZ programming.

Four key sets of NAZ solutions were selected for analysis in the ROI: early childhood education (ECE), parent education and engagement (PE), expanded learning, mentoring, and achievement planning (EL), and career and financial support (CF). These ROI calculations are based on full-scale implementation of these solutions, although some components of the NAZ model have not yet reached full scale and may not do so until 2017.[7]

Early childhood education

NAZ provides early childhood education and planning to all enrolled families with children age birth to 5, and to mothers as soon as they become pregnant. The NAZ approach to early childhood includes both family and system-level solutions.

- Connectors—family coaches who work one-on-one with families—emphasize the value of high-quality early childhood education and goal setting
- Connectors ensure that parents are attending prenatal care and well-child visits on schedule
- NAZ refers parents to high-quality early childhood programs in their area, defined by a three- or four-star rating by Parent Aware, a statewide child care rating agency
- Connectors support parents in developing a plan to ensure uninterrupted enrollment, including a plan to cover the costs of care and a plan for reliable transportation

[7] It is for this reason that the cost figures are based on the 2017 NAZ budget.

- NAZ provides more than 100 Race to the Top early childhood scholarships annually
- At age 3 or earlier, all scholars are screened for developmental problems; if needed, families are connected to behavioral health services

To support high-quality learning throughout the Zone, NAZ works directly with local providers to identify and solve challenges. They provide "match" funds to preschools to support their expansion and the quality of early learning in the area. These match funds improve the quality of early childhood services across the Zone.

Parent education and engagement

NAZ works closely with families to share information and resources to support family development. Programming has been specifically designed to foster healthy relationships between parents and children, support strong parenting, and help parents build on the assets their families already possess. Through ongoing work with Connectors, parents establish goals for their family to support the whole family's wellbeing.

Central to this effort are the Family Academy programs, which are designed for parents of scholars birth through fifth grade. Family Academy aims to help participants become more effective parents using three separate programs:

- ***Family Academy Foundations*** builds parents' empowerment, self-awareness, self-regulation, self-motivation, empathy, and relationship management skills.
- ***Family Academy: College Bound Babies*** is for parents of children age birth to three. It emphasizes parents as children's first teachers and specifically focuses on building parents' positive discipline skills and their ability to contribute to their children's development of language, literacy, and numeracy.
- ***Family Academy: Ready to Succeed*** supports parents of 4- and 5-year olds in preparing their children for Kindergarten—particularly the development of language/ literacy, numeracy and executive function skills—and helps parents develop the knowledge and skills they will need to be active participants in their child's school education, including engaging with teachers and the school system.
- A fourth Family Academy class for parents of school age scholars, College Bound Scholars, is currently in development, and will help parents support their children's school success.

All classes focus on direct skill development which is reinforced by in-home "booster sessions" provided by the family's Connector.

These programs set the foundation for healthy relationships between children and families. Even after fifth grade, these patterns will be reinforced through continued work with NAZ. Parents and children will continue to work with their Connector throughout middle and high school. During this time, Connectors will emphasize college planning, and goal setting with the K-12 Checklist, and will provide access to other NAZ resources as needed.

This process has come to fruition in the form of highly engaged families. Even after their children graduate from high school or no longer need NAZ services, some parents have remained involved as advocates, volunteers, mentors, and even employees. This high level of family engagement could yield substantial returns to families.

Expanded learning, mentoring, and achievement planning

NAZ's primary academic components for K-12 scholars are expanded learning, mentoring, and achievement planning.

Achievement planning helps scholars access the resources and support they need for academic success. Throughout the year, parents and scholars meet with staff—called Academic Navigators, who are "scholar coaches"—to set educational goals. Academic Navigators integrate student data from various sources, then use the information to create a plan for student success. Navigators may make referrals to other NAZ programs, such as behavioral health or expanded learning, to help increase the child's ability to succeed.

NAZ's ***mentoring*** program matches scholars with community members dedicated to their success. This approach combines strong mentor role models with "cradle to career" support. As purposeful connections are made between caring adults and every eligible NAZ child, a culture of achievement is built throughout the Zone.

Expanded learning programs are after-school or day-long summer programs designed to boost scholars' math and reading skills and social-emotional development. The math and reading curricula align with the Minnesota K-12 Academic Standards, and proficiency and progress are monitored through standardized assessments. Coached independent reading and small-group work are used to promote reading development. For math development, instructors coach students in independent mathematics skills. The program also provides one-on-one tutoring in both subjects for students in need. Participation and progress reports are periodically shared with scholars, parents, and teachers. These programs also work to develop skills such as goal-setting, planning, and homework completion, as well as awareness of transitions to high school and college.

Finally, behavioral health interventions are embedded throughout all the other solutions in NAZ. The impacts of these interventions are assumed to coincide with (and be captured in) the quantified benefits of the other K-12 interventions.

Career and financial support

NAZ refers many parents to workforce partners to stabilize their employment and financial situations. Parents work with Connectors to set goals related to finance, employment, and adult education. For employment support, partners work with NAZ families on interviewing skills, resume assistance, job placement, and other job search services. After securing employment, partners contact them monthly for at least one year to provide parents follow-up activities, opportunities for professional development, and consultation on career laddering. NAZ also provides financial literacy counseling, which help families budget and build assets. This includes an in-depth review of the family's finances, goal setting with their NAZ Connector, and ongoing support from community organizations.

Programs not included in analysis

The items above are not a full representation of all supports provided within the four identified solutions, of all NAZ solutions, or of all expected outcomes of NAZ. For a variety of reasons, some strategies and outcomes cannot be included in the present analysis.

Not enough data on outcomes: Some solutions have been omitted from this framework because we could not find quantitative literature describing impacts for comparable programs (e.g. NAZ's whole-school effectiveness work with anchor schools). For other strategies, data limitations have restricted the analysis to only partial coverage of the expected benefits. For example, there are likely additional benefits to family engagement that have not received quantitative assessment in the literature.

Programs still in development: Some planned NAZ solutions have been omitted from this framework because there is currently not enough information about them (scale and/or specific program features) to estimate impacts. These include the high school expanded learning program and the college success solution plan, both of which are still in development.

Not enough data on cost savings: Other solutions have been omitted because of a lack of existing research to quantify the cost savings that will result from the intervention (e.g. NAZ solutions related to housing).

Also excluded from the analysis (related to the first and second categories above) are the prenatal services and support offered by NAZ and their partners. This type of service has been shown to generate positive outcomes for the future children of the women who receive it.[8] For example, the benefits to society of the Nurse-Family Partnership Program range from $9,000 to $41,000.[9] We do not include these benefits in our ROI estimates due to lack of data and parameters, but we believe it is important to acknowledge the benefits of this type of intervention and the presence of these solutions in the NAZ model.

As a result of these omissions, the computed social return on investment necessarily undercounts the benefits of full-scale NAZ implementation while fully capturing the costs, leading to an underestimate of the true return on investment.

Adjustments based on combinations of solutions

Because of NAZ's holistic, wrap-around design, scholars and parents are expected to receive more than one service. The combination of mutually reinforcing solutions is expected to yield larger outcomes, but these joint impacts are not simply additive across solutions. Published data on marginal additive impacts is unavailable; for that reason, the larger of the individual impacts will be assumed and the smaller impact will be disregarded. For example, the existing literature shows large impacts of ECE on high school graduation, but smaller impacts of programs like expanded learning. Therefore, even though many students will participate in both ECE and EL, only the impact of ECE is counted.

[8] Olds, Robinson, Luckey, Homberg, Ng, Isacks, Scheff, and Henderson, 2004.
[9] Karoly, Kilburn, and Cannon, 2005.

Economic benefits of NAZ

The potential economic benefits of NAZ are computed from four solution strategies: early childhood education (ECE); expanded learning, achievement planning, and mentoring (EL); parent education and engagement (PE); and career and financial support (CF). For these strategies, a set of outcomes and economic consequences are included based on the availability of (1) evidence of impact of similar interventions and (2) data quantifying the value of resources associated with the measured outcomes. All costs and benefits are presented as net present values, assuming a discount rate of 3 percent.

The total lifetime social benefit per participant from the selected NAZ solution strategies is $200,178.[10] Figure 1 contains a summary of per-participant benefits to society by economic outcome.[11] Benefits for both scholars and their parents are included in the summary.

About 72 percent of these benefits are derived from increased personal income for participants ($147,794) from increased education, career counseling, or improved productivity. Improved health and reduced mortality (due to reduced smoking, drug use, and depression) accounts for another 14 percent ($28,281) of benefits, while tax revenues from increased earnings are also significant at $15,943 per participant. Finally, public system savings sum to $8,160, split among the justice, K-12, public assistance, and child welfare systems.

1. Benefits by outcomes

Economic outcome	Solution	$ Benefit per participant
Increased lifetime net earnings		**147,794**
…from high school graduation and higher education	ECE	143,267
…from career and employment counseling	CF	2,627
…from reduced smoking (increased productivity)	EL	1,558
…from reduced depression (increased productivity, parents)	PE	191
…from reduced drug use (increased productivity)	ECE	152

[10] All values are expressed in 2013 dollars. Note that the bulk of this report refers to the social return on investment (the sum of all net benefits in society, regardless of who receives the benefit). Later in the document, we also show the return on investment to taxpayers and NAZ scholars.

[11] Most quantified benefits in this study are attributed to ECE due to the availability of research to quantify outcomes; however, the NAZ model is designed to produce these outcomes via ECE or K-12 interventions. The total benefits estimated for other ECE programs are lower than those estimated for NAZ, primarily because this study includes more outcomes. These other programs include, for example, the Child-Parent Center: $92,220 (Reynolds et al., 2011) or other state funded projects: $22,000 to $31,000 (Washington State Institute of Public Policy).

1. **Benefits by outcomes (continued)**

Economic outcome	Solution	$ Benefit per participant
Reduced health care and mortality costs		**28,281**
…from reduced smoking	ECE	27,677
…from reduced depression (children)	ECE	290
…from reduced drug treatment costs	ECE	216
…from reduced depression (parents)	PE	99
Increased tax revenues (parent and child)		**15,943**
…from high school graduation and higher education	ECE	15,450
…from career and employment counseling	CF	279
…from reduced smoking	EL	173
…from reduced depression (increased productivity, parents)	PE	24
…from reduced drug use	ECE	17
Public system savings		**8,160**
…to K-12 system from reduced need for special education and grade retention	ECE	3,840
…to justice system (jail, prison, administrative, and victims' costs) savings from reduced crime	ECE	2,431
…from reduced need for public assistance (direct payments and health insurance)	ECE	1,369
…to child welfare system (foster care and other services, administrative costs, and victim's costs) from reduced child abuse and neglect	ECE	521
Total benefits to society		**200,178**

Several outcomes are impacted by more than one solution strategy (e.g. high school graduation is impacted by ECE and EL). To avoid double-counting benefits from repeated outcomes, benefits are only counted for the solution with the highest per-participant benefits.

Benefits from early childhood education

The total economic benefit associated with NAZ participants receiving ECE amounts to $195,229, as shown in Figure 2. These lifetime benefits are derived from ECE's impact on earnings (and tax revenues) via educational achievement, as well as savings from the reduced cost of public services such as K-12 education and the justice system. Unless noted otherwise, the impact of ECE on the outcomes of interest is estimated based on the work of Reynolds et al. (2011).

2. Expected economic benefits of ECE per participant by outcome

Economic outcome	$ Benefit per participant
Increased lifetime net earnings from educational attainment	143,267
Reduced mortality from lower rates of daily tobacco use	27,677
Increased tax revenues from additional personal income (educational attainment and reduced drug use)	15,467
Savings to the K-12 system – reduced special education and grade retention	3,840
Savings to justice system - jail, prison, admin, and victims' avoided costs	2,431
Reduced public assistance costs (direct payments and admin costs)	1,369
Savings from reduced child abuse/neglect and foster care costs	521
Reduced health care costs from reduced depression	290
Reduced drug treatment costs	216
Increased earnings from reduced drug use	152
Total	**195,229**

Increased earnings

One of the main positive effects of ECE is the improvement in the likelihood of graduating from high school and completing at least some college. The estimated 2013 Zone graduation rate was 59 percent, compared to 79 percent for the state of Minnesota.[12] It is estimated that ECE will increase the likelihood of high school graduation by 9.3 percent. To determine the impact of increased education in the Zone, we use American Community Survey (ACS) data on income and educational achievement specific to the NAZ geography.[13] In the Zone, individuals who earn a high school diploma (and do not complete any college) earn nearly $19,000 more per year than those who do not complete high school.[14] The

[12] To compute high school graduation rates for the Zone, we constructed a weighted average of the graduation rates at the five most frequently attended high schools for Zone high-schoolers, based on the schools identified in the 2013 NAZ Community Survey, conducted by Wilder Research. Details of this calculation are explained in the Appendix. Note that the calculation necessarily assumes that Zone residents graduate at the same rate as the overall population of students in the schools they attend (due to lack of data that is specific to Zone residents), though we have reason to believe that the actual Zone graduation rate is lower due to high concentrations of poverty in the area.

[13] These estimates are based on income and education in Public Use Microdata Area (PUMA) 01405, which includes the Zone. PUMAs are the smallest geographic areas available in American Community Survey (ACS) reporting.

[14] In the Zone, adults with less than a high school diploma earn $18,272 on average, while people with a high school diploma (and no college) earn about $37,957 per year. African Americans earn significantly less than people of other races: $17,129 with less than a high school diploma and $21,725 with only a high school diploma. Average incomes based on Camden and Near North Minneapolis communities, data from Minnesota Compass.

additional annual earnings associated with high school graduation as a result of ECE are therefore about $267, with a total lifetime additional earnings from high school graduation of $12,812 per participant (Figure 3).[15]

ECE also improves the likelihood of attending college by nearly 54 percent. In the Zone, about 31 percent of residents have some college education or an associate's degree as their highest level of education, while 21 percent have obtained a bachelor's degree or higher.[16] We assume that the average NAZ scholar's probability of completing college (if they enroll in college) will mirror these Zone-wide statistics.[17]

The annual earnings of individuals living in the Zone with at least some college education are approximately $76,000. Accounting for the likelihood of completing only some college or a four-year degree, we estimate the average NAZ student who pursues higher education will earn $145,905 more during their lifetime compared to those who only complete high school (Figure 3).

The total additional earnings from increased educational achievement are $158,717 before taxes. We use effective tax rates from the Minnesota Department of Revenue by income decile to compute the estimated taxes associated with these earnings. Additional lifetime tax revenues total $15,450 paid per NAZ participant, resulting in $143,267 in after-tax lifetime net earnings benefits for participants (Figure 3).

3. Increased lifetime earnings and tax revenues from educational attainment

	High school	At least some college	Total $ benefit per participant
Earnings	12,812	145,905	158,717
Tax revenues	1,174	14,276	15,450
Net personal earnings			**143,267**

[15] Lifetime earnings are adjusted by expected growth of earnings from productivity, fringe benefits, inflation, and discounted to present value. Earnings estimates assume a working life between the ages of 18 and 65. Note that this does not suggest that the additional value of a high school diploma is $12,812, but that the net present value impact of ECE on future earnings is $12,812. In fact, Zone residents with only a high school diploma will earn approximately $232,860 more over their work lives than those without a high school diploma. See Appendix for detailed methods.

[16] Based on Camden and Near North Minneapolis communities, data from Minnesota Compass.

[17] On one hand, NAZ scholars will have enhanced support systems for completing college and better academic support. However, NAZ scholars may also face greater obstacles than others in the Zone, as they are more likely to be first-generation college students, struggle academically, and come from families who have experienced financial stress. We assume these opposing impacts will offset one another, leading to the same distribution of educational attainment as observed in the Zone as a whole.

Savings from improved health

ECE improves the health of participants by reducing the incidence of depression and daily tobacco use (see Appendix for detailed list of parameters, assumptions, and references). The largest health care savings associated with ECE come from reduced use of tobacco, which is used by approximately 19 percent of Zone residents. The mortality risk of daily tobacco use leads to a very high lifetime cost of the habit, estimated at $1.4 million,[18] but ECE programs have been shown to reduce the likelihood of daily tobacco use by 19 percent, resulting in a lifetime cost savings of $27,677 per participant (Figure 4).

4. Benefits from improved health

	$ Benefit per participant
Reduced mortality from lower rates of daily tobacco use	27,677
Health care savings from reduced depression	290
Reduced drug treatment costs	216
Increased earnings from reduced drug use	152
Increased tax revenues from reduced drug use	17
Total	**28,352**

ECE has also been shown to reduce symptoms of depression. The national average annual treatment cost associated with depression is estimated to be $4,477,[19] and the current incidence of depression in the Zone is 22 percent.[20] ECE is expected to reduce the incidence of depression by about 26 percent, with resulting savings of $290 per participant (conservatively assuming two years of treatment per individual suffering from depression).

Finally, ECE has been shown to reduce the use of illicit drugs in adulthood, lowering the need for drug treatment and risk of premature death (estimated to cost society $4,073 per year) and increasing lifetime earnings due to increased productivity. By reducing the probability of substance misuse by 24 percent (with a current drug dependence rate of 2 percent),[21] ECE saves an average of $216 per participant in avoided drug treatment costs and leads to about $169 in additional earnings and tax revenues per participant due to increased productivity resulting from reduced drug dependence.

18 Based on mortality costs of smoking as reported by Viscusi & Hersch, 2007.
19 Greenberg et al., table 5 (page 1471).
20 Minneapolis SHAPE survey 2010, proportion of Camden/Near North residents who reported suffering from depression at the time of the survey, p35-36.
21 McAlpine et al. (2011), Table 10, p 22, drug dependence in the Twin Cities metro in 2010.

Savings to the justice system

The total savings to the justice system from reduced felony arrests for each ECE participant is $2,431. In reducing felony arrests by 0.12 arrests per participant on average, ECE results in $1,644 in savings to victims and $787 from reduced jail and prison incarceration costs (Figure 5). These estimates account for the cost of incarceration in Minnesota and the likelihood of going to jail or prison in the fourth judicial district (Minneapolis) based on sentencing guidelines and crime statistics (e.g. the likelihood that a felony arrest results in incarceration and the average length of incarceration).[22]

5. Savings to the justice system

	$ Benefit per participant
Cost to victims (tangible and intangible)	1,644
Reduced incarceration costs, jail	335
Reduced incarceration costs, prison	452
Total	**2,431**

Savings to the K-12 system

One of the estimated effects of ECE is to reduce the need for special education and grade retention. Students who complete ECE need about 0.7 fewer years of special education than non-ECE participants.[23] With an average per-student annual special education cost of $6,254 in Minneapolis Public Schools, ECE reduces special education costs by about $3,838 per participant in present value terms.

ECE also reduces the need for grade retention. Students who complete ECE are 40 percent less likely to be held back in school before age 15. However, because the likelihood of being retained in NAZ partner schools is quite low (only 0.1 percent of students are retained each year), the impact of ECE leads to only a minimal cost savings via reduced grade retention. With an average per-student annual spending of $9,159 at NAZ anchor schools, the reduction in grade retention yields a small savings of $1.44 over the average student's lifetime. Together, the reduced need for special education and grade retention yield a combined savings of $3,840 for the average NAZ scholar.

[22] These statistics are shown in the Appendix.
[23] In NAZ anchor schools, about 18 percent of students currently receive special education.

Reduced public assistance costs

On average, ECE participants are 9 percent less likely to receive public assistance payments in adulthood than those who have not completed ECE. The typical NAZ family on public assistance receives $15,946 per year between direct payments and health care premiums.[24] Including administrative costs, the total annual cost per case is $16,075. In 2013, 90 percent of children in the Zone received some kind of assistance. After adjusting for the number of children per family, applying the effect of ECE, and factoring in that the average case receives payments for 1.8 years, the total per-participant savings is $1,369.[25]

6. Reduced public assistance costs

	Annual $ cost per case
Median annual payment per case (includes direct payments and insurance premium payments) (NAZ residents)	15,946
Mean annual administrative cost per case (Hennepin County)	129
Total annual cost per case	**16,075**

Savings from reduced child abuse/neglect and out-of-home placement costs

ECE has been shown to reduce the incidence of child abuse or neglect by 43 percent. The average incidence of these problems in the Zone is approximately 2 percent. Overall, the average cost per child abuse or neglect case is approximately $66,724, accounting for the fact that the mean number of years receiving payments was 1.95 years in a five-year sample. The total cost includes $57,179 in victim costs, $7,307 in payments for foster care and other related services, and $1,147 in administrative costs. As a result, the expected savings in the child welfare system attributable to ECE are $521 per participant.

[24] $15,946 is the median annual payment, with about 40 percent coming in the form of direct payments and 60 percent coming from insurance premiums for the typical case. Note that the mean payments are higher, totaling $18,285 per year between direct payments and insurance premiums. In addition, median and mean payments are also higher than average for African American families (who comprise roughly 90 percent of families currently served by NAZ). Mean and median total annual payments for African American NAZ residents in 2013 were $18,519 and $16,385, respectively, with median annual *direct* payments of $6,984.

[25] Again, the present value of per-participant savings is significantly lower than the annual costs shown due to 14 years of discounting between when the service occurs and when the savings is accrued.

Benefits from parent education and engagement

The total economic benefit attributed to NAZ's parent education and engagement (PE) in the overall ROI is $571, a result of reduced depression (leading to higher incomes and lower treatment costs) for participating parents. In addition, increased child support compliance leads to a $670 benefit for participants.[26] Figure 7 contains the resulting benefits to society by each outcome quantified for PE.[27]

In addition, PE also contributes to increased lifetime earnings of the children by reducing their future likelihood of teen parenthood, thereby increasing the child's likelihood of graduating from high school. However, this benefit is already included in the ROI as an impact of ECE. To avoid double-counting benefits, the impact of PE on increased earnings from high school graduation are not included in the ROI. Duplicative benefits are shown, greyed out, in Figure 7 to more completely illustrate the quantified impact of this program.

7. Expected economic benefits of PE per participant by outcome

Economic outcome	$ Benefit per participant
Increased child support compliance[28]	670
Increased net earnings from reduced depression (parent)	191
Increased tax revenues from increased income (parent)	24
Reduced health care costs from depression (parent)	99
Total benefits from PE included in ROI	**983**
Increased net earnings from high school graduation via improved behavior and reduced ADHD symptoms (child)[29]	11,489
Increased tax revenues from high school graduation (via improved behavior) (child)	1,159
Total quantified benefits from PE	**13,631**

[26] The administrative costs of managing child support payments are not included in the ROI because it is assumed that the increased compliance simultaneously increases costs of processing payments and decreases costs of enforcing compliance, and these two impacts likely cancel one another out.

[27] PE has also been shown to reduce crime, leading to justice system savings, but this benefit was not computed because the impact of ECE on crime is greater.

[28] Increased child support compliance is counted as a benefit to the participant but is not counted in the social ROI because it is not a net benefit to society (it's a transfer from one person to another).

[29] PE has also been shown to reduce the likelihood of teen parenthood, which increases the probability of high school graduation, but that benefit is not shown because the (larger) impact of improved behavior and reduced ADHD symptoms is shown instead.

In addition to the impact of PE on depression and behavior, NAZ expects to increase parents' involvement with their children, which may lead to improved compliance with child support obligations. The increase in child support payments is a direct benefit for participating children, even though these payments are transfers from parents to their children and do not represent a net benefit for society as a whole. As a result, the change in child support payments is counted as a participant benefit but not as a taxpayer or societal benefit.

Of the 926 active child support cases with a payment due in the Northside Achievement Zone in 2013, 871 (94%) of the non-custodial parents paid less than the full amount due. To bring those cases into compliance would bring an additional $7.9 million to the custodial households between 2013 and the children's 18th year, an average of $5,831 per child of a non-compliant parent. Because not all children in the Zone have a parent who has child support obligations and is non-compliant on child support, we adjust the per-child value based on the proportion of children who have a non-compliant parent (23%).

The child support impact per child ranges from $134 to $1,341, depending on the extent of NAZ's impact on child support compliance (Figure 8). If NAZ could bring 100 percent of non-complaint child support cases into compliance, the expected average gain per child would be $1,341. In the absence of parameters in the literature to inform the expected impact of NAZ on child support compliance, we present three scenarios, assuming NAZ will have a 10 percent, 50 percent, or 100 percent impact on the child support compliance rate. For the primary findings, we assume a 50 percent increase in compliance, which yields a $670 benefit to participants.

8. Benefits from increased child support payments

	$ Benefit per participant
Increased child support (assuming 10% impact on compliance rate)	134
Increased child support (assuming 50% impact on compliance rate)	670
Increased child support (assuming 100% impact on compliance rate)	1,341

Benefits from career and finance solutions

We estimate that NAZ career solutions increase earnings by about 13 percent, following estimates of earnings increases from the National Job Training Partnership study.[30] We multiply this percentage increase by the average pre-enrollment annual income for heads of household with 3 children enrolling in 20 Twin Cities United Way job placement programs: $14,300.[31] Finally, assuming that 40 percent of NAZ parents participate,[32] and assuming ten years of (discounted) benefits per participant, we obtain an expected benefit of $2,905 per NAZ participant (Figure 9). This benefit includes $2,627 in increased net earnings for participants, in addition to $279 in additional tax revenues.

9. Benefits from career and finance solutions

	$ Benefit per participant
Additional net earnings	2,627
Additional tax revenues	279
Total benefits	**2,905**

Benefits from expanded learning, achievement planning, and mentoring

The estimated ROI includes $1,730 in benefits from expanded learning, tutoring, and other educational support provided by NAZ, referred to here as EL (Figure 10). Academic programs have been shown to reduce the likelihood of smoking. The lifetime earnings of individuals who smoke in adulthood are nearly 7 percent lower than those of non-smokers,[33] so the 16 percent reduction in smoking (caused by EL) leads to increased lifetime earnings of $1,558 and increased tax revenues of $173.[34]

30 Bloom et al. (1997), Table 3, p. 562. We assume 75 percent of participants are women and 25 percent are men, because most NAZ households are headed by women.

31 Twin Cities United Way data. This earnings estimate is conservatively low due to Ashenfelter's Dip (immediately prior to program entry, participants' wages will generally be lower than their historical earnings path), leading to a conservatively low estimate of the benefit of participation in the career solution.

32 The assumption that 40 percent of NAZ parents participate is conservatively low, given that 48 percent of NAZ-enrolled heads of household were unemployed as of 9/1/14 and many others are underemployed. In addition, we assume 2.2 NAZ scholars per parent (so the benefit for each participating parent is distributed over his or her assumed 2.2 children).

33 Washington State Institute for Public Policy (2013). Technical report, exhibit 69, p. 122.

34 Washington State Institute for Public Policy (2014). Mentoring for students: community-based (taxpayer costs only). Note that the impact of EL is on smoking during high school while the earnings impact is assumed to result from smoking in adulthood. Therefore, we adjust the impact using the United States Dept. of Health and Human Services' Surgeon General's estimate of the likelihood of high school smokers continuing to smoke in adulthood: 80% (Table 3.1.20, p248).

10. Benefits from expanded learning, achievement planning, and mentoring

	$ Benefit per participant
Increased net earnings from reduced smoking	1,558
Increased tax revenues from reduced smoking	173
Total benefits from EL included in ROI	**1,730**
Increased net earnings from high school graduation	23,368
Avoided mortality from reduced smoking	22,119
Increased tax revenues from high school graduation	1,890
Total quantified benefits from EL	**49,107**

EL has been shown to produce other significant benefits as well, though those benefits overlap with those already captured by ECE in the section above, and so they are not counted in the overall ROI. For example, in the absence of ECE (e.g. if a scholar moved to the Zone and enrolled in NAZ during his or her K-12 career, rather than prior to kindergarten), EL would increase net earnings by $23,368 as a result of increased likelihood of high school graduation, and would avoid $22,119 in mortality costs of smoking. These benefits are shown, greyed out, in Figure 10 above.

In addition to producing benefits for scholars who do not benefit from ECE, EL also serves to maintain the initial impact of ECE by providing ongoing support throughout the scholar's K-12 career. This combined impact of EL and ECE is expected to reduce the risk of benefits fading out, which has been observed for simpler, less comprehensive programs in the ECE literature.[35]

[35] The reduction in this "fading out" effect is likely to be larger for NAZ, but cannot be fully captured given current data availability.

Costs

After NAZ reaches full-scale implementation and the Promise Neighborhood grant ends, the average cost for a year of active NAZ enrollment for one NAZ scholar is estimated to be $6,542.[36] Assuming an average of five years of active and comprehensive engagement in NAZ per scholar, the total cost of NAZ implementation for Brandon is $32,711.[37]

The public/private distribution of future funding sources for NAZ is unknown, so the taxpayer return on investment figures assume that 50 percent of the annual $19 million budget is publicly funded, a conservatively high estimate according to NAZ. Accordingly, the average lifetime per-participant cost paid by taxpayers is 50 percent of $32,711 ($16,356).

For the purpose of the participant return on investment figures, direct participant costs of involvement in NAZ are assumed to be zero. Though fees are charged for some of the services provided by NAZ partners (e.g. early learning centers), NAZ families all receive some kind of public or private subsidy. NAZ staff report that the NAZ target population (the Zone's low-income population) will face no out-of-pocket costs for any of their NAZ services.[38]

Though NAZ has no program costs for participants, participants must pay the additional cost of college tuition to reap the benefits enumerated above. On average, NAZ participants will spend $4,180 to attend college.

Additional details about the NAZ budget, along with additional information about the assumptions underlying these cost estimates, are shown in the Appendix.

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36 This per-scholar cost (also called per-participant cost) reflects not only the cost of programs serving NAZ scholars but also those serving their parents. In other words, both the benefits and costs are expressed in per-scholar terms, but they include the costs and benefits accrued by the scholar's parents as well.

37 Active enrollment is defined as ongoing, comprehensive participation in a full set of NAZ solutions. NAZ families may remain in the NAZ pipeline without actively receiving services, generally because services are no longer necessary (the scholar is performing at grade level). The five years may occur consecutively or in multiple segments during the course of the scholar's academic career. Five years of active enrollment is considered by NAZ staff to be a conservatively high estimate of the average number of years required to "get Brandon in the green and keep him there."

38 Participant opportunity costs are not included in the report. For example, when a NAZ parent is participating in Family Academy, they could be working instead, which would result in lost wages. These calculations are not included in our estimates.

Return on Investment

Three different returns on investment are calculated:

- The *social* return on investment is the return to all parties. This can be considered the total return to society as a whole.
- The *taxpayer* return on investment calculates the return to all taxpayers. We estimate that taxpayers fund 50 percent of NAZ through the government agencies working on the project. We weigh this against the taxpayer benefits from many of the savings generated by NAZ, such as savings on criminal justice, public assistance, K-12 spending, and a portion of health care costs, to compute the taxpayer ROI.
- The *participant* return on investment is the return to participant investments. Participants do not pay for NAZ programs; therefore, the only participant investment is for a college education, while they reap benefits from increased net incomes and savings on a portion of health care costs.

By investing $32,711 per participant in all NAZ solution strategies, including partners' operating costs (for the average participation time of five years), society gains $200,178 per participant. The social return on this investment is $6.12 for every dollar invested, with a net benefit of $167,467 per participant. The main source of benefits is increased earnings from increased educational attainment ($141,190).

11. Return on investment in NAZ

	Participants	Taxpayers	Society
Benefits	155,981	44,868	200,178
Costs	4,180	16,356	32,711
Net benefits	151,131	28,512	167,467
ROI	**37.32**	**2.74**	**6.12**

Each dollar of taxpayers' investment is paid back with a return of $2.74. This return is sensitive to the proportion of health care costs that are borne by taxpayers; we assume that this proportion is about 75 percent because of the high rates of public insurance in the Zone.[39]

Finally, the participant ROI is highest at $37.32. In other words, after factoring in their increased net earnings, when compared to the assumed costs of post-secondary education,[40] participants receive $37.32 in benefits for each dollar they spend.

Breakeven analysis

One important question for any social project is: what is the level of success that would be required to pay back the investment in the project? For NAZ to break even, about 16 percent of the expected benefits per participant must actually occur. To put this in perspective, if a given participant graduates from high school, society will have received full payback on the cost of his or her time as a NAZ scholar.

The expected total investment in NAZ of $285 million in the next 15 years would be paid back if about 1,450 total scholars (over the course of those 15 years) are served by NAZ and achieve their expected benefits. (Enrollment projections are still in development, but NAZ expects to serve at least 7,000 scholars during this period.)

Total impact on the local economy

The total economic (net) benefits per participant top $167,000, totaling more than $16.7 million in net benefits for every 100 participants served by NAZ. It is reasonable to expect that a large portion of these dollars will be spent and invested in the local economy. The additional demand for goods and services and the associated increase in the demand for labor and additional investment will have a multiplicative effect on the local economy. These benefits are not included in the ROI estimation, but can be significant in terms of increased employment and income of residents.

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[39] It is also sensitive to the assumed proportion of NAZ costs that are funded using taxpayer dollars, which is estimated at a conservatively high 50 percent. If taxpayers fund only 25 percent of NAZ costs, the return on investment would be $5.49 for each dollar spent, or $2.29 per dollar spent if taxpayers funded 60 percent of NAZ costs (which is highly improbable). Similarly, if we assume only 50 percent of the benefit of health savings accrue to the taxpayer, the taxpayer ROI is $2.31, or $1.88 if we assume taxpayers receive only 25 percent of health care savings.

[40] See appendix for more information.

Considerations and comments

We have stated the importance of the synergy effect of the integrated and holistic approach of NAZ. Because there is no existing literature quantifying these multiplicative effects, we have taken a conservative approach to capture as many quantifiable returns as possible without double-counting benefits from the same outcomes across NAZ's solution strategies. Furthermore, there is another impact of NAZ that it is not accounted for in this prospective ROI: the impact of NAZ on non-participants. These impacts may include changes in the "micro-culture" of environments where NAZ participants interact with other children and families. For example, in classrooms and schools, non-NAZ participants may be positively influenced by NAZ participants' success. Benefits from this peer effect cannot be captured in this prospective ROI.

Another important factor that is not directly included in the analysis is the effect of in- and out-migration of NAZ residents. Migration can affect economic benefits in several ways. We observed that earning patterns of NAZ's residents with low education levels (high school or less) show levels of income lower than in other broader geographical areas such as Minneapolis, even after controlling for educational levels. That is, equally educated individuals outside NAZ tend to have higher incomes than their NAZ neighbors. This gap may be a consequence of several factors, some of them related to structural issues of the neighborhood's economy (e.g. lack of employment opportunities for low-skilled workers, or low wages for the existing positions). It is also possible that, as residents' incomes increase, they choose to move out of the Zone. Since the additional earnings computation is primarily based on the income distribution across educational levels within the Zone, this out-migration likely leads to an underestimate of the actual earnings increase associated with improved educational outcomes for NAZ youth.

In sum, as we have discussed throughout the report, this ROI is conservative in several ways:

This ROI is conservative in that:

- The benefits only capture selected NAZ programs due to the limited data to quantify the impact of some of NAZ's more innovative programs, while the full costs of the entire NAZ ecosystem (even those whose benefits are not quantified) are included.
- It does not capture the synergies between programs (where the impact of two programs combined is greater than the sum of the two programs implemented independently), a key facet of NAZ's unique model.
- It only counts the impact of one program per child, even though the typical NAZ scholar and family receive multiple solutions. In other words, not only does it not

capture the hypothesized synergy, it does not even capture the sum of the parts (it only takes the maximum effect among the programs in which the child participates).

- It overestimates both the typical length of college enrollment and the annual costs of higher education to produce an upper bound estimate of post-secondary expenses for participants, reducing the participant ROI.
- It reflects costs for a full five years of active enrollment per scholar, when the actual time of active enrollment could be much lower to achieve the outcomes enumerated in this report.
- It assumes that 50 percent of costs will be paid using public funds (the upper bound of the range that NAZ is considering), leading to a conservatively low taxpayer ROI.
- It includes no "spillover" benefits, whereby the improved outcomes of enrolled scholars lead to smaller but still meaningful benefits for their classmates (due to, for example, peer influences or the greater availability of educational resources–like their teachers' attention–when NAZ scholars require fewer resources).

Given the variety of ways in which this report underestimates benefits and overestimates the costs to achieve those benefits, we expect that a future ROI study showing actual outcomes for NAZ scholars will find a higher return on investment than the estimates shown here.

Potential scenarios

This ROI was computed under the assumption that NAZ will impact outcomes similarly to other comparable interventions. However, NAZ has established a set of targets for its level of impact on several outcomes, one of the most important of which is educational achievement. In this area, NAZ expects to significantly increase the percentage of individuals who receive a bachelor's degree. Since this outcome significantly affects the total benefits to society, we present a set of scenarios in which we summarize the potential ROI of NAZ under different targets. Figure 12 summarizes NAZ targets on 4-year college degree holders, while the ROI scenarios for these targets are presented in Figure 13.

12. Bachelor's degree impact rates used in ROI scenarios

	Evidence-based impact	NAZ high impact	NAZ target impact
Current percentage of population with 4-year college degree in NAZ	14%	14%	14%
Expected future percentage of population with 4-year college degree in NAZ	22%	25%	28%
Expected impact rate of NAZ	54%	75%	100%

The current percentage of 4-year degree holders in the Zone is approximately 14 percent. NAZ would like to double this proportion to 28 percent. This NAZ target would generate total benefits in the order of $315,594, with a return to society of $10.62 per dollar invested. A lower impact on educational attainment of 75% would generate returns of $8.13 per dollar spent. Both scenarios show returns at least $2 higher than the evidence-based impact ROI (used throughout the primary ROI), and increase the return on investment between 33 and 73 percent.

13. Potential ROI scenarios

	Evidence-based impact	NAZ high impact	NAZ target impact
Impact on college	54%	75%	100%
Benefits	200,178	265,926	347,306
Costs	32,711	32,711	32,711
ROI	**6.12**	**8.13**	**10.62**

Issues to consider

Even if one ignores the limits imposed by the very conservative approach taken in this study, the 6-to-1 social return on investment of NAZ is very strong, especially when considered alongside the (still very respectable) 4-to-1 and 2-to-1 returns of many other U.S. government-backed efforts.[41] This return on investment study, however, is only a starting point as we seek to understand the impacts of the Northside Achievement Zone.

As discussed at several points in this report, this study is only a partial and "prospective" return on investment. Due to limited data availability, benefits are only partially counted, capturing only a handful of NAZ programs, even though the holistic nature of NAZ is central to the model's expected success. Further, until we can observe the outcomes for NAZ scholars like Brandon and Jasmine, we can only compute a "potential" ROI, basing the expected impacts on those of the most similar programs we can find (which likely provide fewer and less comprehensive services than NAZ). Finally, for the long list of reasons described above, the reported return on investment is quite conservative. As a result, the true impact of the NAZ model will be revealed many years down the line, when Brandon is getting his first job out of college and Jasmine is enrolling her 3-year-old in a NAZ early learning center.

In the meantime, NAZ has already made great strides in documenting their service implementation and outcomes in their comprehensive and collaborative data system, NAZ Connect, which will play a significant role in computing the true return on investment of NAZ in the future. It will be crucial to maintain an ongoing focus on consistent data collection with NAZ families to capture the range and depth of NAZ solutions, paired with follow-up contacts into and beyond the scholars' college years to track their long-term outcomes. Some of the most significant contributors to the benefits estimates, like educational attainment, are already closely tracked for NAZ scholars and the neighborhood as a whole. Others, including health-related issues like tobacco use and depression, could be incorporated into the data system as NAZ strengthens its health-based solutions, which would allow those benefits to be captured in a future ROI study.

With a NAZ organizational culture that is already sharply focused on results-based accountability, the infrastructure is in place to yield a strong return on investment study in the future with only minimal additions to the data system. Such a study would be unparalleled elsewhere in the literature, as the first complete ROI study of such a comprehensive program as NAZ.

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[41] U.S. Office of Management and Budget, Draft 2014 Report to Congress on the Benefits and Costs of Federal Regulations and Unfunded Mandates.

Finally, this study points to several signs that the true return on investment of NAZ will most likely exceed the estimates in this report. For example, it is no accident that NAZ has focused its early efforts on early childhood education, more than doubling the Zone-wide proportion of children attending high-quality early learning centers within their first two years as a Promise Neighborhood.[42] In the existing literature, ECE programs have the most consistently and clearly documented impacts on a wide range of long-term outcomes related to educational attainment (and correspondingly, financial success), health, and crime. The results of this study indicate that the NAZ scale-up strategy, building from the toddlers on up, will likely yield substantial benefits for NAZ scholars and the Zone as a whole, particularly with the ongoing NAZ supports throughout grades K-12 to reduce the "fade-out" effect. The NAZ efforts to keep their scholars "in the green" well beyond ECE are likely to magnify the benefits of early childhood education, leading to even greater benefits for NAZ families than those captured in this report.

[42] Idzelis Rothe, M., Shelton, E., & Owen, G. Northside Achievement Zone: 2013 community survey.

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Appendix

Methods and framework of reference

This framework describes computational procedures to estimate the potential social return on investment (SROI) associated with implementation of selected NAZ solutions.[43] The framework contains assumptions, methods, and data sources that are used to compute the net present value of benefits and costs. This SROI is best described as a "prospective SROI" because benefits are estimated in expected terms; that is, the analysis assumes certain scales and impacts of NAZ implementation rather than computing costs and benefits after full implementation has occurred.

General SROI methods

The cost-benefit model contains three steps:[44]

First, we establish the potential impact of NAZ's solutions on a set of outcomes that have been shown to be impacted by similar programs. We identify similar programs that have been implemented and evaluated with similar populations elsewhere, and use those similar programs as reference points to estimate the effect of corresponding NAZ solutions. We achieve this by conducting a literature review specifically tailored to identify program impacts on outcomes associated with NAZ solutions (e.g. early childhood education, Family Academy, expanded learning, career and financial services, etc.). From the review, we extract an effect size for each solution (a measure of how much the outcome changes because of the program). This is a measure of "what works." We use these effect sizes to compute the prospective impact of NAZ if the selected solutions are implemented as planned.[45]

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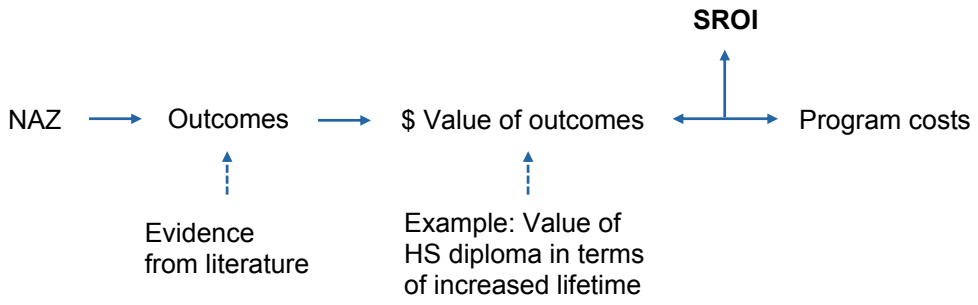
[43] Because of the broad scope of the NAZ initiative, a comprehensive ROI that factors in all of the initiative's solutions is not feasible. This analysis focuses instead on the core solutions that are similar to programs that have been implemented and evaluated elsewhere. Due to the exclusion of many solutions and the unavoidable underrepresentation of the synergies between solutions that drive the NAZ model's design, this ROI presents a conservative (low) estimate of the net benefits of NAZ implementation.

[44] Our approach is built upon the Washington State Institute of Public Policy methods. See: http://www.wsipp.wa.gov/ for detailed description of their methods and procedures.

[45] From the existing literature, we identify a percentage point change that is specific to the population studied in the literature (generally, in Reynolds et al. (2011)). In order to make the percentage point change more generalizable (usable across communities with different base rates because, for example, a 5 percentage point increase is different in a community with a 30 percent rate than in one with a 60 percent rate), we first convert that percentage point change to a percentage change, dividing the percentage point change by the base rate in the control group. However, these calculations require a percentage *point* change to multiply by the cost, so we then multiply the percentage change by the current NAZ-specific rate. The percentage change times the current rate gives us the percentage point change specific to NAZ, which we multiply by the cost to determine the value of the NAZ impact.

We then conduct an economic analysis to estimate the monetary value of the improved outcomes. For instance, we consider the value of obtaining a high school diploma in terms of (discounted) future income, reduced cost of crime, and/or reduced public assistance. Then, we compute the net benefits by comparing the prospective benefits to the cost of the intervention (operating costs + indirect cost).

A1. SROI general framework



Example of SROI methods

As an example, to calculate the impact of early childhood education (ECE) on any symptom of depression, we complete the following equation:

$$\frac{[\text{Likelihood of depression}]*[\text{Impact of ECE on depression rate}]*[\text{Health care costs of depression}]}{(1+\text{Discount Rate})^{([\text{Age of impact}]-[\text{Age at participation}])}}$$

Throughout the report, we assume a discount rate of 3 percent and the age of ECE participation as 4 years old. We also assume that the average NAZ scholar will resemble the current NAZ population, so measures such as "percent of North Minneapolis residents reporting any depression symptom" are used to estimate the likelihood that a typical NAZ scholar will suffer from these symptoms in the future. The measures used throughout the study are outlined later in the Appendix.

Using the outcome measures from Figure A2, we can substitute values to determine the expected reduction in costs. Although the impact of ECE reduces the likelihood of depression symptoms, we use the absolute value of the impact to determine its effect on costs.

$$(0.22*0.264*8953)/(1.03)^{(24-4)} = 289.63$$

The cost savings from reduced depression that can be attributed to ECE amount to $290.

A2. Early childhood education's impact on any depression symptom

Measure	Value	Source
Any depression symptom, % of population	22%	2010 Minneapolis SHAPE Survey
Impact of ECE on any depression symptom	-26.4%	Reynolds (2011)
Cost of health outcomes, any depression symptom	$8,953	Greenberg et al. (2003)
Age of impact	24	Assumption

Solutions and outcomes

The NAZ model consists of a comprehensive set of interventions (referred to as "solutions") that may span over the lifetime of participants. For instance, educational strategies start at pre-K or early childhood education and continue with Expanded Learning and other solutions for scholars in grades K-12. Furthermore, some interventions target children while others focus on the parents. The driving assumption behind this comprehensive approach is that there will be multiplicative effects when these interventions are combined. However, the innovative nature of the NAZ model means there is very little existing evidence of the existence and measurement of this multiplicative effect.

To assess the benefits from the selected solution strategies and avoid double counting, the ROI estimates reflect the benefits associated with the outcomes with the highest benefits. For instance, if early childhood generates a larger increase in future earnings than expanded education and family education, only the results from the impact of early childhood education on earnings are included. We do this for all economic outcomes and strategies.

One of the arguments in favor of the NAZ model is the declining need for services over time after scholars get "in the green." Without loss of generality, imagine a child who receives early childhood education. It is expected that the benefits associated with these services will last over the lifetime of the participant. However, under adverse conditions, these benefits may fade out after the child enters the K-12 system. The NAZ strategy presumes that the availability of continued support for Brandon and his family over his whole K-12 career will reduce the risk of this fade-out effect, but the lack of existing evidence related to comparable programs prevents this ROI from fully capturing the reduction in fade-out. As a result, the impact parameters assume the same probability of impact (the same fade-out effects) as those found in the existing studies of individual programs, despite the expected reduction in the fade-out effect for NAZ, and this ROI once again necessarily undercounts the true benefits of NAZ.

Despite the NAZ focus on populations of color (and African American boys in particular), the lack of racially-specific data prevented the disaggregation of results by race and gender. For example, most effect sizes in the literature were not reported by race. In addition, many cost parameters and incidence rates were not available by race, making it impossible to compute benefits for several outcomes. A racially-specific ROI could have been computed only for one or two outcomes for which adequate data were available, and the ROI would therefore not have been comparable to the overall ROI. In the future, the comprehensive NAZ data system may enable a racially-specific ROI, post-implementation.

Methods and Procedures: Early Childhood Education (ECE)

Outcome 1.1. Increased High School (HS) graduation rate

The primary economic outcome associated with ECE (via high school graduation) is **increased lifetime earnings**. We use 3-year (2010-2012) Current Population Survey (CPS) earnings data for North Minneapolis (PUMA 01405) by educational status and age to estimate the expected gain in life cycle labor market earnings for residents with only a high school degree ($EarnHS_y$) as compared to earnings of those who did not complete high school ($EarnNHS_y$). From these data we compute average earnings per person, by each year (y) of age for each educational status.

To obtain the life-cycle distribution of earnings, we fit the annual earning series for each group using the probability distribution that best fit the data. The rate of growth of earnings (GEarn) and estimated fringe benefits ($Fring_y$, GFring) are also computed and added to the modified earnings series of each group. The series is adjusted by inflation using the Implicit Price Deflator (IPD_{base}/IPD_{cps}). The series is computed for each year (y) from age 18 to age 65.

$$ModEarnHS_y = EarnHS_y \; x \; (1 + GEarnHS)^{y-age} \; x \; FringHS_y \; x \; (1 + GFringHS)^{y-age} \; x \; \frac{IPD_{base}}{IPD_{cps}}$$

Using the discount rate (Dis), we obtain the gain in the present value of lifetime earnings from high school graduation (PVGE) by multiplying the difference in earnings between high school graduates and non-high school graduates by the increase in the number of high school graduation "units" (relative impact) caused by the solution (ImpactECE_HS). We do this for each year from the participant's age of expected graduation to age 65.

$$PVGE = \sum_{y=age}^{65} \frac{\left(ModEarnHS_y - ModEarnNHS_y\right) x \; ImpECE\_HS}{(1 + Dis)^{y-age}}$$

The impact rate is derived from the meta-analysis of ECE studies conducted by WSIPP.

Finally, to incorporate the additional marginal benefit of completing at least some college (relative to completing only high school), we repeat the procedure for people with at least some college. That is, we first compute a weighted average income for residents with at least some college (based on the relative proportions of Zone residents whose highest education attainment is "some college" versus "bachelor's degree or higher") for each age. We then subtract the earnings figure for those with only a high school diploma to compute the marginal increase in earnings for students completing at least some college (relative to those with only a high school diploma). We multiply that marginal earnings increase by the impact parameter in the literature to compute the earnings benefit associated with ECE (as a result of completing at least some college).

Outcome 1.2. Reduced use of special education services

The associated economic outcome with reduced use of special education services is **savings to the K-12 system in special education costs**. ECE participants have been shown to require fewer years of special education on average. The benefit of special education savings is computed by multiplying the estimated reduction in the number of years of special education associated with participation in ECE programs (ImpECE_SEd) by the present value average cost of special education for the relevant school district, conditional on receiving special education. Formally,

$$PVSED = \sum_{y=1}^{sedyears} \frac{ImpECE_{LSEd} x\ SEdCost\ x\ \frac{IPD_{base}}{IPD_y}}{(1+Dis)^y}$$

The average cost of special education is computed using the average per-student special education expenses for NAZ partner schools in the Minneapolis Public School (MPS) District, based on financial data for the 2014-15 school year.[46]

Outcome 1.3. Reduced grade retention

The associated economic outcome with reduced grade retention is **savings to the K-12 system (general expenditure).** The present value cost of an extra year of K–12 education is estimated for those retained for an extra year. This is modeled by assuming that the cost of the extra year of K–12 education, EdCostYear, after adjusting the dollars to be denominated in the base year dollars used in the overall analysis, would be borne when the youth is approximately 18 years old. Since there is a chance that the youth will not finish high school and, therefore, that the cost of this year will never be incurred, this present valued sum is multiplied by the probability of high school completion, HSprob.

[46] We assume that savings for MPS can be applied to students in other NAZ partner schools.

The value of the extra year of education is then multiplied by the impact of ECE on the likelihood of being retained at least once.

$$PVgraderet_{page} = \frac{EdCostYear\ x \frac{IPD_{base}}{IPD_{costy}}}{(1+dis)^{18-age}} x\ HSprob\ x\ ImpECE_{gret}$$

The average/marginal cost of education is computed using the average per-student general expenses for the NAZ partner schools in the Minneapolis Public School District.

Outcome 1.4. Reduced crime

The associated economic outcome of reduced crime is **savings to the justice system and victims of crime.** We use the results of Reynolds et al. (2011), showing the impact of ECE on crime: 0.12 fewer felony arrests per participant.

Felonies trigger a series of costs (from a variety of resources) throughout the justice system and the society. We identify at least 10 resources whose demand could potentially be reduced by NAZ impacts:

- Police
- Juvenile local detention
- Juvenile state institution
- Adult jail
- Adult state prison
- Victims' costs
- Courts/processing sentencing
- Juvenile local supervision
- Juvenile state supervision
- Adult local supervision
- Adult state supervision

Not all of these resources are tapped every time a felony arrest is conducted. Thus, we estimate the likelihood of the resource being tapped for this type of offense. For example, since the impact parameter is measured in terms of a change in the likelihood of arrests, jail time is only affected if the arrest results in a conviction and a subsequent incarceration. In addition, we consider the length of jail/prison time for those crimes that lead to incarceration.

The other important piece of information is the unit cost of each of the resources – that is, the marginal/average cost per day of jail, average police cost per arrest, cost per sentence, etc.

We compute benefits of reduced juvenile and adult crime wherever sufficient data are available.

It is difficult to collect data on all of the listed potential costs of crime. We were able to identify data sources for the costs of adult jail, prison, and courts. We use only local sources of data to compute these savings. See the lists of parameters for detailed information on sources.

Savings from the reduced number of felony arrests are computed using this general model:

$$CrimeECE_{fel} = \sum_{r}^{R} ImpECE_{fel} x\ PrRES_{rfel}\ x\ Units_{rfel}\ x\ Cost_{rfel}$$

Variable definitions:

R—The number of criminal justice cost resources included in the analysis.

ImpECE$_{fel}$ — Impact of ECE on the number of felony arrests, taken from Reynolds et al. (2011).

PrRES$_{rfel}$ — The probability that a criminal justice resource, r, will be used for a felony. For example, not all offenders who are arrested will be convicted and receive a prison sentence.

Units$_{rfel}$ — The number of units of a resource that are used in average for a felony (e.g., the average length of stay in jail for felony convictions).

Cost$_{rfel}$ — The per-unit marginal cost of each criminal justice resource. Marginal costs are computed using time series of expenditures and arrests by type of crime. If time series are not available, average cost data from official reports are used.

Outcome 1.5. Child welfare

The associated economic outcome is **savings to the child welfare system (county) from reduced child abuse and neglect (CAN) costs and out-of-home placement costs (OHP)**. We use Hennepin County data on payments associated with CAN and OHP cases for Zone families for the last 5 years (using the same selection criteria described below in the section for Outcome 1.7 Public Assistance. We combine this cost information with the impact of ECE on indicated cases of abuse and neglect and OHP. We adjust this savings by the incidence of CAN and OHP cases among Zone families.

Outcome 1.6. Health and mental health

Reynolds et al. (2011) showed that ECE reduced future depression symptoms, substance misuse, and daily tobacco use among participants at the Child-Parent Center, while also increasing their likelihood of having health insurance. We use Reynolds et al. as a model to approximate the per-child health and mental health benefits of NAZ ECE.

Outcome 1.7. Public Assistance

The associated economic outcome for the welfare system is **savings from reduced public assistance payments.** We use data on public assistance payments for Zone residents in the last 5 years to compute average costs per family. The public assistance programs reflected in this analysis include medical assistance (MA), Minnesota Family Investment Program (MFIP), and other payments from family-oriented programs. We use individual de-identified data of annual payments extracted in five independent annual samples from the Hennepin County welfare system. Cases are included in the sample if they (1) lived within the geographic boundaries of the Zone and (2) received payments during the month of December of at least one year. Then, for each individual selected in each sample, we extract the total payments for that year. We repeat this procedure for each year from 2009 to 2013.

The complete data set (five annual cohorts of NAZ cases) allow us to compute the average payments for each program. These average payments are multiplied by the expected impact of ECE on welfare payments estimated by Reynolds et al. (2011), and adjusted by the average length of participation in each welfare program.

Methods and Procedures: Expanded Learning Programming; Mentoring; Achievement Planning[47]

The economic outcomes associated with these solution strategies are increased lifetime earnings from increased education (high school graduation and higher education enrollment), savings from reduced crime, savings to the K-12 system from reduced grade retention, and improved health from reduced depression. Benefits include children's and parents' outcomes. The procedures to compute these benefits are the same as in the case of ECE. In this case, the impact parameters used are taken from meta-analysis of after-school and mentoring programs that are comparable to NAZ solutions.

Some children who receive ECE will also receive solutions during their K-12 and HS careers. Therefore, it is likely that there will be some synergies between these solutions. To avoid double counting benefits, the ROI counts benefits from only one of the solutions.

[47] Achievement Planning is noted here because it is an important component of NAZ's holistic approach to academic achievement. However, we have not identified any existing literature on comparable programs, and so the impact of this solution is generally unknown. As a result, the benefits represented in this section are largely derived from the Expanded Learning and Mentoring solutions.

Methods and Procedures: Career and financial support

NAZ refers many parents to workforce partners to improve their employment and income stability. The impact of these referrals depends on the effectiveness of these programs in improving employment and wage conditions of participants. We estimate the percentage wage increase from NAZ job placement and training programs using results from a national study of the Job Training Partnership Act (Bloom et al. 1997). We apply this percentage wage increase to a conservatively low estimate of initial income (prior to participation in the workforce program), based on average annualized wages for the quarter prior to enrollment in 20 United Way workforce programs in the Twin Cities.

Methods and Procedures: Family Academy

NAZ's Family Academy parent education programs target families with children from birth to fifth grade. This analysis reflects Family Academy benefits for both parents and children. For youth, these programs result in higher lifetime earnings by increasing the likelihood of high school graduation. Participation also results in savings to the K-12 system by reducing grade retention. Another outcome is improved child welfare, which lowers costs associated with foster care and child abuse/neglect, while youth themselves are less likely to commit crimes, resulting in savings to the justice system. Behavioral outcomes for parents and children are also substantial. Children experience reduced levels of depression, disruptive behavioral disorder, and ADHD, which decreases health care costs. Parents also demonstrate lower levels of depression, yielding lower health care costs and boosting labor market productivity, which increases family earnings.

These impacts are derived from existing literature on parent education programs. Particular attention was paid to studies of the Incredible Years program, which NAZ has adapted to meet the needs of its participants. Benefits are computed with impact parameters to estimated lifetime earnings, child welfare, and K-12 resource costs (as computed in previous sections).

Child support

To determine the financial impact of improved compliance in child support payments by non-custodial parents, NAZ-specific data on active child support cases were provided by Hennepin County. Though data were available for the years of 2009-2013, the computations of potential additional child support payments were limited to data from 2013 to most accurately capture the value of improving compliance among active but non-compliant child support cases. Of the 926 active child support cases with a payment due in the Northside Achievement Zone in 2013, 871 of the non-custodial parents paid less than the full amount due. To bring those cases into compliance would bring an additional $7.9

million to the custodial households between 2013 and the children's 18th year, an average of $5,831 per child of a non-compliant parent.

The value of child support that is already being paid is excluded from the totals above, so these figures represent the marginal increase in payments from bringing child support payments to full compliance. This estimate assumes the same total annual child support due (and the same proportion already paid by the non-custodial parent) for each year from 2013 up to and including the child's 18th year, with a discount rate of 3 percent. Because of the likely but ignored increase in non-custodial parent income (and thus in child support due), this is a conservatively low estimate.

Because not all children in the Zone have a parent who is non-compliant on child support, we adjust the per-child value based on the proportion of children who do have a parent who is non-compliant (23%). The expected average gain per child is therefore $1,341 if NAZ brings 100 percent of non-complaint child support cases into compliance. In the absence of parameters in the literature to inform the expected impact of NAZ on child support compliance, we present three scenarios, assuming NAZ will have a 10 percent, 50 percent, or 100 percent impact on the child support compliance rate.

Other strategies and outcomes

The above are not a full representation of all NAZ solutions or all expected outcomes of NAZ. For a variety of reasons, some strategies and outcomes cannot be included in the present analysis.

Not enough data on outcomes: As mentioned above, some solutions have been omitted from this framework because there is no basis for estimating outcomes. This includes Achievement Planning, work directly with leaders of Anchor Schools on school effectiveness, and many of the expected benefits from Family Engagement such as increased parental participation with schools and increased parental planning for children's college and career.

Not enough information about strategy yet: Some solutions have been omitted from this framework because there is currently not enough information about them (scale and/or specific program features) to estimate impacts. These include the high school Expanded Learning program and the college success solution plan.

Not enough data on cost savings: Other solutions have been omitted despite information about strategies because of a lack of solid information about cost savings. These include the NAZ housing solution.

As a result of these omissions, the computed Social Return on Investment is an under-estimate of the actual return.

Assumptions and impact parameters

A3. General assumptions

Parameter	Value
Discount rate	3%
Age at program participation – early childhood education	4
Age at program participation – expanded learning	10
Age at program participation – parent education	22
Age of outcome – Child welfare	10
Age of outcome – Special education	18
Age of outcome – Grade retention	18
Age of outcome – Public assistance	24
Age of outcome – Crime	24
Age of outcome – Health	24

Earnings assumptions

A4. Employment and earnings growth

Parameter	Value
Growth rate of earnings	
All	0.0015
Less than HS	0.0004
High School	0.0011
Some college	0.0013
College	0.0028
Ratio of benefits to wages and salaries	1.4410
Growth rate of benefits	0.0004

Source: *Washington State Institute for Public Policy (2013).*

A5. Tax rates

Population decile	Income range	Total local taxes	Total state taxes on individuals	Total state and local taxes on individuals
First	$10,937 & under	13.6%	9.7%	23.3%
Second	$10,938-$18,316	4.9%	4.7%	9.6%
Third	$18,317-$26,397	4.8%	4.3%	9.1%
Fourth	$26,398-$35,600	4.3%	4.7%	9.0%
Fifth	$35,601-$46,507	4.2%	5.8%	10.0%
Sixth	$46,508-$59,998	4.2%	6.1%	10.3%
Seventh	$59,999-$77,704	4.0%	6.5%	10.5%
Eighth	$77,705-$101,616	3.6%	6.9%	10.5%
Ninth	$101,617-$146,400	3.3%	7.0%	10.3%
Tenth	$146,401 & over	2.3%	7.0%	9.3%

Source: *2013 Minnesota Tax Incidence Study, Minnesota Department of Revenue.*

A6. Consumer Price Index

Year	CPI	Year	CPI	Year	CPI
2013	232.957	2006	201.6	1999	166.6
2012	229.594	2005	195.3	1998	163
2011	224.939	2004	188.9	1997	160.5
2010	218.056	2003	183.96	1996	156.9
2009	214.537	2002	179.88	1995	152.4
2008	215.303	2001	177.1	1994	148.2
2007	207.342	2000	172.2	1993	144.5

Source: *Bureau of Labor Statistics.*

Education and earnings

A7. Average earnings, Northside Achievement Zone

Year	Annual
Less than high school	$18,539
High school	$38,513
Some college	$50,549
4-year college degree	$114,160

Source: *ACS 3-year estimates (2010-2012) using total earnings by age, race, gender, and educational attainment within NAZ's geographic boundaries. Calculations performed by Minnesota Compass.*

A8. Educational attainment

	North Minneapolis	Minneapolis
Less than high school	21.0%	12.0%
High school only	27.8%	17.5%
Some college or associate's degree	30.6%	25.0%
Bachelor's degree	14.1%	28.4%
Graduate degree or higher	6.5%	17.1%

Source: *Minnesota Compass, Minneapolis Neighborhood Profiles for Camden and Near North Communities, ACS 2008-2012 estimates. In the table, "North Minneapolis" includes both Camden and Near North.*

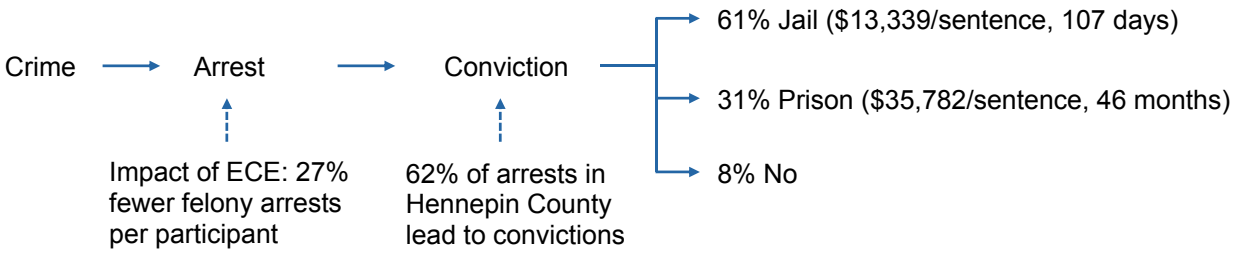
A9. Public education counts and costs (Minneapolis Public NAZ partner schools)

Parameter	Value	Source
Average proportion of students in special education	0.18	Minneapolis Public Schools
Number of students in special education	533	Minneapolis Public Schools
Total cost of special education	4,420,678	Minneapolis Public Schools financial reports
Average annual special education cost per student	8,294	Minneapolis Public Schools financial reports
Total number of students at public NAZ partner schools, 2014-15	2,976	Minneapolis Public Schools
Total general spending at public NAZ partner schools, 2014-15	27,257,003	Minneapolis Public Schools financial reports
Average annual expenditure per student	9,159	Minneapolis Public Schools
Average proportion of students retained in grade	0.001	Minneapolis Public Schools
Weighted high school graduation rate (based on 2013 survey weights)[48]	0.59	NAZ Student Survey, 2013, and Minnesota Department of Education website
High school graduation rate, Minnesota	0.79	"Minnesota graduation rate rose in 2013," Minneapolis Star Tribune, 2/20/2014

Note: *Minneapolis Public Schools figures include Nellie Stone Johnson, Hall International, Patrick Henry High School, and North Academy of Arts & Communication*

[48] To compute high school graduation rates for the Zone, weighted averages were used to account for the wide-ranging rates of the five most common high schools attended by high schoolers living in the Zone. These weights were based on the 2013 NAZ Community Survey, wherein respondents were asked for the name of the school attended by each of their children. The top five high schools identified were Patrick Henry High, Edison High, Roosevelt High, North High, and Plymouth Youth Center, representing a total of 88 students between them. (No other high school was identified for more than six students represented in the survey.) Based on the proportional representation of each high school in the community survey, weights were assigned to each high school to estimate the Zone rates. High school graduation rates were computed using graduation data from the Minnesota Department of Education's Minnesota Report Card website.

A10. Crime statistics



Source: *Hennepin County conviction rate computed based on data from Hennepin County Attorney's office. Probability of jail/prison sentence and average sentence lengths from Minnesota Sentencing Guidelines Commission, Sentencing Practices: Annual Summary Statistics for Felony Offenders Sentenced in 2011. Marginal annual jail costs computed by regressing total expenditure by institution in Minnesota during 2009 on average daily populations (ADP) in 2013 dollars.*

A11. Costs associated with crime (selected felonies)[49]

Costs	Average for any felony	Felony sex crimes	Robbery	Aggravated assault	Felony property
Victim costs (tangible)	4,066	5,556	3,299	8,700	1,922
Victim costs (intangible)	20,677	198,212	4,976	13,435	-
Number of reported crimes in MN in 2013	143,566	1,971	3,661	6,837	131,097
Percent of reported crimes in MN in 2013	100%	1.4%	2.6%	4.8%	91.3%
Weighted average total victim cost per felony	24,743	-	-	-	-

Sources: *Victim costs from Vermont Center for Justice Research (2014). Reported crimes from 2013 Minnesota Department of Public Safety's 2013 Uniform Crime Report.*

[49] Incidence of several other types of felonies (arson, murder) is likely to decline as well, but data on victims' costs were unavailable for these other felonies.

Child welfare

A12. Child welfare payments, Northside Achievement Zone

Parameter	Value	Source
Incidence of maltreatment (2013)	0.022	Hennepin County
Median total cost of direct payments per case (between 2009-2013)*	$7,307	Hennepin County
Child abuse victim cost (per crime)	$57,179	Miller et al. (1996), Reynolds et al. (2011)
Admin cost per child protection report (Hennepin County, 2013)	$1,147	Hennepin County
Mean number of years in child protection system (2009-2013)*	1.95	Hennepin County
Total cost per maltreatment case	$66,724	Hennepin County

Source: *Hennepin County child welfare data.*

Incidence and cost based on cases for which at least one family member resided within the NAZ geography. Parameter includes costs for children of all ages. In 2010, the total population age 0-18 in the NAZ geography was 5,967.

** Median total cost of payments per case is the sum of all payments during the 5-year span from calendar year 2009 to 2013. Note that the mean total cost and the mean number of years receiving payments are both underestimates of the total cost and number of years per case because many cases will have received payments before and after the 5-year window of observed data.*

Health and public assistance

A13. Health concerns

Parameter	Incidence	Measure and geography	Source
Any depression symptom, %	0.22	Currently suffering from depression, Camden/Near North	2010 Minneapolis SHAPE Survey
Substance misuse, %	0.016	Substance abuse/dependence in past year, Minnesota	2010 Minnesota Dept. of Human Services
Daily tobacco use, %	0.19	Daily smoking, Camden/Near North	2010 Minneapolis SHAPE Survey
Teen pregnancy rate, %	0.125	Probability that a teen will become a mother before age 20, United States	Welti 2012

A14. Health costs and assumptions

Parameter	Incidence	Source
Cost of treatment for depression[50]	$8,953	Greenberg et al. (2003)
Cost of treatment for substance misuse[51]	$191,446	Cohen (1998), Reynolds (2011)
Mortality cost of tobacco use[52]	$1,421,775	Viscusi & Hersch (2007), Reynolds (2011)
Probability of tobacco use in high school leading to tobacco use in adulthood	0.8	U.S. Dept. of Health and Human Services (2012)
Assumed proportion of healthcare cost paid by taxpayers	0.75	Assumption

A15. Public assistance (PA) expenditures

Parameter	Value
Median annual payment per case (includes direct payments and insurance premium payments) (NAZ residents)	15,946
Mean annual administrative cost per case (Hennepin County)	129
Total annual cost per case	16,075
Average number of years receiving payments within period*	1.84

Source: *Hennepin County, 2009-2013, Northside Achievement Zone geography only.*

** Note that the mean number of years receiving payments is an underestimate of the total number of years per case because many cases will have received payments before and after the 5-year window of observed data.*

50 Annual cost of depression treatment is estimated to be $4,477 (Greenberg et al. 2003). Lifetime cost estimate follows Reynolds et al. (2011) in conservatively assuming two years of depression treatment per affected individual.

51 Substance misuse lifetime cost based on estimate from Cohen, adjusted for inflation, and subtracting productivity impacts (which are captured elsewhere). Following the methods of Reynolds et al. (2011), the total cost (shown above) was assumed to be evenly distributed over the years from age 14 to age 60, and the included costs were counted only for the 28-year period from age 16 to age 44 (again, following Reynolds). After discounting from age 4 to age 24, the total adjusted cost of substance abuse is $56,465.

52 Lifetime cost of tobacco use is based on Viscusi and Hersch (2007), who compute the mortality cost (using a hedonic wage model) of smoking for an adult who currently smokes "at least some days" and has smoked more than 100 cigarettes in their lifetime. (Estimate is the simple average of their estimates for men and women.)

A16. Early education impacts

Parameter	Impact
Impact on educational attainment	
High school completion, %	0.09
Completed at least 0.5 credits at a 4-year college, %	0.54
Impact on crime	
Any felony arrest, %	-0.25
Number of felony arrests	-0.27
Petition to juvenile court, %	-0.33
Number of petitions to juvenile court	-0.42
Impact on Special Education and grade retention	
Special Education by age 18, %	-0.42
Number of years of Special Education from ages 6 to 18	-0.49
Grade retention by age 15,%	-0.40
Impact on health	
Any depression symptom, %	-0.26
Substance misuse, %	-0.24
Daily tobacco use, %	-0.19
Impact on child welfare	
Any report of abuse or neglect from ages 4 to 17, %	-0.43
Any out of home placement, %	-0.39
Impact on public assistance	
Food Stamp receipt, ages 18-24, %	-0.09

Source: *Reynolds et al, 2011.*

A17. Family Academy and family engagement impacts

Parameter	Impact	Source
Improved behavioral health for children (less disruptive behavior, ADHD)	-0.255	WSIPP (2014a)
Grade retention (ADHD)	-0.321	WSIPP (2013)
High School graduation (ADHD)	-0.213	WSIPP (2013)
Any crime measure (ADHD)	-0.168	WSIPP (2013)
Reduced depression in parents	-0.053	WSIPP (2014a)
Earnings/wages (Depression)	-0.03	WSIPP (2013)

A18. Expanded Learning, Mentoring, and Achievement Planning impacts

Parameter	Impact
Increased HS graduation rate	0.154
Reduced crime	-0.042
Smoking in high school	-0.159
Illicit drug use in high school	-0.203

Source: *Washington State Institute for Public Policy (2014). Mentoring for students: community-based (taxpayer costs only)*

A19. Career support impacts

Parameter	Value	Source
% impact of support on income, males	8.0%	Bloom et al. 1997
% impact of support on income, females	14.8%	Bloom et al. 1997
% impact of support on income, typical NAZ parent	13.1%	Authors' calculation[53]
Individual income prior to program participation	$14,300	Twin Cities United Way[54]
% of NAZ parents receiving career support	40%	NAZ staff
Length of program impact on annual earnings	10 years	Assumption
Total benefits per job placement	$14,446	Authors' calculation
Expected benefits per NAZ participant (child; 2.2 children per participant parent)	$2,627	Authors' calculation

[53] Bloom et al. (1997), Table 3, p. 562. We assume 75 percent of participants are women and 25 percent are men (because most NAZ households are headed by women).

[54] Twin Cities United Way data. Estimate reflects an average of 20 workforce programs in Minnesota. Authors' computations based on United Way dataset. This earnings estimate is conservatively low due to Ashenfelter's Dip (immediately prior to program entry, participants' wages will generally be lower than their historical earnings path), leading to a conservatively low estimate of the benefit of participation in the career solution.

Costs

NAZ implementation cost estimates were gathered from NAZ budget projections for 2017 onward. Figure A20 shows the distribution of the 2017 NAZ projected $19 million budget, both within NAZ Central and between NAZ Central and NAZ partners.

A20. NAZ projected budget, 2017

NAZ CENTRAL OPERATIONS	Dollars	Percent
Program Staff + taxes & benefits	3,839,000	20%
Capacity Staff (mgt. & dev't) + taxes & benefits	1,292,000	7%
Contracts for Evaluation & NAZ Connect	339,000	2%
Other Program Expenses	1,137,000	6%
Overhead (rent, insurance, audits etc.)	915,000	5%
Total annual NAZ Central operations	7,522,000	39%
Solution strategy implementation with partners	11,564,000	61%
Total costs	**19,086,000**	**100%**

Figure A21 shows the distribution of the projected 2017 budget across the three main program areas. The majority of funds are allocated to solutions in the Education Pipeline, while the remaining 45 percent of the budget is split evenly between Family Engagement and Whole Family Services.

A21. NAZ projected annual budget by program area, 2017

	Dollars	Percent
Family Engagement	4,461,000	23%
Education Pipeline	10,423,000	55%
Whole Family Services	4,202,000	22%
Total costs	**19,086,000**	**100%**

The total costs estimated in this report assume constant **annual operating costs** (during the **period of interest**) and a one-time **start-up cost** incurred in 2012. These terms are defined or enumerated as follows:

- **Annual operating costs** – $19,086,000 to serve 2,500 scholars (in 1,000 families) each year. Note that these operating costs include many NAZ solutions for which benefits are not quantified in this report.

- **Period of interest** – For the purpose of distributing the start-up costs across all participants (in order to accurately reflect the full cost of serving each participant, not just the annual operating costs), it was necessary to define a time period over which those start-up costs would be distributed. For the cost calculations, the period of interest is defined as the 15 years between full implementation (post-Promise Neighborhood grant, in 2017) and the target completion date for NAZ's longest-term goal, reaching a Zone-wide high school graduation rate of 75%, in 2031.

- **Start-up cost** – A discussion with NAZ leadership revealed that, though NAZ began some of its activities as early as 2010, most of their fixed cost investment (for building infrastructure, furniture, equipment, development of the data system, design of the solutions, etc.) occurred during 2012. This estimate therefore uses NAZ's total 2012 expenditures as a proxy for start-up costs. Start-up costs are therefore assumed to be $10,653,307.

Furthermore, the per-participant annual cost assumes a constant enrollment of 2,500 scholars during the period of interest. Though some families will discontinue their NAZ enrollment during any given year, it is assumed that new families will be enrolled to fill the vacated positions.

Assuming an annual cost of $19,086,000, the total present value cost of 15 years of full-scale implementation is $245.3 million. In these 15 years, NAZ is expected to serve a total of 7,500 scholars, each for an average of five years of active enrollment. The average lifetime implementation cost per scholar is therefore $32,711, and the annual cost per scholar is $6,542.

Higher education costs

To estimate the cost of attending college for NAZ scholars (which factors into the ROI for participants),[55] we use data from the Minnesota Office of Higher Education to estimate the following:

- Average number of years of college attendance for the typical NAZ scholar who enrolls in college[56]

[55] The costs of higher education do not factor into the social or taxpayer ROIs because college expenses represent a transfer from one member of society to another (or one taxpayer to another).

[56] To be consistent with the approach taken to compute earnings and to be as precise as possible, the average number of years in college was computed separately for two groups (those with only some college and those with at least a bachelor's degree) and then a weighted average of those two numbers was computed based on each group's share of the total population of college enrollees.

- Weighted average annual cost (tuition and fees) of the typical institutions attended by students graduating from NAZ partner high schools[57]

Average number of years of college attendance

The Minnesota Office of Higher Education also tracks the number of students enrolling in college for the first time, returning for subsequent years, returning after a "stop-out" (a year or more away from college), and graduating. Each of these items is tracked annually for six years following a cohort's high school graduation. Using the high school graduating class of 2006 (the latest year for which full six-year data were available), based on the counts enrolled each year, we add up the total number of years enrolled during that six-year span and divide by the number of students ever enrolled to get an average number of years enrolled in college (for the average student who enrolls in college at least once) within that six-year span. For North and Henry High Schools, the average college enrollee will be enrolled in post-secondary education for a total of 3.1 years (4.6 years for students completing a 4-year degree, 2.4 years for students completing less than a 4-year degree). Of students who enrolled in college, 78 percent either graduated from a 2- or 4-year program (35%) or withdrew from college (43%) by the end of the six-year period.

However, the six-year span of tracking enrollment means that students who are enrolled for longer periods (some pursuing graduate and professional degrees, others due to delayed progress for any number of reasons) are not adequately captured in this average. To correct this issue, we assume that the 22 percent of students still attending college after the sixth year will attend for 5.6 more years in addition to the average of 2.4 years that they have already completed (eight years total).[58] We use this generous estimate to reflect the anticipated increase in graduate and professional degrees and/or the continued challenging circumstances in which many Zone students attend college. With 78 percent of students attending college for an average of 3.1 years and 22 percent attending for 8 years, we estimate that the average college enrollee attends college for 4.3 years.

[57] Note that living expenses such as room and board, transportation, etc. are not included in this estimate because they are not a cost associated with attending college; that is, those cost are assumed to be incurred regardless of college attendance.

[58] Due to limited detail in the available data, we have once again erred on the side of a conservative (high) cost estimate. It is unlikely that the full 22 percent of students will attend eight years of post-secondary education.

Weighted average annual cost

The Minnesota Office of Higher Education computes the average annual post-secondary "Net Price" for several types of post-secondary institutions, including all tuition and fees and $12,100 for room and board, subtracting grant and scholarship aid received, by income level. Their estimates for households with incomes in the range of $30,001 - $48,000 for the 2011-12 year are shown in Figure A22.[59]

Based on these cost estimates and the proportion of students attending each type (compiled from Office of Higher Education school-specific reports for the North High and Henry High class of 2012), a weighted average annual (net) cost of $3,602 was computed. This cost does not include the $12,100 in estimated living expenses (because those are assumed to be incurred whether or not the student attends college), but does add $1,000 per year to account for books, transportation, and other expenses that would not have been incurred if the student had not attended college. After assuming 2 percent annual growth in the net cost and discounting future years, the average lifetime cost of higher education (for those students who enroll in higher education) is $15,237. This cost is then multiplied by the impact parameter that quantifies the expected increase in college enrollment as a result of NAZ, to quantify higher education costs that are attributable to NAZ.

[59] Although a large portion of NAZ families have incomes in the lower range (under $30,000), with an estimated median household income of about $32,000, we err on the side of assuming higher costs. With that said, the net price estimates for these two income groups (under $30,000 versus $30,000-$48,000) were very similar.

A22. Average annual net cost of attending college for Minnesota households with incomes of $30,001 - $48,000

Type of School	Average Net Price (with Room & Board)	Average Net Price without Room & Board (includes $1000 for books, etc.)	Student Count	Student Percent
Technical & Community Colleges	$13,690	$1,910	58	44%
State Universities	$13,690	$1,910	12	9%
University of Minnesota	$12,628	$849	22	17%
Private Colleges & Universities	$20,057	$8,277	40*	30%
Weighted average annual net cost		$3,602	132	100%

*Cost figures shown are estimated 2014-15 average (net) costs, projected (assuming 2 percent annual growth) from 2011-12 average costs by institution type and income level from the MN Office of Higher Education website: http://www.ohe.state.mn.us/pdf/MM/NetPriceForFirstTimeFullTimeFreshmen.pdf. Student counts reflect colleges attended in Fall 2012 by all identified college enrollees from the North High and Henry High class of 2012. *Includes 8 students attending out-of-state colleges because costs were unknown and were therefore assumed to fall into the highest cost category.*