Increasing Access to Youth Mental Health Services: A Cost-Benefit Analysis of the PATH Program in the Fox Valley

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By:
Andrew Behm
Ann Drazkowski
Samuel Matteson
Maria Serakos
Cherie Wolter

Prepared for Mary Wisnet
Community Development Program Officer
Health & Healing and Strengthening Families
United Way Fox Cities

La Follette School of Public Affairs
University of Wisconsin - Madison
1225 Observatory Dr.
Madison, WI 53706

Robert M. La Follette
School of Public Affairs
UNIVERSITY OF WISCONSIN–MADISON

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Executive Summary

At the request of the United Way Fox Cities (UWFC), we analyzed the costs and benefits of the Providing Access to Healing (PATH) program. This program increases access to mental health care for students with barriers to receiving treatment by providing in-school therapy by trained therapists. Cognitive behavioral therapy (CBT) features prominently in the treatment provided by PATH, and we focus on CBT for our analysis. Our simulation estimates that the PATH program provides average net benefits of $9.4 million.

CBT greatly increases the likelihood that a student with mental illness graduates from high school (Cobb et al. 2006). As such, we identified two streams of benefits affecting PATH participants: benefits accruing while the participating student is in school (short-term benefits) and benefits after the student leaves school (long-term benefits). For the short-term benefits, we estimate the monetary value of reduced truancy, reduced behavior and discipline problems, freed guidance counselor time, avoided juvenile crime, and avoided suicide. Our analysis includes increased lifetime income among participants and avoided adult crime as long-term benefits.
We developed a Monte Carlo simulation to model the costs and benefits of the program. The Monte Carlo approach allows us explicitly to model the uncertainty in the effect of the program and the value of various life outcomes. Out of 10,000 trials, our simulation generated positive net benefits 91 percent of the time, indicating that PATH is likely to produce benefits greater than its costs.

Our findings agree with those reported in a previous cost-benefit analysis (Brunjes et al. 2012). We therefore recommend that the program continue serving students in the Fox Valley area. Should sufficient resources become available, we recommend that United Way Fox Cities

look for ways to expand into other schools in the area or increase the number of therapists or staffing hours in schools currently participating in the program.

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Introduction

The US Department of Health and Human Services describes childhood mental disorders as “serious deviations from expected cognitive, social and emotional development” (CDC 2013 1). Although these disorders affect up to one in five children in the United States, only between six and 20 percent of children with mental disorders or illnesses receive treatment (Kataoka et al. 2002; Costello et al. 2005). As few as 10 percent of children with disorders classified as *serious mental illness*: major depressive disorders, post-traumatic stress disorders, eating disorders, and bipolar disorders, receive treatment (Erickson 2012). Students without insurance or with inadequate insurance are the most likely to have their mental health treatment needs unmet (Kataoka et al. 2002). Early detection and assessment can prevent mental health problems from compounding and causing a cycle of poor life outcomes (“New Freedom Commission Report” 2003). According to Vander Stoep et al. (2003), 47 percent of high school non-completion is attributable to mental health disorders. Furthermore, the U.S. Department of Education (2001) states that 50 percent of students with mental health disorders will drop out of high school without treatment.

Without intervention, mental health disorders can affect a child's academic performance and their ultimate educational attainment level via poor grades, behavior problems, detentions, suspensions, and expulsions (Fergusson and Woodward 2002). If children are not appropriately screened and treated early, childhood mental disorders can persist and potentially result in a downward spiral of school failure, poor employment opportunities, and poverty in adulthood (“New Freedom Commission Report” 2003). School-based programs like PATH increase access to mental health services for children, allowing timely screenings and interventions that can reduce these immediate and future negative outcomes.

Fox Valley PATH Program

In 2006, United Way Fox Cities, the Community Foundation, and the Fox Valley Chamber of Commerce sponsored the *Fox Cities Leading Indicators for Excellence* (LIFE) study to provide an overview of issues affecting the Fox Valley community. Based on data collected over five years through surveys and studies by UWFC and other groups, the LIFE study found that approximately one in four tenth graders experienced a depressive episode and 13.8 percent of tenth graders attempted suicide in the previous year. UWFC responded to these findings by developing the Providing Access to Healing (PATH) program to facilitate in-school access to mental health services for students in elementary, middle, and high school.

PATH began in 2008 as a pilot project in the Menasha Joint School District. Originally targeting high school students, PATH later expanded to serve middle and elementary school students. According to the Wisconsin Department of Public Instruction, 55.7 percent of students in the Menasha Joint School District were eligible for free or reduced meals during the 2013-14 school year. This rate of free and reduced lunch is significantly higher than the state average of 43.3 percent. These students likely come from low-income families that may not have access to health insurance or mental health services. United Way thus targeted both underinsured and uninsured students, as well as students who may have had insurance but encountered barriers to accessing treatment. For example, many could not attend daytime appointments because their parents worked long hours or did not have access to a car, and mass transit in the Fox Cities area is limited. When available, the use of mass transit to attend mental health appointments led to longer school absences.

A follow-up LIFE study released in 2011 found that the prevalence of depression and suicidal thoughts remained steady in the Fox Valley region. As a result, the program expanded to the Appleton, Kaukauna, Kimberly, and Little Chute school districts. In 2012, La Follette students prepared a cost-benefit analysis based on data from the pilot program in the Menasha Joint School District (Brunjes et al. 2012). Their analysis found that PATH produced net benefits for students in the five school districts in excess of $7 million dollars, or nearly $50,000 per participating student. The program subsequently expanded to the Freedom, Hortonville, Seymour, Shiocton, and Neenah school districts. See Appendix A for a detailed program description of PATH and Figure 4 for a timeline of PATH's development and implementation.

PATH currently operates at 23 school facilities in ten school districts, serving predominantly high school and middle school students with a smaller presence in elementary schools. Each school district allocates services among schools within the district out of a budget of service hours determined by UWFC. UWFC is trying to address long-term sustainability by reducing the dependency on grants and charitable donations. In place of charitable donations, the program is increasing billing to third-party insurers by serving more students who are covered by Medicaid or private insurance. Nonetheless, the vast majority of present funding for the PATH program continues to come directly from the United Way Fox Cities and two grants provided by the Community Foundation.

In the 2013-2014 school year, 183 students were enrolled in the PATH program across all school levels. Of these students, 105 were females and 78 were males. All faced one or more barriers to accessing mental health care such, as lack of insurance, a high insurance deductible, inadequate transportation, parent work conflicts, or lack of parental support. PATH students suffer from a variety of mental disorders, and the majority of program participants experience multiple disorders. The most common mental disorders faced by PATH students are adjustment disorders (affecting 41 percent), mood disorders, including depression, (33 percent), anxiety disorders (27 percent), and ADHD (15 percent). PATH participants also suffer from oppositional defiant disorder (ODD), conduct disorders, and eating disorders. Other community and school-based programs serve students who would otherwise participate in the PATH program. These programs tend to serve students with more severe criminal backgrounds and may be provided with mental health services through the juvenile justice system. See Appendix B for a detailed profile of PATH participants.

Program Costs and Benefits

We reviewed the previous La Follette PATH cost benefit analysis (Brunjes et al. 2012) and extensively reviewed the literature for estimates of the likely effects of cognitive behavioral therapy (CBT), PATH's main mode of treatment. We used a different approach than the previous La Follette cost-benefit analysis. At the time of the previous analysis, there was little background information or data on the students participating in the program. The previous La Follette analysis therefore estimated the prevalence of various disorders among PATH participants and estimated net benefits based on the effect of CBT on each disorder. However, most students enrolled in the PATH program have comorbid mental health diagnoses. Separately analyzing the effect on each disorder risks overestimating the benefits of the program for students with multiple disorders. Instead, we analyze the impacts of PATH's school-based CBT intervention program on a generic mental disorder without differentiating by specific diagnosis.

School-based mental health programs like PATH that use cognitive behavioral interventions have been shown to reduce the likelihood of dropping out of high school and increase the presence of additional positive behaviors (Cobb et al. 2006). Haveman and Wolfe (1984) identify numerous private and public effects of graduation, including increased productivity and wages, reduced criminal activity, better health status, and increased enjoyment of leisure. School-based mental health programs increase the propensity of youth to graduate from high school. To capture many of these benefits associated with reducing the dropout rate in our analysis, we use educational attainment as the driver of the long-term benefits of the PATH program. The long-term expected benefits of PATH's CBT intervention estimated in our simulation result from more students graduating high school.

As discussed further in Appendix C, we expect half of PATH participants not to complete high school in the absence of the program. We expect CBT to improve the behavior and academic performance in the short-term. Helping a student graduate high school turns this temporary improvement into a permanent effect that potentially improves the student's entire life course. We expect about one quarter of the participants to drop out despite the intervention, and we expect half the participants to be on track to graduate anyway. Because the direct effect of CBT on long-term earnings and adult crime are complicated by natural recovery and the decay of the CBT effect over time, we use the high school graduation effect of CBT as the basis for estimating all long term impacts of PATH. We do not expect the effect of CBT to persist over many years, so we assume CBT does not directly affect adult outcomes in our simulation. However, as long as the effect of CBT persists long enough to help students graduate from high school, it can alter the students' life trajectory. If a student with a mental disorder drops out of high school, then we expect that the benefit of natural recovery to be overshadowed by the loss incurred by failing to graduate.

Short-term benefits accrue during a PATH participant's time in school. These benefits include avoided school staff time addressing truancy, avoided school staff time addressing student behavior and discipline problems, guidance counselor time freed for activities other than providing mental health care, avoided juvenile crime, and avoided suicide. In addition, a survey of PATH school principals and counselors report several immediate benefits to the program, such as increased emotional affect, improved academic performance, and reduced classroom disruptions (see Appendices D and E). The PATH program incurs costs for therapist time, UWFC overhead, and space in school buildings.

Costs

The United Way Fox Cities incurs costs to implement the PATH program. UWFC provided information on these costs through a financial statement for the 2013-2014 school year and a budget projection for the 2014-2015 school year. Starting with the pilot program in 2008 in the Menasha School District and up until the completion of the 2013 to 2014 school year, UWFC has paid $55 directly to the mental health care provider for each student therapy session. For the 2014-2015 school year, UWFC changed its reimbursement to fixed grants to the three service providers based on the districts they serve. Because we prepared our analysis based on the 2013-14 school year, the change in the reimbursement structure is not included. See Appendix F for a detailed breakdown of costs incurred by the United Way Fox Cities.

We inflated the 2013-2014 costs to match the costs to the benefits we estimated, which include benefits accruing to 31 students participating in the program in years other than 2013-2014. We also increased costs to account for administrative overhead at UWFC, which did not appear to be included in the cost in the financial statement provided.

Although school districts receive PATH services at no additional charge, the services occur inside the school building. Therefore, schools must find space for PATH sessions. Ideally, this space is dedicated to PATH full time, which allow the therapist to create a comfortable environment without needing to compete with other uses. Our simulation models the cost of a dedicated room for PATH at each participating school.

Short Term Benefits

PATH yields several benefits while participating students are in school. These short-term benefits affect school personnel, the community at large, and students themselves. We discuss the short-term benefits of PATH included in our analysis below. Specifically, these are saved school staff time, avoided costs of juvenile crime, and avoided suicides.

Reduction in School Staff Time Spent on Mental Health

PATH may reduce disruptive behavior and truancy by addressing the mental health needs of participating students. Disruptive behavior causes a variety of negative outcomes, including classroom disruption, suspensions, and expulsions. Disciplining students for these problems requires time, which includes an opportunity cost for school administrators who forgo devoting time and efforts to other purposes. Truancy potentially also incurs legal costs, as habitually truant students are in violation of Wisconsin's compulsory attendance law (WI State Statute 118.15). However, schools may divert habitually truant students to PATH or similar programs rather than prosecuting them in court. Finally, in the absence of PATH guidance counselors devote more time to students in need of mental health interventions, distracting them from other duties.

CBT has been shown to reduce problematic behaviors (Liber et al. 2013), so school administrators no longer have to devote as much time to addressing these problems. In our analysis, we calculate the avoided guidance counselor time spent addressing mental illness, the avoided school staff time spent on student discipline, and reduced school staff time spent on truancy cases. We quantify the opportunity cost of guidance counselor time by considering both the salaries of school guidance counselors and the change in the amount of time devoted to addressing disciplinary problems. To gather information about the time spent on each of the aforementioned student behavioral issues, we surveyed administrators at each PATH school (see Appendix D). For a detailed discussion of the reduced behavioral and disciplinary problems, reduced truancy costs, and shift in guidance counselor time associated with PATH, see Appendices G, H, and I, respectively.

Avoided Juvenile Crime

CBT can reduce the number of crimes committed by participating students while they are in school. We model the effect of CBT on juvenile crime as a reduction in the commission of additional crimes by students with a prior contact with the law. The effect of CBT on students without a prior contact with the law is unclear, and we did not estimate the value of this effect. The benefit of avoided juvenile crime is the cost of juvenile crimes that would have been committed in the absence of PATH. These costs are those incurred by the tri-county (Outagamie, Winnebago, Calumet) juvenile justice system. We assume that juvenile crimes that are avoided by CBT may not have been committed immediately. For students under the age of 15, we discount the cost of a juvenile crime from the current age of the student to age 15 because we assume crimes are most likely to be committed at age 15. For students aged 15 to 19, we do not discount the cost of juvenile crime because we assume these students are in their peak years of crime commission. CBT can therefore avoid crimes in the same year in which the treatment is applied. Appendix J details these estimates and the effect of CBT on juvenile crime.

Avoided Costs Associated with Suicide

As a cognitive behavioral intervention, the PATH program helps prevent suicides by reducing the symptoms of mental illnesses and improving the ability of students to cope with distress. Suicide levies large costs on families, friends of victims, and the community. These costs are difficult to quantify, let alone monetize. This analysis quantifies the cost of suicide using literature estimates of the value of a statistical life. The value of a statistical life is based on observations of people's market decisions that involve small increases or decreases of the risk of death. We assume that the suicide reducing effect of CBT lasts for less than a year. We do not discount the value of a statistical life because suicides that are avoided due to CBT will be avoided within a year of treatment, and the effects of CBT after one year of treatment can potentially fade out (Weisz 2006). See Appendix K for details on how we calculated the avoided costs of suicide.

Long-Term Benefits

In providing CBT to youth with mental illness, PATH greatly increases the likelihood that its participants graduate from high school (Cobb et al. 2006). By reaching this educational milestone, PATH high school graduates give themselves and the community the opportunity to experience a stream of benefits for their lifetime. Haveman and Wolfe (1984) identify a variety of benefits accruing from high school graduation, including increased earnings and decreased criminal activities. Our analysis focuses on these long-term benefits of high school graduation. Haveman and Wolfe (1984) also cite a variety of additional private and public benefits. Our analysis does not estimate the value of these benefits, but we acknowledge them in our unquantified benefits below.

Increased Lifetime Income

CBT improves a student's chance of graduating from high school (Cobb et al. 2006), which, in turn, increases his or her probability of earning additional income throughout his or her lifetime. We expect a workforce with higher educational attainment to be more productive, benefitting workers, firms, and the community.

The Bureau of Labor Statistics (2014) estimates that median weekly earnings increase and unemployment rates decline as individuals advance through their schooling. Workers with less than a high school diploma earn a median $472 per week and have an 11.0 percent unemployment rate, while those who end their education with a high school diploma earn $651 per week and are unemployed at a 7.5 percent rate. Workers with a bachelor's degree earn a median of $1,108 per week and have a 4.0 percent unemployment rate. High school graduates also work longer than dropouts: graduates spend an average of 35 years in the workforce, as compared to 30 years for dropouts (Skoog and Ciecka 2001). These earnings differentials add up over the course of a lifetime: Cohen and Piquero (2008) estimate that the lifetime earnings of high school graduates are between $420,000 and $630,000 higher than non-graduates in 2007 dollars, equivalent to approximately $480,000 to $720,000 in 2014 dollars.

We estimate the effect of PATH on total lifetime income. In estimating this effect we consider the ultimate level of educational attainment of participants. Our simulation allows for a variety of educational outcomes. Students can drop out, or they can graduate high school in four or six years. After graduating on-time or late, students can complete some college or they can graduate college with a bachelor's degree or higher. We obtained median annual total income figures from Current Population Survey data for Wisconsin adults in 2014 by educational attainment (King et al. 2010). These figures account for all sources of income, including earnings, unemployment compensation, and retirement income. We reduce these figures by 19 percent, as adults who experienced depression as an adolescent earn 19 percent less than they would otherwise (Fletcher 2013).

Because many of the earnings' standard deviations were large, we developed triangular distributions with a minimum and maximum value one standard deviation away from the median for use in our simulation. From these numbers, we used zero as the minimum of the triangle distribution when it was within one standard deviation of the median. Our distributions estimate the present value of lifetime earnings at age 18, and we further discount these values from age 18 to the students' actual ages. See Appendix L for a detailed discussion of our lifetime income calculations and assumptions.

Avoided Costs of Adult Crimes

In addition to the benefit of increased lifetime earnings, high school graduation reduces adult crime. Higher educational attainment is associated with lower adult criminal activity, and high school graduation is estimated to reduce the commission of adult crime by 10 to 20 percent (Levin et al. 2007). Moreover, high school dropouts are more likely to be incarcerated. Dropouts comprise less than 20 percent of the US population, yet they represent 37 percent of federal prison inmates, 54 percent of state prison inmates, 38 percent of local jail inmates, and 33 percent of probationers (Levin et al. 2007). To the extent that CBT decreases the likelihood of dropping out of high school, it reduces the commission of crimes as adults.

The benefit of avoided adult crime costs has been monetized in several cost-benefit analyses (Cohen 1998; Cohen and Piquero 2008; Levin et al. 2007; Reynolds et al. 2011). We use Levin et al.'s (2007) estimates for the avoided costs of adult criminal activity based on the effect of high school graduation reducing the commission of high cost crimes, including murder, rape/sexual assault, violent crime, property crime, and drugs offenses. Crimes impose operational costs within the criminal justice system, lost earnings during incarceration (including parole and probation), victim restitution and medical care, and government expenditures on crime prevention. Adjusted to 2014 dollars, the Levin et al. (2007) numbers estimate that high school graduation avoids $38,054 worth of crimes after graduation for males and $10,458 for females. Using these figures, we develop a distribution of the cost of crime for the Monte Carlo simulation. Because Levin et al. (2007) estimate the effect of a high school graduation, we discount the avoided cost of adult crime from age 18 to the students' current ages. See Appendix M for a detailed discussion of avoided adult crime calculations and assumptions.

Unquantifiable Benefits

Graduating high school produces benefits beyond those included in our analysis. While we attempt to cover the downstream benefits of PATH with the largest financial gains, several impacts are small or difficult to value. Haveman and Wolfe (1984) discuss the numerous channels through which schooling yields economic and social impacts. These include increased enjoyment of leisure, better ability to further individual knowledge, increased nonmarket productivity, better familial relationships and child development, better informed purchased decisions, and increased charitable giving. However, the intangibility of these benefits places them outside this analysis.

We did not value decreased classroom disruptions among PATH students, increased future productivity (except as it is reflected in lifetime income), reduced for non-PATH mental health treatment, increased quality of life years, and decreased legal costs due to habitual truancy. Although we were unable to locate the effect of CBT on these outcomes in the academic literature, they may have limited or lasting effects on PATH participants. See Appendix N for a discussion of the literature surrounding the effects of CBT on these unquantifiable outcomes.

Analysis

Our analysis of PATH is based on a Monte Carlo simulation using the statistical software Stata. Short-term benefits of the program accrue while students are in school as described above. Long-term benefits of the program result from increasing students' chance of graduating from high school. The following sections elaborate the Monte Carlo simulation of this graduation effect and various short-term effects.

Effect of PATH on High School Graduation

Because the long-term benefits in our analysis depend on high school graduation, the effect of CBT on high school graduation is of first importance. We draw on several sources to estimate the number of non-graduations in the population of PATH-participating students in the absence of the PATH program and the effect of CBT in avoiding these non-graduations. We consider two groups of students living with mental illness: those participating in PATH, and those with mental illness not participating in a program like PATH. Our approaches to estimating status quo non-graduations and the effect of CBT are detailed below.

Long-term benefits of the PATH program focus on the benefits gained by students from the increased likelihood that they graduate from high school. We construct two long-term benefit estimates, one for increased lifetime earnings and the other for avoided costs of adult crime associated with high school graduation. For the former, we use the six-year weighted graduation rate of schools participating in PATH because we are interested in a single effect of high school graduation on avoided costs. For the latter, we use weighted average four- and six-year graduation rates for males and females. These weighted graduation rates are computed in Appendix O, and make use of the four- and six-year high school graduation data from all of the participating high schools weighted by their population shares.

Monte Carlo Simulation

Monte Carlo is a stochastic approach for assessing the impact of uncertain model parameters on the distribution of outcomes of interest, such as net benefits. Instead of calculating outcomes from the averages of uncertain parameters, the Monte Carlo simulation randomly draws values from the assigned probability distributions. This allows the simulation to address uncertainty in the likelihood of different outcomes and the correlation between outcomes. Outcomes are correlated when the occurrence of one outcome increases the chance of another outcome. For example, a student who has higher earnings as an adult is less likely to commit a crime. Separately estimating an income outcome and a crime outcome would not take into account the relationship between the two outcomes. The causal models that relate status quo probabilities and treatment effects to outcomes of interest are of central importance in the Monte Carlo simulation. We have described these causal models using mathematical equations in the relevant appendices.

The Monte Carlo simulation randomly assigns outcomes to students out of specified probability distributions of possible outcomes. The effect of CBT is also drawn from a statistical distribution of possible effect sizes. By drawing 10,000 observations of the relevant variables, we develop a distribution of net benefits that reflects our uncertainty about the effect of CBT and the life processes that determine the outcomes in which we are interested. Rather than simulating outcomes for each of the students actually participating in PATH, the Monte Carlo simulation assigns outcomes to 30 representative gender-age combinations. Each gender-age combination is scaled up by the number of PATH participants of that specific gender and age.

In addition to randomly assigning outcomes to students, the Monte Carlo simulation randomly draws the money value of outcomes from probability distributions. For example, not every high school graduate has the same income. The Monte Carlo draws the present value of lifetime income from probability distributions of lifetime income. Altogether, the Monte Carlo simulation of representative gender-age combinations addresses the size of the effect of CBT, which is not known with certainty, and the resulting life outcomes, which depend on random life events that cannot be predicted.

Among the variables not known with certainty, some affect the estimate of net benefits so much that we further explore the implications of their sensitivity. Assumptions about the discount rate and the effect of CBT on the high school dropout rate have a large effect on net benefits. Drawing from a probability distribution for these variables would widen the distribution of net benefits without providing useful information. Instead, estimating net benefits using a high, low, and most probable assumption of the uncertain parameter allows us to explicitly see the effect of varying that uncertain parameter. See Appendix P for a summary of the equations and estimates used in the Monte Carlo and Appendix Q for the Stata code.

When benefits or costs occur in the future, we scale the benefits and costs to account for time discounting. Time discounting reflects time preference: people prefer good outcomes sooner rather than later and prefer bad outcomes later rather than sooner. Time discounting also reflects the return on capital: a present quantity of money can be invested and return a greater quantity of money in the future. For an investment project, future benefits must be weighed, not against present money costs, but against the future value that money could have returned in an alternate investment. PATH is not a traditional infrastructure project, but PATH has a similar pattern of present costs and future benefits. Each of the appendices dealing with program benefits also addresses discounting.

Results

The Monte Carlo simulation estimates that the average present value of net benefits from PATH are $9.4 million. There is significant uncertainty in the estimate of net benefits, and 91 percent of trials produce positive net benefits. Said another way, there is a 91 percent chance that the program is a desirable investment. Because our largest benefits depend on educational attainment, uncertainty in the relationship between educational attainment and income drives uncertainty in net benefits. For example, college graduates often earn more than students that only graduate high school, but not always.

Table 1: PATH Benefits and Costs

	Thousands of Dollars
Costs	
Program Cost	338
Cost of Space in Schools	217
Total Costs	**555**
Average Short-Term Benefits	
Time Spent on Truancy	18
Time Spent on Behavior	14
Guidance Counselor Time	71
Avoided Juvenile Crime	8
Avoided Suicide	48
Total Average Short-Term Benefits	**159**
Average Long-Term Benefits	
Increased Lifetime Income	9,086
Avoided Adult Crime	694
Total Average Long-Term Benefits	**9780**
Average Net Benefits	***9,384***

Table 1 shows the average values for the various benefits of PATH. The effect of high school graduation on income drives net benefits. The importance of changes in lifetime income is discussed in more depth below.

The difficulty of measuring the effect of CBT and the uncertain nature of various life outcomes distribute net benefits over a considerable range. Figure 1 visually describes the distribution of estimated net benefits for PATH.

Figure 1: Distribution of PATH Net Benefits

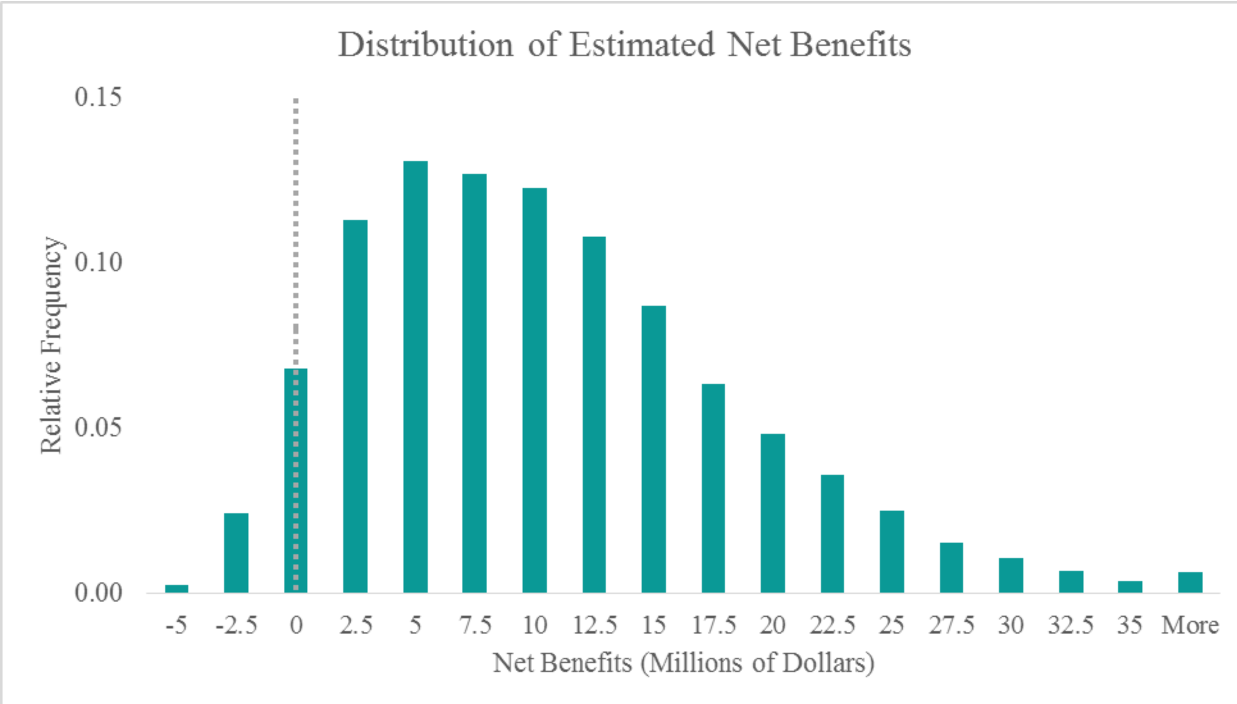

Figure 1 shows that we estimate large net benefits from PATH. The horizontal axis of Figure 1 shows that many of the Monte Carlo trials estimate net benefits in the tens of millions of dollars. Second, our estimate of net benefits has considerable uncertainty. About 9 percent of simulation trials estimate negative net benefits.

Costs

The cost of PATH consists of costs borne by the United Way and costs borne by schools. Although private insurers, public insurers, and charitable organizations reimburse the United Way for a portion of PATH costs, society still bears the cost of providing PATH services. We value the resources used for PATH at its full value because we assume they could be productively employed elsewhere in society if not used for PATH.

The cost of providing PATH services also includes the cost of the space that schools donate for services. Our analysis assumes that schools make a room available throughout the school year. We assume that school space has an opportunity cost of $9 per hour based on the hourly rate charged for school space by Monona Grove, Wisconsin. We recognize that the opportunity cost of school space depends on the degree to which space in each school is constrained. Therefore we reduce the cost of space by a space-scarcity factor drawn from a distribution with an average of 70 percent.

Table 2: PATH Costs for the 2013-2014 School Year

	Thousands of Dollars
Program Cost	338
Cost of Space in Schools	217
Total Costs	**555**

The United Way Fox Cities provided a financial statement for the 2013-2014 school year showing expenditures in excess of $250,000 for therapy sessions and license fees. We estimated PATH benefits for 183 participating students based on the intake form data provided by the United Way. Out of these 183 students, 152 of them completed intake forms during the 2013-2014 school years. The other 31 students completed intake forms either during an earlier or a later school year. We assumed that the $250,000 spent during the 2013-2014 school year only went to serve the 152 students completing intake forms that year. To account for students completing intake forms in other years we increased PATH costs borne by the United Way by 20.4 percent.

We increased the PATH program cost by 12.6 percent compared to the UWFC financial statement to account for administrative overhead at the United Way based on information from UWFC's website.

The UWFC indicated that $440,000 is budgeted for PATH for the 2014-2015 school year. The reason for the significant increase is unclear, but we assumed that it is not relevant for our analysis. However, if these higher costs are driven by the need to serve any of the 183 students for which we estimate benefits, then leaving out these higher costs tends to inflate our estimate of net benefits.

Short-Term Benefits

We estimate that PATH produces short-term benefits of $64,000. These benefits accrue before students graduate while they are still in school. These benefits accrue when PATH reduces the time school staff spends addressing truancy, reduces the time school staff spends disciplining students, makes guidance counselor time available for activities other than providing mental health services, avoids student suicides, or avoids juvenile crimes.

Table 3: Short-Term Benefits of PATH

	Thousands of Dollars
Time Spent on Truancy	18
Time Spent on Behavior	14
Guidance Counselor Time	71
Avoided Juvenile Crime	8
Avoided Suicide	48
Total	**159**

Table 3 summarizes the average estimate of benefits in each short-term category. These benefits are small relative to PATH program costs and relative to the benefits generated by inducing students to graduate that otherwise would drop out. As discussed below, the estimates of short-term benefits are uncertain.

Change in Time Spent to Address Truancy

As shown in Table 3, we estimate that PATH saves schools $18,000 worth of time that would otherwise be spent addressing truancy for PATH-participating students. This estimate is based on schools' reports of the change in staff time spent addressing truancy. See Appendix E for details of the survey.

Of the 19 schools responding to the survey, seven reported that PATH changed the amount of time school staff spent addressing truancy. We assume that we can extrapolate this rate of 37 percent from schools responding to the survey to all 23 participating schools. That is, the Monte Carlo model randomly simulates a 37 probability of a change in school staff time spent addressing truancy. The schools reporting a change in time spent addressing truancy reported an average of five hours saved. The change in hours reported by different schools varied over a large range. For schools that experience a change in the time spent addressing truancy, the Monte Carlo simulation randomly draws the change in hours from a normal distribution based on the mean and standard deviation of the values reported by schools.

Truancy potentially has other, larger costs. Habitual truancy is technically a criminal offense, and schools can bring habitually truant students to court. Truancy court involves significant cost for the county court system, students, school staff, and the student's family if it attends. We did not include the possibility of avoiding these costs as a benefit because both the effect of CBT on habitual truancy and the frequency of prosecutions for habitual truancy are unclear.

Change in Time Spent Disciplining Students

Table 3 above shows our estimate that PATH saves schools $14,000 worth of time that would otherwise be spent addressing discipline for PATH-participating students. We arrived at this estimate from schools' reports of the change in staff time spent addressing discipline. See Appendix E for details of the survey.

Of the 19 schools responding to the survey, eleven reported that PATH changed the amount of time school staff spent addressing discipline. We assume that we can extrapolate this rate of 58 percent from schools responding to the survey to all 23 participating schools. The schools reporting a change in time spent on discipline saved approximately 2.5 hours per month on average. Schools reported values over a large range.

Guidance Counselor Time Freed for Other Activities

As shown in Table 3 above, we estimate that PATH makes $71,000 worth of guidance counselor time available for activities other than providing mental health services to PATH-participating students. Our estimate is based on schools' responses to the survey detailed in Appendix E.

Thirteen of the 19 schools responding to the survey reported that PATH changed the amount of time guidance counselors spent providing ad hoc mental health services to PATH participants. We extrapolate the 68 percent rate to all 23 PATH-participating schools. On average, these 13 schools reported that guidance counselors spent about 10 fewer hours providing mental health care to PATH participants. Schools reported values over a large range.

Based on the survey results, we estimate that guidance counselor time does not change in 32 percent of trials. This accounts for the large number of observations at zero benefit. For simulation trials in which guidance counselor time changes, guidance counselors occasionally spend more time providing mental health care to PATH participants. This is because survey responses to this question varied over a large range, and we assumed that the actual change in guidance counselor time fit a normal distribution.

Avoided Juvenile Crime

Of the 183 students in PATH, 31 have had prior contact with the law. For these students, we estimate that CBT avoids $8,000 worth of subsequent crimes on average.

CBT reduces the rate of recidivism for a period of time. Because the reduction in recidivism does not apply to first-time offenders, we did not estimate a reduction in the commission of crime by PATH-participants without prior contact with the law. The CBT effect on recidivism decays over times, so we only modeled the commission or avoidance of one crime for each participant. Modeling the commission of additional crimes would potentially increase the benefit by increasing the number of crimes that PATH could prevent. However, modeling more crimes would introduce added uncertainty from the decay over time of the reduction of recidivism.

We estimated that an average juvenile crime costs society $2,100, and we drew observations from a normal distribution centered at that value. This estimate only includes costs incurred by the justice system. The estimate represents an average of crimes over a range of severity, including low-probability but potentially very costly crimes.

Avoided Suicide

CBT can potentially prevent suicides, and suicide is anecdotally a significant issue in the Fox Cities. Based on Boardman et al. (2011), we assume the value of a statistical life to be $5,500,000, so avoiding even one suicide has large benefits. However, over the 10,000 trials in our Monte Carlo simulation, the average benefit of avoided suicide is $48,000.

Suicide is a rare event among the general population. We assume that the rate of suicide among PATH-participating students in the absence of PATH equals the rate of suicide among the population in Wisconsin aged 15 to 24, which is 12 per 100,000 people (Wisconsin Department of Human Services). This assumption makes suicide a very rare event among the 183 students for which we are estimating benefits. Because suicide is rare, there are few chances to avoid a suicide. Averaged over 10,000 trials, our Monte Carlo simulation estimates that PATH prevents about 0.01 suicides. Put another way, PATH has a one in 100 chance of preventing a single suicide based on our assumptions.

Long-Term Benefits

The long-term benefits of PATH are increased lifetime income and avoided adult crimes. The increase in the number of high school graduations from PATH generates both benefits. The Monte Carlo simulation estimates that the long-term of PATH on average amount to $9.8 million. These benefits are outlined below.

Increased Lifetime Income

CBT increases students' lifetime earnings by inducing more of them to graduate high school than would have without the treatment. We estimate the PATH program increases the present value of student lifetime income by an average of $9.1 million. The magnitude and uncertainty around this benefit largely drives the magnitude and uncertainty for the net benefits of PATH overall. We discounted the present value of lifetime income at age 18 back to the actual ages of the students participating in PATH.

When a student graduates from high school, the Monte Carlo then simulates higher levels of educational attainment. We assumed that PATH participants who graduate high school have the same probability of completing some college or obtaining a bachelor's degree, as does the general population of high school graduates from these school districts.

Avoided Cost of Adult Crimes

The effect of CBT on crime decays at an uncertain rate. Because adult crime occurs several years after the treatment for many PATH-participating students, the CBT decay complicates any estimate of PATH's direct effect on adult crimes. However, CBT has an established effect on high school graduation, which in turn reduces the commission of crimes. Using estimates of the value of crimes avoided by one additional high school graduation from Levin et al. (2007), we estimated the total value of crimes avoided for the graduations induced by PATH. We discount these values back from age 18 to the actual ages of PATH-participating students.

Our Monte Carlo simulation estimates that the average benefit from avoided adult crime is $690,000. This estimate is subject to uncertainty in whether a student graduates from high school, but the value of avoided crime is drawn from a narrower distribution than the present value of lifetime income above. Therefore, all observations estimate a positive benefit of avoided adult crime.

Sensitivity Analysis

Because our estimate of the increased income from higher educational attainment drives our estimate of the net benefits of PATH, we expect our estimate of net benefits to be sensitive to parameters that affect the present value of lifetime income. In particular, our assumption about the size of CBT's effect on the graduation rate influences our estimate of the number of induced graduation. Our assumption about the discount rate changes the present value of lifetime earnings. The following analysis explicitly examines how sensitive our estimate of net benefits is to changes in these parameters.

Figure 2: Sensitivity of Net Benefits to Variation in the Reduction in Dropouts from CBT

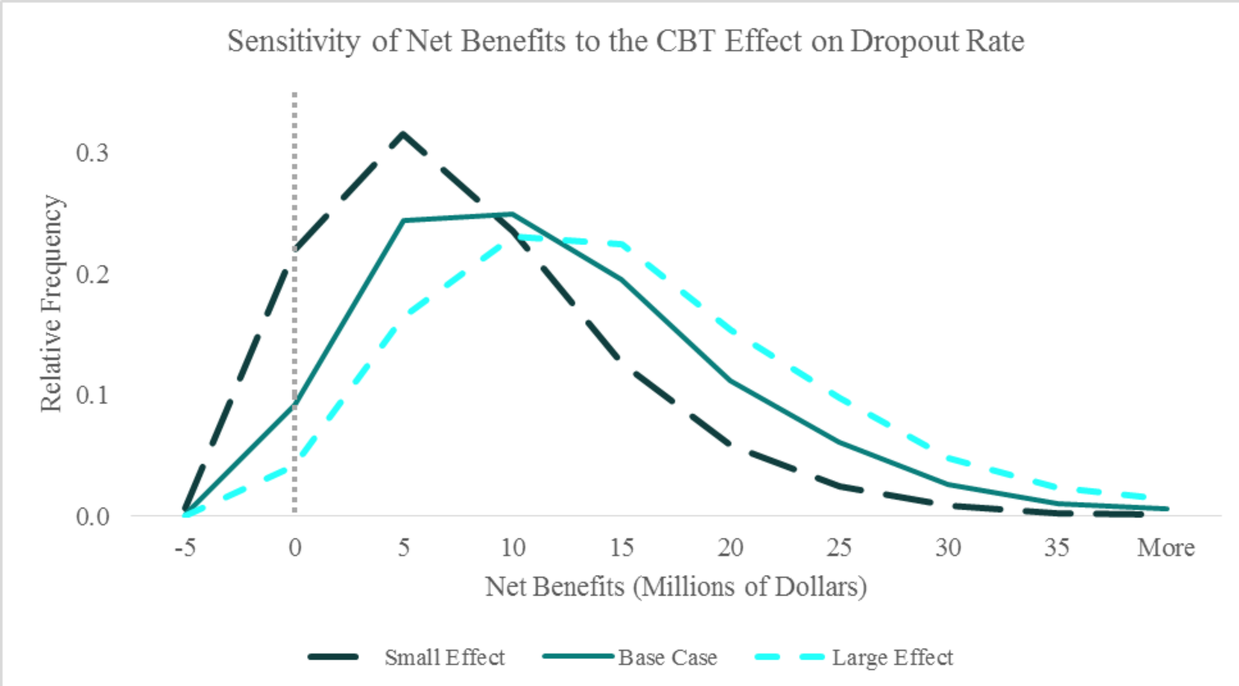

Table 4: Sensitivity of Net Benefits to Variation in the Reduction in Dropouts from CBT

	14 Percentage Point Improvement in Chance of Graduating	21 Percentage Point Improvement in Chance of Graduating	27 Percentage Point Improvement in Chance of Graduating
Average Net Benefits (millions of dollars)	5.6	9.4	12.5
Proportion with Positive Net Present Benefits	0.77	0.91	0.96

Figure 2 and Table 4 demonstrate that the effect of CBT on preventing dropouts and inducing graduations has a major impact on net benefits from PATH. The frequency distributions in Figure 2 show the proportion of trials in the Monte Carlo simulation that produce a given level of net benefits. The vertical dashed line marks zero net benefits. Varying the CBT effect on high school graduation shifts the curve right and left, increasing and decreasing the average estimate of net benefits and the proportion of trials with positive net benefits. Importantly, we are reasonably certain that net benefits are positive and large, even under the most pessimistic assumption for CBT's effect on high school graduation.

Figure 3: Sensitivity of Net Benefits to Variation in the Discount Rate

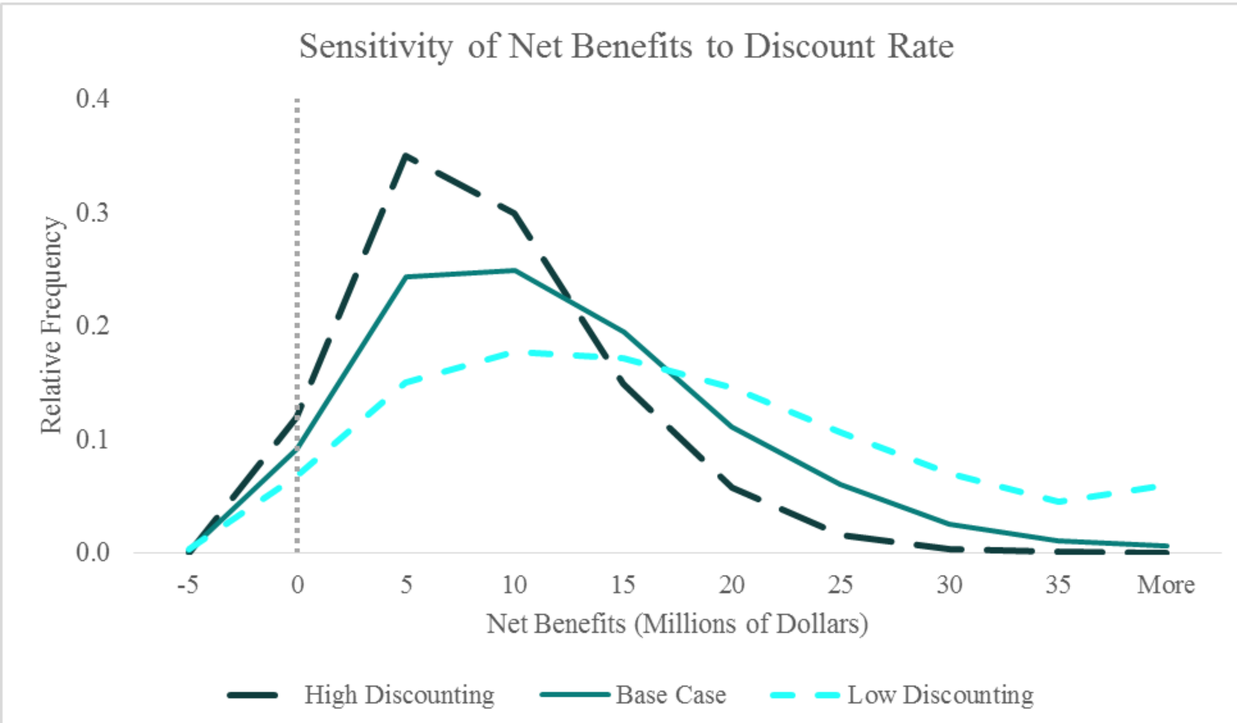

Table 5: Sensitivity of Net Benefits to Variation in the Discount Rate

	High 5.0 Percent Discount Rate	3.5 Percent Discount Rate	Low 2.0 Percent Discount Rate
Average Net Benefits (millions of dollars)	6.3	9.4	14.7
Proportion with Positive Net Present Benefits	0.88	0.91	0.93

Figure 3 and Table 5 show that the estimate of net benefits of is sensitive to the assumed discount rate. Varying the assumed discount rate changes the shape of the distribution of net benefits without changing its position very much. This is because the discount rate determines the distributions from which lifetime income are drawn in the Monte Carlo. Although the discount rate has a large impact on the average estimate of net benefits, the proportion of trials with positive net benefits does not change depending on the assumed discount rate. As before, we are reasonably certain that net benefits are large and positive even under the most conservative assumption.

Limitations

While cost-benefit analysis is a powerful tool for evaluating programs and policies, it is subject to limitations. The effect size estimates used in our analysis come from a variety of sources; hence, the strength of our net benefit calculations is limited by the quality of the existing research (Boardman et al. 2011). To produce the most reliable cost-benefit calculations, we used effect sizes from meta-analyses and other cost-benefit analyses, when available. The estimates provided in these sources were the result of rigorous evaluations and estimates from numerous studies.

As is the case with most cost-benefit analyses, the estimates used in this analysis were often derived from populations that differ from our specific population of interest. In many cases we used estimates from locations that differ demographically and socioeconomically from the Fox Valley area (see Appendix A for a description of the Fox Cities). Many of our estimates were the result of national or Wisconsin-specific analyses. Although these figures provide a general idea of the trends surrounding the effects of CBT, the estimates may not fully capture the idiosyncrasies of the Fox Valley community that affect the effectiveness of CBT interventions.

In monetizing the treatment effects of PATH on its participants, we only estimate the effect of CBT. PATH therapists use a variety of therapies, but CBT is the most prevalent and has an extensive literature on its effects. Additionally, we estimated the effect of CBT on mental illnesses as a whole rather than the effects of the treatment on specific disorders. Although we have information about the prevalence of various mental health disorders among PATH participants, stratifying our effects based on each disorder was unfeasible because of limited published research and our time constraints. Calculating the effects by each disorder and aggregating into a total net benefit calculation would not account for comorbidity, as the majority of PATH participants suffer from multiple mental disorders. (See Appendix B for more information on the characteristics of participating students.)

Regarding our calculation of net benefits, many of our benefits are channeled through the effect PATH has on inducing high school graduations. Our effect sizes for the long-term benefits of increased earnings and reduced adult criminal activity hinge solely upon an individual graduating from high school and do not consider the benefits of CBT itself.

Finally, our analysis considers only the costs and benefits of PATH that can be monetized. (See Appendix N for other, intangible benefits to PATH participants.) Some of the excluded benefits are subjective and difficult or impossible to estimate. Nevertheless, it is important to acknowledge the possibility of unquantifiable benefits. In the same way, there may be unquantifiable costs. For example, PATH requires students to miss regular classes. PATH makes efforts to schedule sessions during classes in which students do well, and the improvement in academic performance generated by CBT likely outweighs the loss of academic performance from missing classes. However, it is conceptually possible that students bear some costs from missing classes. Like unquantified benefits, unquantified costs are worth noting, even if they cannot be monetized.

Recommendations

Our net benefit results corroborate those found in the 2012 cost-benefit analysis and indicate that PATH has had a positive impact on its participants, schools, and the Fox Valley community at large. Furthermore, these positive net benefits are substantial in both the short-and long-run. Therefore, it is our recommendation that the PATH program continue to provide services to students in schools within the Fox Valley community.

We recommend that UWFC explore ways to expand the PATH program within the Fox Valley community. These may include increasing the number of therapists within the program, increasing the hours of current therapists, or providing the program to other schools within the district. If in the future UWFC were to receive sufficient funding to expand the PATH program, we suggest that it strengthen the program's presence within existing schools, as well as expand into other schools in the area. In our survey of school administrators, several schools (68 percent) indicated that they would like to see an increase in hours of current therapists. Nearly half of schools completing the survey indicated that reaching out to other schools in the district would be worthwhile (Appendix E).

Conclusion

To follow up on the 2012 La Follette School of Public Affairs cost-benefit analysis of the Providing Access to Healing (PATH) program, we analyzed the program after its expansion into 23 schools located within ten districts in the Fox Cities area. In order to assess the net benefits of PATH, we monetized several important costs and benefits of the program. Because the CBT treatment used by PATH participants has been proven to increase the likelihood of high school graduation among youth (Cobb et al. 2006), we broke our benefits into two categories: those received by participants prior to graduating high school (short-term) and those that are manifested after graduation (long-term). The short-term benefits of PATH include reduced truancy, reduced behavior and discipline problems, freed guidance counselor time, avoided juvenile crime costs, and avoided suicide costs. PATH's long-term benefits are the increased lifetime income of participants and avoided adult crime costs. The only monetized costs for

PATH are the counseling costs paid to therapists by UWFC and the opportunity cost of school space. In performing the analysis, we limited the treatment effect of PATH to students for whom PATH induced a high school graduation; that is, for those individuals who graduated high school because of PATH but would not have otherwise.

Our findings indicate that the program has continued to produce net benefits to its participants, schools, and the broader community. Because both our report and the 2012 cost-benefit analysis found a positive net benefit stream, we recommend that PATH continue operating and look for ways to expand should sufficient resources become available. In review of the numerous findings in the literature surrounding the positive effects of early mental health interventions and the policy relevance of addressing mental health needs among youth, funding such a program is worthwhile for the community at large. In particular, UWFC should continue its efforts to find a sustainable source of funding for PATH to ensure that it can continue to generate benefits in the future.

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Appendices

Appendix A: PATH Program Overview

The United Way Fox Cities (UWFC) created the Providing Access to Healing (PATH) program in 2008 in response to a 2006 comprehensive analysis of the Fox Valley region. The *Fox Valley Leading Indicators for Life* (LIFE) study is conducted every five years and is designed to provide policymakers, businesses and other actors with a snapshot of the region and its pressing problems and potential opportunities. LIFE consists of originally collected data as well as data aggregated form a number of other sources. The 2006 LIFE study, based on data collected from the Youth Behavioral Risk Survey, found that in the past year approximately 25 percent of tenth grade students in the region reported a depressive episode and 14 percent of tenth graders had attempted suicide. The rate of suicide attempts in the Fox Valley region was higher than the national average of 8.4 percent (LIFE 2006).

In response to the findings on suicide attempts, the UWFC conducted an internal analysis with school and provider partners to determine the structural barriers potentially faced by youth seeking mental health treatment. The analysis uncovered that many students and families had financial barriers to accessing mental health treatment. While many families with barriers were uninsured or underinsured, transportation was also reported as an obstacle. Many families lacked their own transportation and consequently had to rely on a slower mass transit service. Finally, parents identified the inability to take off time from work to accompany children to treatment as an additional barrier.

Over the next two years, UWFC developed a school-based mental health intervention program to address these barriers by placing mental health professionals in schools and financing treatment when necessary. In designing the program, UWFC considered the peer pressure or potential stigma that may inhibit students from reaching out for service. UWFC first developed a pilot program in the Menasha Joint School District, where participating schools had approximately half of their students receiving free or reduced school lunches.

While the PATH program was inspired by the LIFE data for high school-aged youth, the UWFC received feedback that children in elementary and middle schools also experienced mental health difficulty. As a result, the pilot PATH program was also offered to middle and elementary schools in the Menasha Joint School District, a policy maintained in subsequent expansions. The pilot program ran for three years and stigma was not reported as an unusual barrier in the program. School personnel referred most PATH participants to the program, though some were self-referrals. As UWFC was reviewing the program for expansion, the 2011 LIFE study was released, demonstrating that rates of depression and suicide attempts had not diminished. At this point the program expanded to four other school districts: Appleton, Kaukauna, Kimberly, and Little Chute. As in Menasha, district personnel at each new school district determined which schools within the district would house the PATH program. UWFC contracted with a consortium of three providers, Catholic Charities, Lutheran Social Services, and Family Services, to provide mental health services at each school. UWFC allocated time to each school district based on the size of the district and the percentage of students on free and reduced lunch, and the providers decided how to divide this time among therapists.

In 2012, a cost-benefit analysis developed by graduate students at the La Follette School of Public Affairs (Brunjes et al. 2012) found net benefits of the PATH program of over seven million dollars. The largest portion of these benefits came from estimates of improved quality of life for students that participated in the PATH program. While the PATH program was present in five schools at the time of publication, the report team only had access to data from Menasha Joint School District at the time of their analysis. As such, our current cost-benefit analysis offers some advantages over the previous La Follette analysis in the form of newer data that was not available to the previous analysts at the time of their report.

After the first PATH expansion the school districts and UWFC developed an evaluation of therapist hours. The evaluation found that while the program was widely used at the high school level, caseloads were lower at the middle school level. A lack of parental engagement was hypothesized as a reason. In addition, the previous La Follette report indicated that while UWFC did an adequate job of tracking student outcomes, demographic data on participants was lacking. As a result, the UWFC, school districts, and providers sought to improve the collection of data on participants, while still respecting privacy requirements, and track student progress between intake and discharge.

After the previous La Follette cost-benefit analysis, the PATH program was extended into five new school districts: Freedom, Hortonville, Seymour, Shiocton, and Neenah. Again, school district personnel were allotted set number of hours of therapist time to be allocated to the school of their choice. Soon after this expansion, Catholic Charities withdrew from the consortium of providers and was replaced by Caltapa Health.

The program is financed by grants and individual donations to UWFC. As of 2014, the largest funder is the Fox Valley Community Foundation, which extended a $300,000 three-year grant to the program in 2011. The Community Foundation has also granted an additional $100,000 two-year grant to be allocated starting in 2015. Given the dependence on fundraising, the PATH program began billing third party providers in 2013. At the close of the 2013 to 2014 school year, 46 percent of revenue came from third party providers.

PATH therapists predominantly use cognitive behavioral therapy (CBT) with participants. CBT is a structured process designed to aid patients in recognizing distorted thought processes and their connections to behavior. CBT consists of more than talk sessions, as participants will keep plans and journals and are assigned homework. PATH also incorporates other types of therapy, including group therapy and dialectical behavioral therapy, a behavior focused therapy appropriate for certain types of diagnosis (Wisnet 2014).

Most participants in PATH attended fewer than 30 sessions. These sessions are usually weekly or biweekly. Table A1 shows the full distribution of PATH sessions.

Table A1: Number of PATH Sessions per Participant

	Number of Participants	Percent of Participants
1 to 9 Sessions	49	34.8
10 to 19 Sessions	57	40.4
20 to 29 Sessions	22	15.6
30 to 39 Sessions	6	4.3
40 to 49 Sessions	3	2.1
50 or More Sessions	4	2.8
Total	**141**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities

Sources:

Fox Cities Leading Indicators for Excellence Report. "A community assessment for the Fox Cities of Wisconsin." (2006). http://www.foxcitieslifestudy.org/resources/2006lifestudy fullreport.pdf

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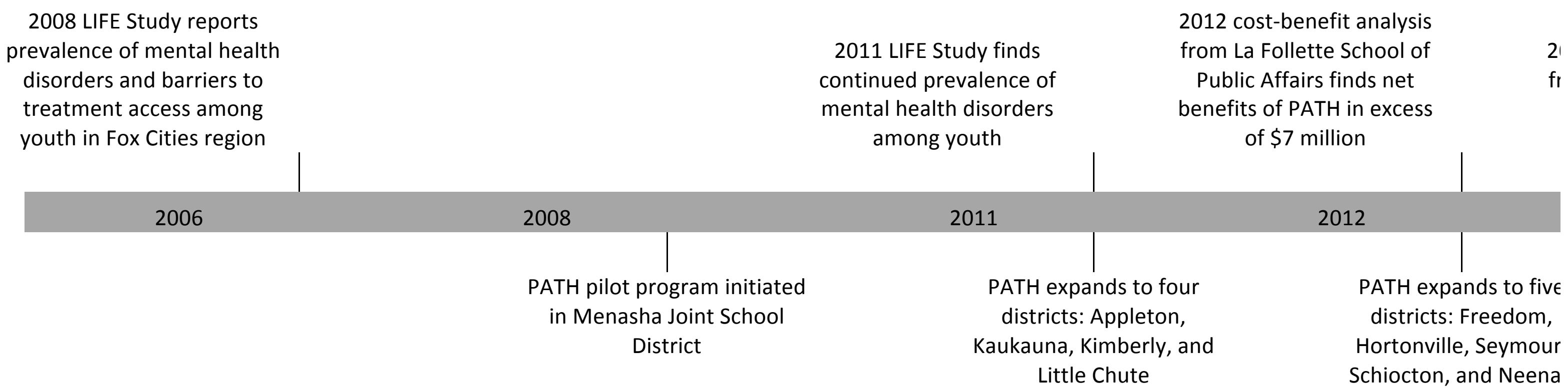
PATH Intake and Discharge Data, provided by United Way of Fox Cities

Figure 4: PATH Program Timeline



Appendix B: Profile of PATH Participants

PATH serves a unique subset of youth with mental health needs in the Fox Cities region. To provide context for our cost-benefit analysis, this appendix summarizes information on the population of students that participated in PATH during the 2013 to 2014 academic year. Using intake and discharge data provided by UWFC, we summarize these students' demographics and various educational, health, and juvenile justice outcomes.

Demographics

Tables B1 through B4 present the basic demographic characteristics of PATH participants across all schools during the 2013 to 2014 academic year. Over 57 percent of students were female, and most of the students served were in high school. Nearly three-quarters of PATH students were Caucasian.

Table B1: Gender of PATH Participants

	Number of Participants	Percent of Participants
Male	78	42.6
Female	105	57.4
Total	**183**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Table B2: Age of PATH Participants

	Number of Participants	Percent of Participants
Ages 5-9	21	11.5
Ages 10-12	24	13.1
Ages 13-15	93	50.8
Ages 16-19	45	24.6
Total	**183**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Table B3: School Level of PATH Participants

	Number of Participants	Percent of Participants
Elementary School	33	18.0
Middle School	58	31.7
High School	91	49.7
Not Reported	1	0.6
Total	**183**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Table B4: Race of PATH Participants

	Number of Participants	Percent of Participants
Caucasian	131	71.6
Hispanic	18	9.8
African American	10	5.5
Native American	6	3.3
Asian	2	1.1
Hmong	1	0.5
Mixed	15	8.2
Total	**183**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Access and Barriers to Care

PATH serves youth with inadequate insurance and other barriers to mental health care, so it is worth noting the proportion of participants with these limitations. Table B5 profiles the insurance status of PATH participants. PATH serves a predominately low-income population, and nearly half of PATH participants were enrolled in Medicaid. Twelve percent of participants did not have insurance coverage, and nearly ten percent did not have a third party payer. Twelve percent were faced with a high deductible, further reinforcing the need for providing affordable mental health services to these youth.

Table B5: Insurance Status of PATH Participants

	Number of Participants	Percent of Participants
Enrolled in Medicaid	90	49.2
No Insurance	22	12.0
High Deductible	22	12.0
No Third Party Payer	17	9.3

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Irrespective of their insurance status, several PATH participants are faced with logistical barriers to receiving mental health treatment (Table B6). Approximately half of participants reported inadequate transportation to get to a provider and half noted how accessing treatment often interferes with work schedules. One-third of participants indicated a lack of parent support in accessing services, which underscores the importance of the school-based setting of PATH.

Table B6: Barriers to Care

	Number of Participants	Percent of Participants
Inadequate Transportation	87	47.5
Work Schedule Conflict	99	54.1
Lack of Parent Support	61	33.3

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Mental Health

The students PATH serves endure a variety of mental health disorders. The majority of participants suffer from more than one condition, confirming findings in the literature about the prevalence of mental health comorbidities (Bruce et al. 2005; Costello et al. 2002). The distribution of mental health disorders incurred by PATH students is presented in Table B7. Adjustment disorders are the most commonly occurring among PATH students, affecting 41 percent of participants. Mood disorders, anxiety disorders, and ADHD each affect at least 15 percent of PATH students. Several other students also suffer from ODD, conduct disorder, eating disorders, and problems in the home.

Table B7: Disorder Prevalence

	Number of PATH Participants	Percent of PATH Participants[1]
Adjustment Disorder	75	41.0
Mood Disorder	60	32.8
Anxiety Disorder	50	27.3
ADHD	27	14.8
ODD	12	6.6
Conduct Disorder	7	3.8
Family Problems	5	2.7
Eating Disorder	3	1.6
Other	25	13.7

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.
[1]Percentages do not sum to 100, as many participants have multiple disorders.

As a result of their mental health needs, many PATH students seek treatment outside of PATH. Table B8 presents information on doctor visits, hospitalizations, and emergency room visits for mental health reasons both one year prior to intake, and during PATH. While the majority of participants report visiting a physician for their illness, relatively few indicated going to the hospital or emergency room either prior to or during PATH. As Table B9 shows, many students saw a decrease in treatment due to mental health between PATH intake and participation.

Table B8: Mental Health of PATH Participants

	Intake (Within Past Year)		During PATH	
	Number of Participants	Percent of Participants	Number of Participants	Percent of Participants
Doctor *Visits*				
0	13	7.1	29	15.8
1 or 2	115	62.8	56	30.6
3 to 5	29	15.8	24	13.1
6 or More	15	8.2	9	4.9
Not Reported	11	6.0	65	35.5
Total	**183**	**100.0**	**183**	**100.0**
Hospitalizations				
0	157	85.8	107	58.5
1	15	8.2	9	4.9
2	7	3.8	3	1.6
3	1	0.5	2	1.1
Not Reported	3	1.6	62	33.9
Total	**183**	**100.0**	**183**	**100.0**
Emergency Room Visits				
0	160	87.4	108	59.0
1	13	7.1	8	4.4
2	6	3.3	4	2.2
3 or More	1	0.5	1	0.5
Not Reported	3	1.6	62	33.9
Total	**183**	**100.0**	**183**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities

Table B9: Trends in Mental Health Treatment between Intake and PATH Participation[1]

	Percent Decrease	Percent Increase	Percent No Change
Doctor Visits (n=118)	33.1	18.6	48.3
Hospitalizations (n=121)	10.7	5.8	83.5
Emergency Room Visits (n=121)	9.1	5.8	85.1

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.
[1]Percentages based on participants with both intake and discharge data for particular outcome.

School Performance
In addition to helping improving overall academic performance and helping students graduate from high school, PATH helps with student behavior in school. Table B10 displays the pre- and during-PATH prevalence of truancies, suspensions, and excused absences. As Table B11 indicates, several students saw an improvement in negative school behaviors as a result of PATH. These findings from the data corroborate with what was reported by school administrators (see Appendix D).

Table B10: School Behavior of PATH Participants

	Intake (Within Past Year)		During PATH	
	Number of Participants	**Percent of Participants**	**Number of Participants**	**Percent of Participants**
Truancies				
0	117	63.9	102	55.7
1 to 4	24	13.1	23	12.6
5 to 9	9	4.9	5	2.7
10 to 19	8	4.4	3	1.6
20 to 29	4	2.2	3	1.6
30 or More	4	2.2	2	1.1
Not Reported	17	9.3	45	24.6
Total	**183**	**100.0**	**138**	**75.4**
Suspensions				
0	138	75.4	99	54.1
1	11	6.0	9	4.9
2	8	4.4	6	3.3
3	6	3.3	4	2.2
4	5	2.7	1	0.5
5 or More	3	1.6	4	2.2
Not Reported	12	6.6	60	32.8
Total	**183**	**100.0**	**183**	**100.0**
Excused *Absences*				
0 to 3	61	33.3	48	26.2
4 to 6	27	14.8	22	12.0
7 to 10	23	12.6	11	6.0
10 or More	44	24.0	39	21.3
Not Reported	28	15.3	63	34.4
Total	**183**	**100.0**	**183**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Table B11: Percent Changes in School Behavior between Intake and Discharge[1]

	Decrease	Increase	No Change
Truancies (n=121)	20.7	2.5	76.9
Suspensions (n=123)	14.6	8.1	77.2
Excused Absences (n=105)	57.1	6.7	36.2

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.
[1]Percentages based on participants with both intake and discharge data for particular outcome.

Juvenile Justice
PATH has the potential to reduce criminal involvement, particularly for youth previously involved with the criminal justice system. The majority of PATH participants has not had contact with the law (Table B12), which is understandable given that youth with mental disorders who are involved with the justice system already receive treatment and are not targeted by PATH. Additionally, fewer PATH students ran into trouble with the law during PATH than prior to participating in the program (Table B13).

Table B12: Juvenile System Justice Involvement

	Intake (Within Past Year)		During PATH	
Times in Trouble with Law	**Number of Participants**	**Percent of Participants**	**Number of Participants**	**Percent of Participants**
0	148	80.9	109	59.6
1	14	7.7	8	4.4
2	9	4.9	3	1.6
3 or More	4	2.2	0	0.0
Not Reported	12	6.6	85	46.4
Total	**183**	**100.0**	**183**	**100.0**

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.

Table B13: Changes in Juvenile Justice Involvement between Intake and Discharge[1]

	Decrease	Increase	No Change
Contact with Law (n=120)	14.2	1.7	84.2

Source: PATH Intake and Discharge Data, provided by United Way of Fox Cities.
[1]Percentages based on participants with both intake and discharge data for particular outcome.

Appendix C: Graduation Effect Size Estimate and Calculation
Our analysis estimates the effect of PATH on high school graduation by comparing two groups of students: those suffering from mental illness in the schools that PATH serves and those with mental illness not participating in a program like PATH. The U.S. Department of Education (2001) estimates that 50 percent of students with mental illness drop out of high school (MI_DOR). We assume that non-PATH participating students with mental illness drop out at this rate. We compare this rate to the expected dropout rate of mentally ill students receiving CBT treatment (CBT_DOR). To do so, we convert Cobb et al.'s (2007) 0.55 Hedges' g mean difference effect size estimate of CBT on dropout rate to an odds ratio, which we then use to calculate the expected high school completion rate of PATH students. This yields an estimate of 71 percent of PATH students we anticipate to graduate, corresponding to a 21 percentage point increase from the non-treated rate. We considered lower and upper bounds of 0.36 and 0.74 on Cobb et al.'s (2007) Hedges' g estimate, corresponding to completion rates of 64 and 77 percent, respectively. This means, in effect, that we estimate a range of a 14 to 27 percentage point increase in graduation associated with PATH treatment, with a 21 percentage point expected value. This graduation effect size estimate of 21 percentage points plays a key role in our estimation of the benefits associated with higher lifetime earnings and avoided crime costs.

This 71 percent figure overestimates the students who will actually graduate from high school because students can fail to graduate without meeting the technical definition of a dropout. Some students may attend high school for four years or even longer without graduating and yet not drop out. The six-year graduation rate for non-dropouts in the schools participating in PATH is 96.6 percent. Applying an adjustment factor results in an estimated 69.6 percent increase in high school graduation associated with PATH (Grad_Transform). See Appendix O for a description of this adjustment factor and calculation.

In mathematical notation, the effect size for graduation is shown in Equation 1.

(1) ES_Grad = (CBT_DOR - MI_DOR) * Grad_Transform

To calculate the number of PATH students who graduate as a result of the program we use the calculation outlined in Equation 2.

(2) ES_Grad * PATH_Tot = [(.71 - .50) * .98] * 183 = 37.7

Sources:
Cobb, Brian, Pat L. Sample, Morgen Alwell, and Nikole R. Johns. "Cognitive—Behavioral Interventions, Dropout, and Youth With Disabilities A Systematic Review." *Remedial and Special Education* 27, no. 5 (2006): 259-275.

U.S. Department of Education, *Twenty-third annual report to Congress on the implementation of the Individuals with Disabilities Education Act*, Washington, D.C., (2001).

Appendix D: PATH Questionnaire School Responses
To complement the data provided to us by United Way Fox Cities, we surveyed the districts and schools served by PATH. PATH has many stakeholders, so it is important to understand how it has affected school administration and functioning in addition to students, families, and the community at large. By surveying school administrators, we hoped to gain insight into how PATH has affected the schools and districts it serves and receive numerical estimates for some of these effects.

We developed a survey tool to be completed by staff at each of the schools PATH serves (Appendix E). The survey asked questions in two broad categories: the impact of PATH on student performance and associated outcomes, and the administrative impacts of PATH. The student performance questions addressed whether PATH reduced school staff time for counseling or discipline, decreased truancy, reduced disruptive classroom behaviors, and improved academic performance. We gathered information on PATH's effect on administrative functioning through questions on whether staffing time has changed since PATH's implementation and how much time PATH therapists spend with students. Finally, we solicited ideas about how PATH's reach might be expanded in each school if given additional resources.

Survey Findings
Nineteen of the 22 PATH schools completed the survey (86 percent response rate), and the aggregated findings for the performance impacts of PATH are presented in Table D1. Of these 19 schools, 13 (68 percent) reported that PATH has had a positive influence on reducing disruptive behaviors and 12 (63 percent) indicated improved student academic performance as a result of the program. These findings are consistent with those in the literature about the effect of school-based interventions on student behavior (Hoagwood et al., 2007; Wilson and Lipsey, 2007). Schools did not indicate, however, that PATH has had a substantial effect on reducing truant behaviors, as only six schools (32 percent) indicated that PATH has decreased truancy rates. On average, PATH students miss a reported 2.67 hours of class time per month, but we expect these losses to be offset by the overall benefits of program participation.

The survey results indicate that the effects of PATH on counseling time and tasks are less noticeable (Table D2). Ten schools (52 percent) noted a reduction in counseling costs, while only six schools (32 percent) indicated that PATH has affected staff time spent disciplining students. Several schools also noted additional student impacts of the PATH program, including improved self-esteem, student affect, relationships among PATH students, and increased access to mental health services for families with barriers.

In addition to affecting student performance, there are several administrative impacts of PATH. These findings are presented in Table D3. School administrators devote approximately two hours of their time each month to PATH. PATH has also affected how much time school counselors and staff devote to addressing mental health needs. Twelve schools (63 percent) report that counselors have had to spend less time responding to mental health needs than they would have in absence of PATH. Six schools (32 percent) reported no change in mental health counseling time, while one school (5 percent) noted an increase in mental health counseling time. In order to gauge further the extent to which PATH has impacted student behavior, we solicited feedback about how PATH has affected the amount of time staff spend addressing disciplinary and truancy issues (Table D4). Eleven schools (57 percent) noted that staff had to spend less time on student discipline as a result of PATH, and eight (42 percent) reported no change. Regarding truancy, 12 of the 19 school respondents (63 percent) noted that PATH has had no effect on the amount of time staff spend on truancy issues, while 7 schools (36 percent) of schools reported a reduction in staff hours devoted to these needs.

Table D1: Impact of PATH on Student Performance

	Number of PATH Schools	Percent of PATH Schools[1]
Reduced Disruptive Classroom Behaviors	13	68
Improved Academic Performance	12	63
Decreased Truancy	7	37

Source: United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire data

Table D2: Impact of PATH on Counseling Time

	Number of PATH Schools	Percent of PATH Schools[1]
Reduced Counseling Staff Hours	10	52
Reduced Discipline Staff Hours	6	32

Source: United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire data

Table D3: Impact of PATH on Administrative Functioning

	Hours per Month
Median Administrative Time Devoted to PATH	2
Median Time PATH Counselors Spend with Students	16

Source: United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire data

Table D4: Potential Expansion of PATH

	Number of PATH Schools	Percent of PATH Schools[1]
Increase Number of Therapists	8	42
Increase Hours of Current Therapists	13	68
Expand to Other Schools in District	9	47

Source: United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire data
[1]Percent of PATH schools who completed the questionnaire (19 of the 22 total schools).

Appendix E: **United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire**

Students at the La Follette School of Public Affairs at UW-Madison are conducting a cost-benefit analysis of the PATH program for United Way Fox Cities. The purpose of this evaluation is to give a comprehensive overview of how PATH affects the lives of the youth it serves, in terms of both current impacts and future benefits. In order to produce the most accurate assessment of the program possible, we hope to gather information from school districts to complement data provided to us by United Way.

Please take the time to complete the following questionnaire to the best of your ability. Your answers will be of immense value to us for completing our evaluation. If you have any questions about the evaluation, do not hesitate to contact our team's liaison, Cherie Wolter (cmwolter@wisc.edu).

Please direct all completed questionnaires to Mary Wisnet at United Way Fox Cities (Mary.Wisnet@UnitedWayFoxCities.org) by OCTOBER 15th.

School District: ____

Name of School:

____

Name and Title of Individual Completing Questionnaire:

____

Email address: ____

May we contact you if we have additional questions? Y N

1. How has PATH impacted school functioning and student performance in your district? Check all that apply.

__ Reduced counseling costs (staffing hours)

__ Reduced discipline costs (staffing hours)

__ Decreased truancy

__ Reduction in disruptive classroom behaviors

__ Improved academic performance

__ Other: ______________________________

2. In the average month, how many hours does administrative staff spend overseeing the PATH program in your district? _________

Explain:

3. On average, how many hours per month has PATH changed the time school counselors spend with students for mental health services? _________

Explain:

4. On average, how many hours per month has PATH changed the time school faculty and staff spend disciplining students? _________

Explain:

5. On average, how many hours per month has PATH changed the amount of time staff spend on truancy cases? _________

Explain:

6. Has your school witnessed a change in disruptive classroom behaviors as a result of PATH? Y N

Explain:

7. To the best of your knowledge, approximately what percentage of the time are PATH therapists engaged with students? _________

Explain:

8. On average, approximately how much class time does a student miss each month as a result of participating in PATH? _________

Explain:

9. If your school district was given additional resources to expand the PATH program, how would these resources best be used? Check all that apply.

__ Expand to additional schools in district

If yes, which ones?: ____________________________________

__ Increase number of therapists in schools currently receiving PATH programming

__ Increase number of hours for current therapists

__ Other: _______________________________

Explain:

10. Do you have any other comments about how PATH has impacted your school?

Thank you for completing this questionnaire!

Appendix F: Costs
The United Way Fox Cities (UWFC) provided its financial statement for the 2013 to 2014 school year and its projected 2014 to 2015 budget. Until the end of the 2013 to 2014 school year, UWFC distributed the funding to the health providers at a rate of $55 per therapy session. Because we use student data from the 2013-14 school year to calculate costs and benefits, we used their total expenses for this time period to calculate costs.

During the 2013-14 school year, United Way Fox Cities spent about $249,000 on therapy sessions to the health care providers and a small amount on licensing fees. UWFC received third-party reimbursements from private insurance and Medicaid for 46 percent of their therapy costs. The third party reimbursements transfer the cost of PATH services without reducing the total cost for society, so we did not adjust costs for third-party reimbursement.

Table F1: 2013-2014 PATH Expenses

	Expenses (Dollars)
Therapy Costs	250,000
Adjustment for Additional Students not Served in 2013-14	51,000
Adjustment for UWFC Administrative Overhead	38,000
Opportunity Cost of Space Donated by Schools	217,000
Total	**556,000**

Source: PATH 2013-14 Financial Statement, provided by United Way Fox Cities

As Table F1 shows, we included an estimate of the opportunity cost of the space that schools donate for therapists to hold PATH sessions. Although this cost does not appear on the UWFC financial statements, schools still bear a cost if rooms used for PATH would have been used for other purposes in the absence of PATH.

Our estimate of the opportunity cost of school space assumes that all 23 schools dedicate a room for PATH for every hour of the school year. PATH services do not occur during every hour of the school year, but a dedicated room would allow PATH therapists to create a conducive space without it being disturbed by other activities. The cost of space may be less than our estimate if schools use the space in which PATH sessions occur for other activities at other times.

We estimated the value of a school room at nine dollars per hour based on rates posted on the website of the Monona Grove School District. Monona Grove, Wisconsin is near Madison serves a suburban area that is qualitatively similar to the Fox Cities. We recognize that the opportunity cost of school space depends on the degree to which schools are space-constrained. Our Monte Carlo simulation reduces the hourly cost of school space by 25 percent on average, with a standard deviation of 10 percentage points.

In the 2014-15 school year, UWFC started paying for PATH services by distributing block grants to the three different health providers based on their proportion of districts served. Total expenditures to all three providers amount to $439,000. See Table F2 for a breakdown of the projections.

Table F2: 2014 to 2015 Projected Expenses

	Expenses (Dollars)
Salaries	281,000
Benefits & Taxes	83,000
Travel Cost	21,000
Administrative Costs	54,000
Total Expenses	**439,000**

Source: PATH 2013-14 Financial Statement, provided by United Way Fox Cities

Sources:
Monona Grove School District. "Information on Renting District Facilities." http://www.mononagrove.org/district/howtorentmgfacilities.cfm. Accessed December 16, 2014.

Appendix G: Avoided Administrative Costs Associated with Behavioral Problems
Behavior problems in school encompass a wide variety of actions, including acting out in class, bullying, and bringing illegal substances onto campus. These behavioral problems are correlated with a number of outcomes including poor school performance and reduced earnings later in life (Segal 2008). Our analysis focused on the school administrative costs pertaining to behavioral problems. We used data from our survey of PATH schools to estimate the incidence of out of school suspensions among PATH participants (Appendix D). These costs stem from the staff time required to document and administer in-school punishments and out-of school suspensions and may vary with administrative practices of each school.

Estimations and Assumptions
The calculation of changes in school staff time addressing discipline is similar to the calculation of freed guidance counselor time (Appendix I). Using the data gathered from our survey of PATH schools, we estimated an average monthly hourly reduction and standard deviation of administrator time spent on addressing behavioral problems. To estimate a dollar value of staff time, we used the average salary figures of guidance counselors from the Wisconsin Department of Public Instruction. Although other administrators may be involved in handling behavioral problems, these positions either do not have salaries listed the database or have similar salaries. We use an hourly wage rate of $47.

Of the 19 schools that responded to our survey, eleven reported a decrease in time devoted to truancy and eight reported no change as a result of PATH. Among those schools reporting a decrease, three quantified the number of hours saved and four just said that time was saved. The average monthly reduction in staff time was 2.4 hours per school with a standard deviation of 1.6 hours. The Monte Carlo simulation gives each school an 11 out of 19 chance to save staff time for discipline to reflect that some schools report no savings.

For each school that does save staff discipline time, the Monte Carlo randomly assigns it a monthly savings from a normal distribution based on schools' survey responses, which we multiply by nine. When we multiply the estimated hours saved by the hourly wage rate discussed above, we estimate a benefit of saved school staff discipline time of $14,000.

Sources:
Wisconsin Department of Public Instruction. "Median Annual Teacher Earnings." WISEdash. Accessed November 30. http://wisedash.dpi.wi.gov/Dashboard/portalHome.jsp.

Appendix H: Avoided Truancy Costs

Truancy is defined in the state of Wisconsin as any unexcused absence from school for either the full school day or part of the day (WI State Statute 118.15). Schools must document when a student is either tardy or has an unexcused absence. Unexcused absences, in addition to being correlated with negative student outcomes such as low academic performance or not graduating on time, also carry administrative costs for school personnel (Newsome 2008). Additional legal costs associated with student truancy may accrue for students who are habitually truant. However, due to potential alternative interventions at the school level for habitually truant students, we cannot provide an estimate of court costs in the form of additional administrative costs or fines levied against students and their families as part of this analysis. For a more information of this unquantifiable benefit, refer to Appendix N. This section discusses school staff directly pertaining to administrative costs associated with truancy.

Estimations and Assumptions

Changes in administrative costs associated with truancy were calculated similarly to those associated with changes in guidance counselor costs. Using the data from the 19 schools that responded to our survey of PATH schools, we estimated an average monthly hourly reduction in staff time spent addressing student truancies (Appendix D). To monetize this reduction in staff time, we used average salary figures for the guidance counselors at PATH participating schools provided in the Wisconsin Department of Instruction's salary database, which indicates an hourly wage rate of $47. While other school personnel in addition to guidance counselors could address student truancies, these individuals either have similar salaries or do not have salaries listed in the database.

Of the 19 schools that responded to our survey of schools, seven reported a decrease in time devoted to truancy and twelve reported no change. Of the schools reporting a change, four estimated the number of hours saved. The schools that estimated the number of hours saved on average 4.9 hours, with a standard deviation of 4.6 hours. As described in Appendix I for school staff discipline time, our Monte Carlo first simulated whether schools saved any time at all. Each school that saved time in the simulation was assigned a number of hours saved per month from a normal distribution based on schools' survey responses and multiplied it by 9 months. Together with the wage rate for school staff, this method estimates that schools save $18,000 worth of staff time that otherwise would have been spent addressing truancy among PATH students.

Sources:

Wisconsin Department of Public Instruction. "2013-2014 PI-1202 Fall Staff Report All Staff File." Data Pulled on June 9th, 2014. http://lbstat.dpi.wi.gov/sites/default/files/imce/lbstat/exe/14staff.zip.

Wisconsin State Statute 118.15: Compulsory School Attendance. http://docs.legis.wisconsin.gov/statutes/statutes/118/15.

Wisconsin Department of Public Instruction. WISEdash. "Truancy rates by School: 2013-2014." Accessed November 25, 2014. http://wisedash.dpi.wi.gov/Dashboard/portalHome.jsp

Appendix I: School Guidance Counselor Time Freed for Other Activities

The Wisconsin Department of Public Instruction describes the responsibilities of high school guidance counselors as promoting a healthy school environment, advising students on post-secondary educational options, providing counseling services for students and families, and referring students to outside services. Because PATH provides in-school mental health services to students, once could expect to see a shift in guidance counselor time spent addressing mental health needs. To gauge how guidance counselor time devoted to mental health issues changed as a result of PATH, we surveyed the schools in the program (Appendix D). Guidance counselors have many responsibilities within a school. We asked schools whether guidance counselors reduced the time they spent addressing the mental health of PATH participants and increased the time they spent on other activities.

Estimations and Assumptions

In our survey of PATH schools, twelve of the 19 respondents reported that PATH freed guidance counselors for other activities. One school indicated that guidance counselors spent more time addressing the mental health of PATH participants because of PATH (Appendix D). The schools estimating the number of hours saved on average 10.2 hours, with a standard deviation of 15.1. The standard deviation of this estimate is large because it includes one school that estimated a negative number of hours saved.

As in Appendices G and H, our Monte Carlo simulated whether schools freed guidance counselor time for other activities. We assigned each school that freed guidance counselor time a number of hours saved from a normal distribution based on schools' survey responses.

Combining the estimated hours saved over the course of the school year with the hourly wage rate for guidance counselors obtained from DPI data, we estimate that PATH frees guidance counselors for activities that generate $71,000 worth of benefits.

Sources

U.S. Office of Personnel Management, "Computing Hourly Wages Using 2,087 Divisor," accessed November 26, 2014,http://www.opm.gov/policy-data-oversight/pay-leave/pay-administration/fact-sheets/computing-hourly-rates-of-pay-using-the-2087-hour-divisor/.

Wisconsin Department of Public Instruction. "Median Guidance Counselor Annual Earnings." WISEdash. Accessed November 30. http://wisedash.dpi.wi.gov/Dashboard/portalHome.jsp.

Wisconsin Department of Public Instruction. "Comprehensive School Counseling Programs." Accessed November 26, 2014. http://sspw.dpi.wi.gov/sspw_counsl.

Wisconsin State Office of Employee Relations. "Wisconsin Human Resources Handbook." Accessed November 26, 2014. http://oser.state.wi.us/docview.asp?docid=3422.

Appendix J: Benefit of Avoided Juvenile Crime

Avoided juvenile crime is a benefit associated with the effect of CBT on students while they are in school. Our model accounts for PATH students who have already been in trouble with the law and may experience reduced criminal recidivism rates based on their CBT experience. We do not attempt to estimate the likelihood of avoided juvenile crime associated with CBT for students who have not already been in trouble with the law, due to lack of reliable effect size estimates for this possibility. The benefit of avoided juvenile crime is the cost that would have been incurred in the absence of PATH by the criminal justice system.

Through our interviews and conversations with the United Way Fox Cities and mental health providers, we learned that the majority of participants in PATH who have already had "trouble with the law," most were involved in underage drinking, habitual truancy (court involved), or other relatively minor, non-violent crimes. We were informed that more serious juvenile offenders are not likely involved in the PATH program and have alternate systems of care. This being said, it is possible that the costs per juvenile crime ($2,100) is over-estimated in the model because it is a weighted average of county court expenditures for all juvenile crimes, which includes more serious (and therefore more expensive) crimes than those committed by PATH participants.

Estimates and Assumptions

Of the students in PATH during the 2013-14 school year, 13 males and 17 females have had at least one incident reported as "trouble with the law." For the purpose of modeling in the Monte Carlo, we designate them as prior juvenile offenders and evaluate the costs of incurred by the county justice system. According to Lipsey (2009), prior juvenile offenders have a 0.50 probability of committing another crime (recidivism) within the next twelve months. Comparatively, if juveniles receive a cognitive behavioral intervention, they have a 0.37 probability of committing another crime over the next year, a 26 percent reduction in recidivism.

(1) BJuvenileCrime = NPV_JuvenileCrime * PATH_Trouble * (ES_Recidivism - ES_CBT_Recidivism) * D_k

Variables:

NPV_JuvenileCrime = NPV of reduced juvenile crime
PATH_Trouble = Number of PATH participants in trouble with the law
ES_Recidivism = Juvenile offender recidivism rate
ES_CBT_Recidivism = Effect Size of CBT on juvenile recidivism
D_k = Discount factor

We calculated a weighted average ($2,100) of county expenditures on juvenile arrests across the three counties (Outagamie, Calumet, and Winnebago) that serve the school districts implementing the PATH program. There is a possibility that PATH participants can commit crime outside of the tri-county boundaries, however we make the assumption that students are most likely to remain within a certain distance to their home and any juvenile crime committed by this population is likely to be processed through these systems. To calculate this weighted average (and standard deviation), we divided total expenditures by total arrests in each county to get a expenditures per arrest rate, and then multiplied by the ratio of arrests in that county over total arrests.

Table J1: Juvenile Crime Effect Size Estimates

Variables	Point Estimate	Notes
PATH_Trouble	Males: 14 Females: 17 Total: 31	PATH Questionnaire School Responses
ES_Recidivism	0.50	Lipsey (2009)
ES_CBT_Recidivism	0.37	Lipsey (2009)
Cost Per Juvenile Crime (in 2014 dollars)	2,100 (196)	WI Department of Corrections State and County Juvenile Justice Services. June 2010.

Table J2: Juvenile Crime Expenditures (Weighted Average Calculation)

County	Total Juvenile Arrests	Total Expenditures on Juvenile Arrests (Dollars)	Expenditures per Juvenile Arrest
Outagamie	3,006	5,663,000	1,900
Winnebago	2,424	5,640,000	2,300
Calumet	247	774,000	3,100
Tri-County Total	**5,677**	**12,077,000**	**2,100 (196)**

Weighted Average = ((3006/5677)*1884.03) + ((2424/5677)*232.56) + ((247/5677)*3134.54)
Std. Deviation = $(2127.38 - 1884.03)^2 + (2127.38 - 3134.54)^2 + (2127.38 - 2326.56)^2$ / 5677

Sources:

Lipsey, Mark W. "The primary factors that characterize effective interventions with juvenile offenders: A meta-analytic overview." *Victims and offenders* 4, no. 2 (2009): 124-147.

PATH Questionnaire School Responses.

Wisconsin Department of Corrections. *State and County Juvenile Justice Services Report June 2010.* (2012).

Appendix K: Benefit of Avoided Suicide

PATH helps participants reduce the severity of mental illness and improves the coping abilities of students, which in turn may help prevent suicide among PATH participants. The suicide rate for 15 to 24 year olds in Wisconsin was 12.0 per 100,000 individuals from 2007 to 2011 according to the Wisconsin Department of Human Services (DHS 'Burden' 2014). County-level adolescent suicide rates are unavailable to us; however, information relayed to us by United Way personnel indicate that suicide rates in the tri-county region where PATH operates have been higher in recent years (Interview with Mary Wisnet). The 2006 Leading Indicators for Excellence on the Fox Cities Region study found that 14 percent of high school students have seriously considered suicide, 12 percent have made plans to commit suicide, and 10 percent have attempted suicide (LIFE 2011), all action correlated with completed suicide. Concerns from the 2006 LIFE report prompted the creation of PATH.

Estimations and Assumptions

Suicide levies large costs on families and friends of suicide victims. These costs are difficult to quantify, let alone monetize. The difficulty in determining the cost of suicide stems from the fact that suicide is a relatively rare phenomenon, albeit a costly one. While rates of occurrence can be observed, subcategories of occurrence by age, mental health status, and location are often not published at the county-level due to privacy concerns. Additionally, as suicide results in death, the presence of risk factors such as mental illness, previous suicide attempts if they did not result in hospitalization, and job or personal problems are difficult to study.

As county-level data are unavailable and subject to large variance, we chose to use the Wisconsin Department of Human Services base rate of 12 suicides per 100,000 15 to 24 year olds. We recognize that this age range does not align with PATH's student population, which may therefore affect our estimation of benefits. A suicide rate limited just to adolescents in Wisconsin with severe mental disorders would have been more appropriate but is unavailable. DHS also provides data on the frequency of suicides over the past five years (DHS 2013), and we were able to calculate a standard deviation of the suicide rate.

"Suicidality" refers to suicidal intentions, including self-harm, attempted suicide, or suicide itself (Meyer et al. 2010). A meta-analysis conducted by Weisz et al. (2006) found that adolescents suffering from depression who receive CBT are at a decreased risk of suicide, with a Hedges' g effect size of 0.18 corresponding to an odds ratio of 0.74.

This analysis quantifies the cost of suicide using literature estimates of the value of a statistical life (VSL). VSL does not represent the actual value of human life but rather the revealed preferences people demonstrate for increases or decreases in the risk of death. Small changes in the risk of death represent small fractions of a statistical life, but the value people put on these small changes can theoretically be extrapolated to a full VSL figure. For this analysis, we use the value of a statistical life provided by Boardman et al. (2011) converted to 2014 dollars, which equates to $5,500,000.

As the Weisz et al. (2006) meta-analysis considers the treatment effects of CBT after only one year, the effect of PATH on future adult suicides remains unknown. Using the same effect size for lifelong suicidality will most likely result in an overestimation of benefits, so we only account for suicidality among adolescents in our analysis. Additionally, educational attainment, which is expected to increase for some PATH participants (Appendix L), is negatively correlated with suicide, though there is uncertainty around the magnitude of this effect.

We use Equation (1) to model the benefits of avoided suicide due to CBT. The benefits of reducing suicide depend on the number of PATH participants (PATH_Tot); DHS's suicide rate among 15 to 24 year-olds; the effect size of CBT on suicide (ES_CBT_Suicide), which refers to Weisz et al.'s (2006) effect size; and the VSL estimate provided by Boardman et al. (2011). These figures are summarized in Table K1.

(1) BSuicide = PATH_Tot * (Rate_Suicide - ES_CBT_Suicide*(Rate_Suicide)) * VSL

Table K1: Suicide Effect Size Estimates

	Point Estimate	Notes and Sources
Rate_Suicide	.00012 (0.00001785)	WI DHS (2014)
ES_CBT_Suicide	0.74	z=1.80, p=.07 CI: .5377 to 1.026 (OR) Weisz (2006)
VSL	$5,500,000	Low Value: $2,600,000 High Value: $7,900,000 Boardman et al. (2011)

Sources:

Boardman, Anthony E., David H. Greenberg, Aidan R. Vining, and David L. Weimer. "Cost-Benefit Analysis, Concepts and Practice", 4th ed. *New Jersey: Pearson Education, Inc, 2011.*

Interview with Mary Wisnet, Community Development Program Officer: Health & Healing and Strengthening Families, United Way Fox Cities. November 14, 2014.

Meyer, Roger E., Carl Salzman, Eric A. Youngstrom, Paula J. Clayton, Frederick K. Goodwin, J. John Mann, Larry D. Alphs et al. "Suicidality and risk of suicide--definition, drug safety concerns, and a necessary target for drug development: a consensus statement." *J Clin Psychiatry* 71, no. 8 (2010): e1-e21.

Weisz, John R., Carolyn A. McCarty, and Sylvia M. Valeri. "Effects of psychotherapy for depression in children and adolescents: a meta-analysis. "*Psychological bulletin* 132, no. 1 (2006): 132.

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Wisconsin Department of Human Services. "Wisconsin Population Estimates in 2014." Accessed November 26, 2014. http://www.dhs.wisconsin.gov/population/.

Appendix L: Benefit of Increased Lifetime Income

Graduating from high school produces lasting impacts on one's lifetime income (Cohen and Piquero 2008). Additionally, earnings rates are affected by one's highest level of educational attainment: those with higher levels work at a higher wage rate and spend more time in the workforce (Bureau of Labor Statistics 2014b; Skoog and Ciecka 2001). In calculating PATH's impact on lifetime income, we account for the ultimate level of educational attainment among the program's participants. Individuals suffering from adolescent depression earn 19 percent less than the general population (Fletcher 2013), so we reduce our income figures by this amount. The discussion that follows presents our methods and assumptions for calculating this program benefit.

Estimates and Assumptions

In modeling the effect PATH has on the lifetime income of participants, we consider once again the effect PATH has on high school graduation and the subsequent impact on lifetime income. Our lifetime income benefit models therefore involve accounting for the number of PATH participants who graduate high school as a result of the intervention but otherwise would not have. We do not apply this income effect to PATH students who would be predicted to complete high school despite participating in PATH and students who participate in PATH but do not complete high school, as they do not receive an additional income benefit as a result of participating in the program.

Our benefits estimate for the income effect of graduation only includes individuals for whom CBT causes them to graduate high school and would not have otherwise. Additionally, we assume that all PATH participants enter the labor force, earning at least the equivalent of a high school dropout. We do not take into consideration how income and productivity may be indirectly influenced by CBT through its potential to reduce mental health symptoms or help individuals develop skills relevant to job success. We omitted these potential income effects, believing they are relatively temporary and smaller than the effect of high school graduation itself on income.

Our modeling strategy involves estimating the highest level of educational attainment reached by PATH participants as a result of the intervention and applying the difference in the median annual lifetime total income of Wisconsin adults at each attainment level from that of high school graduates. These income figures incorporate all sources of income, including unemployment insurance and retirement. We reduce these figures by the 19 percent reduction in earnings associated with adolescent depression reported by Fletcher (2013). Although this figure pertains only to individuals with adolescent depression and not all individuals with any mental illness as a youth, we are confident in this assumption given that mood disorders are among the most prevalent among PATH participants (Appendix B).

We define four levels of educational attainment: (1) four-year high school graduate, (2) six-year high school graduate, (3) some college or a two-year degree, or (4) a bachelor's degree or more. We obtain our high school dropout, some college or two-year degree, and bachelor's degree rates from CPS data (Table L1). For high school graduates, we consider both students who graduate in four and six years ($Grad\_Adj_1$ and $Grad\ Adj_2$, respectively) and use the effect size estimate for high school graduation (ES_Grad), as described in the body of the report.

We then apply the estimated lifetime income for PATH participants attaining each of these levels using the median annual pre-tax income of Wisconsin adults in 2014 gathered from 2014 Current Population Survey data (King et al. 2010; Table L2). These figures pertain to the entire adult population in Wisconsin and are not specific to individuals with a history of mental illness. Our benefits estimates therefore may not fully represent the population PATH serves, though we expect them to be comparable to the true underlying values.

Table L1: 2014 Education Attainment Rates in Wisconsin

	Male		Female	
	Estimate	SD	Estimate	SD
Four-Year High School Graduation Rate ($Grad\_Adj_1$)	0.90	n/a	0.97	n/a
Six-Year High School Graduation Rate ($Grad\_Adj_2$)	0.95	n/a	0.98	n/a
High School Diploma (EduAttain_HS)	0.29	0.46	0.27	0.45
Some College or Two-Year Degree (EduAttain_SomeCol)	0.13	0.34	0.14	0.34
Bachelor's Degree or More (EduAttain_Col)	0.25	0.44	0.28	0.45

Source: King, Miriam, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

Table L2: 2014 Median Annual Pre-Tax Total Income for Adults in Wisconsin, by Educational Attainment

	Male (Dollars)		Female (Dollars)	
	Estimate	SD	Estimate	SD
HS Dropouts	19,900	24,000	10,300	12,200
HS Graduates	31,200	59,200	15,200	19,000
Some College and Two-Year Degree	40,000	44,900	25,000	33,900
Bachelor's Degree and Above	68,500	94,800	40,000	36,000

Source: King, Miriam, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

Modeling in Monte Carlo Simulation

To model the effect of PATH on lifetime income based on level of educational attainment, we need to consider four specific groups of PATH participants: (1) four-year high school graduates, (2) six-year high school graduates, (3) some college and two-year degree recipients, and (4) bachelor's degree or greater recipients.

Equation 1 shows our calculations for the lifetime income benefit for four-year high school graduates by gender (k). Recognizing that the lifetime income effect differs between individuals who graduate high school in four years versus six, we calculate a benefit stream for each group. Equation 1 focuses on PATH participants who graduate in four years using $Grad\_Adj_1$. Here we multiply the expected number of four-year PATH high school graduates by the difference in median lifetime income of a high school graduate in Wisconsin and a high school dropout (NPV_HS_k - $NPV\_Dropout_k$), the effect size of adolescent depression on adult earnings (Dep_Earn), and a discount factor ($\sum D_i$).

(1) $BEarn\_HS_4 = \sum_k \{(NPV\_HS_k - NPV\_Dropout_k) * Dep\_Earn * [PATH\_Tot_k * ES\_Grad_j * Grad\_Adj_1] * \sum D_i\}$

We modify Equation 1 to account for students whose highest level of educational attainment is a high school diploma but who graduate in six years (Equation 2). Here we assume that a student works, earning the equivalent of a high school dropout ($NPV\_Dropout_k$), during the extra two years he or she spends in high school. Upon receiving a high school diploma, he or she then earns the equivalent of a high school graduate for the rest of his or her time in the labor force, receiving an income benefit of (NPV_HS_k - $NPV\_Dropout_k$). We again account for the earnings reduction due to adolescent depression (Dep_Earn).

(2) $BEarn\_HS_6 = \sum_k \{[PATH\_Tot_k * ES\_Grad_j * Grad\_Adj_2] * [2 * NPV\_Dropout_k + (NPV\_HS_k - NPV\_Dropout_k)] * Dep\_Earn * \sum D_i\}$

Our final two educational attainment categories include PATH participants who graduate from high school and continue on to college. The first group is individuals who either attain a two-year degree or complete some college without graduating. The income benefits for this group are presented in Equation 3. Here we multiply the expected number of individuals who graduate from high school as a result of PATH by the two-year and some college attainment rate by gender for Wisconsin in 2014 ($EduAttain\_SomeCol_k$). Applying the difference in net present value of lifetime income for this attainment group from that of dropouts ($NPV\_SomeCol_k$ - $NPV\_Dropout_k$), the earnings reduction from adolescent depression (Dep_Earn), and the discount rate ($\sum D_i$) yields the income benefit for this group.

(3) $BEarn\_SomeCol = (NPV\_SomeCol_k - NPV\_Dropout_k) * Dep\_Earn * [PATH\_Tot_k * ES\_Grad_j * EduAttain\_SomeCol_k] * \sum D_i$

Calculating the income benefits for PATH participants obtaining a four-year degree or more is similar, but now we incorporate the educational attainment rate for this group in Wisconsin in 2014 ($EduAttain\_Col_k$) and the associated lifetime income (NPV_Col_k - $NPV\_Dropout_k$ and reduction due to adolescent depression Dep_Earn: Equation 4)

(4) $BEarn\_Col = (NPV\_Col_k - NPV\_Dropout_k) * Dep\_Earn* [PATH\_Tot_k * ES\_Grad_j * EduAttain\_Col_k] * \sum D_i$

Summing the benefits calculated from Equations 1 through 4 produces the estimated lifetime benefits accruing as a result of PATH.

Sources:

Bureau of Labor Statistics. *Employment Projections: Earnings and unemployment rates by educational attainment*. 2014. http://www.bls.gov/emp/ep_table_001.htm.

Cohen, Mark A., and Alex R. Piquero. "New evidence on the monetary value of saving a high risk youth." *Journal of Quantitative Criminology* 25, no. 1 (2008): 25-49.

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Appendix M: Benefit of Avoided Adult Crime

The estimate for the avoided costs of adult crime will be based primarily on the effect of high school graduation on long-term avoided crime outcomes. Levin et al. (2007), Cohen and Piquero (2008), Reynolds et al. (2011) and others find that educational attainment, and in particular high school graduation, has a significant effect on reducing adult crime rates.

Because PATH increases the likelihood that students with mental disorders will graduate from high school, this effect can be used to predict avoided costs of adult crime. For our purposes, this specific effect is only applied to students who are predicted to graduate after receiving CBT who would not have graduated in the absence of PATH. It is not applied to students who drop out of high school or would be predicted to complete high school anyway. In order to link the effect of CBT treatment to the reduction in adult crime, we look at the duration of CBT treatment on juvenile depression, since depressive and mood disorders are the most prevalent disorders among PATH students (approximately 32.8 percent), and because these disorders tend to persist into adulthood. Estimates of the effect of CBT on juveniles treated for depression are not shown to be significant past a one-year horizon (Weisz et al. 2006). In other words, the effect is more immediate to PATH students and we cannot assume that the CBT treatment PATH students receive while in high school will have lasting effects beyond high school graduation. Thus, we cannot predict adult avoided crime for the other PATH participants based on the data at hand. We do, however, estimate elsewhere the avoided costs of juvenile crime for PATH participants.

Estimates and Assumptions

Estimates of the total avoided cost of adult crime of PATH students can be made by using estimates of the total present value of average lifetime cost-savings from reduced criminal activity for high school graduates, which Levin et al. (2007) estimated to be $30,200 for white males and $8,300 for white females. Consumer Price Index adjusted to 2014 dollars, these estimates are $38,000 and $10,500 respectively. In Equation 1 below we define these net present values with the following notation (k = males, females), $NPV\_Red\_AdultCrime_k$.

Among the 183 PATH participants, 2013-14 intake and discharge data show that 14 males and 17 females have had some "trouble with the law," which we assume to be reflective of previous arrest. PATH therapists reported that "trouble with the law" included offenses such as underage drinking and truancy, therefore our estimates of all criminal activity may be overstated, as higher order correctional institutions may be handling more serious levels of crime. In the estimates below, we combine the Levin et al. (2007) estimates, PATH data on times in trouble with the law, and the high school graduation effect size associated with PATH to calculate an estimated avoided adult crime cost for the program. In Equation 1, we define the number of PATH students who have been in trouble with the law as, $PATH\_Trouble_k$, where again k = males, females. We compute an estimate of avoided adult crime costs based on the effect size estimate for high school graduation, explained in Appendix C, and shown in Equation 2.

(1) $$BAdultCrime_k = [NPV\_Red\_AdultCrime_k * PATH\_Trouble_k * ES\_Grad] * D_k$$

Variables:

$NPV\_Red\_AdultCrime_k$ = NPV of reduced adult crime by gender

$PATH\_Trouble_k$ = Number of PATH participants in trouble with law by gender

ES_Grad = ES of PATH on graduation
D_k = Discount factor

Estimates:

	Point Estimate	Notes
$NPV\_Red\_AdultCrime_k$	Males: $38,000 Females: $10,500	Levin, 2007
$PATH\_Trouble_k$	Males: 14 Females: 17	PATH Data
ES_Grad_j	.206	See Appendix O
D_k		See Adult Crime Benefit Appendix

(2) $BAdultCrime_k = [D_k(\$38{,}054*14*.269) + D_k(\$10{,}458*17*.269)]$

Exclusions
The possible benefit of increased lifetime income due to avoided lost income during incarceration is not included in this calculation. We assume that the benefit of high school graduation on lifetime income captures avoided lost earnings during incarceration.

Sources:

Cohen, Mark A., and Alex R. Piquero. "New evidence on the monetary value of saving a high risk youth." *Journal of Quantitative Criminology* 25, no. 1 (2008): 25-49.

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Appendix N: Unquantifiable Benefits

We have identified several additional benefits to those monetized in this cost-benefit analysis, including reduced discipline costs, increased productivity, reduced need to access external treatment, and increased quality of life years. These benefits consist of a variety of ways that PATH could impact students; however, due to measurement difficulty or lack of appropriate effect sizes in the literature, we have chosen to exclude them from our fiscal analysis. Recognizing that these effects likely have lasting impacts on PATH participants, we devote this appendix to explaining how each of these benefits could impact PATH stakeholders in addition to summarizing why each was left out of our cost-benefit calculations.

Discipline costs: Classroom disruptions

Childhood mental illness is correlated with bullying and disruptive classroom behavior (August et al. 1996; Liber et al. 2013). These behaviors can levy costs associated with teacher and student distraction and adverse outcomes for other children who are the victims of bullying. However, the results of these effects are difficult to define, measure and attach a cost. Staff at PATH schools reported reductions in time spent on behavioral problems due to the program and we were able to quantify the effect of disruptive behavior in terms of administrative costs. Other possible costs such as impacts on other students' ability to learn are not monetized as we do not have reliable estimates of these intangible costs.

Productivity

We do not attempt to monetize the benefit of possible increased lifetime productivity due to PATH for two reasons. First, increased productivity is in part captured in the benefit of increased lifetime earnings due to high school graduation. Second, the effect of CBT on productivity is limited to short-term effects. This is illustrated by looking at the effect of CBT on depression, since untreated depression is highly correlated with a decrease in labor force productivity (Stewart et al. 2003). Weisz et al. (2007) find that the effect CBT on juvenile depression (improved outcomes in three to six months post-treatment) does not persist beyond one year past the end of treatment. Therefore, we cannot assume that the CBT treatment PATH students receive would have lasting effects on future labor force productivity. We could not find estimates of the effect of early treatment of depression on the likelihood of pursuing treatment as an adult, which could give us a basis for estimating an effect of PATH on productivity through its effect on future depression treatment. However, the immediate, short-term benefits of CBT on PATH students in captured in the effect of CBT on decreasing the number of dropouts and increasing the number of students who go on to graduate from high school and gain the benefits associated with high school graduation.

Reduced Need to Access External Treatment

Since PATH participants are receiving in-school mental health treatment, one could infer that their frequency of visits to external providers would decline. However, the PATH intake and discharge data do not fully support this claim. Nearly 85 percent of participants saw no change in their frequency of hospitalizations and emergency room visits between one year prior to entering PATH and during their participation in the program. Approximately half of participants, however, saw a change in their number of doctor visits for mental health reasons; however, nearly 40 percent of this group saw an increase in physician visits while in PATH (see Appendix B). Because in the inconsistency on how PATH has influenced the external mental health treatment access of students, we do not include this potential benefit of the program in our analysis. Additionally, quantifying such an effect would be difficult, as it would involve a thorough assessment of the insurance status of participants and the billing rates for the services they seek.

An additional change in accessing external treatment could be the type of treatment accessed outside of school. Lack of access to preventative mental health care can lead to an increased emergency room use and hospitalization both of which are more expensive than preventative therapy (Guo 2008). Research on school based mental health centers in Ohio has indicated that emergency room visits and hospitalizations fall when mental health services are provided in schools. However as we lack a comprehensive analysis of the insurance status of PATH participants, the reasons for reported emergency room visits and the billing rates for the services that PATH participants might seek we cannot quantify the change in costs associated with access to preventative care.

Quality of Life

A quality adjusted life year (QALY) compares the effects of a variety of physical and mental health interventions both the quantity of years that patients can be expected to live as well as the expected quality of that time can be made (Weinstein 2008). We acknowledge that there may be a benefit of increased QALYs to students in the PATH program since, broadly speaking, reviews of school based mental health interventions have shown that CBT does improve mental health outcomes and thus potentially quality of life (Hoagwood 2007). However, QALYs are underutilized in mental health care, as there is concern that the tools used to estimate it are ill-suited for changes in mental health (Chisholm et al. 1997; Sherbourne 2001). Moreover the reliability of effect sizes on adult populations from the literature may not represent PATH students since there is evidence that adolescents value their health in a different manner than adults (Ratcliffe et al. 2012). Therefore, we do not attempt to monetize possible QALY benefits associated with PATH.

Legal Costs due to Habitual Truancy

The State of Wisconsin mandates compulsory student attendance and defines habitual truancy as five or more unexcused absences from school during a semester (WI Statue 118.15). Once a student is habitually truant schools can refer the habitually truant student and their family to truancy court after notifying parents, providing opportunities for counseling or alternative educational programs. If a student and his or her family is referred to truancy court the maximum penalty for the first offense is $500 and a 30 day sentence. The second maximum penalty is $1,000 and a 30-day sentence.

While in some cases these costs can be high schools do not refer every habitually truant student to truancy court. As part of the administrative processes prior to referral a school can provide opportunities in alternative programs. PATH is an example of one of these programs. Others, such as the Appleton Area School district, have access to programs independent of PATH (WI Legislative Audit Bureau 2008). In addition while maximum penalties are set these are not necessarily the penalties levied on habitually truant students or their families.

Truancy data provided in Appendix Q indicates that there is a difference in habitual truancy as defined by state statute between the times that students enter the program and while they are participating, though the information on students currently in PATH might not reflect a full school year. If PATH was unavailable to these schools we cannot be sure that students who are habitually truant and currently participating in PATH would ultimately be referred to truancy court or would have their truancy addressed via other means. As such we have excluded this benefit.

Sources:

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http://docs.legis.wisconsin.gov/statutes/statutes/118/15

Wisconsin State Legislative Audit Bureau. "Best Practices Review: Truancy Reduction Efforts." Wisconsin Legislative Council 2008, accessed November 30, 2014, http://legis.wisconsin.gov/lab/reports/08-0truancyfull.pdf

Appendix O: Expected High School Graduation Rate and Adjustment Factor

Six-year Weighted Expected Graduation Rate

The weighted average six-year high school graduation rate for the 2010-11 cohort for the eleven high schools served by PATH is 96.6 percent. The weighted average dropout rate for the same schools is 1.38 percent. Because not all students who do not drop out eventually graduate, the expected induced graduation rate of the PATH students who would have otherwise dropped out must be estimated by combining the avoided dropout rate with the expected graduation rate of non-dropouts. Based on calculations in the Appendix C, our expected proportion of PATH students who do not drop out is 71 percent. To adjust this effect size to reflect graduation, we do the following: 100 percent - 1.38 percent dropout rate = 98.6 percent students who do not drop out, but may not all graduate

A ratio of the weighted average six-year graduation rate, 96.6 percent, and the 98.6 percent of students who do not drop out, but may not all graduate gives us an adjustment factor for students who do not drop out, but can be expected to graduate: 96.6/98.6 = 98 percent. We multiply this adjustment factor by 71 percent to give the adjusted expected number of graduates due to PATH. This gives us an estimated graduation rate for PATH participants of 69.6 percent. Performing the same calculation for the control groups of mentally ill students not participating in PATH yields an estimation of 49 percent. Therefore, PATH participants are 20.6 percentage points more likely to graduate high school than their non-participant counterparts.

Four- and Six-year Weighted Average Expected Graduation Rates for Increased Lifetime Income by Gender

These graduation rates were calculated by gender, using the method above for the 2010-11 and 2012-13 cohorts of students in PATH schools and are shown in Table 1.

Table O1: Four- and Six- Year Wisconsin High School Graduation Rates

	Males	Females
Four-year Weighted Average High School Graduation Rate	0.90	0.97
Six-year Weighted Average High School Graduation Rate	0.95	0.98

Source: Wisconsin Department of Public Instruction. "Wisconsin high school graduation rates". WISEdash. Accessed November 30, 2014. http://wisedash.dpi.wi.gov/Dashboard/portalHome.jsp

Sources:

Wisconsin Department of Public Instruction. "Wisconsin high school graduation rates." WISEdash. Accessed November 30. http://wisedash.dpi.wi.gov/Dashboard/portalHome.jsp.

Appendix P: Monte Carlo Equations and Estimates

This appendix summarizes the equations and estimates that were inputted into the Monte Carlo simulation. First we highlight how the short-term benefits of the analysis, namely truancy, behavioral problems, guidance counselor time, juvenile crime, and suicide, were modeled. Next we display how we calculated the graduation effect that drives our long-term benefits. Finally, we show the equations for our two long-term benefits: lifetime earnings and adult crime.

Short-Term Benefits: Truancy
Equation:
BTruancy = Chg_TruancyHrs * AdminCost

Variables:
Chg_TruancyHrs= Change in hours spent on truancy per month
AdminCost = Administrative cost per hour

Estimates:
Table P1: Truancy Effect Size Estimates

	Point Estimate	Source
Chg_TruancyHrs (all schools)	4.9 hrs/mth reduction SD: 4.6 hrs/mth	United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire data
AdminCost	$47/hr	WI Department of Public Instruction

Behavior and Discipline Problems
Equation:
BDiscipline = Chg_DisciplineHrs * AdminCost

Variables:
Chg_DisciplineHrs = Change in hours spent on truancy per month
AdminCost = Administrative cost per hour

Estimates:
Table P2: Behavior and Discipline Effect Size Estimates

	Point Estimate	Source
Chg_DisciplineHrs	2.4 hrs/mth SD: 1.6 hrs/mth	United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire data
AdminCost	$47/hr	Wisconsin Department of Public Instruction

Guidance Counselor Time
Equation:
BGuidTime = Chg_GCTime * AdminCost

Variables:
Chg_GCTime: Change in Guidance Counselor time spent on PATH related tasks.
AdminCost = Administrative Cost per Hour

Estimates:
Table P3: Guidance Counselor Time Effect Size Estimates

	Point Estimate	Source
Chg_GCTime	10.2 hrs./mth SD: 15.1 hrs/mth	United Way Fox Cities PATH Cost-Benefit Analysis School Questionnaire data
AdminCost	$47/hr	Wisconsin Department of Public Instruction

Juvenile Crime
Equations:
BJuvenileCrime = Cost_JuvenileCrime * PATH_Trouble * (ES_Recidivism - ES_CBT_Recidivism) * D_k

Variables:
Cost_JuvenileCrime = NPV of reduced juvenile crime
PATH_Trouble = Number of PATH participants in trouble with the law
ES_Recidivism = Juvenile offender recidivism rate
ES_CBT_Recidivism = Effect Size of CBT on juvenile recidivism
D_k = Discount factor

Estimates:
Table P4: Juvenile Crime Effect Size Estimates

	Point Estimate	Source
Cost_JuvenileCrime	$2,127 (196)	WI Department of Corrections State and County Juvenile Justice Services. June 2010.
PATH_Trouble	Males: 14 Females: 17 Total: 31	PATH Data
ES_Recidivism	0.50	Lipsey (2009)
ES_CBT_Recidivism	0.37	Lipsey (2009)

Suicide
Equation:
BSuicide= PATH_Tot * (Rate_Suicide – ES_CBT_Suicide*Rate_Suicide) * VSL

Variable List:
PATH_Tot = Number of PATH participants
ES_CBT_Suicide = Effect size of CBT on reducing suicidality
VSL = Value of statistical life

Estimates:
Table P5: Suicide Effect Size Estimates

	Point Estimate	Low Value (CI)	High Value (CI)	Notes and Sources
Rate_Suicide	0.00012	n/a	n/a	SD: 0.000018 WI DHS (2014)
ES_CBT_Suicide	0.74	.5377	1.026	z=1.80, p=.07 Weisz (2006)
VSL	$5,500,000	$2,600,000	$7,900,000	Boardman et al. (2011)

Graduation Effect
Equation:
$ES\_Grad = ExDOR * ES\_CBT\_DOR * Grad\_Adj_2$

Variable List
ES_Grad = Effect size of PATH on HS graduation
ExDOR = Expected dropout rate of students with mental illness
ES_CBT_DOR = Effect size of CBT on HS graduation
$Grad\_Adj_l$ = Adjusted graduation rate (l=1 4-year, l=2 6-year)

Estimates:
Table P6: Graduation Effect Size Estimates

	Point Estimate	Low Value (CI)	High Value (CI)	Notes and Sources
ExDOR	0.50	n/a	n/a	US DOE (2007)
ES_CBT_DOR	0.55	0.36	0.74	z=5.6, p<.0001 Cobb (2007)
Grad_Adj1	Males: 0.90 Females: 0.97	n/a	n/a	DPI
Grad_Adj2	Males: 0.95 Females: 0.98	n/a	n/a	DPI

Long-Term Benefits: **Lifetime Income**
Equations:
$BEarn\_HS_4 = \sum_k \{(NPV\_HS_k - NPV\_Dropout_k) * [PATH\_Tot_k * ES\_Grad_j * Grad\_Adj_1] * \sum D_i\}$
$BEarn\_HS_6 = \sum_k \{[PATH\_Tot_k * ES\_Grad_j * Grad\_Adj_2] * [2 * NPV\_Dropout_k + (NPV\_HS_k - NPV\_Dropout_k)] * \sum D_i\}$
$BEarn\_SomeCol = (NPV\_SomeCol_k - NPV\_Dropout_k) * [PATH\_Tot_k * ES\_Grad_j * EduAttain\_SomeCol_k] * \sum D_i$
$BEarn\_Col = (NPV\_Col_k - NPV\_Dropout_k) * [PATH\_Tot_k * ES\_Grad_j * EduAttain\_Col_k] * D_i$

Variable List:
BEarn_[x] = Lifetime income benefit at educational attainment level
NPV_[x] = NPV of income at appropriate attainment level
EduAttain_[x] = WI education attainment rate at appropriate level
$PATH\_Tot_k$ = Number of PATH participants of gender k
ES_Grad_j = Effect size of CBT on HS graduation
$Grad\_Adj_l$ = Adjusted graduation rate (l=1 4-year, l=2 6-year)
D_i = Discount factor

Estimates:
Table P7: 2014 Education Attainment Rates in Wisconsin

	Male		Female	
	Estimate	**SD**	**Estimate**	**SD**
Four-Year High School Graduation Rate ($Grad\_Adj_1$)	0.90	n/a	0.97	n/a
Six-Year High School Graduation Rate ($Grad\_Adj_2$)	0.95	n/a	0.98	n/a
High School Diploma (EduAttain_HS)	0.2958	0.45	0.2708	0.45
Some College or Two-Year Degree (EduAttain_SomeCol)	0.1327	0.33	0.1374	0.34
Bachelor's Degree or More (EduAttain_Col)	0.2531	0.43	0.2779	0.45

Source: Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

Table P8: 2014 Median Annual Pre-Tax Earnings for Adults in Wisconsin, by Educational Attainment

	Male (Dollars)		Female (Dollars)	
	Estimate	**SD**	**Estimate**	**SD**
HS Dropouts (NPV_Dropout)	19,900	24,000	10,300	12,000
HS Graduates (NPV_HS)	31,200	59,200	15,200	19,100
Some College and Two-Year Degree (NPV_SomeCol)	40,000	44,900	25,000	33,900
Bachelor's Degree and Above (NPV_Col)	68,500	94,800	40,000	36,200

Source: Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

Adult Crime
Equation:
$BAdultCrime_k = [NPV\_Red\_AdultCrime_k * PATH\_Trouble_k * ES\_Grad_j] * D_k$

Variables:
$NPV\_Red\_AdultCrime_k$ = NPV of reduced adult crime by gender
$PATH\_Trouble_k$ = Number of PATH participants in trouble with law by gender
ES_Grad_j = ES of PATH on graduation
D_k = Discount factor

Estimates:

Table P9: Adult Crime Effect Size Estimates

	Point Estimate	Source
$NPV\_Red\_AdultCrime_k$	Males: $38,054 Females: $10,458	Levin, 2007
$PATH\_Trouble_k$	Males: 14 Females: 17	PATH Data
ES_Grad_j	.269	See above
D_k		See Appendix M

Appendix Q: Stata Code

```
/*Created fall 2014 for D Weimer PA 881 cost benefit analysis
Monte Carlo simulation of costs and benefits of United Way
of the Fox Valley (WI)Providing Access to Healing (PATH) program.
Project group: Andy, Ann, Cherie, Maria, Sam*/

capture program drop Monte_Carlo /*Housekeeping to delete existing programs named
Monte_Carlo*/
program Monte_Carlo /*Defines this program with the name Monte_Carlo, which is the
main program that calls all the subprograms*/
log using PATH_monte_carlo, text replace /*Create log file*/
display "Executing: main Monte Carlo program" /*Output message to help with
troubleshooting*/

display "Loading program: Load_Data" /*Output message to help with troubleshooting*/
quietly do Load_Data /*Load the do-file Load_Data, which inputs the number of students at
each school level and student ages*/
Load_Data /*Execute the program Load_Data*/

display "Loading program: Treatment_Effect" /*Output message to help with
troubleshooting*/
quietly do Treatment_Effect /*Load the do-file Treatment_Effect, which generates status
quo probabilities and CBT effects for outcomes of interest*/
Treatment_Effect `1' /*Execute the program Treatment_Effect; argument is the rate at
which CBT induces graduations*/

display "Loading program: Outcome_Value`2'" /*Output message to help with
troubleshooting*/
quietly do Outcome_Value`2' /*Load the do-file Outcome_Value, which generates money
values for outcomes of interest; separate do-file for low, middle, and high discount rate
assumptions*/
Outcome_Value`2' /*Execute the program Outcome_Value with low, middle, or high
discount rate assumption*/

display "Loading program: Simulate_Outcomes" /*Output message to help with
troubleshooting*/
quietly do Simulate_Outcomes /*Load the do-file Simulate_Outcomes, which randomly
assigns outcomes to individual students and sums the value of outcomes*/
Simulate_Outcomes /*Execute the program Simulate_Outcomes*/

end /*End Monte Carlo simulation program.*/
```

```
/*This subprogram inputs the number of students at each age summed over all districts
and sets observations.*/
/*This subprogram is executed early in the main program.*/

capture program drop Load_Data /*Housekeeping to delete existing programs named
Load_Data*/
program Load_Data /*Defines this subprogram with the name Load_Data*/

display "Executing: Load_Data" /*Output message to help with troubleshooting*/

set obs 10000 /*Use 10000 observations for Monte Carlo simulation*/
set seed 2625713

scalar nF05 = 0 /*Input number of girls for each age.*/
scalar nF06 = 0
scalar nF07 = 0
scalar nF08 = 3
scalar nF09 = 0
scalar nF10 = 3
scalar nF11 = 2
scalar nF12 = 4
scalar nF13 = 18
scalar nF14 = 20
scalar nF15 = 21
scalar nF16 = 13
scalar nF17 = 11
scalar nF18 = 9
scalar nF19 = 1

scalar nM05 = 1 /*Input number of boys for each age.*/
scalar nM06 = 3
scalar nM07 = 0
scalar nM08 = 7
scalar nM09 = 7
scalar nM10 = 4
scalar nM11 = 5
scalar nM12 = 6
scalar nM13 = 11
scalar nM14 = 12
scalar nM15 = 11
scalar nM16 = 8
scalar nM17 = 1
scalar nM18 = 2
scalar nM19 = 0

gen F05age = 5 /*Input the age for each representative female for discounting later.*/
```

```
gen F06age = 6
gen F07age = 7
gen F08age = 8
gen F09age = 9
gen F10age = 10
gen F11age = 11
gen F12age = 12
gen F13age = 13
gen F14age = 14
gen F15age = 15
gen F16age = 16
gen F17age = 17
gen F18age = 18
gen F19age = 19

gen M05age = 5 /*Input the age for each representative male for discounting later.*/
gen M06age = 6
gen M07age = 7
gen M08age = 8
gen M09age = 9
gen M10age = 10
gen M11age = 11
gen M12age = 12
gen M13age = 13
gen M14age = 14
gen M15age = 15
gen M16age = 16
gen M17age = 17
gen M18age = 18
gen M19age = 19

display "Finished executing: Load_Data" /*Output message to help with troubleshooting*/

end /*End this subprogram*/
```

```
/*This subprogram generates status quo probabilities and CBT effects on outcomes of interest
by randomly drawing such probabilities and effects from appropriate distributions.*/

/*This subprogram executes relatively early in the main program. Probabilities and effects estimated here are used by Simulate_Outcomes to simulate student outcomes.*/

capture program drop Treatment_Effect /*Housekeeping to delete existing programs named Treatment_Effect*/
program Treatment_Effect /*Defines this program as Treatment_Effect*/

display "Executing: Treatment_Effect" /*Output message to help with troubleshooting*/

/*Lists of representative students by gender*/
local girls "F05 F06 F07 F08 F09 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19"
local boys "M05 M06 M07 M08 M09 M10 M11 M12 M13 M14 M15 M16 M17 M18 M19"

/*Probability of school experiencing change in staff time and expected change based on survey.*/
gen PSv_Truant = 0.37 /*Probability of CBT changing staff time addressing truancy at a given school.*/
gen PSv_Dscpln = 0.58 /*Probability of CBT changing staff time addressing discipline at a given school.*/
gen PSv_Counsl = 0.68 /*Probability of CBT changing guidance counselor time providing mental health services at a given school.*/
gen School_Wage = 47 /*Average 2013-14 guidance counselor hourly wage rate for relevant districts from DPI excluding benefits.*/

gen F_Prior_Rate = 17 / 105 /*Proportion of female students with prior contact with the law. Assumed to be independent of age.*/
gen M_Prior_Rate = 14 / 78 /*Proportion of male students with prior contact with the law. Assumed to be independent of age.*/
gen HS_4yr = 90 / 95 /*Probability that a graduation occurs on time rather than within 6 years based on average 4 and 6 year
graduation rates for relevant school districts. Assumed to be independent of gender.*/

/*Cycle through representative females.*/
foreach girl of local girls {
	/*Status quo educational attainment and CBT improvement. CBT only improves chance of high school graduation.*/
	gen `girl'HSg_SQ = 0.5 /*Status quo chance of graduating HS in 6 yrs for PATH participant.*/
	gen `girl'SCol_SQ = rnormal(0.1402,0.3445) /*Status quo chance of completing some college given high school graduation.*/
	gen `girl'Col_SQ = rnormal(0.2836,0.4482) /*Status quo chance of graduating college given high school graduation.*/
```

```
	replace `girl'SCol_SQ = `girl'SCol_SQ + `girl'Col_SQ /*Move range for some college
outside of range for college.*/
	gen `girl'HSg_CBTEf = `1' * 0.98 /*Percentage point reduction in dropouts due to
CBT.*/
	gen `girl'HSg_CBT = `girl'HSg_SQ + `girl'HSg_CBTEf /*CBT chance of graduating HS.*/
	gen `girl'SCol_CBT = `girl'SCol_SQ /*Treatment assumed not to change probability of
completing some college.*/
	gen `girl'Col_CBT = `girl'Col_SQ /*Treatment assumed not to change probability of
graduating college.*/

	/*Estimate probability of commiting crime as a juvenile. Assumed independent of
gender.*/
	gen `girl'JCri_SQ = rnormal(0.5,0.01) /*Status quo probability of juvenile crime.
Standard deviation is a guess.*/
	gen `girl'JCri_CBTEf = rnormal(0.13,0.01) /*CBT reduction in probability of juvenile
crime. Standard deviation is a guess.*/
	gen `girl'JCri_CBT = `girl'JCri_SQ - `girl'JCri_CBTEf /*CBT reduces probability of
juvenile crimes.*/

	/*Estimate status quo suicide risk and improvement from CBT. Assumed
independent of gender.*/
	gen `girl'Suic_SQ = rnormal(0.00012,0.00001) /*Rate of suicide for the general
population in Wisconsin. Standard deviation is a guess.*/
	gen `girl'Suic_CBTEf = rnormal(0.26,0.01) /*Percent of suicides prevented by CBT.
Standard deviation is a guess. Effect revised Dec 15 per Ann D.*/
	gen `girl'Suic_CBT = `girl'Suic_SQ * (1 - `girl'Suic_CBTEf)

	drop `girl'HSg_CBTEf `girl'JCri_CBTEf `girl'Suic_CBTEf /*Clean up unneeded
variables.*/
}

/*Cycle through representative males.*/
foreach boy of local boys {
	/*Status quo educational attainment and CBT improvement. See above for line by
line comments.*/
	gen `boy'HSg_SQ = 0.5
	gen `boy'SCol_SQ = rnormal(0.1397,0.3395)
	gen `boy'Col_SQ = rnormal(0.2664,0.4350)
	replace `boy'SCol_SQ = `boy'SCol_SQ + `boy'Col_SQ
	gen `boy'HSg_CBTEf = `1' * 0.95
	gen `boy'HSg_CBT = `boy'HSg_SQ + `boy'HSg_CBTEf
	gen `boy'SCol_CBT = `boy'SCol_SQ
	gen `boy'Col_CBT = `boy'Col_SQ

	/*Estimate probability of commiting crime as a juvenile. Assumed independent of
gender.*/
```

```
	gen `boy'JCri_SQ = rnormal(0.5,0.01)
	gen `boy'JCri_CBTEf = rnormal(0.13,0.01)
	gen `boy'JCri_CBT = `boy'JCri_SQ - `boy'JCri_CBTEf

	/*Estimate status quo suicide risk and improvement from CBT. Assumed
independent of gender.*/
	gen `boy'Suic_SQ = rnormal(0.00012,0.00001)
	gen `boy'Suic_CBTEf = rnormal(0.26,0.01)
	gen `boy'Suic_CBT = `boy'Suic_SQ * (1 - `boy'Suic_CBTEf)

	drop `boy'HSg_CBTEf `boy'JCri_CBTEf `boy'Suic_CBTEf /*Clean up unneeded
variables.*/
}

display "Finished executing: Treatment_Effect" /*Output message to help with
troubleshooting*/

end /*End this program*/
```

```
/*This subprogram randomly draws the money value of outcomes of interest.
This subprogram executes midway through the main program, before net benefits are
calculated.
This version of the program uses the low discounting assumption: 2%.*/

capture program drop Outcome_ValueLow /*Housekeeping to delete existing programs
named Outcome_ValueLow*/
program Outcome_ValueLow /*Defines this program as Outcome_ValueLow*/

display "Executing: Outcome_ValueLow" /*Output message to help with troubleshooting*/

quietly do Draw_Corr /*Load do-file for drawing present value of lifetime income
by educational attainment from correlated distributions.*/

/*Lists of representative students by gender*/
local girls "F05 F06 F07 F08 F09 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19"
local boys "M05 M06 M07 M08 M09 M10 M11 M12 M13 M14 M15 M16 M17 M18 M19"

gen VSL = 5513926.88 /*Value of a statistical life. Has minimal effect on net benefits
because the suicide rate is so small.*/
gen depr = 0.02 /*Low discount rate assumption for sensitivity analysis.*/

/*Cycle through representative females.*/
foreach girl of local girls {
	Draw_Corr `girl' Dout 0 312618 681963 HSg4 0 461931 1039375 HSg6 0 432318
972744 SCol4 0 708682 1670514 SCol6 0 662024 1560531 Col4 102817 1060478
2018139 Col6 95852 988640 1881428

	/*Discount from age 18 to current age. Present values of lifetime earnings use low
discounting assumption.*/
	gen D`girl'_earnDout = `girl'_earnDout / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnDout = `girl'_earnDout if (`girl'age >= 18)

	/*Discount present value of lifetime earnings for females who graduate high school
in 4 years.*/
	gen D`girl'_earnHSg4 = `girl'_earnHSg4 / ((1 + depr) ^ (18 - `girl'age)) if (`girl'age <
18)
	replace D`girl'_earnHSg4 = `girl'_earnHSg4  if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who graduate high school
in 6 years.*/
	gen D`girl'_earnHSg6 = `girl'_earnHSg6 /((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnHSg6 = `girl'_earnHSg6  if (`girl'age >= 18)

	/*Discount present value of lifetime earnings for females who finish some college
after graduating high school in 4 years.*/
	gen D`girl'_earnSCol4 = `girl'_earnSCol4 / ((1 + depr) ^ (18 - `girl'age))
```

```
	replace D`girl'_earnSCol4 = `girl'_earnSCol4 if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who finish some college
after graduating high school in 6 years.*/
	gen D`girl'_earnSCol6 = `girl'_earnSCol6 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnSCol6 = `girl'_earnSCol6 if (`girl'age >= 18)

	/*Discount present value of lifetime earnings for females who graduate college after
graduating high school in 4 years.*/
	gen D`girl'_earnCol4 = `girl'_earnCol4 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnCol4 = `girl'_earnCol4 if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who graduate college after
graduating high school in 6 years.*/
	gen D`girl'_earnCol6 = `girl'_earnCol6 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnCol6 = `girl'_earnCol6 if (`girl'age >= 18)

	drop `girl'_earnDout `girl'_earnHSg4 `girl'_earnHSg6 `girl'_earnSCol4
`girl'_earnSCol6 `girl'_earnCol4 `girl'_earnCol6 /*Clean up unneeded variables*/

	/*Estimate social cost per crime. Discounted to age of maximum crime
production.*/
	gen `girl'_Jcri = rnormal(2127,196) /*Expected cost of one juvenile crime.
Independent of gender.*/
	gen `girl'_Acri = rnormal(10458,1000) /*Expected lifetime reduction in social cost of
adult crime due to graduating high school.
	Depends on gender. Standard deviation is a guess.*/
	gen D`girl'_Jcri = `girl'_Jcri
	replace D`girl'_Jcri = `girl'_Jcri /((1 + depr) ^ (15 - `girl'age)) if (`girl'age < 15)
	gen D`girl'_Acri = `girl'_Acri
	replace D`girl'_Acri = `girl'_Acri /((1 + depr) ^ (18 - `girl'age)) if (`girl'age < 18)

	drop `girl'_Jcri `girl'_Acri /*Clean up unneeded variables*/
}

/*Cycle through representative males.*/
foreach boy of local boys {
	Draw_Corr `boy' Dout 0 604914 1334518 HSg4 0 944941 2739118 HSg6 0 884365
2563524 SCol4 0 1135190 2406946 SCol6 0 1060452 2248478 Col4 0 1813801 4324791
Col6 0 1690933 4031826

	/*Discount dropout*/
	gen D`boy'_earnDout = `boy'_earnDout / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnDout = `boy'_earnDout  if (`boy'age >= 18)

	/*Discount high school graduate*/
	gen D`boy'_earnHSg4 = `boy'_earnHSg4 / ((1 + depr) ^ (18 - `boy'age)) if (`boy'age <
18)
```

```
	replace D`boy'_earnHSg4 = `boy'_earnHSg4  if (`boy'age >= 18)
	gen D`boy'_earnHSg6 = `boy'_earnHSg6 /((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnHSg6 = `boy'_earnHSg6  if (`boy'age >= 18)

	/*Discount some college.*/
	gen D`boy'_earnSCol4 = `boy'_earnSCol4 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnSCol4 = `boy'_earnSCol4  if (`boy'age >= 18)
	gen D`boy'_earnSCol6 = `boy'_earnSCol6 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnSCol6 = `boy'_earnSCol6 if (`boy'age >= 18)

	/*Discount college graduation.*/
	gen D`boy'_earnCol4 = `boy'_earnCol4 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnCol4 = `boy'_earnCol4  if (`boy'age >= 18)
	gen D`boy'_earnCol6 = `boy'_earnCol6 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnCol6 = `boy'_earnCol6  if (`boy'age >= 18)

	drop `boy'_earnDout `boy'_earnHSg4 `boy'_earnHSg6 `boy'_earnSCol4
`boy'_earnSCol6 `boy'_earnCol4 `boy'_earnCol6

	/*Estimate social cost per crime. Discounted to age of maximum crime
production.*/
	gen `boy'_Jcri = rnormal(2127,196)
	gen `boy'_Acri = rnormal(38054,1000) /*Standard deviation is a guess.*/
	gen D`boy'_Jcri = `boy'_Jcri
	replace D`boy'_Jcri = `boy'_Jcri /((1 + depr) ^ (15 - `boy'age)) if (`boy'age < 15)
	gen D`boy'_Acri = `boy'_Acri
	replace D`boy'_Acri = `boy'_Acri /((1 + depr) ^ (18 - `boy'age)) if (`boy'age < 18)

	drop `boy'_Jcri `boy'_Acri /*Clean up unneeded variables*/
}

/*Costs for the program overall. These do not vary from student to student, so they
are estimated once for each Monte Carlo observation.
Adjustment to include 20.4% of students with intake forms not during 2013-14 school
year.
12.6% increase to account for United Way overhead, which does not appear in PATH
financial statement provided.*/
gen Cost_Ther_Time = 248706 * 1.204 *1.126
gen Cost_License = 925 * 1.204 *1.126

/*Cost of space in schools is estimated at the rate they charge outside groups for school
space.*/
gen Room_Rate = 9 /*Hourly rate from Monona Grove WI.*/
gen Space_Scarcity = rnormal(0.7,0.1) /*Room cost reduced because schools may not be at
capacity; this is a guess.*/
```

```
gen Cost_Space = Room_Rate * 1500 * 23 * Space_Scarcity /*Assumes each school dedicates
a room to PATH full time.*/

gen Cost = Cost_Ther_Time + Cost_License + Cost_Space
drop Room_Rate Space_Scarcity

display "Finished executing Outcome_Value" /*Output message to help with
troubleshooting*/

end /*End this program*/
```

```
/*This subprogram randomly draws the money value of outcomes of interest.
This subprogram executes midway through the main program, before net benefits are calculated.
This version of the program uses the base discounting assumption: 3.5%.*/

capture program drop Outcome_ValueMid /*Housekeeping to delete existing programs named Outcome_ValueMid*/
program Outcome_ValueMid /*Defines this program as Outcome_ValueMid*/

display "Executing: Outcome_ValueMid" /*Output message to help with troubleshooting*/

quietly do Draw_Corr /*Load do-file for drawing present value of lifetime income
by educational attainment from correlated distributions.*/

/*Lists of representative students by gender*/
local girls "F05 F06 F07 F08 F09 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19"
local boys "M05 M06 M07 M08 M09 M10 M11 M12 M13 M14 M15 M16 M17 M18 M19"

gen VSL = 5513926.88 /*Value of a statistical life. Has minimal effect on net benefits because the suicide rate is so small.*/
gen depr = 0.035 /*Mid discount rate assumption for sensitivity analysis.*/

/*Cycle through representative females.*/
foreach girl of local girls {
	Draw_Corr `girl' Dout 0 236368 515627 HSg4 0 349262 748863 HSg6 0 320288 720669 SCol4 0 525036 1237620 SCol6 0 480697 1133105 Col4 74656 770016 1465375 Col6 68228 703714 1339200

	/*Discount from age 18 to current age. Present values of lifetime earnings use base discounting assumption.*/
	gen D`girl'_earnDout = `girl'_earnDout / ((1 + depr) ^ (18 - `girl'age)) /*Discount from 18 to current age.*/
	replace D`girl'_earnDout = `girl'_earnDout if (`girl'age >= 18) /*Restore to undiscounted value for age 18 and 19.*/

	/*Discount present value of lifetime earnings for females who graduate high school in 4 years.*/
	gen D`girl'_earnHSg4 = `girl'_earnHSg4 / ((1 + depr) ^ (18 - `girl'age)) if (`girl'age < 18)
	replace D`girl'_earnHSg4 = `girl'_earnHSg4  if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who graduate high school in 6 years.*/
	gen D`girl'_earnHSg6 = `girl'_earnHSg6 /((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnHSg6 = `girl'_earnHSg6  if (`girl'age >= 18)
```

```
	/*Discount present value of lifetime earnings for females who finish some college
after graduating high school in 4 years.*/
	gen D`girl'_earnSCol4 = `girl'_earnSCol4 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnSCol4 = `girl'_earnSCol4 if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who finish some college
after graduating high school in 6 years.*/
	gen D`girl'_earnSCol6 = `girl'_earnSCol6 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnSCol6 = `girl'_earnSCol6 if (`girl'age >= 18)

	/*Discount present value of lifetime earnings for females who graduate college after
graduating high school in 4 years.*/
	gen D`girl'_earnCol4 = `girl'_earnCol4 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnCol4 = `girl'_earnCol4 if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who graduate college after
graduating high school in 6 years.*/
	gen D`girl'_earnCol6 = `girl'_earnCol6 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnCol6 = `girl'_earnCol6 if (`girl'age >= 18)

	drop `girl'_earnDout `girl'_earnHSg4 `girl'_earnHSg6 `girl'_earnSCol4
`girl'_earnSCol6 `girl'_earnCol4 `girl'_earnCol6 /*Clean up unneeded variables*/

	/*Estimate social cost per crime. Discounted to age of maximum crime
production.*/
	gen `girl'_Jcri = rnormal(2127,196) /*Expected cost of one juvenile crime.
Independent of gender.*/
	gen `girl'_Acri = rnormal(10458,1000) /*Expected lifetime reduction in social cost of
adult crime due to graduating high school.
	Depends on gender. Standard deviation is a guess.*/
	gen D`girl'_Jcri = `girl'_Jcri
	replace D`girl'_Jcri = `girl'_Jcri /((1 + depr) ^ (15 - `girl'age)) if (`girl'age < 15)
	gen D`girl'_Acri = `girl'_Acri
	replace D`girl'_Acri = `girl'_Acri /((1 + depr) ^ (18 - `girl'age)) if (`girl'age < 18)

	drop `girl'_Jcri `girl'_Acri /*Clean up unneeded variables*/
}

/*Cycle through representative males.*/
foreach boy of local boys {
	Draw_Corr `boy' Dout 0 457370 1009017 HSg4 0 714462 2071025 HSg6 0 655192
1899217 SCol4 0 841019 1783214 SCol6 0 769996 1632625 Col4 0 1317006 3140241
Col6 0 1203605 2869853

	/*Discount dropout*/
	gen D`boy'_earnDout = `boy'_earnDout / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnDout = `boy'_earnDout  if (`boy'age >= 18)
```

```
	/*Discount high school graduate*/
	gen D`boy'_earnHSg4 = `boy'_earnHSg4 / ((1 + depr) ^ (18 - `boy'age)) if (`boy'age <
18)
	replace D`boy'_earnHSg4 = `boy'_earnHSg4  if (`boy'age >= 18)
	gen D`boy'_earnHSg6 = `boy'_earnHSg6 /((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnHSg6 = `boy'_earnHSg6  if (`boy'age >= 18)

	/*Discount some college.*/
	gen D`boy'_earnSCol4 = `boy'_earnSCol4 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnSCol4 = `boy'_earnSCol4  if (`boy'age >= 18)
	gen D`boy'_earnSCol6 = `boy'_earnSCol6 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnSCol6 = `boy'_earnSCol6 if (`boy'age >= 18)

	/*Discount college graduation.*/
	gen D`boy'_earnCol4 = `boy'_earnCol4 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnCol4 = `boy'_earnCol4  if (`boy'age >= 18)
	gen D`boy'_earnCol6 = `boy'_earnCol6 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnCol6 = `boy'_earnCol6  if (`boy'age >= 18)

	drop `boy'_earnDout `boy'_earnHSg4 `boy'_earnHSg6 `boy'_earnSCol4
`boy'_earnSCol6 `boy'_earnCol4 `boy'_earnCol6

	/*Estimate social cost per crime. Discounted to age of maximum crime
production.*/
	gen `boy'_Jcri = rnormal(2127,196)
	gen `boy'_Acri = rnormal(38054,1000) /*Standard deviation is a guess.*/
	gen D`boy'_Jcri = `boy'_Jcri
	replace D`boy'_Jcri = `boy'_Jcri /((1 + depr) ^ (15 - `boy'age)) if (`boy'age < 15)
	gen D`boy'_Acri = `boy'_Acri
	replace D`boy'_Acri = `boy'_Acri /((1 + depr) ^ (18 - `boy'age)) if (`boy'age < 18)

	drop `boy'_Jcri `boy'_Acri /*Clean up unneeded variables*/
}

/*Costs for the program overall. These do not vary from student to student, so they
are estimated once for each Monte Carlo observation.
Adjustment to include 20.4% of students with intake forms not during 2013-14 school
year.
14.4% increase to account for United Way overhead, which does not appear in PATH
financial statement provided.*/
gen Cost_Ther_Time = 248706 * 1.204 *1.126
gen Cost_License = 925 * 1.204 *1.126

/*Cost of space in schools is estimated at the rate they charge outside groups for school
space.*/
gen Room_Rate = 9 /*Hourly rate from Monona Grove WI.*/
```

```
gen Space_Scarcity = rnormal(0.7,0.1) /*Room cost reduced because schools may not be at
capacity; this is a guess.*/
gen Cost_Space = Room_Rate * 1500 * 23 * Space_Scarcity /*Assumes each school dedicates
a room to PATH full time.*/

gen Cost = Cost_Ther_Time + Cost_License + Cost_Space
drop Room_Rate Space_Scarcity

display "Finished executing Outcome_Value" /*Output message to help with
troubleshooting*/

end /*End this program*/
```

```
/*This subprogram randomly draws the money value of outcomes of interest.
This subprogram executes midway through the main program, before net benefits are
calculated.
This version of the program uses the high discounting assumption: 5%.*/

capture program drop Outcome_ValueHigh /*Housekeeping to delete existing programs
named Outcome_ValueHigh*/
program Outcome_ValueHigh /*Defines this program as Outcome_ValueHigh*/

display "Executing: Outcome_ValueHigh" /*Output message to help with troubleshooting*/

quietly do Draw_Corr /*Load do-file for drawing present value of lifetime income
by educational attainment from correlated distributions.*/

/*Lists of representative students by gender*/
local girls "F05 F06 F07 F08 F09 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19"
local boys "M05 M06 M07 M08 M09 M10 M11 M12 M13 M14 M15 M16 M17 M18 M19"

gen VSL = 5513926.88 /*Value of a statistical life. Has minimal effect on net benefits
because the suicide rate is so small.*/
gen depr = 0.05 /*High discount rate assumption for sensitivity analysis.*/

/*Cycle through representative females.*/
foreach girl of local girls {
	Draw_Corr `girl' Dout 0 185600 404879 HSg4 0 274246 617072 HSg6 0 245887
553261 SCol4 0 403072 950127 SCol6 0 360906 850731 Col4 56051 578124 1100197
Col6 50111 516858 983605

	/*Discount from age 18 to current age. Present values of lifetime earnings use base
discounting assumption.*/
	gen D`girl'_earnDout = `girl'_earnDout / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnDout = `girl'_earnDout if (`girl'age >= 18)

	/*Discount present value of lifetime earnings for females who graduate high school
in 4 years.*/
	gen D`girl'_earnHSg4 = `girl'_earnHSg4 / ((1 + depr) ^ (18 - `girl'age)) if (`girl'age <
18)
	replace D`girl'_earnHSg4 = `girl'_earnHSg4  if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who graduate high school
in 6 years.*/
	gen D`girl'_earnHSg6 = `girl'_earnHSg6 /((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnHSg6 = `girl'_earnHSg6  if (`girl'age >= 18)

	/*Discount present value of lifetime earnings for females who finish some college
after graduating high school in 4 years.*/
	gen D`girl'_earnSCol4 = `girl'_earnSCol4 / ((1 + depr) ^ (18 - `girl'age))
```

```
	replace D`girl'_earnSCol4 = `girl'_earnSCol4 if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who finish some college
after graduating high school in 6 years.*/
	gen D`girl'_earnSCol6 = `girl'_earnSCol6 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnSCol6 = `girl'_earnSCol6 if (`girl'age >= 18)

	/*Discount present value of lifetime earnings for females who graduate college after
graduating high school in 4 years.*/
	gen D`girl'_earnCol4 = `girl'_earnCol4 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnCol4 = `girl'_earnCol4 if (`girl'age >= 18)
	/*Discount present value of lifetime earnings for females who graduate college after
graduating high school in 6 years.*/
	gen D`girl'_earnCol6 = `girl'_earnCol6 / ((1 + depr) ^ (18 - `girl'age))
	replace D`girl'_earnCol6 = `girl'_earnCol6 if (`girl'age >= 18)

	drop `girl'_earnDout `girl'_earnHSg4 `girl'_earnHSg6 `girl'_earnSCol4
`girl'_earnSCol6 `girl'_earnCol4 `girl'_earnCol6 /*Clean up unneeded variables*/

	/*Estimate social cost per crime. Discounted to age of maximum crime
production.*/
	gen `girl'_Jcri = rnormal(2127,196) /*Expected cost of one juvenile crime.
Independent of gender.*/
	gen `girl'_Acri = rnormal(10458,1000) /*Expected lifetime reduction in social cost of
adult crime due to graduating high school.
	Depends on gender. Standard deviation is a guess.*/
	gen D`girl'_Jcri = `girl'_Jcri
	replace D`girl'_Jcri = `girl'_Jcri /((1 + depr) ^ (15 - `girl'age)) if (`girl'age < 15)
	gen D`girl'_Acri = `girl'_Acri
	replace D`girl'_Acri = `girl'_Acri /((1 + depr) ^ (18 - `girl'age)) if (`girl'age < 18)

	drop `girl'_Jcri `girl'_Acri /*Clean up unneeded variables*/
}

/*Cycle through representative males.*/
foreach boy of local boys {
	Draw_Corr `boy' Dout 0 359135 792297 HSg4 0 561008 1626203 HSg6 0 502994
1458038 SCol4 0 645654 1368982 SCol6 0 578110 1225768 Col4 0 988802 2357679 Col6
0 884015 2107827

	/*Discount dropout*/
	gen D`boy'_earnDout = `boy'_earnDout / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnDout = `boy'_earnDout  if (`boy'age >= 18)

	/*Discount high school graduate*/
	gen D`boy'_earnHSg4 = `boy'_earnHSg4 / ((1 + depr) ^ (18 - `boy'age)) if (`boy'age <
18)
```

```
	replace D`boy'_earnHSg4 = `boy'_earnHSg4  if (`boy'age >= 18)
	gen D`boy'_earnHSg6 = `boy'_earnHSg6 /((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnHSg6 = `boy'_earnHSg6  if (`boy'age >= 18)

	/*Discount some college.*/
	gen D`boy'_earnSCol4 = `boy'_earnSCol4 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnSCol4 = `boy'_earnSCol4  if (`boy'age >= 18)
	gen D`boy'_earnSCol6 = `boy'_earnSCol6 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnSCol6 = `boy'_earnSCol6 if (`boy'age >= 18)

	/*Discount college graduation.*/
	gen D`boy'_earnCol4 = `boy'_earnCol4 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnCol4 = `boy'_earnCol4  if (`boy'age >= 18)
	gen D`boy'_earnCol6 = `boy'_earnCol6 / ((1 + depr) ^ (18 - `boy'age))
	replace D`boy'_earnCol6 = `boy'_earnCol6  if (`boy'age >= 18)

	drop `boy'_earnDout `boy'_earnHSg4 `boy'_earnHSg6 `boy'_earnSCol4
`boy'_earnSCol6 `boy'_earnCol4 `boy'_earnCol6 /*Clean up unneeded variables*/

	/*Estimate social cost per crime. Discounted to age of maximum crime
production.*/
	gen `boy'_Jcri = rnormal(2127,196)
	gen `boy'_Acri = rnormal(38054,1000) /*Standard deviation is a guess.*/
	gen D`boy'_Jcri = `boy'_Jcri
	replace D`boy'_Jcri = `boy'_Jcri /((1 + depr) ^ (15 - `boy'age)) if (`boy'age < 15)
	gen D`boy'_Acri = `boy'_Acri
	replace D`boy'_Acri = `boy'_Acri /((1 + depr) ^ (18 - `boy'age)) if (`boy'age < 18)

	drop `boy'_Jcri `boy'_Acri /*Clean up unneeded variables*/
}

/*Costs for the program overall. These do not vary from student to student, so they
are estimated once for each Monte Carlo observation.
Adjustment to include 20.4% of students with intake forms not during 2013-14 school
year.
14.4% increase to account for United Way overhead, which does not appear in PATH
financial statement provided.*/
gen Cost_Ther_Time = 248706 * 1.204 *1.126
gen Cost_License = 925 * 1.204 *1.126

/*Cost of space in schools is estimated at the rate they charge outside groups for school
space.*/
gen Room_Rate = 9 /*Hourly rate from Monona Grove WI.*/
gen Space_Scarcity = rnormal(0.7,0.1) /*Room cost reduced because schools may not be at
capacity; this is a guess.*/
```

```
gen Cost_Space = Room_Rate * 1500 * 23 * Space_Scarcity /*Assumes each school dedicates a room to PATH full time.*/

gen Cost = Cost_Ther_Time + Cost_License + Cost_Space
drop Room_Rate Space_Scarcity

display "Finished executing Outcome_Value" /*Output message to help with troubleshooting*/

end /*End this program*/
```

```
/*Subprogram to generate random draws from correlated distributions.
Used to estimate present value of lifetime income.
This subprogram is called by subprogram Outcome_Value.
Adapted from file binormalm.do provided by Professor D Weimer; thanks.*/

capture program drop Draw_Corr /*Housekeeping to delete existing programs named
Draw_Corr*/
program Draw_Corr /*Defines this program as Draw_Corr*/

display "Executing: Draw_Corr" /*Output message to help with troubleshooting*/

/*Give names to inputs.
Identify values to define income distribution for dropouts.*/
local Dout_Min `3'
local Dout_Med `4'
local Dout_Max `5'
/*Identify values to define income distribution for 4 year high school graduates.*/
local HSg4_Min `7'
local HSg4_Med `8'
local HSg4_Max `9'
/*Identify values to define income distribution for 6 year high school graduates.*/
local HSg6_Min `11'
local HSg6_Med `12'
local HSg6_Max `13'
/*Identify values to define income distribution for 4 year high school graduates.*/
local SCol4_Min `15'
local SCol4_Med `16'
local SCol4_Max `17'
/*Identify values to define income distribution for 4 year high school graduates.*/
local SCol6_Min `19'
local SCol6_Med `20'
local SCol6_Max `21'
/*Identify values to define income distribution for 4 year high school graduates.*/
local Col4_Min `23'
local Col4_Med `24'
local Col4_Max `25'
/*Identify values to define income distribution for 4 year high school graduates.*/
local Col6_Min `27'
local Col6_Med `28'
local Col6_Max `29'

/*Draw correlated random index values from 4 normal distributions.*/
matrix C=(1,.85\.85,1)
drawnorm `1'_DoutIndx `1'_HSgIndx, corr(C) means(0 0) sds(0.5 0.5)
matrix D=(1,.80\.80,1)
drawnorm `1'_SColIndx `1'_ColIndx, corr(C) means(0 0) sds(1.8 1.8)
```

```
replace `1'_SColIndx = 0.15 * `1'_SColIndx + 0.85 * `1'_HSgIndx
replace `1'_ColIndx = 0.15 * `1'_ColIndx + 0.85 * `1'_DoutIndx
replace `1'_SColIndx = 0.55 * `1'_SColIndx + 0.45 * `1'_DoutIndx
replace `1'_ColIndx = 0.55 * `1'_ColIndx + 0.45 * `1'_HSgIndx
replace `1'_SColIndx = 0.908 * `1'_SColIndx + 0.092 * rnormal(0,1.8)
replace `1'_ColIndx = 0.908 * `1'_ColIndx + 0.092 * rnormal(0,1.8)
replace `1'_SColIndx = 1.10 * `1'_SColIndx
replace `1'_ColIndx = 1.10 * `1'_ColIndx
/*Summarize correlated index values randomly drawn to determine lifetime income by
educational attainment.*/
sum `1'_DoutIndx `1'_HSgIndx `1'_SColIndx `1'_ColIndx
corr `1'_DoutIndx `1'_HSgIndx `1'_SColIndx `1'_ColIndx

/*Draw present value of lifetime income based on index values.
For dropout.*/
gen `1'_earnDout = `Dout_Med'
replace `1'_earnDout = `Dout_Med' + (`Dout_Min' - `Dout_Med') * `1'_DoutIndx if
(`1'_DoutIndx < 0) /*Below median*/
replace `1'_earnDout = `Dout_Med' + (`Dout_Max' - `Dout_Med') * `1'_DoutIndx if
(`1'_DoutIndx > 0) /*Above median*/
replace `1'_earnDout = 0 if (`1'_earnDout < 0) /*Censor negative values.*/
replace `1'_earnDout = `1'_earnDout * 0.81 /*Reduce earnings to account for lower
productivity caused by mental disorder.*/

/*For 4 year high school graduate.*/
gen `1'_earnHSg4 = `HSg4_Med'
replace `1'_earnHSg4 = `HSg4_Med' + (`HSg4_Min' - `HSg4_Med') * `1'_HSgIndx if
(`1'_HSgIndx < 0) /*Below median*/
replace `1'_earnHSg4 = `HSg4_Med' + (`HSg4_Max' - `HSg4_Med') * `1'_HSgIndx if
(`1'_HSgIndx > 0) /*Above median*/
replace `1'_earnHSg4 = 0 if (`1'_earnHSg4 < 0) /*Censor negative values.*/
replace `1'_earnHSg4 = `1'_earnHSg4 * 0.81 /*Reduce earnings to account for lower
productivity caused by mental disorder.*/

/*For 6 year high school graduate.*/
gen `1'_earnHSg6 = `HSg6_Med'
replace `1'_earnHSg6 = `HSg6_Med' + (`HSg6_Min' - `HSg6_Med') * `1'_HSgIndx if
(`1'_HSgIndx < 0) /*Below median*/
replace `1'_earnHSg6 = `HSg6_Med' + (`HSg6_Max' - `HSg6_Med') * `1'_HSgIndx if
(`1'_HSgIndx > 0) /*Above median*/
replace `1'_earnHSg6 = 0 if (`1'_earnHSg6 < 0) /*Censor negative values.*/
replace `1'_earnHSg6 = `1'_earnHSg6 * 0.81 /*Reduce earnings to account for lower
productivity caused by mental disorder.*/

/*For some college completer after 4 year high school graduation.*/
gen `1'_earnSCol4 = `SCol4_Med'
```

```
replace `1'_earnSCol4 = `SCol4_Med' + (`SCol4_Min' - `SCol4_Med') * `1'_SColIndx if
(`1'_SColIndx < 0) /*Below median*/
replace `1'_earnSCol4 = `SCol4_Med' + (`SCol4_Max' - `SCol4_Med') * `1'_SColIndx if
(`1'_SColIndx > 0) /*Above median*/
replace `1'_earnSCol4 = 0 if (`1'_earnSCol4 < 0) /*Censor negative values.*/
replace `1'_earnSCol4 = `1'_earnSCol4 * 0.81 /*Reduce earnings to account for lower
productivity caused by mental disorder.*/

/*For some college completer after 6 year high school graduation.*/
gen `1'_earnSCol6 = `SCol6_Med'
replace `1'_earnSCol6 = `SCol6_Med' + (`SCol6_Min' - `SCol6_Med') * `1'_SColIndx if
(`1'_SColIndx < 0) /*Below median*/
replace `1'_earnSCol6 = `SCol6_Med' + (`SCol6_Max' - `SCol6_Med') * `1'_SColIndx if
(`1'_SColIndx > 0) /*Above median*/
replace `1'_earnSCol6 = 0 if (`1'_earnSCol6 < 0) /*Censor negative values.*/
replace `1'_earnSCol6 = `1'_earnSCol6 * 0.81 /*Reduce earnings to account for lower
productivity caused by mental disorder.*/

/*For college graduate after 4 year high school graduation.*/
gen `1'_earnCol4 = `Col4_Med'
replace `1'_earnCol4 = `Col4_Med' + (`Col4_Min' - `Col4_Med') * `1'_ColIndx if (`1'_ColIndx <
0) /*Below median*/
replace `1'_earnCol4 = `Col4_Med' + (`Col4_Max' - `Col4_Med') * `1'_ColIndx if (`1'_ColIndx >
0) /*Above median*/
replace `1'_earnCol4 = 0 if (`1'_earnCol4 < 0) /*Censor negative values.*/
replace `1'_earnCol4 = `1'_earnCol4 * 0.81 /*Reduce earnings to account for lower
productivity caused by mental disorder.*/

/*For college graduate after 6 year high school graduation.*/
gen `1'_earnCol6 = `Col6_Med'
replace `1'_earnCol6 = `Col6_Med' + (`Col6_Min' - `Col6_Med') * `1'_ColIndx if (`1'_ColIndx <
0) /*Below median*/
replace `1'_earnCol6 = `Col6_Med' + (`Col6_Max' - `Col6_Med') * `1'_ColIndx if (`1'_ColIndx >
0) /*Above median*/
replace `1'_earnCol6 = 0 if (`1'_earnCol6 < 0) /*Censor negative values.*/
replace `1'_earnCol6 = `1'_earnCol6 * 0.81 /*Reduce earnings to account for lower
productivity caused by mental disorder.*/

drop `1'_DoutIndx `1'_HSgIndx `1'_SColIndx `1'_ColIndx /*Clean up unneeded variables.*/

sum `1'_earnDout `1'_earnHSg4 `1'_earnHSg6 `1'_earnSCol4 `1'_earnSCol6 `1'_earnCol4
`1'_earnCol6
corr `1'_earnDout `1'_earnHSg4 `1'_earnHSg6 `1'_earnSCol4 `1'_earnSCol6 `1'_earnCol4
`1'_earnCol6

end
```

```
/*This subprogram randomly assigns outcomes of interest to PATH participants based on
probabilities defined in subprogram Treatment_Effect. It also sums up the value of
outcomes.
This is the last subprogram to run.*/

capture program drop Simulate_Outcomes /*Housekeeping to delete existing programs
named Simulate_Outcomes*/
program Simulate_Outcomes /*Defines this program as Simulate_Outcomes*/

display "Executing: Simulate_Outcomes" /*Output message to help with troubleshooting*/

/*Lists of representative students by gender*/
local girls "F05 F06 F07 F08 F09 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19"
local boys "M05 M06 M07 M08 M09 M10 M11 M12 M13 M14 M15 M16 M17 M18 M19"

/*List of representative schools*/
local schools "S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S12 S13 S14 S15 S16 S17 S18 S19
S20 S21 S22 S23"

/*Start variables to count high school graduations, so we can calculate induced
graduations.*/
gen HS_Grads_SQ = 0
gen HS_Grads_CBT = 0

/*Start variables that will accumulate benefits for females. The loops below will
increment these variables with the outcomes accruing to each representative female.*/
gen F_Earn_SQ = 0
gen F_Earn_CBT = 0
gen F_JCri_SQ = 0
gen F_JCri_CBT = 0
gen F_ACri_SQ = 0
gen F_ACri_CBT = 0
gen F_Suic_SQ = 0
gen F_Suic_CBT = 0

/*Start variables that will accumulate benefits for males.*/
gen M_Earn_SQ = 0
gen M_Earn_CBT = 0
gen M_JCri_SQ = 0
gen M_JCri_CBT = 0
gen M_ACri_SQ = 0
gen M_ACri_CBT = 0
gen M_Suic_SQ = 0
gen M_Suic_CBT = 0

/*Start variables that will accumulate benefits for elementary school students.*/
```

```
gen EL_Earn_SQ = 0
gen EL_Earn_CBT = 0
gen EL_JCri_SQ = 0
gen EL_JCri_CBT = 0
gen EL_ACri_SQ = 0
gen EL_ACri_CBT = 0
gen EL_Suic_SQ = 0
gen EL_Suic_CBT = 0

/*Start variables that will accumulate benefits for middle school students.*/
gen MS_Earn_SQ = 0
gen MS_Earn_CBT = 0
gen MS_JCri_SQ = 0
gen MS_JCri_CBT = 0
gen MS_ACri_SQ = 0
gen MS_ACri_CBT = 0
gen MS_Suic_SQ = 0
gen MS_Suic_CBT = 0

/*Start variables that will accumulate benefits for high school students.*/
gen HS_Earn_SQ = 0
gen HS_Earn_CBT = 0
gen HS_JCri_SQ = 0
gen HS_JCri_CBT = 0
gen HS_ACri_SQ = 0
gen HS_ACri_CBT = 0
gen HS_Suic_SQ = 0
gen HS_Suic_CBT = 0

/*Start variables that will track benefits that are not assigned to particular representative
students.*/
gen Truant_Ben = 0
gen Dscpln_Ben = 0
gen Counsl_Ben = 0

/*Randomly simulate if CBT changes time spent by school staff addressing mental
disorders changes.
Draw independently for each school.*/
foreach school of local schools {
	/*Truancy*/
	gen Sv_Truant`school' = runiform()
	gen Truant_Hrs`school' = rnormal(4.9,4.6)
	replace Truant_Ben = Truant_Ben + (Truant_Hrs`school' * School_Wage * 9) if
(Sv_Truant`school' <= PSv_Truant)
	/*Discipline*/
	gen Sv_Dscpln`school' = runiform()
```

```
	gen Dscpln_Hrs`school' = rnormal(2.4,1.6)
	replace Dscpln_Ben = Dscpln_Ben + (Dscpln_Hrs`school' * School_Wage * 9) if
(Sv_Dscpln`school' <= PSv_Dscpln)
	/*Guidance counsel time*/
	gen Sv_Counsl`school' = runiform()
	gen Counsl_Hrs`school' = rnormal(10.2,15.1)
	replace Counsl_Ben = Counsl_Ben + (Counsl_Hrs`school' * School_Wage * 9) if
(Sv_Counsl`school' <= PSv_Counsl)
	drop Sv_Truant`school' Truant_Hrs`school' Sv_Dscpln`school' Dscpln_Hrs`school'
Sv_Counsl`school' Counsl_Hrs`school'
}

/*Cycle through representative females.*/
foreach girl of local girls {
	display "`girl'" /*Output to keep track of progress through loop.*/

	/*Randomly assign education outcomes to female PATH participants. The random
variable for high school
	acheivement is equal to the random variable for college achievement to reflect that
we expect
	chance of finishing high school to be correlated with chance of finishing college.*/
	gen `girl'_HS = runiform()
	gen `girl'_Col = `girl'_HS

	/*Simulate status quo educational attainment for females.*/
	gen `girl'HSg_SQO = (`girl'_HS <= `girl'HSg_SQ) /*Does she graduate high school in 6
years or less?*/
	gen `girl'Dout_SQO = !`girl'HSg_SQO /*If she doesn't graduate in 6 years or less, she
is assigned the dropout outcomes.*/
	gen `girl'4or6_HS = runiform()
	gen `girl'HSg4_SQO = (`girl'HSg_SQO & (`girl'4or6_HS <= HS_4yr)) /*Simulate
whether graduation takes place within 4 years.*/
	gen `girl'HSg6_SQO = (`girl'HSg_SQO & (`girl'4or6_HS > HS_4yr)) /*Simulate whether
graduation takes place within 6 years.*/
	gen `girl'Col4_SQO = ((`girl'_Col <= `girl'Col_SQ) & `girl'HSg4_SQO) /*Does she
graduate college (after on-time high school graduation)?*/
	gen `girl'Col6_SQO = ((`girl'_Col <= `girl'Col_SQ) & `girl'HSg6_SQO) /*Does she
graduate college (after late high school graduation)?*/
	gen `girl'SCol4_SQO = ((`girl'_Col <= `girl'SCol_SQ) & `girl'HSg4_SQO &
!`girl'Col4_SQO) /*If she doesn't graduate college, does she complete some college (after
on-time high school graduation)?*/
	gen `girl'SCol6_SQO = ((`girl'_Col <= `girl'SCol_SQ) & `girl'HSg6_SQO &
!`girl'Col6_SQO) /*If she doesn't graduate college, does she complete some college (after
late high school graduation)?*/
```

```
	drop `girl'HSg_SQ `girl'SCol_SQ `girl'Col_SQ `girl'HSg_SQO /*Clean up unneeded variables.*/

	/*Increment number of high school graduates*/
	replace HS_Grads_SQ = HS_Grads_SQ + n`girl' if !`girl'Dout_SQO

	/*Increment total status quo earnings for females. Add dropout discounted lifetime earnings.*/
	replace F_Earn_SQ = F_Earn_SQ + ((`girl'Dout_SQO * D`girl'_earnDout) * n`girl')
	/*If she doesn't complete some college or graduate from college, add high school graduate discounted lifetime earnings.*/
	replace F_Earn_SQ = F_Earn_SQ + ((`girl'HSg4_SQO * D`girl'_earnHSg4 + `girl'HSg6_SQO * D`girl'_earnHSg6) * n`girl') if !(`girl'SCol4_SQO | `girl'SCol6_SQO | `girl'Col4_SQO | `girl'Col6_SQO)
	/*Add some college completion discounted lifetime earnings.*/
	replace F_Earn_SQ = F_Earn_SQ + ((`girl'SCol4_SQO * D`girl'_earnSCol4 + `girl'SCol6_SQO * D`girl'_earnSCol6) * n`girl')
	/*Add college graduate discounted lifetime earnings.*/
	replace F_Earn_SQ = F_Earn_SQ + ((`girl'Col4_SQO * D`girl'_earnCol4 + `girl'Col6_SQO * D`girl'_earnCol6) * n`girl')
	/*Increment total status quo earnings for elementary school students.*/
	replace EL_Earn_SQ = EL_Earn_SQ + ((`girl'Dout_SQO * D`girl'_earnDout) * n`girl') if (`girl'age <= 11)
	replace EL_Earn_SQ = EL_Earn_SQ + ((`girl'HSg4_SQO * D`girl'_earnHSg4 + `girl'HSg6_SQO * D`girl'_earnHSg6) * n`girl') if (`girl'age <= 11 & !(`girl'SCol4_SQO | `girl'SCol6_SQO | `girl'Col4_SQO | `girl'Col6_SQO))
	replace EL_Earn_SQ = EL_Earn_SQ + ((`girl'SCol4_SQO * D`girl'_earnSCol4 + `girl'SCol6_SQO * D`girl'_earnSCol6) * n`girl') if (`girl'age <= 11)
	replace EL_Earn_SQ = EL_Earn_SQ + ((`girl'Col4_SQO * D`girl'_earnCol4 + `girl'Col6_SQO * D`girl'_earnCol6) * n`girl') if (`girl'age <= 11)
	/*Increment total status quo earnings for middle school students.*/
	replace MS_Earn_SQ = MS_Earn_SQ + ((`girl'Dout_SQO * D`girl'_earnDout) * n`girl') if (`girl'age > 11 & `girl'age <= 14)
	replace MS_Earn_SQ = MS_Earn_SQ + ((`girl'HSg4_SQO * D`girl'_earnHSg4 + `girl'HSg6_SQO * D`girl'_earnHSg6) * n`girl') if (`girl'age > 11 & `girl'age <= 14 & !(`girl'SCol4_SQO | `girl'SCol6_SQO | `girl'Col4_SQO | `girl'Col6_SQO))
	replace MS_Earn_SQ = MS_Earn_SQ + ((`girl'SCol4_SQO * D`girl'_earnSCol4 + `girl'SCol6_SQO * D`girl'_earnSCol6) * n`girl') if (`girl'age > 11 & `girl'age <= 14)
	replace MS_Earn_SQ = MS_Earn_SQ + ((`girl'Col4_SQO * D`girl'_earnCol4 + `girl'Col6_SQO * D`girl'_earnCol6) * n`girl') if (`girl'age > 11 & `girl'age <= 14)
	/*Increment total status quo earnings for high school students.*/
	replace HS_Earn_SQ = HS_Earn_SQ + ((`girl'Dout_SQO * D`girl'_earnDout) * n`girl') if (`girl'age > 14)
	replace HS_Earn_SQ = HS_Earn_SQ + ((`girl'HSg4_SQO * D`girl'_earnHSg4 + `girl'HSg6_SQO * D`girl'_earnHSg6) * n`girl') if (`girl'age > 14 & !(`girl'SCol4_SQO | `girl'SCol6_SQO | `girl'Col4_SQO | `girl'Col6_SQO))
```

```
	replace HS_Earn_SQ = HS_Earn_SQ + ((`girl'SCol4_SQO * D`girl'_earnSCol4 + 
`girl'SCol6_SQO * D`girl'_earnSCol6) * n`girl') if (`girl'age > 14)
	replace HS_Earn_SQ = HS_Earn_SQ + ((`girl'Col4_SQO * D`girl'_earnCol4 + 
`girl'Col6_SQO * D`girl'_earnCol6) * n`girl') if (`girl'age > 14)

	/*Simulate CBT educational attainment for females. See comments on status quo 
simulation above.*/
	gen `girl'HSg_CBTO = (`girl'_HS <= `girl'HSg_CBT)
	gen `girl'Dout_CBTO = !`girl'HSg_CBTO
	gen `girl'HSg4_CBTO = (`girl'HSg_CBTO & (`girl'4or6_HS <= HS_4yr))
	gen `girl'HSg6_CBTO = (`girl'HSg_CBTO & (`girl'4or6_HS > HS_4yr))
	gen `girl'Col4_CBTO = ((`girl'_Col <= `girl'Col_CBT) & `girl'HSg4_CBTO)
	gen `girl'Col6_CBTO = ((`girl'_Col <= `girl'Col_CBT) & `girl'HSg6_CBTO)
	gen `girl'SCol4_CBTO = ((`girl'_Col <= `girl'SCol_CBT) & `girl'HSg4_CBTO & 
!`girl'Col4_CBTO)
	gen `girl'SCol6_CBTO = ((`girl'_Col <= `girl'SCol_CBT) & `girl'HSg6_CBTO & 
!`girl'Col6_CBTO)

	drop `girl'HSg_CBT `girl'SCol_CBT `girl'Col_CBT `girl'HSg_CBTO /*Clean up unneeded 
variables.*/

	/*Increment number of high school graduates*/
	replace HS_Grads_CBT = HS_Grads_CBT + n`girl' if !`girl'Dout_CBTO

	/*Increment total CBT earnings for females.*/
	replace F_Earn_CBT = F_Earn_CBT + ((`girl'Dout_CBTO * D`girl'_earnDout) * n`girl')
	replace F_Earn_CBT = F_Earn_CBT + ((`girl'HSg4_CBTO * D`girl'_earnHSg4 + 
`girl'HSg6_CBTO * D`girl'_earnHSg6) * n`girl') if !(`girl'SCol4_CBTO | `girl'SCol6_CBTO | 
`girl'Col4_CBTO | `girl'Col6_CBTO)
	replace F_Earn_CBT = F_Earn_CBT + ((`girl'SCol4_CBTO * D`girl'_earnSCol4 + 
`girl'SCol6_CBTO * D`girl'_earnSCol6) * n`girl')
	replace F_Earn_CBT = F_Earn_CBT + ((`girl'Col4_CBTO * D`girl'_earnCol4 + 
`girl'Col6_CBTO * D`girl'_earnCol6) * n`girl')
	/*Increment total status quo earnings for elementary school students.*/
	replace EL_Earn_CBT = EL_Earn_CBT + ((`girl'Dout_CBTO * D`girl'_earnDout) * 
n`girl') if (`girl'age <= 11)
	replace EL_Earn_CBT = EL_Earn_CBT + ((`girl'HSg4_CBTO * D`girl'_earnHSg4 + 
`girl'HSg6_CBTO * D`girl'_earnHSg6) * n`girl') if (`girl'age <= 11 & !(`girl'SCol4_CBTO | 
`girl'SCol6_CBTO | `girl'Col4_CBTO | `girl'Col6_CBTO))
	replace EL_Earn_CBT = EL_Earn_CBT + ((`girl'SCol4_CBTO * D`girl'_earnSCol4 + 
`girl'SCol6_CBTO * D`girl'_earnSCol6) * n`girl') if (`girl'age <= 11)
	replace EL_Earn_CBT = EL_Earn_CBT + ((`girl'Col4_CBTO * D`girl'_earnCol4 + 
`girl'Col6_CBTO * D`girl'_earnCol6) * n`girl') if (`girl'age <= 11)
	/*Increment total status quo earnings for middle school students.*/
	replace MS_Earn_CBT = MS_Earn_CBT + ((`girl'Dout_CBTO * D`girl'_earnDout) * 
n`girl') if (`girl'age > 11 & `girl'age <= 14)
```

```
	replace MS_Earn_CBT = MS_Earn_CBT + ((`girl'HSg4_CBTO * D`girl'_earnHSg4 +
`girl'HSg6_CBTO * D`girl'_earnHSg6) * n`girl') if (`girl'age > 11 & `girl'age <= 14 &
!(`girl'SCol4_CBTO | `girl'SCol6_CBTO | `girl'Col4_CBTO | `girl'Col6_CBTO))
	replace MS_Earn_CBT = MS_Earn_CBT + ((`girl'SCol4_CBTO * D`girl'_earnSCol4 +
`girl'SCol6_CBTO * D`girl'_earnSCol6) * n`girl') if (`girl'age > 11 & `girl'age <= 14)
	replace MS_Earn_CBT = MS_Earn_CBT + ((`girl'Col4_CBTO * D`girl'_earnCol4 +
`girl'Col6_CBTO * D`girl'_earnCol6) * n`girl') if (`girl'age > 11 & `girl'age <= 14)
	/*Increment total status quo earnings for high school students.*/
	replace HS_Earn_CBT = HS_Earn_CBT + ((`girl'Dout_CBTO * D`girl'_earnDout) *
n`girl') if (`girl'age > 14)
	replace HS_Earn_CBT = HS_Earn_CBT + ((`girl'HSg4_CBTO * D`girl'_earnHSg4 +
`girl'HSg6_CBTO * D`girl'_earnHSg6) * n`girl') if (`girl'age > 14 & !(`girl'SCol4_CBTO |
`girl'SCol6_CBTO | `girl'Col4_CBTO | `girl'Col6_CBTO))
	replace HS_Earn_CBT = HS_Earn_CBT + ((`girl'SCol4_CBTO * D`girl'_earnSCol4 +
`girl'SCol6_CBTO * D`girl'_earnSCol6) * n`girl') if (`girl'age > 14)
	replace HS_Earn_CBT = HS_Earn_CBT + ((`girl'Col4_CBTO * D`girl'_earnCol4 +
`girl'Col6_CBTO * D`girl'_earnCol6) * n`girl') if (`girl'age > 14)

	drop D`girl'_earnDout D`girl'_earnHSg4 D`girl'_earnSCol4 D`girl'_earnCol4
D`girl'_earnHSg6 D`girl'_earnSCol6 D`girl'_earnCol6 /*Clean up unneeded variables.*/
	drop `girl'_HS `girl'_Col `girl'4or6_HS /*Clean up unneeded variables.*/

	/*Simulate juvenile crime outcome for each female student.*/
	gen JCri`girl' = runiform() /*Generate random number to determine if she commits
a juvenile crime.*/
	gen Prior`girl' = runiform() /*Assumes only students with prior contact with the law
commit juvenile crimes. Generate random number to determine if she has a prior contact
with the law.*/
	gen HasPrior`girl' = (Prior`girl' < F_Prior_Rate) /*Simulate whether she has a prior
contact with the law.*/
	gen `girl'JCri_SQO = 0 /*Initiate variable for status quo juvenile crime outcome.*/
	gen `girl'JCri_CBTO = 0 /*Initiate variable for CBT juvenile crime outcome.*/
	replace `girl'JCri_SQO = 1 if ((JCri`girl' <= `girl'JCri_SQ) & HasPrior`girl') /*Simulate
comission of a juvenile crime under status quo. Assumes each representative student
commits a maximum of one juvenile crime.*/
	replace `girl'JCri_CBTO = 1 if ((JCri`girl' <= `girl'JCri_CBT) & HasPrior`girl')
/*Simulate comission of a juvenile crime under CBT. Assumes each representative student
commits a maximum of one juvenile crime.*/

	/*Increment total status quo juvenile crime cost. The benefit to juvenile crime is an
avoided cost. These variables accumulate the negative of the cost of juvenile crime.
	CBT has fewer juvenile crimes, so it has a smaller negative. When the status quo
outcome (large negative) is subtracted from the CBT outcome (small negative), the
difference
	is positive. This positive difference is the avoided cost of juvenile crime due to CBT.
	*/
```

```
	replace F_JCri_SQ = F_JCri_SQ - (D`girl'_Jcri * `girl'JCri_SQO * n`girl')
	replace EL_JCri_SQ = (EL_JCri_SQ - (D`girl'_Jcri * `girl'JCri_SQO * n`girl')) if (`girl'age
<= 11)
	replace MS_JCri_SQ = (MS_JCri_SQ - (D`girl'_Jcri * `girl'JCri_SQO * n`girl')) if (`girl'age
> 11 & `girl'age <= 14)
	replace HS_JCri_SQ = (HS_JCri_SQ - (D`girl'_Jcri * `girl'JCri_SQO * n`girl')) if (`girl'age >
14)
	/*Increment total juvenile crime cost after CBT.*/
	replace F_JCri_CBT = F_JCri_CBT - (D`girl'_Jcri * `girl'JCri_CBTO * n`girl')
	replace EL_JCri_CBT = (EL_JCri_CBT - (D`girl'_Jcri * `girl'JCri_CBTO * n`girl')) if
(`girl'age <= 11)
	replace MS_JCri_CBT = (MS_JCri_CBT - (D`girl'_Jcri * `girl'JCri_CBTO * n`girl')) if
(`girl'age > 11 & `girl'age <= 14)
	replace HS_JCri_CBT = (HS_JCri_CBT - (D`girl'_Jcri * `girl'JCri_CBTO * n`girl')) if
(`girl'age > 14)

	drop `girl'JCri_SQ `girl'JCri_CBT D`girl'_Jcri JCri`girl' Prior`girl' HasPrior`girl' /*Clean
up unneeded variables.*/

	/*Simulate suicide outcome for each female student.*/
	gen suic`girl' = runiform() /*Generate random number for suicide simulation.*/
	gen `girl'suic_SQO = (suic`girl' <= `girl'Suic_SQ) /*Simulate status quo suicide.*/
	gen `girl'suic_CBTO = (suic`girl' <= `girl'Suic_CBT) /*Simulate CBT suicide.*/

	/*Increment total status quo suicide cost for females.*/
	replace F_Suic_SQ = F_Suic_SQ - (VSL * `girl'suic_SQO * n`girl')
	replace EL_Suic_SQ = (EL_Suic_SQ - (VSL * `girl'suic_SQO * n`girl')) if (`girl'age <= 11)
	replace MS_Suic_SQ = (MS_Suic_SQ - (VSL * `girl'suic_SQO * n`girl')) if (`girl'age > 11
& `girl'age <= 14)
	replace HS_Suic_SQ = (HS_Suic_SQ - (VSL * `girl'suic_SQO * n`girl')) if (`girl'age > 14)
	/*Increment total suicide cost after CBT for females.*/
	replace F_Suic_CBT = F_Suic_CBT - (VSL * `girl'suic_CBTO * n`girl')
	replace EL_Suic_CBT = (EL_Suic_CBT - (VSL * `girl'suic_CBTO * n`girl')) if (`girl'age <=
11)
	replace MS_Suic_CBT = (MS_Suic_CBT - (VSL * `girl'suic_CBTO * n`girl')) if (`girl'age >
11 & `girl'age <= 14)
	replace HS_Suic_CBT = (HS_Suic_CBT - (VSL * `girl'suic_CBTO * n`girl')) if (`girl'age >
14)

	drop `girl'Suic_SQ `girl'Suic_CBT suic`girl' /*Clean up unneeded variables.*/

	/*Increment status quo avoided adult crime cost for females by expected reduction
depending on graduation.*/
	replace F_ACri_SQ = F_ACri_SQ + D`girl'_Acri * n`girl' if (`girl'HSg4_SQO |
`girl'HSg6_SQO)
```

```
	replace EL_ACri_SQ = EL_ACri_SQ + D`girl'_Acri * n`girl' if ((`girl'HSg4_SQO | 
`girl'HSg6_SQO) & `girl'age <= 11)
	replace MS_ACri_SQ = MS_ACri_SQ + D`girl'_Acri * n`girl' if ((`girl'HSg4_SQO | 
`girl'HSg6_SQO) & `girl'age > 11 & `girl'age <= 14)
	replace HS_ACri_SQ = HS_ACri_SQ + D`girl'_Acri * n`girl' if ((`girl'HSg4_SQO | 
`girl'HSg6_SQO) & `girl'age > 14)

	/*Increment CBT avoided adult crime cost for females by expected reduction 
depending on graduation.*/
	replace F_ACri_CBT = F_ACri_CBT + D`girl'_Acri * n`girl' if (`girl'HSg4_CBTO | 
`girl'HSg6_CBTO)
	replace EL_ACri_CBT = EL_ACri_CBT + D`girl'_Acri * n`girl' if ((`girl'HSg4_CBTO | 
`girl'HSg6_CBTO) & `girl'age <= 11)
	replace MS_ACri_CBT = MS_ACri_CBT + D`girl'_Acri * n`girl' if ((`girl'HSg4_CBTO | 
`girl'HSg6_CBTO) & `girl'age > 11 & `girl'age <= 14)
	replace HS_ACri_CBT = HS_ACri_CBT + D`girl'_Acri * n`girl' if ((`girl'HSg4_CBTO | 
`girl'HSg6_CBTO) & `girl'age > 14)

	drop `girl'age D`girl'_Acri /*Clean up unneeded variables.*/
}

/*Cycle through representative males.*/
foreach boy of local boys {
	display "`boy'" /*Output to keep track of progress through loop.*/

	gen `boy'_HS = runiform()
	gen `boy'_Col = `boy'_HS

	/*Simulate status quo educational attainment for males. See female loop above for 
detailed comments.*/
	gen `boy'HSg_SQO = (`boy'_HS <= `boy'HSg_SQ)
	gen `boy'Dout_SQO = !`boy'HSg_SQO
	gen `boy'4or6_HS = runiform()
	gen `boy'HSg4_SQO = (`boy'HSg_SQO & (`boy'4or6_HS <= HS_4yr))
	gen `boy'HSg6_SQO = (`boy'HSg_SQO & (`boy'4or6_HS > HS_4yr))
	gen `boy'Col4_SQO = (`boy'_Col <= `boy'Col_SQ & `boy'HSg4_SQO)
	gen `boy'Col6_SQO = (`boy'_Col <= `boy'Col_SQ & `boy'HSg6_SQO)
	gen `boy'SCol4_SQO = (`boy'_Col <= `boy'SCol_SQ & `boy'HSg4_SQO & 
!`boy'Col4_SQO)
	gen `boy'SCol6_SQO = (`boy'_Col <= `boy'SCol_SQ & `boy'HSg6_SQO & 
!`boy'Col6_SQO)

	drop `boy'HSg_SQ `boy'SCol_SQ `boy'Col_SQ `boy'HSg_SQO /*Clean up unneeded 
variables.*/

	/*Increment number of high school graduates*/
```

```
	replace HS_Grads_SQ = HS_Grads_SQ + n`boy' if !`boy'Dout_SQO

	/*Increment total status quo earnings for males.*/
	replace M_Earn_SQ = M_Earn_SQ + ((`boy'Dout_SQO * D`boy'_earnDout) * n`boy')
	replace M_Earn_SQ = M_Earn_SQ + ((`boy'HSg4_SQO * D`boy'_earnHSg4 +
`boy'HSg6_SQO * D`boy'_earnHSg6) * n`boy') if !(`boy'SCol4_SQO | `boy'SCol6_SQO |
`boy'Col4_SQO | `boy'Col6_SQO)
	replace M_Earn_SQ = M_Earn_SQ + ((`boy'SCol4_SQO * D`boy'_earnSCol4 +
`boy'SCol6_SQO * D`boy'_earnSCol6) * n`boy')
	replace M_Earn_SQ = M_Earn_SQ + ((`boy'Col4_SQO * D`boy'_earnCol4 +
`boy'Col6_SQO * D`boy'_earnCol6) * n`boy')
	/*Increment total status quo earnings for elementary school students.*/
	replace EL_Earn_SQ = EL_Earn_SQ + ((`boy'Dout_SQO * D`boy'_earnDout) * n`boy') if
(`boy'age <= 11)
	replace EL_Earn_SQ = EL_Earn_SQ + ((`boy'HSg4_SQO * D`boy'_earnHSg4 +
`boy'HSg6_SQO * D`boy'_earnHSg6) * n`boy') if (`boy'age <= 11 & !(`boy'SCol4_SQO |
`boy'SCol6_SQO | `boy'Col4_SQO | `boy'Col6_SQO))
	replace EL_Earn_SQ = EL_Earn_SQ + ((`boy'SCol4_SQO * D`boy'_earnSCol4 +
`boy'SCol6_SQO * D`boy'_earnSCol6) * n`boy') if (`boy'age <= 11)
	replace EL_Earn_SQ = EL_Earn_SQ + ((`boy'Col4_SQO * D`boy'_earnCol4 +
`boy'Col6_SQO * D`boy'_earnCol6) * n`boy') if (`boy'age <= 11)
	/*Increment total status quo earnings for middle school students.*/
	replace MS_Earn_SQ = MS_Earn_SQ + ((`boy'Dout_SQO * D`boy'_earnDout) * n`boy')
if (`boy'age > 11 & `boy'age <= 14)
	replace MS_Earn_SQ = MS_Earn_SQ + ((`boy'HSg4_SQO * D`boy'_earnHSg4 +
`boy'HSg6_SQO * D`boy'_earnHSg6) * n`boy') if (`boy'age > 11 & `boy'age <= 14 &
!(`boy'SCol4_SQO | `boy'SCol6_SQO | `boy'Col4_SQO | `boy'Col6_SQO))
	replace MS_Earn_SQ = MS_Earn_SQ + ((`boy'SCol4_SQO * D`boy'_earnSCol4 +
`boy'SCol6_SQO * D`boy'_earnSCol6) * n`boy') if (`boy'age > 11 & `boy'age <= 14)
	replace MS_Earn_SQ = MS_Earn_SQ + ((`boy'Col4_SQO * D`boy'_earnCol4 +
`boy'Col6_SQO * D`boy'_earnCol6) * n`boy') if (`boy'age > 11 & `boy'age <= 14)
	/*Increment total status quo earnings for high school students.*/
	replace HS_Earn_SQ = HS_Earn_SQ + ((`boy'Dout_SQO * D`boy'_earnDout) * n`boy') if
(`boy'age > 14)
	replace HS_Earn_SQ = HS_Earn_SQ + ((`boy'HSg4_SQO * D`boy'_earnHSg4 +
`boy'HSg6_SQO * D`boy'_earnHSg6) * n`boy') if (`boy'age > 14 & !(`boy'SCol4_SQO |
`boy'SCol6_SQO | `boy'Col4_SQO | `boy'Col6_SQO))
	replace HS_Earn_SQ = HS_Earn_SQ + ((`boy'SCol4_SQO * D`boy'_earnSCol4 +
`boy'SCol6_SQO * D`boy'_earnSCol6) * n`boy') if (`boy'age > 14)
	replace HS_Earn_SQ = HS_Earn_SQ + ((`boy'Col4_SQO * D`boy'_earnCol4 +
`boy'Col6_SQO * D`boy'_earnCol6) * n`boy') if (`boy'age > 14)

	/*CBT educational attainment for males.*/
	gen `boy'HSg_CBTO = (`boy'_HS <= `boy'HSg_CBT)
	gen `boy'Dout_CBTO = !`boy'HSg_CBTO
```

```
	gen `boy'HSg4_CBTO = (`boy'HSg_CBTO & (`boy'4or6_HS <= HS_4yr)) /*Simulate whether graduation takes place within 4 years.*/
	gen `boy'HSg6_CBTO = (`boy'HSg_CBTO & (`boy'4or6_HS > HS_4yr)) /*Simulate whether graduation takes place within 6 years.*/
	gen `boy'Col4_CBTO = (`boy'_Col <= `boy'Col_CBT & `boy'HSg4_CBTO)
	gen `boy'Col6_CBTO = (`boy'_Col <= `boy'Col_CBT & `boy'HSg6_CBTO)
	gen `boy'SCol4_CBTO = (`boy'_Col <= `boy'SCol_CBT & `boy'HSg4_CBTO & !`boy'Col4_CBTO)
	gen `boy'SCol6_CBTO = (`boy'_Col <= `boy'SCol_CBT & `boy'HSg6_CBTO & !`boy'Col6_CBTO)

	drop `boy'HSg_CBT `boy'SCol_CBT `boy'Col_CBT `boy'HSg_CBTO /*Clean up unneeded variables.*/

	/*Increment number of high school graduates*/
	replace HS_Grads_CBT = HS_Grads_CBT + n`boy' if !`boy'Dout_CBTO

	/*Increment total CBT earnings for males.*/
	replace M_Earn_CBT = M_Earn_CBT + ((`boy'Dout_CBTO * D`boy'_earnDout) * n`boy')
	replace M_Earn_CBT = M_Earn_CBT + ((`boy'HSg4_CBTO * D`boy'_earnHSg4 + `boy'HSg6_CBTO * D`boy'_earnHSg6) * n`boy') if !(`boy'SCol4_CBTO | `boy'SCol6_CBTO | `boy'Col4_CBTO | `boy'Col6_CBTO)
	replace M_Earn_CBT = M_Earn_CBT + ((`boy'SCol4_CBTO * D`boy'_earnSCol6 + `boy'SCol6_CBTO * D`boy'_earnSCol6) * n`boy')
	replace M_Earn_CBT = M_Earn_CBT + ((`boy'Col4_CBTO * D`boy'_earnCol6 + `boy'Col6_CBTO * D`boy'_earnCol6) * n`boy')
	/*Increment total CBT earnings for elementary school students.*/
	replace EL_Earn_CBT = EL_Earn_CBT + ((`boy'Dout_CBTO * D`boy'_earnDout) * n`boy') if (`boy'age <= 11)
	replace EL_Earn_CBT = EL_Earn_CBT + ((`boy'HSg4_CBTO * D`boy'_earnHSg4 + `boy'HSg6_CBTO * D`boy'_earnHSg6) * n`boy') if (`boy'age <= 11 & !(`boy'SCol4_CBTO | `boy'SCol6_CBTO | `boy'Col4_CBTO | `boy'Col6_CBTO))
	replace EL_Earn_CBT = EL_Earn_CBT + ((`boy'SCol4_CBTO * D`boy'_earnSCol6 + `boy'SCol6_CBTO * D`boy'_earnSCol6) * n`boy') if (`boy'age <= 11)
	replace EL_Earn_CBT = EL_Earn_CBT + ((`boy'Col4_CBTO * D`boy'_earnCol6 + `boy'Col6_CBTO * D`boy'_earnCol6) * n`boy') if (`boy'age <= 11)
	/*Increment total CBT earnings for middle school students.*/
	replace MS_Earn_CBT = MS_Earn_CBT + ((`boy'Dout_CBTO * D`boy'_earnDout) * n`boy') if (`boy'age > 11 & `boy'age <= 14)
	replace MS_Earn_CBT = MS_Earn_CBT + ((`boy'HSg4_CBTO * D`boy'_earnHSg4 + `boy'HSg6_CBTO * D`boy'_earnHSg6) * n`boy') if (`boy'age > 11 & `boy'age <= 14 & !(`boy'SCol4_CBTO | `boy'SCol6_CBTO | `boy'Col4_CBTO | `boy'Col6_CBTO))
	replace MS_Earn_CBT = MS_Earn_CBT + ((`boy'SCol4_CBTO * D`boy'_earnSCol6 + `boy'SCol6_CBTO * D`boy'_earnSCol6) * n`boy') if (`boy'age > 11 & `boy'age <= 14)
```

```
	replace MS_Earn_CBT = MS_Earn_CBT + ((`boy'Col4_CBTO * D`boy'_earnCol6 + 
`boy'Col6_CBTO * D`boy'_earnCol6) * n`boy') if (`boy'age > 11 & `boy'age <= 14)
	/*Increment total CBT earnings for high school students.*/
	replace HS_Earn_CBT = HS_Earn_CBT + ((`boy'Dout_CBTO * D`boy'_earnDout) * 
n`boy') if (`boy'age > 14)
	replace HS_Earn_CBT = HS_Earn_CBT + ((`boy'HSg4_CBTO * D`boy'_earnHSg4 + 
`boy'HSg6_CBTO * D`boy'_earnHSg6) * n`boy') if (`boy'age > 14 & !(`boy'SCol4_CBTO | 
`boy'SCol6_CBTO | `boy'Col4_CBTO | `boy'Col6_CBTO))
	replace HS_Earn_CBT = HS_Earn_CBT + ((`boy'SCol4_CBTO * D`boy'_earnSCol6 + 
`boy'SCol6_CBTO * D`boy'_earnSCol6) * n`boy') if (`boy'age > 14)
	replace HS_Earn_CBT = HS_Earn_CBT + ((`boy'Col4_CBTO * D`boy'_earnCol6 + 
`boy'Col6_CBTO * D`boy'_earnCol6) * n`boy') if (`boy'age > 14)

	drop D`boy'_earnDout D`boy'_earnHSg4 D`boy'_earnSCol4 D`boy'_earnCol4 
D`boy'_earnHSg6 D`boy'_earnSCol6 D`boy'_earnCol6 /*Clean up unneeded variables.*/
	drop `boy'_HS `boy'_Col `boy'4or6_HS /*Clean up unneeded variables.*/

	/*Simulate juvenile crime outcome for each male student.*/
	gen JCri`boy' = runiform()
	gen Prior`boy' = runiform()
	gen HasPrior`boy' = (Prior`boy' < M_Prior_Rate)
	gen `boy'JCri_SQO = 0
	gen `boy'JCri_CBTO = 0
	replace `boy'JCri_SQO = 1 if ((JCri`boy' <= `boy'JCri_SQ) & HasPrior`boy')
	replace `boy'JCri_CBTO = 1 if ((JCri`boy' <= `boy'JCri_CBT) & HasPrior`boy')

	/*Increment total status quo juvenile crime cost.*/
	replace M_JCri_SQ = M_JCri_SQ - (D`boy'_Jcri * `boy'JCri_SQO * n`boy')
	replace EL_JCri_SQ = (EL_JCri_SQ - (D`boy'_Jcri * `boy'JCri_SQO * n`boy')) if (`boy'age 
<= 11)
	replace MS_JCri_SQ = (MS_JCri_SQ - (D`boy'_Jcri * `boy'JCri_SQO * n`boy')) if (`boy'age 
> 11 & `boy'age <= 14)
	replace HS_JCri_SQ = (HS_JCri_SQ - (D`boy'_Jcri * `boy'JCri_SQO * n`boy')) if (`boy'age 
> 14)
	/*Increment total juvenile crime cost after CBT.*/
	replace M_JCri_CBT = M_JCri_CBT - (D`boy'_Jcri * `boy'JCri_CBTO * n`boy')
	replace EL_JCri_CBT = (EL_JCri_CBT - (D`boy'_Jcri * `boy'JCri_CBTO * n`boy')) if 
(`boy'age <= 11)
	replace MS_JCri_CBT = (MS_JCri_CBT - (D`boy'_Jcri * `boy'JCri_CBTO * n`boy')) if 
(`boy'age > 11 & `boy'age <= 14)
	replace HS_JCri_CBT = (HS_JCri_CBT - (D`boy'_Jcri * `boy'JCri_CBTO * n`boy')) if 
(`boy'age > 14)

	drop `boy'JCri_SQ `boy'JCri_CBT D`boy'_Jcri JCri`boy' Prior`boy' HasPrior`boy' 
/*Clean up unneeded variables.*/
```

```
	/*Simulate suicide outcome for each male student.*/
	gen suic`boy' = runiform()
	gen `boy'suic_SQO = (suic`boy' <= `boy'Suic_SQ)
	gen `boy'suic_CBTO = (suic`boy' <= `boy'Suic_CBT)

	/*Increment total status quo suicide cost for males.*/
	replace M_Suic_SQ = M_Suic_SQ - (VSL * `boy'suic_SQO * n`boy')
	replace EL_Suic_SQ = (EL_Suic_SQ - (VSL * `boy'suic_SQO * n`boy')) if (`boy'age <=
11)
	replace MS_Suic_SQ = (MS_Suic_SQ - (VSL * `boy'suic_SQO * n`boy')) if (`boy'age > 11
& `boy'age <= 14)
	replace HS_Suic_SQ = (HS_Suic_SQ - (VSL * `boy'suic_SQO * n`boy')) if (`boy'age > 14)
	/*Increment total suicide cost after CBT for males.*/
	replace M_Suic_CBT = M_Suic_CBT - (VSL * `boy'suic_CBTO * n`boy')
	replace EL_Suic_CBT = (EL_Suic_CBT - (VSL * `boy'suic_CBTO * n`boy')) if (`boy'age
<= 11)
	replace MS_Suic_CBT = (MS_Suic_CBT - (VSL * `boy'suic_CBTO * n`boy')) if (`boy'age
> 11 & `boy'age <= 14)
	replace HS_Suic_CBT = (HS_Suic_CBT - (VSL * `boy'suic_CBTO * n`boy')) if (`boy'age >
14)

	drop `boy'Suic_SQ `boy'Suic_CBT suic`boy' /*Clean up unneeded variables.*/

	/*Increment status quo avoided adult crime cost for females by expected reduction
depending on graduation.*/
	replace M_ACri_SQ = M_ACri_SQ + D`boy'_Acri * n`boy' if (`boy'HSg4_SQO |
`boy'HSg6_SQO)
	replace EL_ACri_SQ = EL_ACri_SQ + D`boy'_Acri * n`boy' if ((`boy'HSg4_SQO |
`boy'HSg6_SQO) & `boy'age <= 11)
	replace MS_ACri_SQ = MS_ACri_SQ + D`boy'_Acri * n`boy' if ((`boy'HSg4_SQO |
`boy'HSg6_SQO) & `boy'age > 11 & `boy'age <= 14)
	replace HS_ACri_SQ = HS_ACri_SQ + D`boy'_Acri * n`boy' if ((`boy'HSg4_SQO |
`boy'HSg6_SQO) & `boy'age > 14)

	/*Increment CBT avoided adult crime cost for females by expected reduction
depending on graduation.*/
	replace M_ACri_CBT = M_ACri_CBT + D`boy'_Acri * n`boy' if (`boy'HSg4_CBTO |
`boy'HSg6_CBTO)
	replace EL_ACri_CBT = EL_ACri_CBT + D`boy'_Acri * n`boy' if ((`boy'HSg4_CBTO |
`boy'HSg6_CBTO) & `boy'age <= 11)
	replace MS_ACri_CBT = MS_ACri_CBT + D`boy'_Acri * n`boy' if ((`boy'HSg4_CBTO |
`boy'HSg6_CBTO) & `boy'age > 11 & `boy'age <= 14)
	replace HS_ACri_CBT = HS_ACri_CBT + D`boy'_Acri * n`boy' if ((`boy'HSg4_CBTO |
`boy'HSg6_CBTO) & `boy'age > 14)

	drop `boy'age D`boy'_Acri /*Clean up unneeded variables.*/
```

```
}

/*Calculate induced graduations*/
gen Induced_Grads = HS_Grads_CBT - HS_Grads_SQ
drop HS_Grads_CBT HS_Grads_SQ

/*Net earnings benefits.*/
gen F_Earn_Ben = F_Earn_CBT - F_Earn_SQ
gen M_Earn_Ben = M_Earn_CBT - M_Earn_SQ
gen EL_Earn_Ben = EL_Earn_CBT - EL_Earn_SQ
gen MS_Earn_Ben = MS_Earn_CBT - MS_Earn_SQ
gen HS_Earn_Ben = HS_Earn_CBT - HS_Earn_SQ
gen Earn_Ben = F_Earn_Ben + M_Earn_Ben
sum F_Earn_Ben M_Earn_Ben EL_Earn_Ben MS_Earn_Ben HS_Earn_Ben Earn_Ben
drop F_Earn_CBT F_Earn_SQ M_Earn_CBT M_Earn_SQ EL_Earn_CBT EL_Earn_SQ
MS_Earn_CBT MS_Earn_SQ HS_Earn_CBT HS_Earn_SQ

/*Net suicide benefits.*/
gen F_Suic_Ben = F_Suic_CBT - F_Suic_SQ
gen M_Suic_Ben = M_Suic_CBT - M_Suic_SQ
gen EL_Suic_Ben = EL_Suic_CBT - EL_Suic_SQ
gen MS_Suic_Ben = MS_Suic_CBT - MS_Suic_SQ
gen HS_Suic_Ben = HS_Suic_CBT - HS_Suic_SQ
gen Suic_Ben = F_Suic_Ben + M_Suic_Ben
sum  F_Suic_Ben M_Suic_Ben EL_Suic_Ben MS_Suic_Ben HS_Suic_Ben Suic_Ben
drop F_Suic_CBT F_Suic_SQ M_Suic_CBT M_Suic_SQ EL_Suic_CBT EL_Suic_SQ MS_Suic_CBT
MS_Suic_SQ HS_Suic_CBT HS_Suic_SQ

/*Net juvenile crime benefits.*/
gen F_JCri_Ben = F_JCri_CBT - F_JCri_SQ
gen M_JCri_Ben = M_JCri_CBT - M_JCri_SQ
gen EL_JCri_Ben = EL_JCri_CBT - EL_JCri_SQ
gen MS_JCri_Ben = MS_JCri_CBT - MS_JCri_SQ
gen HS_JCri_Ben = HS_JCri_CBT - HS_JCri_SQ
gen JCri_Ben = F_JCri_Ben + M_JCri_Ben
sum  F_JCri_Ben M_JCri_Ben EL_JCri_Ben MS_JCri_Ben HS_JCri_Ben JCri_Ben
drop F_JCri_CBT F_JCri_SQ M_JCri_CBT M_JCri_SQ EL_JCri_CBT EL_JCri_SQ MS_JCri_CBT
MS_JCri_SQ HS_JCri_CBT HS_JCri_SQ

/*Net adult crime benefits.*/
gen F_ACri_Ben = F_ACri_CBT - F_ACri_SQ
gen M_ACri_Ben = M_ACri_CBT - M_ACri_SQ
gen EL_ACri_Ben = EL_ACri_CBT - EL_ACri_SQ
gen MS_ACri_Ben = MS_ACri_CBT - MS_ACri_SQ
gen HS_ACri_Ben = HS_ACri_CBT - HS_ACri_SQ
gen ACri_Ben = F_ACri_Ben + M_ACri_Ben
```

```
sum F_ACri_Ben M_ACri_Ben EL_ACri_Ben MS_ACri_Ben HS_ACri_Ben ACri_Ben
drop F_ACri_CBT F_ACri_SQ M_ACri_CBT M_ACri_SQ EL_ACri_CBT EL_ACri_SQ MS_ACri_CBT
MS_ACri_SQ HS_ACri_CBT HS_ACri_SQ

/*Subtract costs from total benefits.*/
gen Net_Ben = Earn_Ben + Suic_Ben + JCri_Ben + ACri_Ben + Dscpln_Ben + Truant_Ben +
Counsl_Ben - Cost

sum Earn_Ben Suic_Ben JCri_Ben ACri_Ben Dscpln_Ben Truant_Ben Counsl_Ben Net_Ben
Cost

histogram Net_Ben

display "Finished executing: Simulate_Outcomes" /*Output message to help with
troubleshooting*/

end /*End this subprogram*/
```